



E c o n o m i c &

S o c i a l A f f a i r s

The Handbook on Management and Organization of National Statistical Systems

4th Edition of the Handbook of Statistical Organization

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Chapter 1. Introduction

1.1 General context

This *Handbook on Management and Organization of National Statistical Systems* is the fourth version of the series of Handbooks (see Annex 1 of the Handbook for more details). The Statistical Commission agreed, at its forty-eighth session¹, to develop this fourth edition of the Handbook.

1.1.1 Data revolution for sustainable development: the “first wave”

In July 2017, United Nations Member States adopted the 232 statistical indicators for assessing progress towards achieving 17 Sustainable Development Goals (SDGs) and 169 targets.

Prior to this formal adoption, the United Nations Secretary-General’s Independent Expert Advisory Group on a Data Revolution for Sustainable Development (IEAG) in the 2014 seminal report, *[A World that Counts: Mobilising the Data Revolution for Sustainable Development](#)* highlighted two big global challenges for the current state of data:

- a) **The challenge of invisibility:** data is collected about what is known and visible, but what is not visible get forgotten.
- b) **The challenge of inequality:** there is a gap between those with and those without the information needed to make decisions.

The Report highlights that new technologies lead to an exponential increase in the volume and types of data available, creating unprecedented possibilities for informing and transforming society and protecting the environment. Governments, companies, researchers, and citizen groups are in a ferment of experimentation, innovation, and adaptation to the new world of data, a world in which data are bigger, faster, and more detailed than ever before. Thus, the Report calls for urgent action to “mobilise the data revolution for all people and the whole planet in order to monitor progress, hold governments accountable and foster sustainable development” based on the following key principles:

- a) Data quality and integrity;
- b) Data disaggregation;
- c) Data timeliness;
- d) Data transparency and openness;
- e) Data usability and curation;
- f) Data protection and privacy;
- g) Data governance and independence;

¹ Refer to decision 48/103, page 41 <https://unstats.un.org/unsd/statcom/48th-session/documents/Report-on-the-48th-session-of-the-statistical-commission-E.pdf>

- h) Data resources and capacity;
- i) Data rights.

In the discussions that have taken place since, the principle of *data interoperability* has been added to the above. It is defined as ensuring that systems are using the same set of definitions, classifications and methodology, as well as technologically compatible platforms allowing for full harmonisation of interfaces and access protocols (see also Chapter 10.7.1 - *Dissemination by websites and data portals*). The principle of *data disaggregation* underpins the data requirements of the *Leave no one behind* promise of the 2030 Agenda. The other key principles precisely pinpoint critical challenges in meeting these requirements.

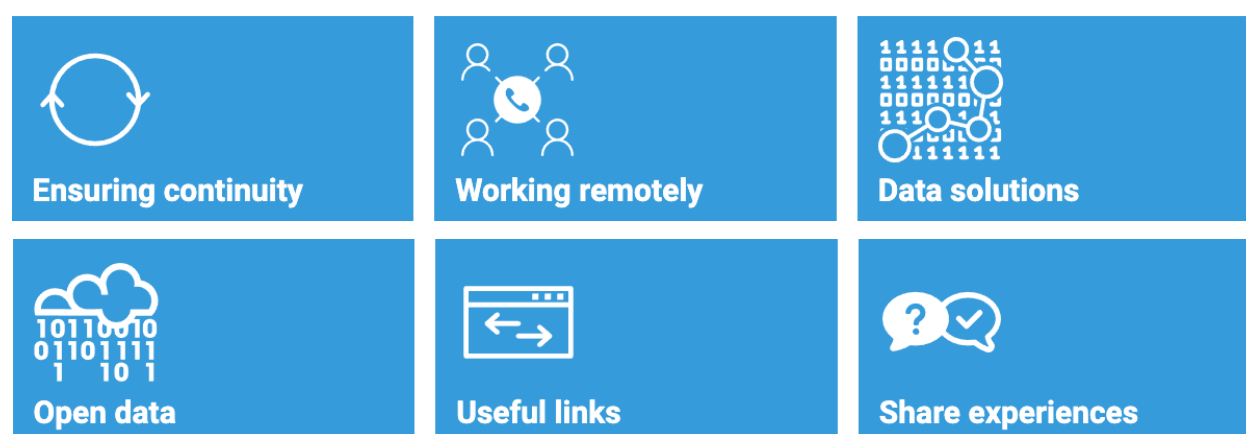
Statistical organizations have been discussing at the sessions of the United Nations Statistical Commission (UNSC), either in special-topic forums or as part of work under the formal agenda, what these principles mean for national statistical offices and national statistical systems. The mandate, functions and working modes of the United Nations Statistical Commission are described in Chapter 16 - *The International Statistical System* and further details can also be found [here](#).

1.1.2 Data revolution for COVID-19: the “second wave”

While the original discussions on the data revolution in the context of official statistics were inspired by the challenges for meeting the data needs for the SDGs, it may be said that a second wave of the data revolution became imperative in the context of the impact of the COVID-19 pandemic on national statistical systems.

The global COVID-19 crisis affected critical operations across the entire international statistical system. National and international statistical organizations had to take immediate action to ensure the continuity of key statistical compilation activities and the continued availability of data to inform emergency mitigation actions by governments and all sectors of the society. These actions are depicted in Figure 1.

Figure 1: COVID-19 response



Source: <https://covid-19-response.unstatshub.org/>

A description of the initial responses and links to the available knowledge resources on dealing with the impact of COVID-19 on statistical systems is presented in Chapter 15 - *Management of buildings, physical space and finance* and are structured around three main actions:

- a) establishing new procedures and workflows, collaborating in virtual teams, and implementing secure remote data access and data exchange capabilities;
- b) adapting and innovating data production methods and processes to ensure continuity of major official statistical programmes;
- c) addressing the increased need for data openness and accessibility to meet the urgent demand for reliable and accurate information.

Before the COVID-19 pandemic, other external shocks or disruptions such as the Global Financial Crisis (GFC) gave rise to questions about what value national statistical systems (NSSs), and in particular national statistical offices (NSOs), brings to societies and economies. However, these disruptive moments are opportunities for NSOs and NSSs not only to survive but also to thrive, and for which the Handbook provides contemporary guidance and examples.

1.1.3 Transformation and modernisation

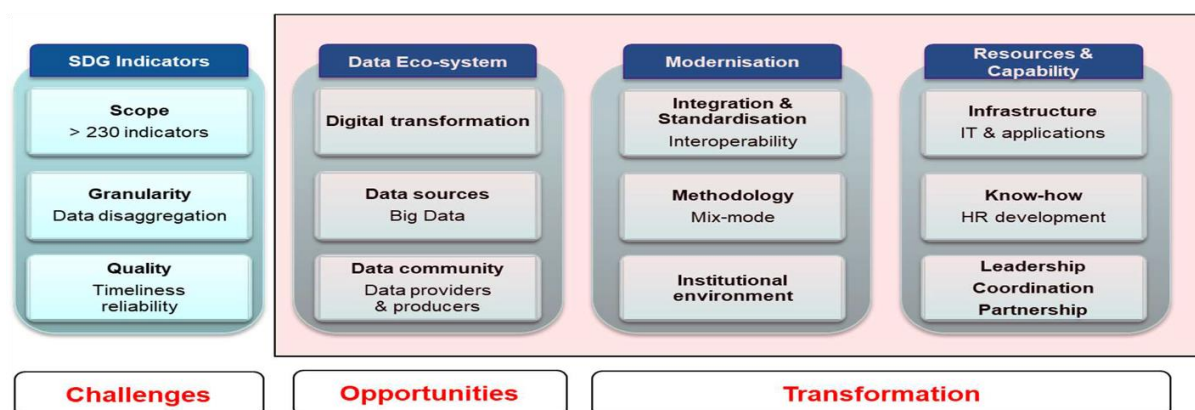
Indeed, the changing environment within which national statistical systems and national statistical organizations operate has highlighted the imperative to transform and modernise to grasp the potential of innovative technologies in a rapidly changing data ecosystem. This data ecosystem is characterised by a plethora of sources of data and related producers that have crowded the data space. Thus, transformation also calls for reinforcing leadership, coordination, communication, and dialogue through institutional and organizational reform.

The discussions about a [Transformative Agenda](#) under the auspices of the UNSC have mapped out an initiative with the primary objective of supporting national statistical institutions in their efforts to formulate a strategic direction and a national action plan for transforming the institutional environment of their national statistical systems and for integrating and modernising the statistical production processes of their sociodemographic, economic and environmental statistics programmes. The main focus of transformation and modernisation is to enhance national statistical systems' capacity to meet the increasing request efficiently and effectively for statistical information, and adapt their operations to address emerging data demands that cannot be anticipated. A schematic summary of the needed transformative changes and the opportunities to do so are shown in Figure 2.

Discussions at national, regional and global levels have converged on the fact that modernisation and transformation are crucial to official statistics' ability to meet the widening and increasing requirements of policymakers, researchers, the media, and civil society for high-quality, timely and disaggregated statistics. These aspects are the basis for the Cape Town Global Action Plan for Sustainable Development Data ([CTGAP](#)) which is further articulated in Chapter 16 – *The International Statistical System*. How to transform and modernise has been further explored in a series of global and regional conferences on a transformative agenda for official statistics. The consensus that emerged is that a review is needed of institutional, organizational, and technical processes across national statistical systems, and in conformity with the United Nations Fundamental Principles of Official Statistics ([UNFPOS](#)).

The response to the impact of the COVID-19 pandemic on statistical operations, addressing pressing and timely data needs, created unprecedented challenges for national statistical systems. The various webinars conducted by international and regional agencies, and the [Third World Data Forum](#) (see also Chapter 16 - *The International Statistical System*) shone a light on the many challenges and issues, but also solutions and good practices. Although not taken directly into account in the decisions leading up to the need to update the Handbook, these discussions are relevant to the topics covered in the Handbook.

Figure 2: What has changed since 2003



1.2 Purpose, users and uses of the Handbook

The primary objective of this fourth edition of the Handbook is to guide chief statisticians and senior managers of national statistical offices (NSOs) and other producers of official statistics in maintaining and developing statistical capacity that is fit for purpose while strengthening trust in official statistics (see also Chapter 4 – *The National Statistical System*). At the same time, the Handbook is also designed to be useful to a broader range of users and stakeholders at all levels within and outside the NSS with the aim to develop a mutual understanding of official statistics and a common statistical culture.

The *Handbook* takes into account that national statistical systems and offices vary significantly in terms of size (human, financial and infrastructure), level of maturity or development (developing, developed, advanced), the extent of decentralisation (centralised, decentralised), but also the institutional environment in which producers of official statistics operate. The outcome of the review and consultation rounds, and the results of a survey conducted among chief statisticians revealed the need for the following:

- Increased focus on the implementation of the UNFPOS, both within the national statistical offices and among other producers of official statistics within the national statistical systems;
- Increased focus on the national statistical system, not just the national statistical office, and the need for coordination among national statistical system members;
- Increased focus on the systematic reuse and exchange of data;
- Better understanding of technological developments that have significant implications for data collection, handling, and dissemination;

- e) Increased dialogue and consultation with users to understand and, when possible, anticipate emerging data needs at national, regional, and global levels.

Thus, to address these requirements, the *Handbook* is designed with the following user-oriented features:

- a) It can be used as a *checklist* that an NSO, or any other producer of official statistics, would take into consideration when managing and carrying out the various statistical processes in producing, analysing, and disseminating official statistics.
- b) It provides clear and sometimes firm guidance but, with the exception of elements related or referring to the UNFPOS, is not prescriptive as the situation in each country is unique, and only those in the country can determine the usefulness of provided guidance.
- c) It contributes to harmonising and aligning concurring definitions and terminology that have emerged recently through various, and sometimes uncoordinated, initiatives and programmes at the global and regional levels.

The Handbook relies heavily on relevant global, regional and subregional initiatives such, as the deliverables and recommendations of the High-level Group for Partnership, Coordination and Capacity-Building for Statistics for the 2030 Agenda for Sustainable Development, ([HLG-PCCB](#)), the work of the High-level Group for the Modernisation of Official Statistics, ([HLG-MOS](#)), the 2019 United Nations National Quality Assurance Framework and its guidelines ([UN-NQAF](#)) as well as the outcome and conclusions of the series of regional [Thematic Conferences](#).

In addition, the overall approach is to present general principles that appear to have withstood the test of time, location, tradition, and legal context and to illustrate them using national examples and practices. The Handbook draws on common challenges based on institutional principles, managerial practices, and innovative production processes and technologies acknowledged internationally and implemented successfully in countries. Likewise, illustrative examples of difficulties and failures serve to shorten the learning curve by analysing lessons learned or providing insights on what may be adapted in specific country contexts.

The 16 chapters of the Handbook can be read independently, as they focus on specific aspects of these processes. As a web-based publication with links generously distributed across chapters, users can create their own reading roadmaps, depending on their needs and interests. For illustration purposes, reading roadmaps are based: i) on the combination of all chapters of the Handbook into four cross-cutting themes used for the Thematic Conferences and covering broadly all strategic areas of the CT-GAP; and ii) by type of user and are provided in Annex 2.

1.3 Main topics, key concepts, and terminologies

1.3.1 Main topics discussed

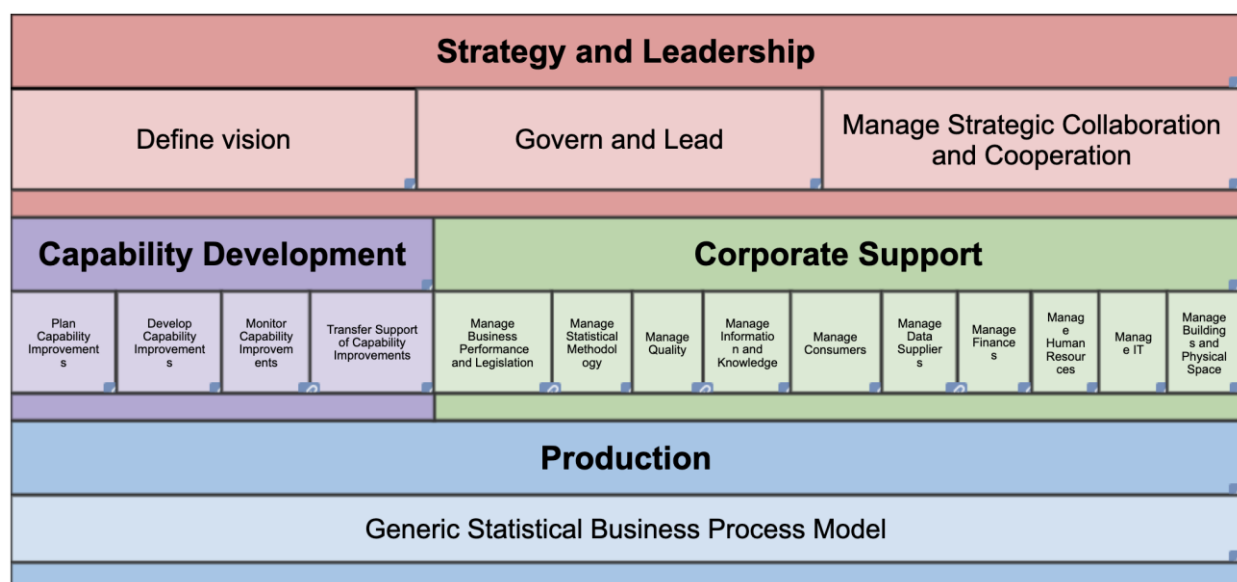
The *Handbook* chapters cover the following main topics:

- a) Institutional and organizational frameworks securing resilience and the adaptability of official statistics;
- b) Communication, advocacy, and multi-stakeholder partnerships for official statistics;

- c) Production processes and data sources for integrated production systems in official statistics;
- d) Information technology infrastructure to support data collection and the sharing, processing, and dissemination of official statistics;
- e) Quality assurance frameworks, quality policy and quality management in official statistics;
- f) Capacity development, training, and resource mobilisation in official statistics.

The presentations and discussions are based on the most recent versions of the [Global Inventory of Statistical Standards](#)², concepts and definitions, classifications, and methodologies when writing the Handbook. The standards are presented and discussed in the specific chapters that refer to them.

Figure 3. Activity areas of GAMSO



Source: <https://statswiki.unece.org/display/GAMSO/II.+Structure>

Where necessary, the evolution and changes in the standards are presented. In discussing standards-based modernisation of the statistical production process, the Generic Statistical Business Process Model ([GSBPM](#)) is used as the organising framework. The discussion on the management of statistical activities is loosely based on another modernisation standard linked to the GSBPM—the Generic Activity Model for Statistical Organizations ([GAMSO](#)). A schematic diagram of the GAMSO and its relationship to GSBPM is displayed in Figure 3.

1.3.2 Key concepts and definitions

Each chapter introduces the terminologies and defines the key concepts necessary to have a common basis for understanding the topics. In addition, the *Handbook* has a **Glossary** that serves as a compilation of key terms and their definitions, along with explanatory notes where

² The Global Inventory of Statistical Standards is a work in progress and an updated version with improved content and functionalities should be available soon.

needed. A list and description of statistical applications, software and modernisation models and standards is also included in the Handbook.

The key concepts and terminologies in this handbook on the management of national statistical systems are the *national statistical office*, *other producers of official statistics*, *official statistics*, and the *national statistical system* defined as follows in the Glossary and further developed in - *The Basis of Official Statistics*:

- a) The **national statistical office (NSO)** is defined as the main producer of official statistics in a country and/or the organization responsible for coordinating all activities related to the development, production, and dissemination of official statistics in the national statistical system.
- b) An **other producer of Official Statistics (OPOS)** is an organizational entity within a government ministry, department, or agency, other than the *national statistical office*, that develops, produces and disseminates *official statistics*.
- c) **Official statistics** are defined as statistics produced according to the Fundamental Principles of Official Statistics (UNFPOS) by a national statistical office or by another producer of official statistics mandated by the national government or certified by the national statistical office to compile statistics for its specific domain.
- d) The **national statistical system (NSS)**, or national system of official statistics, comprises the national statistical office (NSO) and all other producers of official statistics in the country.
- e) The **data ecosystem** defined as the entire network of data collectors, data producers, data analysts and other data users that directly or indirectly collect, process disseminate, analyse and/or otherwise consume data and associated services within a specified country or region.

Typically, official statistics are produced and disseminated in compliance with the respective national statistical legislation and identified as such in the national statistical programmes.

All statistics produced by a national statistical office (NSO) are assumed to be official statistics except for those explicitly stated by the NSO as not official. Statistics produced by NSOs that might not be considered official statistics would be methodological studies that have not been adopted officially such as studies on seasonal adjustment procedures or experimental statistics using new methods or data sources.

Most countries have one organization for which the development, production and dissemination of official statistics is the core function. The name of this organization differs among countries (e.g. National Statistical Institute (NSI), National Bureau of Statistics (NBS), Central Bureau of Statistics (CBS), National Statistical Agency (NSA), Central Statistical Agency (CSA), Central Statistics/Statistical Office (CSO), etc.). Another practice in naming the organization follows the form “Statistics [name of country]”. In this handbook, the term used is the national statistical office (NSO), defined above. In general, the NSO is the biggest producer of official statistics. It is typically responsible for major data collection activities for official statistics and, in most cases, the population census.

Countries have found different ways of placing the NSO within their administrative structure and in a few cases as an autonomous agency outside the main branch of the executive. In most

cases, the function of chief statistician is assigned to the head of the NSO. Chapter 5- *National statistical office* discusses various aspects of the NSO as an organization. It includes its vision, mission statement, core function, strategic planning, finance and administrative structures. Chapter 5 also discusses [statistical business architecture](#), project management and various options for (re) organising the NSO.

Chapter 4 – *The National statistical system* further examines organizational issues for national statistical systems derived from the principles and the definition of official statistics and how these principles are translated into institutional safeguards for the various actors in official statistics. The chapter also discusses relationships between the NSO and other producers of official statistics; the ways NSSs are organised (the spectrum from centralised to decentralised, vertically and horizontally, etc.); legislative frameworks and governance; and the chief statistician position and function.

The data ecosystem within a country is broader than the national statistical system because it includes not only those producing official statistics but all producers and users of data in a country.

Considering and understanding the various issues, models, and practices in relation to one's own NSS and functioning of the NSO and other producers of official statistics are significantly useful in undertaking transformative change, adopting modernisation principles and tools, and managing the resulting changes.

Annex 3 provides an overview of how these definitions have progressed across the time dimensions represented by the three versions of the Handbook.

1.4 Features and outline of the Handbook

1.4.1 Features of the Handbook

The main topics and related key concepts and terminology discussed in this Handbook are organised into 16 stand-alone chapters (including this chapter). The distinctive features of the Handbook include:

- a) All chapters, except for Chapter 2 *Official Statistics – a general overview*, which has a hard-copy publication version (in all UN official languages), are available and published on an interactive web platform only.
- b) The interactive web platform supports the idea that the Handbook is a “living” document to be updated at regular intervals. The mechanism for doing so is described [here](#). This strategy is more attuned to the needs for timely, rapid, and innovative responses to changes and challenges in the environment within which official statistics are produced, disseminated, and communicated.
- c) While each chapter is a stand-alone chapter, they are linked together through hyperlinks where relevant.
- d) As much as possible, the references and related materials included in the Handbook are available on the internet, with links provided. In some cases, hyperlinks to web resources are embedded in the related texts.

- e) The platform allows for printing portions, specific sections, or whole chapters. The entire Handbook can also be downloaded in pdf format.

1.4.2 Outline of the chapters of the Handbook

Chapter	Title	Outline
1	Introduction	<p>Chapter 1 traces the motives for issuing a revised version of the Handbook on the Organization and Management of National Statistical Systems; the 4th edition of the Handbook series of Statistical Organization. The chapter highlights the changes in the ecosystem in which national statistical offices and other producers of official statistics operate since the last edition (2003).</p> <p>The chapter provides an informative summary of the main topics, contents and structure of the handbook. The chapter serves as a quick guide to users/readers to find which chapters/sections would have the information or resources of interest to them.</p>
2	Official Statistics - a general overview	Chapter 2 serves as statistical advocacy, awareness, and literacy piece, covering the main topics and critical issues dealt with in the various chapters of the Handbook. This chapter does not address only chief statisticians and senior managers of statistical offices, but target a broad range of users, data providers and stakeholders at all levels within and outside the national statistical system. Thus, the chapter is designed to be a stand-alone publication and will be the only hard-copy chapter of the Handbook, available in all UN official languages.
3	The Basis of Official Statistics	Chapter 3 aims to provide a common basis for understanding what is meant by official statistics, the principles that should guide the production of official statistics, and how these principles can be implemented through legislation and guidelines.
4	National Statistical System	Chapter 4 defines the concept and describes the components of a national statistical system (NSS). The chapter discusses and illustrates its governance and associated programmatic and coordination mechanisms.

Chapter	Title	Outline
5	National Statistical Office	Chapter 5 covers the key features of a national statistical office (NSO) and describes the statistical processes using the <i>Generic Statistical Business Process Model (GSBPM)</i> . Although many topics discussed in this chapter are mainly applicable to an NSO, good practices can be applied to any other producers of official statistics.
6	Users and their Needs	Chapter 6 identifies the key users of official statistics, describes user needs and discusses ways a national statistical office (NSO) can meet these needs and measure user satisfaction for these efforts. Needs associated with the Sustainable Development Goals and other international policy frameworks are also highlighted.
7	Quality Management	Chapter 7 discusses quality management for national statistical offices (NSOs), including general quality management principles, the development and administration of a statistical quality assurance framework, definition and implementation of quality monitoring and evaluation, user surveys, the labelling of official statistics, and quality certification of an organization, and the relationship of quality management to other strategic initiatives, such as risk management.
8	Data Sources, Collection and Processing	Chapter 8 describes the main sources of data for official statistics— the standard statistical surveys and censuses as well as administrative data, geospatial data, and Big Data. The chapter discusses the corresponding modes of collection and provides guidance on the choice of collection modes and data processing. For administrative, geospatial, and Big Data, the chapter discusses the challenges in accessing, using, and processing the data.
9	Analysis and Analytical Frameworks	Chapter 9 covers the data analysis that a national statistical office carries out at different production stages, including preparing statistical content and ensuring outputs are ‘fit for purpose’ before dissemination to users.

Chapter	Title	Outline
10	<u>Dissemination of Official Statistics</u>	Chapter 10 discusses all aspects of the dissemination of official statistics covering all activities that make official statistics, statistical analyses, statistical services, and metadata accessible to users. The chapter provides guidance on the “why”, “what”, and “how” of the dissemination, based on the UNFPOS.
11	<u>Common Statistical Infrastructure</u>	Chapter 11 focuses on the statistical infrastructure that supports the production process, including the development and the maintenance of internal registers, methods, tools, systems, and standards. The topics and discussions complement and supplement considerations in other chapters on users and their needs; data sources, collection, and processing; analysis and analytical frameworks; and dissemination of official statistics.
12	<u>Human Resources Management and Development</u>	<p>Chapter 12 discusses strategic issues on human resource management and development (HRMD) that need to be considered by national statistical offices as well as other producers of official statistics. The chapter provides information, guiding principles and examples of good practices addressing issues related to identifying skills needed now and in the future; careers and opportunities for growth development; and securing a stimulating working environment for the production of high-quality statistics.</p> <p>This chapter has interlinkages with the various technical chapters where skills needed for the specific processes and subject matters are described.</p>
13	<u>Data, Information, and Knowledge Management</u>	Chapter 13 covers the management of data, information, and knowledge for the production of official statistics. The NSO and other producers of official statistics require well-functioning data systems, information systems and knowledge management systems to ensure that statistics are available to meet users’ needs in the right format and at the right time.
14	<u>Information Technology Management</u>	Chapter 14 describes current trends in the information technology (IT), reviews emerging and existing standards, and looks at how the rapidly changing environment impacts technology infrastructure required by a modern NSO.

Chapter	Title	Outline
15	Managing of Buildings, Physical Space, and Finance	Chapter 15 covers management issues of an operational nature. General requirements of buildings and physical space regarding the working environment of a statistical office are highlighted. Financial management with a focus on setting priorities in the presence of budgetary constraints is also discussed.
16	The International Statistical System	Chapter 16 focuses on international statistical activities— <i>who</i> undertakes them (members of the international statistical system), <i>what</i> they are covering (standards-setting and international cooperation activities) and <i>how</i> they are undertaken (consensus-building, tapping statistical expertise, capacity development).

Users can create their own reading roadmaps, depending on their needs and interests. For purposes of illustration, reading roadmaps for specific types of users are mapped in Annex 2.

Chapter 2. Official Statistics – a general overview

2.1 Official statistics

In most countries, national authorities undertake to compile, process, and publish, systematically and regularly, numerical information – statistics – on the various phenomena affecting the development and well-being of people. These are termed official statistics and aim to describe the demographic, economic, environmental, and social development and situation in a given country. They are concerned with measuring and analysing the progress of nations – or the lack of it.

Official statistics provide a factual basis for assessment and decisions on economic, social and environmental issues at all levels of society. Thus, government and politicians use the statistics to evaluate and formulate policies and measures that national authorities may undertake to influence developments and improve the prevailing situation – overall or in specific areas. Official statistics are also the basis for businesses to evaluate the economic situation and allow them to make informed business decisions. They also allow the media, various organizations, and the community at large to assess situations and developments and formulate their opinions and attitudes thereon. In all member states of the United Nations, the national authorities recognise their duty and responsibility to provide their people regularly with statistical information on the state of their countries.

2.2 The international dimension

In the international arena, official statistics are unique in the sense that, starting from the early 1990s, most countries of the world have come to recognise and abide by specific ground rules for official statistics and how they are to be conducted. These rules are set out in the United Nations Fundamental Principles of Official Statistics (UNFPOS). These were originally developed by the Conference of European Statisticians (CES) at the beginning of the 1990s. They were adopted by the United Nations Economic Commission for Europe (UNECE) in 1992, by the United Nations Statistical Commission (UNSC) in 1994, by the UN Economic and Social Commission in 2013, and the UN General Assembly in 2014.

International statistical cooperation, however, has a much longer history. That history started in Europe in the 1850s when statisticians from a few European countries started to meet at conferences discussing statistical methods and standards. This cooperation was cemented with the establishment of the International Statistical Institute (ISI) in 1885. The ISI was and is a society of professional statisticians, many of whom were and are leaders in statistical activities and methodological development in their countries. The European conferences in the 1850s and the ISI itself from 1885 became the main forum for the international statistical cooperation until the First World War disrupted it. After the War, government cooperation in official statistics was formalised under the auspices of the League of Nations with the first inter-governmental conference being held in 1929. After the founding of the United Nations, the international statistical cooperation became the responsibility of the UN, centred in the UN Statistical Commission (founded in 1946, first convened in 1947).

Thus, modern official statistics are the outcome of a long-standing and close international cooperation and consultation on statistical methods, standards, procedures and practices. This cooperation continues unabated and is carried out in different fora all over the world.

2.3 Basis of official statistics

Official statistics were originally thus named because they were produced by national statistical offices (NSOs) and other specialised institutions on behalf of national authorities – governments – in the different countries of the world. However, the term official statistics has come to refer not only to the producers of the statistics but also to the fact that their activities and outputs are expected to conform to a set of international standards and norms as regards their relevance for the phenomena they are supposed to describe, their quality, impartiality, transparency and coverage. Following the remarkable convergence of official statistics in countries across the world, culminating in the generally accepted UNFPOS, a modern definition of official statistics reflects this common ground and the principles governing the conditions for and production of the statistics. Hence, official statistics are currently defined as statistics developed, produced and disseminated by the national statistical systems of countries in conformity with the United Nations Fundamental Principles of Official Statistics, internationally agreed statistical standards, codes and recommendations as well as applicable national legislation and programmes.

As mentioned above, the UNFPOS provide the ground rules for the conduct of official statistics. The UNFPOS are composed of a preamble on the fundamental importance of official statistics and ten principles on the conduct of these. Principle 1 states that official statistics are to be compiled and made available by official statistical agencies to honour citizens' entitlement to public information. Principle 2 states that statistical agencies need to determine their methods and procedures according to strictly professional considerations, including scientific principles and professional ethics. Principle 3 charges the statistical agencies to present their information according to scientific standards on the sources, methods, and procedures of the statistics. Principle 4 states that statistical agencies are entitled to comment on erroneous interpretation and misuse of statistics. Principle 5 says that data for statistical purposes may be drawn from all types of sources, be they surveys or administrative records. Principle 6 prescribes the obligation to respect statistical confidentiality and principle 7 that the laws, regulations and measures under which the statistical systems operate are to be made public. Principle 8 spells out that coordination among statistical agencies within countries is essential and principle 9 recommends the use by statistical agencies in each country of international concepts, classifications and methods. Finally, principle 10 recommends bilateral and multilateral cooperation in statistics as that contributes to improving systems of official statistics in all countries.

2.4 National statistical offices and national statistical systems

In most countries, the main activities and the leadership in official statistics are entrusted to a government agency specialised in the field. In very many countries and in this handbook, this agency is called the *national statistical office* (NSO). Different countries use different names, such as a central statistical office (CSO), national statistical institute (NSI), or some other name

that indicates that the office is public and that it is charged with statistical issues that concern the nation as a whole. Other public agencies may work on official statistics alongside the NSO, such as statistical departments or units of government ministries. This very much depends on the areas of responsibilities of the departments and ministries. In some countries, the specialised departments and ministries, like ministries of education, health, labour and transport, to name a few examples, may develop statistics on their subject alongside their main functions of formulating and implementing policy and performing their administrative duties. Moreover, ministries of finance may be responsible for government finance statistics, partly or wholly. It is also quite common that central banks are responsible for monetary and balance of payments statistics. In many countries, the NSO has been entrusted with the bulk of official statistics irrespective of domains in its capacity as the specialised statistical organization. In those cases, the ministries, departments, and agencies, (MDAs) are often essential data sources for the official statistics compiled by the NSO.

Historical and institutional reasons can often explain the division of labour between the NSO and the different ministries and departments. Still, it may also be the result of deliberate policies. While there are no specific norms or rules for that, two main issues need to be observed in all cases: a) that no matter where they are carried out, the statistical activities are very specialised and require specific skills and expertise besides the subject matter knowledge, and b) irrespective of the division of responsibilities, there is a need for close cooperation between the NSO and other producers of official statistics in the MDAs.

There are several reasons for the need for cooperation: It is necessary to ensure that the coverage of the official statistics is adequate, both as regards subject matters and geographic coverage. There is also the need to avoid duplication of collection of data and other statistical activities. It is also necessary that all official statistics are based on scientific methods and standards and that they have a common base of agreed and established concepts, classifications, and procedures. Otherwise, there is a danger that the official statistics are fragmented, that there is confusion as to their coverage, quality, and applicability, and that they are not comparable, over time, within and between countries.

The *national statistical system* (NSS) of a country comprises the national statistical office and all other producers of official statistics in the country. The governing and coordination arrangements of the NSS vary from country to country. These arrangements may be legally binding and required by the statistical laws of the country, or they may be somewhat informal and pragmatic. The cooperation may also be centred around the statistical programmes for the entire NSS. In many countries, the arrangements for cooperation are reinforced by formal agreements, such as memoranda of understanding (MoUs) setting out in detail the role and responsibilities of the different partners. Close cooperation between the NSO and other producers of official statistics is strongly recommended in international fora and is exercised in most countries.

Most countries recognise the role of the NSO in providing the professional leadership of the NSS. The NSO is the designated specialised statistical agency of the government. Official statistics are its main – and often only – concern. It is expected to have the greatest oversight over the needs for official statistics and the extent to which they are satisfied. Moreover, the NSO is most often the country's representative in the international statistical cooperation with the responsibility of ensuring that international standards and recognised scientific methods and procedures are followed.

That role of leading the NSS includes taking the initiative in coordinating activities of all institutions involved with the aim that the official statistics follow the UNFPOS, specifically including that international statistical methods and standards are applied, and the users are provided with timely and reliable statistics. In some countries, the coordination is based on formal or semi-formal consultations or meetings between the NSS partners, convened by the head of the NSO. In many countries, as mentioned above, cooperation and coordination are centred around the annual statistical programme of the country, in which the parts played by the NSO and the different institutions are set out. Most often, the cooperation within the NSS takes place at different levels of the organizations. Thus, the main decisions and agreements, such as the priorities of the statistical programme and the modes of cooperation, are taken by the head of the NSO in consultation with the other producers of official statistics in the MDAs. The detailed cooperation is then carried out by statistical professionals in different subject matter areas in the different institutions. Thus, the NSS is most often a network of professionals in many institutions working on the statistical programme of the country and official statistics in general along agreed lines of cooperation and division of responsibilities.

In developing countries, statistical development programmes financed by international institutions and other development partners emphasise as a rule how important it is that there is a functional NSS in the country within which statistical cooperation is coordinated and carried out regularly. In the absence of an NSS, they may aim to help countries establish and operate such a system. Hence, medium-term programmes, like the national strategies for the development of statistics (NSDS) advocated and often facilitated by the Partnership in Statistics for Development in the 21st Century ([PARIS21](#)) and other development partners, are invariably directed at the official statistics of the country through the NSS. Thus, such programmes require full cooperation and coordination by the NSO and the NSS partners.

2.5 The role of the chief statistician

In most countries, the head of the NSO plays a key role in the official statistics and the statistical system of the country. Most governments have assigned to the head of the NSO the role of being the main caretaker of their official statistics and representing the country in international statistical fora. The title of the NSO head varies considerably between countries, based on the traditions and rules of their administrative systems. Some titles of the head of the NSO are Director, Director-General, National Statistician, State Statistician, President, and Chairman (of a state committee of statistics). A common international term for the head of the NSO in a country is *chief statistician*.

The chief statistician is the main guardian of the official statistics of the country, ensuring that they are carried out on an impartial basis according to the statistical law of the country and the UNFPOS, free from political and other unprofessional infringement. The chief statistician is responsible for leading and developing the official statistics of the country, for harmonising them internally and externally, and for coordinating the NSS. In an NSO and an NSS that are professionally independent in line with the UNFPOS, the chief statistician has sole responsibility for selecting methods, standards and procedures as well as for ensuring that these are applied uniformly by all relevant NSS institutions. This should, of course, be done in consultation with all other relevant producers of official statistics. Apart from that, the chief statistician is limited in this selection because he is at the same time committed, often by law

and generally by the UNFPOS and his country's participation in international statistical cooperation, to adopt and apply internationally agreed methods, standards and procedures.

The role of the chief statistician is, to a considerable extent, based on the UNFPOS. Notwithstanding the concise rules of the UNFPOS and the responsibility they assign to the chief statistician of a country, it is crucial that an appropriate legal framework is in place to support the role of the chief statistician as custodian and prime mover of the statistical system of a country. A model for a national statistical law has been developed and promoted by the UNECE. Such legislation should spell out the main role of official statistics and hence the chief statistician. But it also needs to spell out the obligations of the government in establishing and operating an NSO with sufficient infrastructure, staffing and funding. NSOs in many countries are notoriously underfunded. This is all the more serious as demand for statistics is continuously rising, for example, due to the adoption of the SDGs and their accompanying indicators. It is one of the duties of the chief statistician to explain this to the government and advocate for appropriate funding and working environment for the official statistics of the country.

To carry out this role successfully, the chief statistician must be proactive. He has to instigate a dialogue with the government on the need for statistical information and statistical services and their funding. He should explain the need for applying a uniform set of methods, standards and procedures throughout the NSS, advocate that practice, and strive to ensure that the agreed standards are followed diligently in all official statistics of the country. One main duty of the chief statistician is to guard against political and other unprofessional interference. NSOs and other producers of official statistics in some countries are frequently requested to deviate from their normal work procedures, to accentuate some data or some findings, discard or suppress others. Such requests and pressures are often clothed as being necessary for some so-called "national interest". The chief statistician has duties that extend beyond those of serving the government or the political forces of the time; he has the duty to the users of statistics, in general, to see to it that the statistics are compiled, processed and released consistently, with full transparency and integrity, comparable over time and between countries, following established international and internal practices. That is the only national interest in this respect.

2.6 Statistical confidentiality

NSOs have a long tradition of keeping their data confidential. In developed statistical systems of democratic countries, it has been standard practice for a long time to respect the confidentiality of individual data and ensure that information that is collected or acquired for statistical purposes is used solely for those purposes and no other. These cardinal rules of statistical confidentiality and privacy are set out in clear terms in Principle 6 of the UNFPOS: "Individual data collected by statistical agencies for statistical compilation, whether they refer to natural or legal persons, are to be strictly confidential and used exclusively for statistical purposes."

This has several implications. One is that the main focus is on publication of aggregate statistics and that individual data is rarely disseminated and then only after being anonymised, i.e. cleaned of individual identifiers. Another consequence is that the individual data is kept confidential within the NSO and not handed out to other authorities. Furthermore, care is taken

in tabulation that microdata on persons, households and businesses cannot be traced, directly or indirectly, back to specific persons, households, and businesses.

Observing confidentiality of individual data can be said to be first and foremost a mindset of the management and staff of the NSO and other producers of official statistics. This is also the first rule that all new statistical staff are taught – that the individuals and businesses supplying the data have a right to confidentiality and that their data is to be handled as confidential and with respect. Therefore, NSOs in organising data collections of individual data promise and publicly make it clear that they will ensure confidentiality and will not release or provide access to the individual data that can be identified. It follows from this that the statistical producers must take great care when analysing and storing their microdata. It is recommended that microdata is stored either anonymised or without individual identifiers. Some NSOs carry out the anonymisation of all microdata immediately after processing. However, it is considered important to conserve anonymisation keys in some instances to link data over time or between datasets at a later date.

If confidentiality is not observed, the trust that data providers place in the NSO is eroded, which in turn undermines the willingness of people and businesses to provide data. Many statistical agencies have a procedure for making this clear to staff by having all new staff members agreeing to and signing a confidentiality statement whereby they pledge to keep all individual data confidential and not to release or hand over confidential microdata they work with, or become aware of, in performing their work. It is recommended that such pledges are renewed at a few years' intervals.

The implication of the rule of confidentiality that individual data may not be handed over to other authorities is not difficult to explain and teach but may be stressful to uphold in some exceptional circumstances. The 6th Principle of the UNFPOS is particularly helpful in such situations, particularly after the Principles were unanimously adopted by the UN General Assembly in 2014.

Ensuring that information published in statistical tables cannot be directly or indirectly traced to individual persons or businesses can be somewhat difficult. Such difficulties have in recent years been solved by statistical methods and techniques which involve suppressing in the published tables any values that might be traced back to the individual subjects to which the data refers.

2.7 Who are the users of official statistics?

Official statistics are there to be used. Conversely, statistics that are not used should not be compiled. But who are the users and what are their needs for statistics? Users of official statistics are frequently divided into several groups according to their purpose for using the statistics. The main groups are the following:

Government. This includes the policy and lawmakers in the national government and in the legislative assembly, civil servants in MDAs as well as in regional and local government. These are the largest users of the official statistics. Their main uses are for gaining knowledge of developments in the various fields of society, supporting the formulation and implementation of policies and measures as well as monitoring the actions taken to assess if and to what extent they are producing the planned results. This applies to all kinds of political planning and

implementation; annual and medium-term economic planning, such as for preparing the government agenda, the central government budget; policies and planning in the social sector, for health services, education and labour market measures; and in the environment sector to lay short and medium-term plans and decide on measures and actions.

Closely related to government uses of statistics are those of *international* and *regional organizations*. Those uses are dictated by the mandates of the various organizations and the participation of the countries in international cooperation and programmes.

Businesses are intensive users of official statistics. Their interest is planning and running their business activities in light of the observed and expected economic developments. They use official statistics to assess the economic situation and for deciding on their business plans – for “evidence-based decision making”. Similarly, *trade unions and labour market organizations* use official statistics for assessment purposes and planning their labour market policies.

Media are important users of official statistics and one of the main channels for communicating statistical information to the various actors in society and the public at large. It is their role to report on main developments in society, assess the economic, social, and environmental situation and generally act to hold government and public and private sector players accountable for their actions.

The academic, research and education community uses official statistics in various ways. Universities and higher-level schools use official statistics in their teaching activities. Universities and research institutions use various types of official statistics in their research. While government, businesses and media are mainly users of aggregate data and statistical indicators, more detailed information is often needed in academic and applied research, even at the most detailed level of microdata.

Non-government organizations (NGOs) and civil society need official statistics to gauge the need for their activities and determine where to focus their attention and services.

The public at large has a right to be served with official statistics to be able to assess situations and developments for themselves. Of course, this group of users is the largest, the most diffused and dispersed and probably the least focused. Particularly for those reasons, it is the duty of the NSOs and other producers of official statistics to see that the needs of the public for official statistics are taken care of.

2.8 Maintaining close relations with users

The NSO and other producers of official statistics need to plan and carry out their statistical production and services to satisfy different user groups' needs. Thus, the statistical programmes should be based on demand for the statistics – be “demand-driven”. Hence, the statistical agencies must study, map, and monitor the different needs and demand. This may be done in several ways.

Internally, the producers of official statistics face demand from their various users, both for broad level statistics and for specific data sets. To learn of such demands and monitor them, the NSOs and the other producers have to establish and maintain close relations with their users. This can be done in various ways. Some countries operate statistical advisory councils composed of user representatives of various institutions and groups, such as ministries and

other heavy users from government, labour market organizations, academia, and research institutions as well as representatives of civil society. The mandate of the statistical councils is most often to work with the chief statistician of the country and advise the NSO and other producers how to respond to user demand and help set priorities for the statistical production in light of the demand. Many NSOs operate user groups in various domains. Their mandate is most often that of working with middle management and experts of the NSO and other producers on the provision of statistics in the different domains. In many countries, user groups are found to be valuable users-producers fora to discuss the coverage and quality of the supply of statistics, the need for new statistics, and the extension of the current compilation into new or emerging fields.

All NSOs and other producers of official statistics participate in international statistical cooperation. Consequently, they face demands for specific statistics from international statistical agencies of which they are members or partners in cooperation. In many instances, this originates from the commitments made by their governments as members of international bodies and participants in cooperation. A large part of the regular statistical production of NSOs and their NSS partners is based on such commitments. This applies to the basic economic statistics like national accounts, foreign trade statistics, government finance statistics and monetary statistics. In social statistics, most countries are committed to render regular statistics on their population, and various aspects of social conditions, such as poverty, health, education, employment, and gender equality. In recent years, countries have undertaken to compile and publish various kinds of environment and energy statistics through international agreements and cooperation. Many countries have recently committed themselves to supply statistics for the sustainable development agenda, which has greatly added to their statistical programmes.

In addition to having country commitments, NSOs may, and many do, take advantage of international cooperation to learn from what neighbouring countries are doing in terms of official statistics and how they are managing to extend their programmes beyond their international commitments.

The NSOs, and in some cases their NSS partners, operate dissemination departments that are responsible for the release of statistical results and reports and communicating with users. Such departments are usually responsible for the websites that have become a major if not the main choice of the NSOs and other producers for publishing their statistical findings and products. Websites are also an important means for communicating with users, seeking their feedback and views on their demand and level of satisfaction, and gauging their needs and priorities. Data portals are recent additions to digital dissemination tools. These are web-based, interactive data platforms that provide access to one or more databases containing statistical indicators. With growing digitalisation of governments, data portals have become an important means of making statistics available within government and the public.

2.9 Data for official statistics

Official statistics are based on information, mostly numerical – statistical data – that the NSO and other producers collect or acquire from various sources and in various ways. Basically, there are three ways in which data is obtained: by direct enquires – surveys – among individuals, households, businesses and institutions; by the acquisition of administrative data from government and other administrative sources; and by utilisation of other data sources,

such as commercial data streams from businesses, geospatial data, data from sensors, and social media data. The first category is termed survey data and is defined as primary data as it is obtained for the specific purpose of statistical compilation. Administrative data is collected by administrative authorities for their administrative operations but made available to the NSO for statistical purposes. Hence, administrative data is defined as secondary data as the primary purpose for its collection is administrative but not statistical. The third category, commercial data streams from businesses and data from other sources, is also secondary data. Most so-called “Big Data” falls within this category.

A traditional method for collecting data for statistical purposes is to obtain the data directly from people, businesses and institutions – respondents – by surveys, i.e. by requesting the respondents to submit information for specific statistical purposes. The surveys can either be total counts termed censuses in which the whole of a given population is surveyed, or they can be based on representative samples of the population to be surveyed – sample surveys. The best known and oldest censuses are the population and housing censuses which are conducted primarily to obtain information on the population of a country or a given territory, its size and composition, living conditions, gainful activity, work etc. Population and housing censuses may also be carried out for obtaining benchmark information for renewing frames for household surveys. In the economic sector, censuses may also be conducted to map the level and composition of economic activity. These are referred to as economic censuses. Survey-based censuses are both large and expensive undertakings. Sample surveys are much lighter and less expensive than censuses, and they are, therefore, the preferred method of surveying as their results are sufficient to gauge developments, trends, and situations. Sample surveys, however, may not be sufficient to satisfy the demand for detailed information on small areas or population sub-groups. Hence, it may be inevitable to resort to census taking to provide detailed disaggregation at the required quality level.

Until quite recently, censuses and sample surveys used paper questionnaires for collecting data. However, this practice has been reduced, even discontinued, in many countries and replaced by modern technology – using digital questionnaires uploaded on laptops, tablets, or mobile phones, or via the Internet. Paper questionnaires require, besides paper and printing, that the information collected by them is coded and classified, and checked for errors before it is, often manually, entered into a digital database. Using digital questionnaires carries hardware and software costs, but this is nowadays lower than the cost of paper and printing. The use of digital questionnaires has also involved significant improvements in survey technology. Thus, the digital questionnaires are usually augmented by automatic coding and logical checks which greatly enhance the quality and consistency of the data. Another important development is that this technology often makes it possible – and feasible – to capture the exact geolocalisation of the surveyed statistical unit – such as household, dwelling, plot, or establishment. Finally, the data entered in the digital questionnaire is sent over the internet or the telephone network and uploaded onto the database in the NSO. All of this has greatly enhanced the efficiency, quality and richness of surveys. Using digital questionnaires and digital means of collecting data has, therefore, become the preferred method of data collection in censuses and surveys.

Although much lighter than censuses, sample surveys are still quite costly, particularly for countries with small populations, due to the relatively large sample size required for obtaining representative results. Survey-based censuses are, as mentioned above, always extensive and expensive operations. For these reasons, NSOs and other producers of official statistics in some

countries, particularly in Northern Europe, started a few decades ago to acquire data for statistical purposes by utilising administrative data. As the experience of utilising such data grew, and the methods and procedures became established and known, this practice has been adopted in many countries. This development has been partly a direct result of cuts made in the budgets of NSOs in many countries simultaneously as the demand for regular and timely statistics has been growing rapidly. Examples of administrative data utilised in many countries are tax data for economic statistics, including national accounts, customs data for foreign trade statistics, social security data for statistics on living conditions, civil registration data on demographic changes, business registration data for establishing and maintaining business registers, and administrative data on migration, education, health, labour, transport, and tourism.

Much of the administrative data is used directly for statistical purposes, but it may also be used for creating frames for sample surveys. A good example of this is the statistical business register (SBR) which is usually based on administrative data on businesses. It may also be based on mixed sources, an economic census and administrative data. The SBR is a structured database on businesses, maintained on a regular basis, supported by specific software. It is used by the NSO to create frames for business surveys and sometimes as a direct source of information on the number and kind of businesses, by location, size, economic activity and more. Another example is the statistical farm register (SFR) which in many countries is based on an agricultural census (often taken every ten years) and administrative data. Yet another example is a household address register which may be generated from census or administrative information. All such registers may be augmented by additional information collected through sample surveys with the registers as frames.

Concomitant with the digitisation of economic activities and transactions, possibilities have opened for capturing very large volumes of data from businesses and other sources. Such data is often termed Big Data. Technically, such data can be captured by accessing and tapping data from the databases of firms and institutions by electronic means. This has been done in a few countries in the last few years for obtaining very detailed data on inputs, outputs, prices and business transactions. Such data has been utilised for economic statistics and price statistics, e.g. price indices. A recent source of data on land and land use, earth observations collected by satellite imagery and requiring Big Data methodology for processing, is a potentially rich source of data for environment statistics, agricultural statistics, transport statistics, etc. A very promising Big Data source is cell phone information for compiling various statistics on mobility and communication such as for transport and tourism statistics. Related developments in this respect involve capturing data from social media content and transactions.

2.10 Comparing modes of data acquisition

It is of interest to list and discuss the main advantages and disadvantages of the three main data acquisition modes discussed above and the feasibility for the producers of official statistics in utilising them. Starting with surveys and survey-based censuses, the main advantage is that the data is in advance, defined for statistical purposes. The data collection is organised to respond precisely to the need for data and statistics about specific phenomena. It also follows that successions of surveys on specific matters carried out at specific intervals, monthly, quarterly, annually or at other intervals, can be kept fixed, entailing that the different surveys are basically

comparable over time. Furthermore, new variables can be added to capture new issues, and some existing ones cut as they become obsolete. Against these advantages weighs the substantial cost of carrying out surveys and survey-based censuses.

The main advantages of utilising administrative data are the relative ease and low cost of acquiring the data, given that the NSO and the other producers of official statistics are granted access to the administrative data or provided with the data regularly. Another advantage is that the statistical producers can compile their statistics based on administrative sources quite quickly and regularly, once the data has been defined, agreed on and organised. Yet another advantage is that by using administrative data, the statistical producers avoid having to request data directly from individuals, households, firms etc. This is found to be of increasing importance as in many countries, the survey tolerance of respondents has diminished markedly and led to difficulties in direct canvassing of households and firms and reduced response rates.

The main disadvantage of using administrative data is that it is collected for administrative use and may not be a good match for the statistical needs of given issues. Thus, the administrative variables often do not correspond to requested statistical variables and may not be immediately organised into the statistical classifications applied for the relevant issues. In such cases, the administrative data may not be sufficient and must be augmented by statistical surveys. Labour force statistics are a good example of this as available administrative data in many countries does not satisfy the data needs as agreed internationally and required for domestic monitoring and policy purposes. For this reason, labour force sample surveys are still carried out in most countries.

A general requirement for using administrative data is that administrative systems have been developed and are available for statistical purposes. The more developed these are and the more embedded they are into the workings of the societies, the easier and more feasible it is to replace surveys with administrative data capture. Conversely, using administrative data for statistical purposes is less feasible in countries with poorly developed administrative systems. In a few countries, civil registration systems are operated based on unique identification numbers of persons that are used in the entire administrative system. Similarly, there are business registration systems that apply unique registration numbers of firms. In these countries, the utilisation of administrative data is greatly enhanced, particularly as this allows linking data from the different administrations for statistical purposes. It has to be borne in mind, however, that such data linking has to be exercised carefully and may be restricted for reasons of ensuring full confidentiality of the data and the need to respect requirements for privacy of individuals, households and businesses.

Their novelty and the richness trigger the interest in making use of other data sources (Big Data). This is thought to open up possibilities for acquiring data on new phenomena in various fields, such as in commerce, communication, and social media, that may allow new or extended analysis of economic and social matters. It has been found, however, that harnessing some of these sources is easier said than done. For statistical purposes, some sources are poorly defined, insufficiently structured, or lacking consistency and comparability. Another factor is that it has proven quite difficult in many countries to obtain permission from firms to access their databases and data streams, as the firms prefer to keep their business transactions confidential. Nonetheless, it seems likely that various types of new data sources will be further harnessed by developing novel methods, applications, and algorithms for this specific purpose.

2.11 Time and space dimensions of data

The dimension of time has always been essential in official statistics. Data is collected in a way that allows the statistics to be analysed over time, showing developments and trends, and allowing comparisons between different periods or points in time. Periodicity and regularity are thus main preoccupations of official statistics – the statistical producers aim to provide their statistical outcomes at appropriate but short intervals and with specific regularity.

Official statistics have also always been related to a specific space, most often linked to an administrative concept – a country, a region, a town. There has been increasing interest in geospatial data in recent years, i.e. microdata linked precisely to a specific geographic location. This has the potential to reveal relationships and phenomena which are difficult to discover by analysing statistical databases alone. In official statistics, geo-referenced data has been collected in population and housing censuses and household surveys, notably after introducing digital questionnaires on laptops, tablets, and cell phones. More recently, increasing use has been found for geospatial data in environment statistics and agricultural statistics. The interest in and use for geospatial data is clearly reflected in the sustainable development indicators. However, it should be born in mind that geo-referenced data is particularly taxing on data confidentiality.

2.12 Sustainable development indicators

In 2017, the UN General Assembly adopted the 2030 Agenda for Sustainable Development, including a global indicator framework for monitoring progress, informing policy, and ensuring all stakeholders' accountability. There are currently 231 unique indicators in the framework. The Inter-Agency Expert Group on SDG indicators has classified these into three classes as follows:

- a) **Tier 1:** Indicator is conceptually clear, has an internationally established methodology and standards are available, and data are regularly produced by countries for at least 50 per cent of countries and of the population in every region where the indicator is relevant. At mid-2020, 123 indicators (53% of the total number) were classified at tier 1.
- b) **Tier 2:** Indicator is conceptually clear, has an internationally established methodology and standards are available, but data are not regularly produced by countries. At mid-2020, 106 indicators (46% of the total number) were classified at tier 2.
- c) **Tier 3:** No internationally established methodology or standards are yet available for the indicator, but methodology/standards are being (or will be) developed or tested. At mid-2020, two indicators were classified at tier 3.

As discussed in the Sustainable Development Goal Report 2020, good progress has been made in recent years in increasing the availability of internationally comparable data for SDG monitoring. However, substantial data gaps still exist in terms of required geographic coverage, timeliness, and disaggregation level. Moreover, challenges remain in compiling and disseminating metadata to document the data quality of SDG indicators at local and national levels.

The adoption of the SDG indicators in 2017 greatly increased the burden and the strain on NSOs and other producers of official statistics in the world in producing development data.

Many of the SDG indicators were not compiled in large parts of the world. The figures quoted above show that the required data is not produced regularly for almost half the number of SDG indicators. Thus, it is necessary to greatly increase the statistical activities and, what is more, to extend them into fields where there is little if any collection of statistical data. The nature of the SDGs has also called for data being collected in innovative ways. Substantial effort has been made on providing technical assistance in statistical methods, systems and applications in many countries in the developing world.

The effort to increase the collection of data and the compilation of SDG statistics should have been accompanied by increasing investment in statistical infrastructure and increasing government expenditure on statistics. This has not been realised. Nonetheless, some successes have been recorded, mainly based on various donor funded programmes. These have in particular focused on training on methods and statistical systems as well as direct technical assistance. Examples are the application of digital technology in various surveys, such as household surveys and farm surveys, and innovative methods in capturing data through aerial photography. Moreover, the years 2018 and 2019 saw some notable overall increases in SDG data collection in the developing world. In 2020, however, the COVID-19 pandemic severely halted the progress in the compilation of SDG indicators. Official statistics in developing countries were hit hard by the pandemic. Many statistical offices had to close down temporarily and work remotely on their tasks. In several countries, face-to-face collection of data had to be curtailed, resulting in surveys being much delayed or scrapped altogether. In some countries, statistical budgets were cut as a result of the pandemic. All of this has added to the difficulties of collecting the data necessary for the SDG indicators while at the same time showing up the great need for providing funds for statistical capacity building.

2.13 The statistical production processes

The process of producing official statistics can, in simple terms, be described as involving three logical steps – the collection of data, processing and analysis of the statistics, and reporting and disseminating the findings. Traditionally, these processes have, as a rule, been undertaken within the different divisions or units of NSOs. Thus, as an example, the agricultural division of the NSO has taken care of all the individual steps of producing agricultural statistics. The division's statistical staff have designed the necessary surveys, collected the data, checked for errors, cleaned and edited the data, processed and tabulated, analysed the statistics, and reported on the findings. The price statistics have been compiled similarly within the department of price statistics, and the same goes for the various other statistics of the NSO.

This traditional system is referred to as a *stovepipe* or *silo* system. The reason for and the strength of this system is that it has ensured that there is systematic knowledge of the different subjects for which the statistics are to be compiled. The ensuing weakness of the system is that it does not focus on the statistical functions that are common to all statistical production processes and does not allow or encourage internal cooperation across the boundaries of different subject matter departments. Many NSOs have sought to alleviate these shortcomings by organizing centralised support for different subject matter departments in areas like questionnaire design, methodology, data collection, IT services, data editing and dissemination, all of which have helped increase the efficiency of the statistical production.

However, this has been considered insufficient and efforts have been made to create a more functional system for the statistical production processes.

Significant support in these efforts was the creation of the Generic Statistical Business Process Model (GSBPM). This model has been developed under the coordination of the Statistical Division of the UNECE in Geneva, based on innovative practices in a few leading NSOs. The GSBPM seeks to describe and guide the overall process of the statistical production as well as the individual production processes. The idea behind the GSBPM is that the statistical production is better organized around functions than subject matters and that the same procedures can be utilised for the generation of several subject matter statistics. Thus, as an example, the same procedures for collecting data apply to several subject matter areas. Also, instead of designing and building specific methods and IT tools for each subject matter area, the idea is to build methods and tools for the different functions that can be utilised in many subject matter areas.

It is useful to describe the overall statistical production process in terms of the GSBPM. The model identifies and describes eight phases of the overall statistical production process (*specify needs, design, build, collect, process, analyse, disseminate, and evaluate*), divided into sub-processes; 44 sub-process in all.

The production process starts by identifying the needs of the particular statistics that are being considered. Here, the recommended procedures apply equally to all types of statistics; it is necessary to determine what statistics are needed, who needs them and for what purposes, if there are similar statistics available, and what are the pros and cons, gains and costs of producing new statistics. This phase ends with deciding whether to proceed and plan for a new or modified statistical product and, if so, what this product should look like.

The second phase (design) involves determining how the new product should be produced and designing the methods and procedures for creating it.

The third phase (build) involves building the tools for producing new or amended products. Both this and the design phase make heavy demand for the IT and methodological services of the NSO. Here, the basic assumption is that the same methods and IT applications can be used in the production of several different products. This requires that the software and applications be designed and built as modules that can be used in many production streams and interchanged. This is one of the keys to enhancing the efficiency of the production processes.

The fourth phase (collect) involves collecting data needed for the new or amended statistical product. The data collection procedures are based on outputs of the previous phases. The collection methods have been determined and designed so all that is needed is to organize, prepare, and implement the data collection. This phase includes hiring or selecting and training staff involved in data capture, both in surveys and in other data collection modes. It also includes a possible trial run of the data collection, usually referred to as conducting a pilot survey or data collection.

The fifth phase (process) involves checking and editing the collected data and preparing it for analysis, as well as carrying out the necessary tabulation.

The sixth phase (analyse) involves analysing the new statistics, laying the foundation for analytic reports of the new or amended statistics.

The seventh phase (disseminate) involves writing and editing the analytic reports, preparing press releases based on the new statistics, including producing such graphs and other visual means that may enhance the message brought out by the new statistics. This phase involves the actual release of the statistics and subsequent press releases and reports in accordance with the release calendar of the NSO, editing of the website on which the statistical products are posted, and communicating with users, seeking and capturing their feedback.

The eighth phase (evaluate) involves evaluating the new product and the production processes that were applied. This evaluation is carried out for each sub-process applied in the production of the new or amended statistics. The basic idea is to assess the quality and efficiency of each step of production as well as the overall quality of the end product.

The evaluation of a product and the process by which it was produced requires that all decisions and actions taken in each sub-process of each phase be thoroughly documented in such a way that the documentation at each stage forms the basis and is used for subsequent stages. This documentation is referred to as *process or structural metadata*.

The GSBPM is said to have several over-arching processes, i.e. processes that apply to the whole production process. One of these is *metadata management* and involves both the creation of metadata at each stage and its transfer and utilisation at subsequent stages of the overall production process. Metadata may be grouped into two types, process metadata and product metadata. The process metadata informs in detail on the methods and procedures applied in the statistical production, as described above. The process metadata is for specialised use in the statistical processes and for use by experts for enabling them to evaluate in detail the quality and the robustness of the statistics. The product metadata is compiled to inform the users about the specifications of the statistics, their strengths, weaknesses, applicability, comparability, and delimitations. Most NSOs strive to compile product metadata, at least that pertaining to the statistics most used, and publish on the web.

Another main over-arching process concerns *quality management*. To improve quality, quality management should be present throughout the business process model, based on the evaluation and quality control at each stage, each sub-process. If done in accordance with the suggestions of the GSBPM, quality failures can be detected and analysed at every stage of the process, traced to failures at previous stages, corrected or amended, thus raising the quality of each sub-process and the final product.

The awareness and use of the GSBPM have grown substantially in the last few years. The main importance can be the impact it has had on replacing the traditional stovepipe thinking and subject-oriented approach to producing statistics and encouraging planning based on functions that are common to all statistical production. In this way, the GSBPM has increased communication across subject matter boundaries as well as cooperation between methodologists and subject matter experts. It has encouraged IT experts to design their applications as interchangeable modules between production processes and can be reused in several processes and for several products. The GSBPM has also led to increased focus on documentation of the production processes of different products, thereby greatly facilitating amendments of processes and products leading to increased quality of the statistics.

2.14 Managing quality

In the last few decades, NSOs and other producers of official statistics have spent much effort on improving the quality of their output and adopting quality management principles and procedures for that purpose. This has partly been driven by the interest of international and supra-national organizations in enhancing the relevance, consistency and comparability of the official statistics of their member countries. Quality management efforts have been comprehensive but multi-faceted and dependent on the focus of the different organizations. The main message that has been brought forward and adopted by many NSSs is the insistence on the need to observe the quality of official statistics, at all stages in the production process as well as the end product. This has been universally accepted, and NSOs have responded by adopting quality principles for their statistics and statistical processes, organizing and implementing quality management and control, and applying quality assurance systems as benchmarks for their statistical production and outputs.

NSOs and other producers of official statistics turn out numerous statistical products every year. These products are required to fulfil several criteria as regards their relevance, impartiality, accuracy, and timeliness. These criteria are derived from the UNFPOS, codes of practice based on the UNFPOS, specific international standards as well as statistical laws of the different countries.

At the global level, the UN National Quality Assurance Framework for Official Statistics (NQAF) was first adopted by the UNSC in 2012. The NQAF was subsequently revised by the UNSC with the issue of the NQAF Manual in 2019. The Manual includes recommendations, framework and implementation guidance and is directed at assuring the quality of official statistics throughout the entire NSS of a country. The Manual offers comprehensive guidance for an NSO on adopting and operating a quality assurance framework to help implement quality management policy.

In the European Statistical System (ESS) various measures have been taken that oblige the NSOs and other producers of official statistics to observe quality and operate quality management and control. Thus, the ESS has included provisions on quality in its statistical legislation, issued a quality declaration and a Code of Practice, and adopted a Quality Assurance Framework of the European Statistical System. Furthermore, an ESS Handbook for Quality and Metadata Reports has been issued (latest version 2020) along with various guidelines on managing and improving quality.

In the field of economic and finance statistics, the International Monetary Fund (IMF) has sought to ensure the quality of the statistics of member states by implementing the data dissemination standards, developing a data quality assessment framework (DQAF) facilitating a comprehensive view of data quality, and undertaking regular reviews of the quality of the statistics of the different countries (named reports on the observance of standards and codes, ROSC).

2.15 Disseminating and communicating the statistics

In the last few decades, the digital revolution has allowed NSOs and other producers of official statistics to transform their dissemination of official statistics. Nowadays, most NSOs release

their statistics by digital means, in particular on their websites. There are several reasons for this:

- a) The dissemination cost is low, only a fraction of publishing on paper which was the primary dissemination mode prior to the digital age.
- b) Digital dissemination is technically easy and ensures a higher quality of the statistics than paper releases.
- c) Dissemination by digital means is rapid; hence statistical findings can be accessed by users very soon after they have been compiled.
- d) Publishing on the web ensures that all users with internet access and digital tools can access the statistics simultaneously.

Official statistics are mostly released in the form of tables or through access to databases. Many NSOs provide interactive databases on the web that allow users to specify their own tables. NSOs and other producers publish their releases of new statistical findings on their websites as well as their larger and more detailed reports of statistics on various subject matters. They also use the websites for publishing reports on statistical production processes and products, such as reports on content, quality and applicability of the different statistics, as well as their statistical policies, rules of procedure and other documents describing the basis for the statistical activities and processes. This has the added advantage of allowing easy and quick updating of documents.

Many NSOs use their websites or data portals as the main release mode and only print tables, reports, and other releases on special demand. NSOs and other producers in countries with low digitisation rates and undeveloped digital networks continue to provide printed publications, seeking to ensure that the statistics are accessible to most segments of the population. Some NSOs are increasingly using social media to disseminate “headline” figures, with links to their websites for more detailed information.

In the international arena, several rules and guidelines on disseminating official statistics have been advanced, based on the UNFPOS (see here UNSD guidelines for improving data dissemination in the digital age). These aim to encourage producers of official statistics to fulfil specific minimum criteria regarding the public release of their statistics, the quality of the release, regularity, and periodicity, and the access by users of the statistics.

The IMF has issued three dissemination standards to which the member countries subscribe. They describe specific requirements that the countries commit themselves to fulfil. These concern the coverage of the statistics produced and periodicity of their provision, requirements that statistics are published at pre-determined times according to a statistical release calendar, and requirements for metadata, i.e. information about the methods and classifications followed in the statistical production. Release calendars should be published in advance so that all users of statistics are given equal opportunity to receive statistical information and access the statistics simultaneously.

The three IMF dissemination standards vary in their number and severity of requirements. The lightest is the General Data Dissemination System (GDDS) which many developing countries subscribe to (the latest version is the enhanced GDDS (e-GDDS)). The Special Data Dissemination Standard (SDDS) makes considerably heavier statistical provision requirements than the GDDS while the so-called SDDS+ contains additional requirements for the provision

of monetary and finance statistics. Member countries with more advanced statistical systems subscribe either to the SDDS or the SDDS+.

The European Statistics Code of Practice (ESS CoP) contains, among other things, specific principles and guidance relevant to the dissemination of the statistics. The ESS CoP lays down specific requirements for clarifying the statistical outputs, their regularity, timeliness, and how they are released. All NSOs and other producers of official statistics within the European Statistical System follow and respect these requirements.

Recommended international practice reinforced by ESS CoP and dissemination standards discussed above, require NSOs and other producers of official statistics to publish metadata on their statistics along with the statistics themselves. Most NSOs strive to compile product metadata, at least that pertaining to the statistics most used, and publish them on the web.

NSOs publish their statistics in aggregate form, thereby seeking to ensure the confidentiality of the data providers and the subjects they refer to. There is, however, substantial demand for microdata for research purposes. Several NSOs have in recent years started to release or grant access to microdata to researchers. For some years, some NSOs have been preparing a specific set of microdata for research, initially to be handed over to recognised researchers, more recently for release on the web. The data set has then been prepared specifically for such use by anonymisation, i.e., removing identifiers of individuals, households, and businesses, and removing variables that would have allowed indirect identification. Some NSOs have also granted on-line access to such microdata for research. Granting access to microdata is usually also accompanied by documentation signed by the researcher specifying the datasets that are made available, the purpose of use of the data, the safeguarding of the data as well as a pledge to respect rules of statistical confidentiality and the privacy of respondents. Granting access to microdata for research purposes entails a significant addition to the utilisation of the data and the value of the statistical production.

2.16 International statistical cooperation

As outlined at the beginning of this chapter, international cooperation in official statistics is both long-standing and extensive. It reaches all countries and all NSOs of the world and encompasses all aspects of official statistics. The international statistical cooperation has several objectives, of which the main can be said to be the following:

- a) ensuring adequate generation of official statistics for both national and international use;
- b) harmonising official statistics between countries;
- c) developing methods, standards and systems;
- d) enhancing the clarity and quality of official statistics;
- e) disseminating national statistics at the international level;
- f) building capacity for the compilation, provision and use of official statistics in developing countries.

Following its foundation in 1946, the United Nations Statistical Commission (UNSC) has been the centre of the world-wide cooperation in official statistics. The UNSC is the forum for discussions and decisions on statistical development and harmonisation, for development of

standards, classifications, concepts, methods and procedures as well as on policies and actions to extend the cooperation and statistical development to all continents and countries. The work on these actions is carried out, both on the global and regional level, in the various institutions of the UN, including the International Monetary Fund and the World Bank (the so-called Bretton Woods institutions), as well as in various other international and supranational agencies.

The UN Statistics Division (UNSD) is the secretariat of the UNSC and coordinates many statistical cooperation aspects. It also receives statistics from member countries and makes these available in databases that can be accessed online and in various publications. The regional dimension of the statistical cooperation is the responsibility of the five UN regional commissions in charge of statistical development and capacity building in their respective regions.

Various specific institutions of the UN also work at the global level on statistics in their respective domains. A few of these can be mentioned. The World Health Organization (WHO) is concerned with harmonising and developing health statistics as well as collecting health statistics from member countries. The International Labour Office (ILO) harmonises and develops standards for labour statistics. The Food and Agriculture Organization of the UN is concerned with statistics on agriculture, forestry and fishing, and on production and supply of food in the world. It also engages in statistical capacity building in developing countries. The United Nations Educational, Scientific and Cultural Organization (UNESCO) is concerned with statistics in its field, developing standards and collecting statistics from member countries. The United Nations Children's Fund (UNICEF) is engaged in developing statistics relating to children and families and conducting statistical programmes in developing countries. The United Nations Population Fund (UNFPA) works with population statistics and census taking, largely focusing on developing countries. The United Nations Conference on Trade and Development (UNCTAD) compiles, processes and validates a wide range of international trade statistics. Other UN institutions such as the United Nations Development Programme (UNDP) and the United Nations Industrial Development Organization (UNIDO) engage in statistical capacity building programmes in developing countries.

The International Monetary Fund (IMF) and the World Bank, the Bretton Woods institutions, are major international statistical cooperation partners. The IMF focuses on economic, financial and monetary statistics, and it develops standards and handbooks on these subjects. It sets the dissemination standards mentioned previously on minimum requirements for compilation and regular provision of statistics in its field. The World Bank is a major actor in statistical capacity building, developing, funding and promoting capacity building programmes in developing countries.

Various international organizations outside the UN system are involved in statistical cooperation and development at global, regional and sub-regional levels. In particular, mention can be made of Eurostat, the statistical office of the European Union (EU). The NSOs and other producers of official statistics in the 27 EU member states, together with the four member countries of the European Free Trade Association (EFTA), form the European Statistical System (ESS). Under Eurostat's leadership, the ESS countries have harmonised the bulk of their official statistics, including standards, procedures, and the requirements made for statistical quality. Eurostat is among the leaders in international statistical cooperation, participating actively in developing standards and procedures.

The Organization for Economic Cooperation and Development (OECD) is an association of several developed countries in Europe, America, Asia and Oceania. For a long time, the OECD has been engaged in developing and harmonising statistics, mainly economic statistics, in its member countries and has been at the forefront in international statistical cooperation.

The Partnership in Statistics for Development in the 21st Century (PARIS21) is an important player in statistical capacity building in developing countries. It aims to increase the use of statistics for decision-making, strengthening statistical systems, for instance, by promoting and facilitating the work on NSDSs and providing a forum for donor cooperation in the field of official statistics. Regional development banks also play a critical role by providing technical assistance to their member countries for statistical capacity development.

Most of the international organization mentioned above participate actively in developing statistical methodologies and guidelines and extending data collection to new domains required by world agendas. Many of them contribute actively to statistical capacity building in developing countries, through technical advice and/or financing of programmes. Some of them also undertake assessments of national statistical systems and statistical programmes, e.g. through so-called assessments, peer reviews or reports of specific statistical operations aspects. All the institutions participate in the current statistical work relating to the 2030 Agenda for Sustainable Development. The work on the SDG indicators involves the international statistical players in one way or another – in developing new techniques, in educating and training staff to compile statistics in line with modern and harmonised concepts, standards, and methods or providing technical assistance and funding for such statistical work.

2.17 The constant challenge of modernizing official statistics

During the last few decades, the operations and products of NSOs and other producers of official statistics have undergone extensive modernisation in many fields. This has been possible by the recent and steadily technical developments and the simultaneous fall in relative prices of digital hardware and software. During this time, the demands made on official statistics have changed markedly. These have not only been for more significant provision of statistics in traditional fields but also for statistics on new and emerging subjects. There has also been growing demand for increased periodicity in statistical production, better regional coverage and small area statistics, easier and quicker access to the statistics as well as greater accuracy, granularity and quality. This development can only continue; it has already had a significant impact in the developed countries of the world but needs to be strengthened and secured in the developing parts of the world.

The digital age has dramatically impacted the NSOs, bringing considerable changes in their activities, leading to large gains in output, coverage, and quality of the statistics. The degree of efficiency has significantly increased. The NSOs and other producers of official statistics offices have offered much-improved services to their users regarding availability and coverage of the statistics, periodicity, ease of access, quality, disaggregation and relevance. Data collection has been transformed, as discussed above, with traditional paper questionnaires being replaced by electronic questionnaires via the Internet or uploaded on tablets, laptops, and mobile phones and transferred over a digital network to the central databases of the institutions. Many NSOs have also started to collect data from businesses through web-portals, in some cases with the businesses linking their information systems to the portals. Progress has also

been made using aerial photography to gather data and information. This is thought to add new potential to acquiring information in several fields, not least for agricultural and environment statistics. This is mainly thought to bring increased data collection possibilities for the SDG indicators in these and other areas.

Among other advances that can be mentioned are new techniques for transferring data between computers, termed *machine to machine* transfer of data. Recent digital advances have also involved large increases in data storage and computing capacity. Significant advances have also been made in statistical software, transforming manual handling of data by digital handling, facilitating many tasks and processes, and increasing speed and quality of processes through automation. Data security and confidentiality have also been enhanced by recourse to digital means in data collection, data processing and data exchange.

NSOs and other statistical organizations have been undergoing transformation to increase efficiency, relevance, and quality. The restructuring of the statistical business process in accordance with the GSBPM results in greater efficiency and higher quality in all the production processes and the overall operations of NSOs. Critical factors in this respect are planning for reusing digital applications and specific functions between different subjects and departments and breaking down the stove-pipe structure barriers. Discussions are also ongoing in international fora on structural and organizational issues of NSOs, involving enhanced use of digital technology.

2.18 Impact of the COVID-19 pandemic

The COVID-19 pandemic in 2020 has had disruptive effects on the production of official statistics worldwide. The disruptions resulted mainly from the need to diminish physical communication and exercise distancing between people to prevent the spreading of the virus. This impacted data collection in many countries that collect their data mainly by visits to households and businesses as surveys had to be cancelled and data collection in the field by enumerators had to be stopped to reduce the risk of contamination. On the other hand, for NSOs and other statistical producers with broad access to administrative data, the effect of the COVID-19 pandemic has not been that dramatic on data collection. This shows up one main strength of utilising administrative sources or other innovative data sources for official statistics and underscores the importance of developing administrative records and registers to enable and facilitate their use for statistical purposes.

Apart from the disruptive effects on data collection, the pandemic has hurt the statistical production in many countries, particularly by severing the continuity and regularity of the statistical activities and outputs. In the NSOs and the other producers of statistics, regular activities were disturbed as staff had to be sent home to carry out their duties by virtual means. This has most likely not had significant effects in well-developed countries with excellent network coverage and ample computer capacity. The effects were strongly felt in NSOs in developing countries with little to spare laptops, limited network connection, and uneven electricity provision. In several countries, statistical budgets were cut due to the pandemic and face-to-face collection of data had to be curtailed, resulting in surveys being much delayed or scrapped altogether. All of this has added to the difficulties of collecting and processing the necessary data to inform COVID-19 response and in the longer-term for the monitoring of the

SDG indicators but eventually showing up the great need for providing funds for securing resilient statistical capacity and infrastructure.

2.19 Infrastructure and resources

Operating an NSO or a similar unit of production of official statistics requires building space, equipment as well as human and financial resources. An NSO does not need a very specialised space and infrastructure other than computer equipment. The basic needs are for office space and meeting rooms with the usual inventory of desks, chairs and the like as well as space outside the proper offices for a reception area and library with a study area for visitors, such as journalists, researchers and students. The NSO will also need facilities for storing its archives safely as well as space for servers of appropriate quality and security, fire-proof if possible.

The NSO has quite extensive requirements for computer equipment. An NSO cannot function without modern computer equipment, such as servers, networks workstations, laptops and/or tablets as well as printers. A minimum requirement for workstations is one per staff member. Laptops may be needed to work remotely, and tablets, and mobile phones for both communication and data collection. All equipment must be connected to a local area network requiring both wired connections and appropriate software. But the NSO does not thrive on hardware alone. It requires various software tools such as operating systems, basic office ware, database software, software for communicating, including running the website of the NSO, and a host of applications for the various production processes. The software should also include virus protection. For security reasons, the NSO also needs to apply standard protocols for data exchange, both within the NSS and for outside delivery and reception of data.

All computer equipment (hardware), and software alike, must be regularly updated. It is recommended that the NSO formulates and implements a medium-term IT strategy, perhaps of some 4-5 years, including plans for updating the hardware and software in specific instalments. This is recommended with a view of spreading the cost of renewal and updating as well as evening out the burden of maintaining the equipment. Care should be taken that upgrading benefit all employees using computer equipment. A few years ago, many NSOs preferred to use software and systems specialised for their particular use. The conditions for acquiring software and systems, however, have changed markedly in the last few years. Many systems and software can now be bought off-the-shelf at a much lower cost than having them tailor-made, and much of the available software is now open-source, generally free of charge and free to use and adapt to the needs of users. Using open-source and off-the-shelf software usually saves much money and greatly adds to the flexibility of IT operations. Computing and storage “in the cloud” have also involved dramatic additions to capacity and removed IT operations constraints.

NSOs and the other producers of official statistics are very specialised agencies. To operate a modern NSO and satisfy domestic and international requirements for compiling and communicating statistics, the office needs staff with mixed but relatively high professional skills and expertise. The mixed skills include very specialised staff such as methodologists, IT specialists and highly trained statisticians, subject matter experts as well as assistant staff, administrators etc. Many NSOs require field workers for data collection. All staff should receive training regularly. It is recommended that the NSO runs a continuous multi-annual training programme spelling out how the office intends to satisfy the training needs and training

interests of staff. New staff members should receive introductory training about the nature and requirements of official statistics, the rules for confidentiality, the office's operations, etc. It is further recommended that the training organized by the NSO be offered to other producers of official statistics and staff in regional offices. Allowing staff members to enhance their soft and hard skills such as working methods, computer skills, languages, and project positively impact staff satisfaction and motivation.

It goes without saying that NSOs and other producers of official statistics need financial resources to finance their operations. Salary and wage cost are usually by far the largest cost components. In most countries, the NSOs and other producers are financed through the central government budget. In some countries, the annual budget allocation is basically for use by the NSO within the normal confines of its original budget proposal or budget request. This is the recommended mode of financing official statistical activities. In some countries, although the budget of the NSO is set out specifically in the government budget and approved as such, the budget allocation to official statistics is still subject to particular scrutiny and approval by the relevant ministry, often the Ministry of Finance. This implies that the NSO cannot be sure that it will receive all the funds approved on the budget, receive it regularly or evenly over the fiscal year. This practice is considered much inferior as it involves great uncertainty about the operations of the NSO, the conduct of its survey programme, and prevents all flexibility in the operations and spending.

It is a sad thing to relate that most NSOs in the world are underfunded. The same applies to other producers of official statistics in MDAs. NSOs and official statistics are not very popular phenomena; they are not held in high esteem, are considered un-sexy, to use the popular speech. In many countries, wage and salary levels in NSOs are lower than in other government agencies, in some countries much lower. This has severe implications for official statistics as it gets challenging to hire skilled staff, difficult to retain good employees as they will seek higher-paid jobs elsewhere, both within and outside the public sector. Unfortunately, despite their obligations – internally to ensure that reliable and regular official statistics are produced and externally to ensure that the provision of official statistics meets the country's international commitments – governments in many countries fail to provide adequate funding to official statistics. In the developing world, many NSOs rely on donor funding for essential parts of their operations. This is not a sustainable situation as it entails that the NSO does not have full control of its operations and cannot formulate and implement its statistical programme in accordance with national priorities.

It seems clear that the technical transformation and modernisation of statistical activities will continue unabated in developed countries. This will not happen in developing countries at present funding levels. The main tasks ahead in this respect are bringing the technical and organizational advances to the developing world. Without substantial digital and infrastructural advances in the developing part of the world, their official statistics will remain poorer and not sufficient for constituting the basis for economic, social, and environmental planning and advancements.

Chapter 3. The Basis of Official Statistics

3.1 Introduction

The key concept and the main topic in this handbook are *official statistics*. This chapter seeks to clarify what is meant by official statistics, the principles that should guide the production of official statistics, and how these principles can be implemented through legislation and guidelines.

3.1.1 Defining official statistics

The concept of official statistics in this handbook is based on the [UN Fundamental Principles of Official Statistics](#) (UNFPOS). They promote that official statistics should adhere to well-defined professional and scientific standards, while clearly defining the content and identifying the producers of the statistics. A number of principles, codes and legislative initiatives have contributed to clarifying the concepts outlined in the UNFPOS. Thus, in the context of this Handbook *Official statistics*³ are defined as comprising the following three elements:

- a) Statistics describing the economic, demographic, social and environmental phenomena meeting diverse user requirements, at different geographical levels from sub-national, via national to supranational and international level.
- b) Statistics developed, produced and disseminated in compliance with the United Nations Fundamental Principles of Official Statistics as well as internationally agreed statistical standards, codes and recommendations fostering trust and ensuring consistent and high quality.
- c) Statistics normally produced by a national statistical office (NSO) and other entities designated as producers of official statistics and indicated as official statistics in relevant legislation and in statistical programmes and documents.

The concept of official statistics used in this Handbook is further defined in Chapter 3.2 – *UN Fundamental Principles of Official Statistics*, Chapter 3.4 - *Legislative frameworks* and Chapter 3.5 - *Certification and branding of official statistics*. In addition, it will also be covered in Chapter 4 – *The National Statistical System* and Chapter 7 - *Quality Management*. It is essential to underline that proper quality criteria are closely linked to the concept of official statistics as used in this handbook.

³ Many countries do not apply the term ‘official statistics’ but rather use terms such as ‘statistics’, ‘state statistics’, ‘national statistics’, or ‘central statistics’. These terms might in some cases mean the same as official statistics but might also differ and lack a clear specification of principles and quality requirements.

3.1.2 The importance of official statistics

Official statistics should be a cornerstone of a modern society by providing an unbiased and accurate picture of the economic, demographic, social and environmental situation and development in a country. To an increasing degree, high quality and comparable statistics are also important for analysis and decision-making at the international and global level. Thus, it is essential that official statistics can be trusted by all users and stakeholders and are made accessible and understandable for all users.

A great deal of statistics is also being produced by private and public agencies that are not part of the system of official statistics. Statistics of questionable quality and proper documentation can be potentially confusing and lead to distrust of the national statistical office (NSO) which is supposed to produce unbiased and high-quality official statistics. Therefore, it is of utmost importance that those statistics considered to be ‘official’ follow strict and well-defined principles and standards.

A more in-depth discussion of official statistics and its importance is provided in [Recommendations for promoting, measuring and communicating the value of official statistics](#), UNECE 2018.

3.1.3 The need for the UN Fundamental Principles

The need for a set of principles governing official statistics became apparent at the end of the 1980s when countries in Central Europe began to change from centrally planned economies to market-oriented democracies. To re-establish trust in these and similar countries' official statistics, it was essential to ensure that their national statistical systems (NSSs) would produce appropriate and reliable statistics that adhered to established professional and scientific standards. To this end, the Conference of European Statisticians (CES) developed and adopted the Fundamental Principles of Official Statistics in 1991, which were subsequently adopted in 1992 at the ministerial level by Economic Commission of Europe. Statisticians in other parts of the world soon realized that the principles were not necessarily a European phenomenon but were of much wider, global significance. Following an international consultation process, a milestone in the history of international statistics was reached when the United Nations Statistical Commission at its Special Session of 11-15 April 1994 adopted the same set of principles – with a revised preamble – as the United Nations Fundamental Principles of Official Statistics (UNFPOS).

To be effective, the UNFPOS need to be respected by all stakeholders and at all political levels. Thus, the principles were reaffirmed by the Statistical Commission in 2013 and endorsed by the Economic and Social Council in its resolution 2013/21 of 24 July 2013. Finally, [the UN Fundamental Principles of Official Statistics](#) were adopted on 29 January 2014 at the highest political level as a General Assembly resolution (A/RES/68/261).

These principles and the related [Implementation Guidelines](#) are covered in Chapter 3.2 - *UN Fundamental Principles of Official Statistics*. There are several other international principles and guidelines that partly cover the same topics as [the UNFPOS](#). These are described in detail in Chapter 3.3 - *Other principles practices and guidelines*.

3.1.4 Implementing the UN Fundamental Principles

International statistical principles and good practices must be implemented and followed within each national statistical system (NSS) using national legal frameworks and guidelines. The Implementation Guidelines provide advice regarding implementation of legal frameworks, which is further elaborated in Chapter 3.4 - *Legislative Frameworks* based on the reference document [Guidance on modernising statistical legislation](#) (UNECE 2018). This document describes in more detail the implementation of legislation in the field of statistics and builds on and provides some extensions and modification to [The Generic Law on Official Statistics](#) (GLOS), adopted by the UNECE 2016. An equivalent generic law was adopted for Latin America by the Statistical Conference of the Americas, [Generic Law on Official Statistics for Latin America](#) (GLOS-LA). These documents represent the efforts to develop a model legal framework for legislation in the field of official statistics based on the UNFPOS and taking into consideration other well-established principles.

When discussing official statistics, it is necessary to differentiate between national and international activities in the field of official statistics. Thus, some parts of this chapter, and of this Handbook, might be more relevant to NSOs than to international agencies. There are also some specific challenges for international agencies that are not covered in detail in this handbook. Specific issues are covered in [Principles Governing International Statistical Activities](#). An additional reference is the [UN Statistics Quality Assurance Framework](#) that targets UN agencies as well as international and national users of statistics.

The practical implementation of fundamental principles and legislative procedures is further developed in Chapter 4 - *the National Statistical System*, Chapter 5 - *the National Statistical Office*, Chapter 7 - *Quality management* and Chapter 10 – *Dissemination of Official Statistics*.

3.2 UN Fundamental Principles of Official Statistics

The following description is to a large extent based on the [United Nations Fundamental Principles of Official Statistics - Implementation Guidelines](#). In addition, criteria and indicators described in the [European Statistics Code of Practice](#), as well as other guidelines mentioned above, have been taken into consideration, when appropriate.

3.2.1 Principle 1 - Relevance, impartiality and equal access

Principle 1 states that “*Official statistics provide an indispensable element in the information system of a democratic society, serving the Government, the economy and the public with data about the economic, demographic, social and environmental situation. To this end, official statistics that meet the test of practical utility are to be compiled and made available on an impartial basis by official statistical agencies to honour citizens' entitlement to public information.*”

Relevance:

Motivation for and explanation of the principle:

- a) Official statistics exist to provide information to the general public, government, businesses and research communities in the economic, demographic, social and environmental fields.

- b) Official statistics as an important public good in democratic societies, have to meet the needs of users, and must be disseminated in an impartial way ([UN Global Review 2013, page 6](#)). They are an essential element of the accountability of governments and public bodies to the public in a democratic society.
- c) Relevance is the degree to which statistics meet current and potential needs of various user groups, including the public.
- d) Relevance includes the possibility for users to make comparisons in time and space.

Compliance criteria:

- a) Processes should be in place to consult users, monitor the relevance and utility of existing statistics in meeting their needs, and consider their emerging needs and priorities.
- b) Priority needs should be identified and be met and reflected in the work programme.
- c) User satisfaction should be monitored on a regular basis and systematically followed up.

Impartiality and equal access:

Motivation for and explanation of the principle:

- a) The use and benefit of official statistics are dependent on their credibility and trust among users.
- b) Professional independence of producers of official statistics, scientific competence of their staff and impartiality are the crucial preconditions of trust in official statistics.

Compliance criteria:

- a) Statistics should be compiled on an objective basis determined by statistical considerations.
- b) Choices of sources and statistical methods, as well as decisions about the dissemination of statistics, should be informed by statistical considerations.
- c) Errors discovered in published statistics should be corrected at the earliest possible date and publicised.
- d) Information on the methods and procedures used should be publicly available.
- e) Statistical release dates and times should be pre-announced.
- f) Advance notice should be given on major revisions or changes in methodologies.
- g) All users should have equal and simultaneous access to statistical releases. Privileged pre-release access to any user is not recommended and, if any, should be limited, controlled and publicised.
- h) Statistical releases and statements made in press conferences should be objective and non-partisan and should not contain any policy-prescriptive statements.
- i) As from the release date, official statistics should be accessible for a sufficiently long period. The underlying micro-data should be stored in such a way that they can be used for subsequent statistical purposes by statistical producers and the research community, subject to specific rules.

3.2.2 Principle 2 - Professional standards, scientific principles and professional ethics

Principle 2 states that *“To retain trust in official statistics, the statistical agencies need to decide according to strictly professional considerations, including scientific principles and professional ethics, on the methods and procedures for the collection, processing, storage, and presentation of statistical data.”*

Motivation for and explanation of the principle:

- a) Public trust in statistics relies heavily on the strict adherence by producers of official statistics to scientific principles and independence from any undue political and external influence.
- b) Producers of official statistics should be free from conflicts of interest that might be generated through the assignment of non-statistical tasks, or certain statistical tasks outside official statistics, notably with respect to the principles of impartiality and confidentiality.

Compliance criteria:

- a) The independence of the producers of official statistics from political and other external interference in developing, producing and disseminating statistics should be specified in law both for the NSO⁴ and other producers of official statistics, and be associated in the law with appropriate institutional safeguards.
- b) Staff and statistical experts within the national system of official statistics should follow and respect professional ethics⁵. Laws, regulations, and other mechanisms should reinforce adherence to scientific principles and professional ethics.
- c) The head of an NSO and, where appropriate, the heads of any other statistical authorities should have sufficiently high hierarchical standing to ensure senior-level access to policy authorities and public administrative bodies. They should be of the highest professional calibre.
- d) The head of an NSO and, where appropriate, the heads of any other statistical authorities, should have the final responsibility for ensuring that statistics are developed, produced and disseminated in an independent manner. This covers decisions on the development, production, and dissemination of statistics, including the selection of data sources, concepts, definitions, methods and classifications to be used, and the timing and content of all forms of dissemination.
- e) The head of an NSO and, where appropriate, the heads of any other producers of official statistics, should have the sole responsibility for deciding on statistical methods, standards and procedure and the timing of statistical releases.
- f) The statistical work programmes should be published, and periodic reports should describe progress made.

⁴ NSO means National statistical office which is the main national office producing official statistics and normally coordinating the national statistical system. In some countries it might be called national statistical institute, central bureau of statistics, central statistical office, or other names.

⁵ For further discussion of professional ethics see the ISI declaration in Chapter 3.3.

- g) The appointment of the head of an NSO and, where appropriate, the heads of any other statistical authorities, should be based on professional competence only; and not based on political considerations. The reasons on which basis the incumbency can be terminated should be specified in the legal framework. These cannot include reasons compromising professional or scientific independence.

3.2.3 Principle 3 - Accountability and transparency

Principle 3 states that *“To facilitate a correct interpretation of the data, the statistical agencies are to present information according to scientific standards on the sources, methods and procedures of the statistics.”*

Motivation for and explanation of the principle:

- a) The objective is to guarantee user access to necessary information and support the interpretation, the characteristics and quality of official statistics by describing and making available policies and practices surrounding statistical production and dissemination.

Compliance criteria:

- a) The head of an NSO and, where appropriate, the heads of any other statistical authorities, should guarantee user access to available statistical information including information on sources, methods and procedures used.
- b) Metadata and quality reports should be made readily available to users that will enable them to judge the fitness of use of the data.
- c) Producers of official statistics should continuously aim to introduce methodological improvements and systems to manage and improve the quality and transparency of statistics.
- d) Producers of official statistics should enhance the professional level of staff by encouraging them to attend training courses, to do analytical work, to publish scientific papers and to participate in seminars and conferences.
- e) To ensure accountability, programmes/strategies, as well as reports on the implementation of the statistical work, should be made public.

3.2.4 Principle 4 - Prevention of misuse

Principle 4 states that *“The statistical agencies are entitled to comment on erroneous interpretation and misuse of statistics.”*

Motivation for and explanation of the principle:

- a) Incorrect and misleading use of official statistics can harm society, the business community, and the general trust in official statistics.
- b) Reactions to erroneous interpretation and misuse of official statistics, especially in the media and by public users, are essential to ensure that trust in statistics is maintained and thereby improving the use and understanding of official statistics.
- c) Educating users on the correct interpretation of official statistics is also crucial.

Compliance criteria:

- a) Producers of official statistics should comment publicly on statistical issues, including criticisms and misuse of statistics by users.
- b) Producers of official statistics should develop training material and programmes to educate users on the use and correct interpretation of official statistics.

3.2.5 Principle 5 - Sources of official statistics

Principle 5 states that *“Data for statistical purposes may be drawn from all types of sources, be they statistical surveys or administrative records. Statistical agencies are to choose the source with regard to quality, timeliness, costs and the burden on respondents.”*

Motivation for and explanation of the principle:

- a) To produce official statistics is a costly and labour-intensive task for statistical offices as well as for respondents. Therefore, statisticians should apply methods in the least intrusive way and choose sources considering data quality, cost-efficiency and response burden.

Compliance criteria:

- a) The mandate of the statistical authorities to collect information for the development, production and dissemination of official statistics should be specified in law.
- b) The statistical authorities should be allowed by law to access and collect data for statistical purposes from all public and private data sources and to process such data according to statistical definitions and classifications, and to combine data from different sources.
- c) Based on legislation, the statistical authorities should compel response to specific statistical surveys and distinguish between mandatory items/questions (that might include the possibility to issue administrative fines) and non-mandatory ones.

3.2.6 Principle 6 - Confidentiality

Principle 6 states that *“Individual data collected by statistical agencies for statistical compilation, whether they refer to natural or legal persons, are to be strictly confidential and used exclusively for statistical purposes.”*

Motivation for and explanation of the principle:

- a) A fundamental requirement for official statistics is public confidence and acceptance. To maintain respondents' trust, it is the utmost concern of official statistics to safeguard the privacy of data providers (like individuals, households or enterprises) by assuring that no data, whatever their origin, are disseminated that might be traced back to an identifiable person or business.

Compliance criteria:

- a) Clear provisions should be laid down in the statistical law and national policies to ensure the strict statistical confidentiality of statistical data and its exclusive use for statistical purposes.

- b) The legislation and/or policy should absolutely guarantee:
 - The privacy of data providers (individuals, households, enterprises and other respondents) and the confidentiality of the information about them.
 - The security of information received from all data providers during the whole production process.
 - The exclusive use for statistical purposes of all data in the statistical system that concerns natural or legal persons, whatever their origin.
- c) Confidentiality protection should be implemented at each level of the statistical process – from the preparation of surveys up to the dissemination of statistical products.
- d) Penalties should be laid down in the statistical law and/or other legal provisions for any persons (staff or other persons) who wilfully breach the statistical confidentiality, leading to confidential data disclosure.
- e) Staff of producers of official statistics should upon appointment sign a legally binding confidentiality pledge. The same applies to third parties who, due to any activity performed within the scope of the NSS, have access to confidential data.
- f) Guidelines and instructions on the protection of statistical confidentiality should be provided to staff.
- g) The confidentiality policy should be made known and explained to the public.
- h) Physical, technological and organizational provisions should be in place to protect the security and integrity of statistical databases. Strict protocols should apply to users accessing statistical microdata for research purposes.

3.2.7 Principle 7 - Legislation

Principle 7 states that *“The laws, regulations and measures under which the statistical systems operate are to be made public.”*

Motivation for and explanation of the principle:

- a) Updated and proper legislation is critical to the effective performance of a national statistical system (see Chapter 3.4 - *Legislative Frameworks* for further discussion of legislation).
- b) Transparency of legislation, rules and measures pertaining to the operation of the statistical system is a precondition for maintaining trust in official statistics.

Compliance criteria:

- a) The provisions of a statistical law should cover all phases of developing, producing, disseminating and communicating official statistics, and apply to all data collected or obtained for statistical purposes.
- b) Public availability and full transparency of laws, regulations, and measures under which a national statistical system operates is a precondition for enforcing the laws, regulations and measures among stakeholders.

3.2.8 Principle 8 - National coordination

Principle 8 states that *“Coordination among statistical agencies within countries is essential to achieve consistency and efficiency in the statistical system.”*

Motivation for and explanation of the principle:

- a) Coordination of statistical activities is necessary to avoid duplication of work, data gaps, conflicting terminology and the dissemination of conflicting results, no matter what the organizational arrangements are for producing national statistics.
- b) Coordination is also necessary to minimize the reporting burden of respondents and to facilitate the integration of data from different sources using statistical standards.

Compliance criteria:

- a) The mandate/power to coordinate the statistical system should be specified in law.
- b) Necessary mechanisms for coordination should be implemented.
- c) The national coordinating body, most often the NSO, should effectively coordinate statistical activities within the NSS and thereby improve the consistency and efficiency of the statistical system.
- d) Exchange of technical knowledge, including training courses and workshops for members of the system, can support the use of common conceptual framework, processes and appropriate statistical methods.
- e) When standards are generated for use by the producers of official statistics, control mechanisms for implementing them should be established.

3.2.9 Principle 9 - Use of international standards

Principle 9 states that *“The use by statistical agencies in each country of international concepts, classifications and methods promotes the consistency and efficiency of statistical systems at all official levels.”*

Motivation for and explanation of the principle:

- a) Use of international standards enhances quality, comparability and usefulness of national statistics.
- b) Comparability is an essential dimension of quality, and non-comparable statistics lose a lot of their utility and value for the users.
- c) Use of common standards improves efficiency, both within individual agencies, and across the whole system of official statistics.

Compliance criteria:

- a) The obligation to use international concepts, classifications and methods for developing, producing, and disseminating official statistics should be specified in law and monitored throughout the statistical system.
- b) Use of international concepts, classifications and methods should be promoted in the national statistical system.

3.2.10 Principle 10 - International cooperation

Principle 10 states that “*Bilateral and multilateral cooperation in statistics contributes to improving systems of official statistics in all countries.*”

Motivation for and explanation of the principle:

- a) An essential requirement to develop high-quality statistics is to share challenges, lessons learned and best practices between producers of official statistics from different countries.
- b) International cooperation should contribute to the development of national statistical capacities. Active international engagement, including capacity building projects, has a positive impact on the image of the NSO and may have an impact on domestic trust in the NSO of both sides (beneficiary and donor).
- c) In general, international cooperation should be a win-win situation for both partners of the cooperation as partnerships should be based on finding joint solutions for challenges and tasks.

Compliance criteria:

- a) The NSO, and when relevant, other statistical agencies, should actively participate in the main international discussion forums pertaining to statistics, such as the United Nations Statistical Commission, to ensure continuous improvement of statistics at the international level.

3.3. Other principles practices and guidelines

This section describes a number of other international principles and guidelines.

3.3.1 A Human rights-based approach to data

[A Human Rights-Based Approach to Data](#) produced by the UN Office of the High Commissioner for Human Rights focuses on the following principles. Some of these principles overlap with the UN Fundamental Principles, whereas others provide some additional perspectives.

- a) **Participation:** Participation of relevant population groups in data collection exercises, including planning, data collection, dissemination and analysis of data.
- b) **Data disaggregation:** Disaggregation of data allows users to compare population groups and understand specific groups' situations. Disaggregation requires that data on relevant characteristics are collected.
- c) **Self-identification:** For the purposes of data collection, populations of interest should be self-defining. Individuals should have the option to disclose or withhold information about their personal characteristics.
- d) **Transparency:** Data collectors should provide clear, openly accessible information about their operations, including research design and data collection methodology. Data collected by State agencies should be openly accessible to the public.

- e) **Privacy:** Data disclosed to data collectors should be protected and kept private, and confidentiality of individuals' responses and personal information should be maintained.
- f) **Accountability:** Data collectors are accountable for upholding human rights in their operations, and data should be used to hold states and other actors to account on human rights issues.

3.3.2 IMF standards for data dissemination

The IMF has taken steps to enhance transparency and openness of statistics of member countries, including setting voluntary standards for dissemination of economic and financial data in the [IMF Standards for Data Dissemination](#). The Special Data Dissemination Standard (SDDS) was established in 1996 to guide members that have, or might seek, access to international capital markets in providing their economic and financial data to the public. The General Data Dissemination System (GDDS) was established in 1997 for member countries with less developed statistical systems as a framework for evaluating their needs for data improvement and setting priorities. In 2012, the SDDS Plus was created as an upper tier of the IMF's Data Standards Initiatives to help address data gaps identified during the global financial crisis. In 2015 the enhanced GDDS (e-GDDS) replaced the GDDS. More than 97 per cent of IMF member countries participate in the e-GDDS, SDDS, or SDDS Plus.

3.3.3 ISI Declaration on professional ethics

[The International Statistics Institute \(ISI\)](#) has issued a [Declaration on Professional Ethics](#), which sets out the professional values and principles that should govern statisticians' work in general. The Declaration is also relevant for official statistics. It is fully in line with the UNFPOS and also brings in important ethical perspectives. The values and principles are as follows:

- a) Professional values:
 - Respect;
 - Professionalism;
 - Truthfulness and integrity.
- b) Ethical principles:
 - Pursuing objectivity;
 - Clarifying obligations and roles;
 - Assessing alternatives impartially;
 - Conflicting interests;
 - Avoiding pre-empted outcomes;
 - Guarding privileged information;
 - Exhibiting professional competence;
 - Maintaining confidence in statistics;
 - Exposing and reviewing methods and findings;

- Communicating ethical principles;
- Bearing responsibility for the integrity of the discipline;
- Protecting the interests of subjects.

3.3.4 OECD recommendations on good statistical practice

The [Recommendation of the OECD Council on good statistical practice](#) is addressed to both members and non-members of the OECD. Most of these issues raised there are covered in the discussion of the UN Fundamental Principles. Some additional points are adequacy of human and financial resources and exploring innovative methods and alternative data sources. Quality of statistical outputs and processes is also more directly specified. The Recommendation covers the following topics:

- a) Legal and institutional framework;
- b) Professional independence;
- c) Adequacy of human and financial resources;
- d) Protect the privacy of data providers;
- e) Right to access administrative sources;
- f) Impartiality, objectivity and transparency;
- g) Quality of statistical outputs and processes;
- h) User-friendly data access and dissemination;
- i) Co-ordination of statistical activities;
- j) International co-operation;
- k) Exploring innovative methods and alternative data sources.

3.3.5 European Statistics Code of Practice

The [European Statistics Code of Practice](#) covers to a large extent the same main principles as the UN Fundamental Principles but with some more specification of issues related to professional independence, quality and dissemination. Adequacy of resources is also a specific principle. The principles described are the following:

- a) Institutional environment
 - Professional independence / Coordination and cooperation;
 - Mandate for data collection;
 - Adequacy of resources;
 - Commitment to quality;
 - Statistical confidentiality;
 - Impartiality and objectivity.
- b) Statistical processes

- Sound methodology;
 - Appropriate statistical procedures;
 - Non-excessive burden on respondents;
 - Cost-effectiveness.
- c) Statistical output
- Relevance;
 - Accuracy and reliability;
 - Timeliness and punctuality;
 - Coherence and comparability;
 - Accessibility and clarity.

3.3.6 Code of Good Practice in Statistics for Latin America and the Caribbean

The [Code of Good Practice in Statistics for Latin America and the Caribbean](#) approved in 2011 at the sixth meeting of the Statistical Commission of the Americas of the Economic Commission for Latin America and the Caribbean, follows to a large extent the headings and the indicators of the European Statistics Code of Practice.

3.3.7 ASEAN Community Statistical System (ACSS) Code of Practice

The [ACSS Code of Practice](#) as adopted by the ACSS Committee at its 2nd Session in Siem Reap, Cambodia, in 2012, is also consistent with the UN Fundamental Principles of Official statistics and comprises eight principles under three main headings:

- a) Institutional Environment
- Mandate for data collection;
 - Professionalism & integrity;
 - Confidentiality;
 - Accountability;
 - Statistical cooperation & coordination.
- b) Statistical Process
- Cost-effectiveness;
 - Reduced respondent burden.
- c) Statistical Output
- Commitment to quality (relevance, reliability, timeliness, comparability & accessibility).

3.3.8 African Charter on Statistics

The [African Charter on Statistics](#) was adopted by the African Union Commission in 2009. The Charter is based on the UN Fundamental Principles and comprises the following main headings:

- a) Professional independence;
- b) Quality;
- c) Mandate for data collection and resources;
- d) Dissemination;
- e) Protection of individual data, information resources and respondents;
- f) Coordination and cooperation.

3.3.9 CARICOM'S Good Statistical Practices

[CARICOM'S Statistics Code of Practice](#), adopted by the Standing Committee of Caribbean Statisticians (SCCS) in 2011, is modelled after the European Code; It has 15 principles under three main headings: i) Institutional Environment, ii) Statistical Processes, and iii) Statistical Output and 78 indicators.

3.3.10 Principles and Practices for a Federal Statistical Agency

The [Principles and Practices for a Federal Statistical Agency](#) include four principles and thirteen practices. A number of these principles and practices overlap with the UN Fundamental Principles, whereas others provide some additional perspectives.

The four Principles are:

- a) Relevance to policy issues;
- b) Credibility among data users;
- c) Trust among data providers;
- d) Independence from political and other undue external influence.

The thirteen Practices are:

- a) A clearly defined and well-accepted mission;
- b) Necessary authority to protect independence;
- c) Use of multiple data sources for statistics that meet user needs;
- d) Openness about sources and limitations of the data provided;
- e) Wide dissemination of data;
- f) Cooperation with data users;
- g) Respect for the privacy and autonomy of data providers;
- h) Protection of the confidentiality of data providers' information;
- i) Commitment to quality and professional standards of practice;

- j) An active research program;
- k) Professional advancement of staff;
- l) A strong internal and external evaluation program;
- m) Coordination and collaboration with other statistical agencies.

3.4 Legislative frameworks

Well-developed national legislation regulating the production of official statistics is necessary to ensure the implementation of the principles described in Chapter 3.2 - *UN Fundamental Principles of Official Statistics*. The overall target is to ensure the production of official statistics with a high level of quality, meeting users' needs and being trusted by users and other stakeholders.

As legal structures and traditions vary between countries, legal frameworks for the production of official statistics have to be adapted to the national context.

3.4.1 Types of legislative frameworks

A successful national statistical system should have the flexibility to respond to changing conditions and circumstances without needing to change its primary legislation frequently. A flexible legal environment minimizes legislation changes and the associated risk of political interference with the legislation when it is opened for revision.

The [Guidance on modernising statistical legislation, UNECE 2018](#) discusses the issue of flexibility versus stability in section 3C6.

One characteristic of a flexible legislative framework is developing and maintaining definitions, methodologies and standards for official statistics without the need to amend legislation when they change. It may even be better not to list the different producers of official statistics belonging to the NSS in the statistical law, but to regulate only the procedure for their identification and criteria for which products should be part of the national statistical programme. Similarly, it is advisable to describe the statistical domains and outputs of the NSO/NSS in general terms rather than listing them one by one. Such lists may be understood to be complete and preclude abandoning redundant statistics and prevent the development of new statistics.

A statistical system that on one side ensures the stability of key principles and structures with the necessary flexibility might combine several legal instruments:

- a) **The national law on official statistics:** the core of the legal system would be the national law on official statistics. This should, in principle, translate the UNFPOS into the national legal and regulatory framework. It is advised to keep the statistical law rather general and leave the implementation details for the by-laws (e.g. regulations, orders and decrees). This law would typically have to be developed through a well-prepared process involving different stakeholders and be endorsed by the legislator (e.g. Parliament). Chapter 3.4.3 - *The content and structure of a national statistical law* will treat this in more detail.
- b) **Regulations, orders and decrees:** Implementing the law on official statistics might be made through regulations, orders and decrees. These decisions might regulate some

issues more in detail or cover items of a shifting or temporary character. This might be related to the NSS composition, structure and content of the statistical programmes and organizational issues. The power of decision might be delegated to the President, the Prime Minister, a line minister or sometimes the head of the NSS/chief statistician.

- c) **Guidelines and handbooks:** non-formal guidelines and handbooks could clarify in more detail technical or methodological issues to apply across the entire NSS. Such guidelines and handbooks, endorsed by the chief statistician, may often not have legal status but can be updated more frequently⁶.

For instance, a national code of practice might have its basis in the national law on official statistics but then be developed and updated through regulations, orders or decrees, if needed. However, implementation guidelines of the code could be endorsed by the chief statistician in consultation with other producers of official statistics.

3.4.2 The relationship between legislation in the field of official statistics and other legislation

The legislation in the field of official statistics may have cross-linkages with the other legislation not directly related to statistics. Other legislation might conflict with the statistical legislation, with the risk of hindering the coordination and functioning of the NSS. Thus, when revising or updating the statistical legislation, these cross-linkages must be carefully taken care of.

The [Guidance on modernising statistical legislation](#), UNECE 2018 provides in Chapter 6C a detailed discussion of many of the issues to be considered. The document recommends that the statistical law prioritise the safeguard of the UNFPOS, avoiding, in particular, any breaches with the principle of confidentiality and professional independence of statistical authorities. In the proposed common elements of statistical legislation, it is thus, stated that:

“Any other legal act referring to official statistics shall be adapted to comply with the statistical law. In case of conflicting legislation, the provisions of the statistical law or another act based on or mentioned in the statistical law shall apply.”

The document further identifies legislation that could be referred to in the statistical legislation:

- a) **Government Act:** this describes the position of the NSO, the chief statistician, legislative procedures etc.;
- b) **Information Security Act:** this describes the information security procedures etc. relevant for the NSO;
- c) **Criminal code:** this provides a list of illegal acts in a specific country recognized as criminal offence etc.;
- d) **Minor Offences Act:** this covers the fundamental principles of minor offence proceedings that the statistical offices should follow when applying possible sanctions.

⁶ chief statistician is the head of the NSO and is also likely to be head of the NSS. Also, often called Director General, President, Chief Executive Officer or equivalent.

Furthermore, statistical legislation might have an impact on the following legal acts:

- a) **Public Servants Act:** The Public Servants Act could conflict with the appointment procedure and the mandate of statistical staff. To comply with the principle of professional independence of statistical production, the appointment procedure, the mandate and reasons for dismissal of the Head of statistical office should be defined in the statistical legislation, to avoid suspicion of political interference.
- b) **Public Finance Act:** The budgetary provisions of the Public Finance Act may affect the process for budget allocation to the NSO and the statistical system. Thus, the NSO and other partners should be directly involved in the planning and budgetary process.
- c) **Legal acts governing administrative or other data sources:** e.g. registers, Big Data, privately held databases. Statistical legislation typically should give a clear mandate for access to data from all administrative data sources and existing registers held by public authorities and private data holders.

However, there might be cases where legislation regarding the protection of individual data in administrative sources do not allow the transmission of these data, with identifier to producers of official statistics, even if the statistical law provides a legal basis for this transmission. In this case, the option would be to strengthen the statistical law provision allowing producers of official statistics to access administrative data at micro-level and ensure when legal acts governing data sources are revised to allow this access explicitly for statistical purposes.

The same issue might arise regarding access to business data and other private parties' databases containing personal data. In the future, to be able to use data from these sources, changes in relevant legislation and necessary agreements on appropriate usage and pricing might be necessary.

- d) **Electronic Communication Act:** The Electronic Communication Act may include an explicit ban of allowing access to electronic communication data for statistical or any other purpose, except for clearly defined purposes, such as national security, defence of public security. As data generated in publicly available electronic communications networks could be instrumental for the production of official statistics, necessary amendments in relevant legislation could be foreseen.
- e) **Privacy and Data Protection Act:** The Privacy and Data Protection Act regulates the protection of individuals with regard to the processing and sharing of personal data. Official statistics are often provided exemptions from the right of persons to review, correct or remove their data because data held by statistical authorities are not used to make any decisions about individuals. This exemption should also be part of the statistical legislation.

One issue, related to this, is the full protection of individual data obtained exclusively for statistical production that should be ensured in the statistical legislation. These data should not be used for any investigation, surveillance, legal proceedings, administrative decision making or other similar handling of matters concerning a natural or a legal person by any authorities or international organizations. Thus, full protection of data within the statistical system should be provided, even if some other national laws might open up for the possibility also to access such data.

- f) **Archiving Act:** The Archiving Act provides for the procedure and archiving of data of national interest. The Act applies when statistical data become part of the public archive and provide obligations for electronic archiving. There could be some conflicting regulation between the statistical and archiving legislation, for instance, about national interest and what is not, who could be the data's warden and how this data should be archived, including the technological environment. Divergences should be reviewed when revising either legislation.
- g) **Public Information Access/ Freedom of Information Act:** The Public Information Access Act governs the procedure which ensures everyone free access to and right to reuse public information held by state bodies, local government bodies, public agencies, public funds and other entities of public law, public powers holders and public service contractors. As defined in statistical legislation, confidential data should be an exemption to the general rule of free access to the data held by the government bodies.

The Public Information Access Act should define confidential statistical data referred to in the statistical law to avoid conflicting legislation. This access for statistical purposes should be treated as an exemption in the Public Information Access Act.

- h) **Census legislation in relation to the statistical legislation:** The preparation and conduct of a population and housing census, regardless of the methodology, requires a legal basis, be it the general regulations of the statistical law, a specific article in the statistical law or a dedicated census act. If such an act exists, the relationship between a national law on official statistics and specific census act should be harmonised to ensure consistency related to mandate, handling of confidentiality, dissemination, etc.

The Guidance on modernising statistical legislation also discusses some legal aspects related to censuses in Chapter 8C. It is mentioned that this legislation should typically regulate the following issues related to censuses:

- Funds allocated for the overall census operations;
 - General scope and timing of the census;
 - Division of work, responsibilities and rights of the participating organizations;
 - Obligation for citizens to provide complete and accurate census information, and of the enumerator to record the responses faithfully, and the sanctions and penalties to be imposed for failure to comply;
 - Access, utilization and linkage of registers to produce census data or to support field operations.
 - Confidentiality of individual information collected in the census operations, and sanctions for confidentiality breaches.
- i) **Legislation regulating the activity of other producers of official statistics:** the laws and rules regulating the activity of other producers of official statistics in MDAs and other public authorities such as the Central Bank, might not be in line with the UNFPOS and the statistical.

The Guidance on modernising statistical legislation discusses in Chapter 8D the collaboration between NSOs and the Central Banks, including legislative issues. It also

emphasizes that the national statistical law should apply to all activities related to official statistics and carried out by any producer of official statistics. It is stressed that macroeconomic, financial and monetary statistics produced within the Central Bank, are key official statistics. Thus, it is proposed that the entities of Central Banks that produce official statistics should be recognized as statistical authorities and be considered part of the NSS. In return, as members of the NSS, these entities must be professionally independent of the rest of their respective organizations, and their activities follow the national statistical law and the UNFPOS. To adapt to this situation, an amendment of these laws might be necessary.

3.4.3 The content and structure of a national statistical law

Several efforts have been made to propose a model of national laws on official statistics. These include the following:

- a) The annex of the previous [Handbook of Statistical organization](#);
- b) The [Model Bill on Statistics in the Caribbean region](#) that addresses the specificities of small island developing states in that region;
- c) The [Model Statistics Law in the Context of the African Charter on Statistics](#) is also an example aiming at assisting countries that would revise their legislation in that region.

The [Guidance on modernising statistical legislation](#), UNECE 2018 is based on and extends the [Generic Law on Official Statistics](#) (GLOS) developed by UNECE in cooperation with EFTA, Eurostat, with the support of the United Nations Statistics Division. The Conference of European Statisticians reviewed the Guidance at its plenary session, 18-20 June 2018, endorsed the Guidance with some amendments and supported the proposals for further work including reviewing the Guidance in five years. The [Generic Law on Official Statistics for Latin America](#) (GLOS-LA) was adopted in 2019 by the Statistical Conference of the Americas of the Economic Commission for Latin America and the Caribbean at its tenth meeting. Its purpose is to provide a regional model for Latin American countries interested in formulating or reformulating the legal basis for the functioning of their NSSs and the production of official statistics. The GLOS-LA is an adaptation of the GLOS to the specific Latin American context.

The rest of this chapter is mainly based on these latest generic laws and guidance.

3.4.3.1 The main headings of a statistical law

The Guidance on modernising statistical legislation suggests the following headings in a law on official statistics:

- a) Objective and scope of the law;
- b) Main principles and definitions of official statistics;
- c) Organization of the national statistical system;
- d) Statistical advisory council and other advisory bodies;
- e) Coordination of the national statistical system and statistical programmes;
- f) Data collection;
- g) Statistical confidentiality;

- h) Quality of official statistics;
- i) Dissemination and communication;
- j) Statistical services;
- k) International cooperation;
- l) Infringements;
- m) Relationship to other legislation.

3.4.3.2 Some main issues to be covered in a statistical law

Some of the key issues to be covered in a statistical law are as follows:

- a) The definition of official statistics, to be distinguished from administrative information, and in compliance with the UNFPOS;
- b) Definitions of the key concepts used in the law and necessary for the interpretation of the legal text, such as statistical survey, administrative data, statistical unit, individual data etc.;
- c) Criteria for identifying the national statistical system: who are the producers of official statistics;
- d) The tasks for the NSO and the chief statistician, especially in relation to coordination and planning;
- e) The process for developing multiannual and annual programs, user consultations, the involvement of the Statistical Advisory Council, decision process etc.;
- f) The mandate for data collection ensuring access to administrative data and other data sources;
- g) The principles and procedures for handling confidential statistical data, securing exclusive use for statistical use of individual data;
- h) Quality criteria and mechanisms/procedures for ensuring high quality;
- i) Principles for dissemination securing equal treatment of users and user-friendly dissemination.

3.5. Certification and branding of official statistics

3.5.1 Certification

All statistics produced by national authorities might not comply with the UNFPOS and have the quality necessary to be termed official statistics. Such ‘unofficial’ statistics will continue to be produced outside statistical legislation and, in many cases, made public by the competent authorities that are not producers of official statistics. In some cases, statistics made public by a producer of official statistics may also not fully comply with the UNFPOS. Thus, it is useful and good practise to implement mechanisms that differentiate between statistics which are considered official from those which are not, regardless of whether they originated from a producer of official statistics.

Typically, such mechanisms should be based on clear criteria and principles, based on the national law on official statistics and/or a national code of practice, based on transparent criteria and in line with available international principles. Multiannual and annual work programmes for official statistics will generally serve as a basis for certifying producers and products considered official statistics.

Links to guidelines, best practices and examples:

- a) **Statistics Lithuania:** The activity of Statistics Lithuania is guided by a specific [regulation](#) approved by the Government of the Republic of Lithuania. In line with its responsibility, Statistics Lithuania applies the following criteria, which are assessed before granting the status of other producer of official statistics and before including statistics into the Official Statistics Work Programme:

- The institution must be a public authority;
- The institution must have been formally given the responsibility to produce specific statistics at the national level; the responsibility to produce specific statistics has to be laid down in legislation;
- The institution has a responsibility to produce specific statistics, for instance, those required by EU legislation;
- The institution has the capability and commitment to comply with the European Statistics Code of Practice.

Statistics Lithuania signs bilateral agreements with other producers of official statistics, which allow gaining personal commitment of the top management of the producers of official statistics and ensuring awareness and execution of the European Statistics Code of Practice. The agreements include a commitment by the producers of official statistics to:

- Adhere to the principles of the European Statistics Code of Practice and to establish measures for the implementation of the provisions;
- Provide information to Statistics Lithuania for the Official Statistics Work Programme and to report on its implementation;
- Harmonize statistical data collection questionnaires with Statistics Lithuania;
- Harmonize statistical methodologies with Statistics Lithuania;
- Monitor and assess labour and other costs incurred by respondents in relation to statistical data collection and implement their reduction measures;
- Ensure the confidentiality of statistical data collected for official statistical purposes;
- Ensure the accessibility of statistical indicators and metadata on the Official Statistics Portal;
- Provide statistical data to Eurostat according to agreed schedules;
- Cooperate with Statistics Lithuania on the development of official statistics.


- b) **Guest working paper by Steve MacFeely and Bojan Nasta:** an approach to certify unofficial statistics, especially for the use in the context of Sustainable Development Goals (SDG), is discussed in “[You say you want a \[data\] Revolution](#)”: A proposal to use unofficial statistics for the SDG Global Indicator Framework

3.5.2 Branding of official statistics

The concept of ‘branding of official statistics’ is not used very often. In most cases, the focus is on ensuring the high quality of official statistics. This will be discussed further in Chapter 7 - *Quality Management*.

It should also be noted that the perception of the NSO and other producers of official statistics as independent and professional organizations is a critical aspect in providing a positive image of official statistics as having high quality.

In this section, some examples will show the possibility to design some statistics as official by using a specific logo, generally based on formal procedures.

- a) **The UK Statistics Authority:** The [UK Statistics Authority](#) differentiates between three types of statistics (called ‘official statistics’ in the UK context) produced by public bodies:
- National Statistics (which in the terminology of this Handbook will be “official statistics”), which have been assessed by the Office for Statistics Regulation as fully compliant with the (UK) Code of Practice for Official Statistics. For a complete list of all National Statistics, see the list maintained by the Office for Statistics Regulation. Accredited National Statistics use the following quality mark:
- 
- Experimental statistics, which are newly developed or innovative statistics. These are published so that users and stakeholders can be involved in assessing their suitability and quality at an early stage.
 - Statistics that have not been assessed as fully compliant with the (UK) Code of Practice. A register of the designated statistics is maintained by the Office for Statistics Regulation.
- b) **SCB Sweden:** [Statistics Sweden](#) uses a label for Official Statistics when published. There are some general requirements for a statistical product to be given that label, whether produced by Statistics Sweden or by one of the many other authorities producing official statistics.

According to the law (Official Statistics Act (2001:99) and Official Statistics Ordinance (2001:100)), official statistics must be for general information, investigation and research. The statistics are to be objective and made available to the public. Statistics Sweden is responsible for coordinating the system for official statistics. It is further stated that when official statistics are published, they are to be labelled as Official Statistics of Sweden or have the symbol:



- c) **Official Statistics Authority France:** The [Official Statistics Authority \(ASP\)](#), has been put in place, linked to the [French Statistical Office, INSEE](#), to ensure the independence and the quality of official statistics and to oversee the compliance with international and national codes of practice.

The term "official statistics" (statistique publique) includes all material generated by statistical surveys, as specified in the list determined every year in a ruling by the Ministry for the Economy, and the use of data collected by government administrations, public or private bodies with a public service role for purposes of general information.



The design, production and dissemination of official statistics are conducted with full professional independence by the official statistical system, and by producers approved by the National Council for Statistical Information (CNIS) or the Official Statistics Authority (ASP).

- d) **Irish Statistical System Code of Practice:** in [Ireland](#), a code of practice for compilers of official statistics in the Irish Statistical System (ISS) has been introduced to assess national official statistics that are not part of European Statistics. The CSO director develops a list of official statistics with each public body that produces statistics within the ISS. These statistics will be assessed against the Code. Only those statistics that are assessed as compliant with the Irish Statistical System Code of Practice (ISSCoP) will be designated as official statistics and may be published under the ISSCoP Logo.

Chapter 4. The National Statistical System

4.1. Introduction

The composition, structure, and governance modalities of a national statistical system (NSS) vary widely between countries. In many cases, this reflects the history of a specific country; how official statistics have become a regular function of the various parts of a national administration; how national statistical offices (NSOs), that have official statistics as their core function have been established; and how the various organizations engaged in the official statistics of a country have evolved to respond to user needs, technological changes, as well as to institutional changes.

For this reason, international standards leave the decision on how to organize official statistics to each country, and rather concentrate on standards for outputs, methods, definitions and terminology, and on the principles that govern all activities of official statistics (see Chapter 3 - *The Basis of Official Statistics*). This chapter examines those organizational issues for NSSs that can be derived from the principles and the definition of official statistics and how these principles are translated into institutional safeguards for the various actors in official statistics. In addition, cumulative experience in countries has allowed the international community of professional statisticians to derive lessons on both efficiency and credibility of the various organizational arrangements. These are presented in this chapter, along with their respective advantages and disadvantages.

This chapter aims to provide indications rather than recommendations, unless there is a clear basis such as The [Generic Law on Official Statistics](#) (GLOS) adopted in 2016 by the Conference of European Statisticians⁷, the [Generic Law on Official Statistics for Latin America](#) (GLOS-LA) adopted in 2019 by the Statistical Conference of the Americas, and the [Guidance on modernising statistical legislation](#), UNECE 2018.

The title of this chapter includes the term "*system*". In the context of this handbook, a national statistical system is composed of all public institutions that work on official statistics, entirely as is the case for most NSOs or partly as applies to many ministries or government departments. Ideally, the NSS should meet the following criteria:

- a) it has a common legal base: This would be the national law on official statistics (the statistical law), which applies to the NSO and all public institutions that are part of the NSS;
- b) the statistical law and lower-level legislation based on this law (together referred to as statistical legislation) are based on the [UN Fundamental Principles of Official Statistics](#) (UNFPOS) and contain the rules and modalities on how this system is operated in accordance with the UNFPOS and how it is governed. Because of the principle on

⁷ The GLOS is a model statistical law in English, French and Russian, originally developed under the United Nations Development Account Project for the countries of Eastern Europe, Caucasus and Central Asia. It has been translated into Spanish and Arabic and adapted by UNECLAC and UNESCWA to the regional contexts of Latin America and the Arab regions respectively.

professional independence, the rules of governance have to be specific for official statistics, and to a certain extent different from the rules of decision-making and governance that are generally applicable to the wider administration to which the statistical system belongs;

- c) the statistical law should oblige all producers of official statistics to apply the same set of standards, methods, and definitions based on international recommendations;
- d) as part of the rules of governance, the function of a leader of the entire NSS (hereafter called chief statistician) should be defined. The rules need to include provisions for appointment and termination of appointment specific to this role and necessary to ensure the chief statistician's professional independence. The explicit legal basis for a leader of the entire NSS is necessary because, in a hierarchically organized set-up such as a national administration, it is the only way to confer professional authority to the chief statistician that stretches beyond the organizational units of which he or she is the superior. Across countries, there are various titles for characterising this position, which is suited to the respective official language and national administrative structure.

Most countries have one organization for which the development, production and dissemination of official statistics is the core function. The names of this organization differ among countries; in this handbook and in many countries, it is termed the national statistical office (NSO).⁸ In general, the NSO is the main producer of official statistics (in reality, the share varies between almost 100% and less than 40%) and is responsible for major data collection and data processing activities for official statistics, including the population census.

Countries have found different ways of placing the NSO within their administrative structure and in a few cases as an autonomous agency outside the main branch of the executive. In most cases, the function of chief statistician is assigned to the head of the NSO. This chapter outlines the obligations and restrictions for the NSO and other producers in terms of institutional safeguards needed to meet the requirements of official statistics as laid down in UNFPOS. Other models of NSSs are also articulated in Chapter 4.3 - *Organization of national statistical systems*.

4.2 Structure of the national statistical system

4.2.1 Delimitation of the national statistical system

The NSS is composed of all organizations which produce official statistics and are a part of the public administration in a country. These are:

- a) the NSO as core producer;

⁸ Very large countries may feel the necessity to designate more than one organization for which official statistics is the core function. For example, this is the case with the US.

- b) other national producers. These are statistical departments⁹ or units of other organizations such as government departments/ministries or special agencies.¹⁰ In this handbook, the term *parent body* is used to designate the organization such as ministry or agency to which the statistical department or unit belongs.

Many countries lack a clear delimitation of the NSS. The NSS is often assumed to consist of those producers that are included in the annual or multi-annual statistical programmes. In some cases, there is an explicit enumeration of producers of official statistics in the statistical legislation. However, explicit criteria for being one of the other producers of official statistics and therefore being a member of the NSS are seldom defined.

The clear delimitation in terms of organizational units is recommended for the following reasons:

- a) **Confidentiality:** The confidentiality provisions of the statistical legislation should apply to all activities of official statistical and hence to all units that produce them. These provisions need to be strictly followed and cover the exclusive use for statistical purposes of individual data, whatever their origin, including data that were originally collected for administrative purposes. There is also a need to include the restriction on sharing individual data outside the system for any other use than statistics, e.g. for administrative purposes or administrative registers.
- b) **Professional independence:** Each producer of statistics within the NSS should be independent in professional issues (as defined in Chapter 3 - *The Basis of Official Statistics*) from any organizational unit outside the national statistical system, including parent bodies and bodies to which they report. Professional independence also extends to protection from any interference in professional issues from outside the administration.¹¹ Professional independence must be ensured in the statistical law itself but not at a lower level of legislation so that it cannot be curtailed or even abolished by the government.
- c) **Scope of legislation:** Statistical legislation should extend to the whole NSS as well as collection and utilisation of data by other administrative bodies that are subsequently used for the purposes of official statistics (see Chapter 4.2.2 - *Legal frameworks, obligations and restrictions*).
- d) **Users:** Anybody who accesses and/or reprocesses any data or statistics disseminated by the NSS, independently of the nature of use, is considered a user. Use of data and statistics can vary between simple re-dissemination of results, their inclusion in an internal report, or extended reprocessing of data using sophisticated statistical methods. The data or statistics could be used for internal purposes of the organization, with all or part of the

⁹ The term "department" is used here in a generic way as an organizational unit within a larger organization and does not imply a specific level of hierarchy.

¹⁰ There are cases where even organizations that have a basis in private rather than public law can be declared responsible for producing official statistics in a given subject area, if this is foreseen in the national statistical law. The condition is, however, that this organization is already existing, entrusted by law with a public function other than statistics (e.g. research) and receives public funds for this purpose, and can take over, based on the statistical legislation, the responsibility of producing official statistics in an area related to its main function.

¹¹ The relationship between producers of the same statistical system is part of the governance rules of the system, which may restrict the autonomy of individual producers through professional standards and procedures that are binding for the whole system, and through other prerogatives of the chief statistician (see Chapter 4.3.3)

results they produce made public under their own responsibility. Users engaged in the more elaborate type of using data from official statistics are sometimes distinguished from other users as *re-users*.

- e) **Quality of official statistics:** Delimitation of organizational units limits the application of the statistical legislation to those units that are recognised as producers of official statistics. Organizational units that do not produce official statistics and are outside the NSS are affected by the statistical legislation only in as much that explicit reference is made to them or their activities, e.g. as providers of administrative data, respondents in surveys, users, or in some instances decision-makers. This does not confer upon them the institutional quality of producers of official statistics and members of the NSS.

Therefore, it is crucial that the delimitation of the NSS in terms of organizational units covered is clear at any given moment and is transparent to the public. In the case of the other national producers, only a specific department of the parent body and not the parent body as a whole can be part of the statistical system, and therefore the list of members of the statistical system should show this degree of detail. Since such internal organizational arrangements vary frequently, it is recommended to include a list of organizational units in the statistical programmes (see Chapter 4.4.4 – *Annual and multi-annual planning and priority setting*) or, as recommended by the GLOS, in a lower-level legal act adopted by the government rather than directly in the statistical law itself. In whatever form such a list is adopted, the composition of the national statistical system should be easily accessible for users, e.g. through the websites of the NSO.

Statistical systems can sometimes be defined in a more encompassing sense where all stakeholders and all users are included. Since every person is a potential or actual user of official statistics, it is difficult to see the practical utility of including such a wide definition in a statistical law. The notion of a system does not imply that there are no relationships or transactions between units inside and outside the boundary. It implies only that the relationships and functions of those within the system have some unique characteristics compared to the units outside the system. In the definition that is used in this handbook, this is clearly the case, since the units within a national statistical system are bound by the UNFPOS, notably the provisions on confidentiality and professional independence, whereas this is not the case for the units outside the system. Over and above these unique characteristics of the insiders, the statistical legislation should cover the relationships between them and other stakeholders such as users, respondents, and administrative data providers.

4.2.2 Legal frameworks, obligations, and restrictions

There are several conditions that a producer of official statistics must fulfil in order to become part of the national statistical system. These conditions are mainly derived from the UNFPOS and are typically included in the statistical law. Any additional specific conditions need to be explicitly included in the law. The statistical legislation might have to define a process by which producers are certified (and decertified) as members of the statistical system.

The main criterion to be met by each producer of official statistics is whether it has the capability and willingness to fully and sustainably respect all UNFPOS, not least those on confidentiality and professional independence, and the other provisions of the statistical law. Other criteria include:

- a) **Regular production and dissemination of statistical products:** This covers official statistics for which the producer is fully accountable.
- b) **Freedom from conflicts of interest:** The statistical department in charge of the production has to be free of any conflicts of interest that may be created by parallel non-statistical tasks of the parent body, such as administrative decisions concerning individual persons or businesses or the maintenance of administrative registers. Combining simultaneous responsibility for such non-statistical activities and official statistics activities in a statistical department can undermine the commitment to use data exclusively for statistical purposes. A statistical department acting as producer of official statistics should not be seen as part of the policy-making branch of the parent body as this can undermine the credibility of impartiality. Neither should it act and be considered as part of the monitoring activities of the parent body. However, a producer of official statistics can carry out a limited range of statistical activities that do not qualify as official statistics because of their experimental, scenario-based, or internal nature¹².
- c) **Autonomy:** For its official statistics activities, the statistical department has to be autonomous from the rest of the parent body in terms of choice of methods, definitions and in the timing and content of all forms of dissemination (see Chapter 4.2.1 - *Delimitation of the national statistical system*), and this has to be accepted by the senior managers of the parent body.
- d) **Use of administrative data:** The statistical department should have the knowledge and the authority to make the necessary adaptations to data collected by the parent body for administrative purposes in order to render them as close as possible to concepts, definitions, and target universes of official statistics. This may involve:
 - estimating missing elements and eliminating statistical units that are not relevant from a statistical point of view,
 - combinations with other data sources,
 - using editing and imputation methods.

The results disseminated as official statistics are therefore in most cases different from a simple counting or adding up of the records of the original administrative transactions.

- e) **Quality management:** The statistical department has implemented or is willing to implement a process of quality management that is in line with the standards established for the whole statistical system (see Chapter 7 - *Quality Management*).

¹² If a producer of official statistics is engaged in these types of activities, it should limit its responsibility to statistical concepts and methods used and the quality of data, but leave the responsibility for assumptions about policies or conclusions in terms of policy actions to actors from outside the statistical system. Otherwise, the credibility of impartiality and independence may be at risk.

- f) **International participation:** The statistical department has the means to participate in international activities in official statistics relevant to its domain of responsibility and to implement any new statistical standards that may emerge at the international level.

Whether the conditions above are met in practice, both by producers other than the NSO that are part of the NSS and by other organizational units that seek to become members of it, should be regularly assessed. Such an assessment should take place as part of the NSO's task of preparing a multi-annual programme. (see Chapter 4.4.1 – *Annual and multi-annual statistical programmes*). An NSO should also be assessed against these criteria. This may be done through regular internal audits of the various departments in turn as part of its quality management. Occasional assessments of the NSO (or the national statistical system as a whole) by the international community of official statistics may also be organized. For this purpose, this community has developed instruments such as peer reviews or global assessments (see Chapter 4.2.5 - *Relationship between national and international statistical systems*). Such reviews are also a valid mechanism for the occasional assessment of other national producers by the NSO.

Many statistics published as part of activity reports of the various parts of the national administration are not designed to qualify as official statistics. If this type of output is the only statistical product, the relevant administration unit should not be considered a producer of official statistics. An organization may have an administrative data source that has a potential value as input into official statistics but not be willing to make the organizational changes and investment needed to ensure the respect of the provisions of the statistical legislation (including to separate statistical from administrative tasks). The task of converting these administrative data into official statistics should be assigned to the NSO or another producer of official statistics. In such cases, the organization responsible for collecting and processing the administrative data has to regularly transmit the data set to the NSO or another unit within the NSS. The NSO or the responsible national producer would then take over the responsibility for transforming these data into official statistics and disseminate them as such with a clear indication of the origin of the data sources used.¹³

The delimitation of the NSS is also necessary as it defines the scope of how statistical legislation is applied for any data collected on the basis of other legislation than the statistical law. When such data are imported into the statistical system, they become subject to the statistical law. Depending on the national legislation, notably concerning data protection, it may be advisable to include a provision in the statistical law such as article 15.3 of the GLOS so as make any change of legal frame explicit. This is also likely to reduce conflicts between confidentiality regulations in the statistical and other laws.

Some national statistical laws focus on the NSO and do not address the issue where there are several producers of official statistics, especially in small and developing countries. In such cases, the provisions in the law concerning data collection, production and dissemination, and the principles to be respected refer only to the NSO, leaving undefined the status of statistical products disseminated by other government bodies. In such cases, it is recommended that the law is changed and extended to all activities of official statistics irrespective of the producer.

¹³ In practice, situations can be found where the administrative body transmits to the NSO only aggregates, together with some metadata. However, a quality check by the NSO is only possible if the individual data are transmitted to the NSO as well. Otherwise, the administrative body acts as producer of official statistics within the national statistical system and would have to be certified accordingly; it may however use the NSO for the dissemination of its products.

If that is not feasible, it is recommended that the NSO reaches out to the other producers, seeking to convince them to follow the provisions of the law and the UNFPOS as concerns their activities related to official statistics.

4.2.3 The position of the Central Bank

In most countries, the statistical department of the Central Bank has the responsibility to produce official statistics in certain subject areas such as monetary and financial statistics or balance of payments statistics, as provided for in the law of the Central Bank. However, the Central Bank law is unlikely to include the same provisions on the principles of official statistics as the statistical law. Therefore, it is important to make sure that the official statistics for which the Central Bank is responsible are subject to the same (or at least equivalent) principles as contained in the national statistical law and the UNFPOS. Similarly, the statistical department of the Central Bank needs to be professionally independent of the top management of the Bank and a part of the NSS. Some countries have assigned the responsibility for producing the national accounts to the Central Bank. However, for such a widely accepted and powerful analytic system for economic, social, and demographic statistics, this is not a recommended practice (see Chapter 9 - *Analysis and Analytical Frameworks*).

It is recommended to explicitly mention the Central Bank in the statistical law, and not only in a lower-level legal act or in the statistical programme for statistical departments of ministries. The reason is that the Central Bank law normally states that it is independent of the government, which in some countries is interpreted as making it impossible for the statistical department of the Central Bank to be part of a national statistical system and to be bound by the provisions in law other than the Central Bank law.

An explicit statement in the statistical law can open up the possibility of including the statistical department of the Central Bank in the NSS and ensure that its activities on official statistics are in accordance with the UNFPOS. In this way, the official statistical activities of the Central Bank will be subject to the NSS-wide standards and to other provisions on coordinating official statistics. As an important user of official statistics, it will also ensure that the Central Bank has access to data that are available for statistical purposes within the NSS (see Chapter 4.5.5 - *Users access to confidential data for their own purposes*).

4.2.4 Relationship between national and sub-national statistical systems

One of the conditions for qualifying as national statistical system is a common legal base. For national systems, this common legal basis is the statistical law at national level, but countries differ in the status of sub-national statistical offices and their coverage by the national statistical law.

4.2.4.1 Sub-national statistical offices as units of the NSO

The simplest case of sub-national statistical offices in legal and organizational terms is regional statistical offices that are an integral part of the NSO and are, therefore, integrated into the national statistical system without being a separate member of this system. The role and functions of regional statistical offices that are subordinate to the NSO vary substantially between countries. Some NSOs have regional offices with identical functions throughout the territory of the country, sometimes at more than one layer. Many small countries do not have

regional offices but operate from a single location, usually, the capital. Other countries have a few offices in other places than the headquarters, but with responsibilities for certain nation-wide activities assigned to them. In some countries, the statistical law requires the NSO to set up regional offices, but that may be it is essential that such statistical sub-offices have only one line of reporting, that being to the headquarters of the NSO, and do not have a second line of reporting to a senior administrator of the local or regional entity (as used to be the case in some countries with centrally planned economies).

4.2.4.2 Organizational models in federal countries and countries with regions that have a special status

Different organizational and legal solutions may exist in countries composed of states that form a federation or confederation, or countries with regions that have some degree of autonomy guaranteed by the constitution or by an international agreement. A comprehensive NSS can be set up in federally organized countries if the federal and state level agree that an NSS should meet the information needs also of state administrations.¹⁴ The statistical law would then not only be a federal statistical law but a true national statistical law. The same holds for the NSO in terms of its mandate, although in most cases it will remain a part of the federal executive structure and mainly financed by the federal budget. In such cases, the role of the states in the governance of the NSS will have to be clearly spelt out in the statistical law. If the federal and state level can agree to such a solution, and if it is constitutionally possible, this can be an efficient set-up, independent of the number of states. However, it implies a high degree of functional centralisation in the NSO. Such an NSO may have, as part of its internal organization, regional offices or branches.

In some federal countries, such a national solution for official statistics would be possible only if it were explicitly foreseen in the constitution, which is not always the case. Otherwise, states either have to be satisfied with what is produced by the federal statistical system or if not, create the necessary legal basis for additional statistical activities they would like to carry out at their territorial level, including the possibility of organizing their own data collection for statistical purposes. In this case, there will be a statistical law at the federal level and parallel statistical laws for some or all states, which will normally designate a single producer of official statistics (or at the maximum a sub-national statistical office¹⁵ plus a very limited number of other producers of official statistics in the sub-national administration), thus forming a parallel statistical system at the sub-national level.¹⁶

Sub-national statistical offices (and possibly the other producers at this level) have a dual role in official statistics: they can be asked, on the basis of the federal statistical law, to participate actively such as by data collection for official statistics at the federal level, and, based on the sub-national statistical law, engage in any additional statistical activity (official or otherwise) limited to the respective territory. Therefore, such sub-national offices are simultaneously members of the NSS and of the sub-national statistical system, which institutionally and legally

¹⁴ Examples are Australia, Brazil, Canada, and Mexico

¹⁵ In the context of a federal statistical system, a sub-national statistical office is the main producer of statistics at level of a state or an autonomous region.

¹⁶ Examples are Austria, Germany, and Switzerland, and for countries with regions that have special status UK (Scotland, Northern Ireland, Wales) or Denmark (Greenland, Faeroe Islands).

is a rather complex set-up¹⁷. Sub-national statistical offices at the level of an autonomous region are therefore the third type of members of the NSS, in addition to the NSO and other national producers. To avoid substantive problems from this dual role, it is essential that the provisions in the two statistical laws are as identical as possible, notably on the issue of confidentiality and exchange of confidential data within both systems.

As members of the NSS, sub-national statistical offices must fulfil the criteria (see Chapter 4.2.2 - *Legal frameworks, obligations, and restrictions*) applying to other national producers, with the possible exception of the ability to participate in international activities of official statistics. Since they tend to be relatively small units, sub-national statistical offices may face the same problem of a credible organization-internal borderline at a relatively low organizational level as statistical departments of other national producers. The statistical law at national level should include explicit provisions about the possibility that the state level is charged with carrying out parts of official statistics activities that are part of the federal statistical programme and how they are involved in the process of preparing such programmes at the federal level (see Chapter 4.4.2 - *Types of statistical programmes*).

Finally, it would be desirable to use the same criteria to periodically assess the institutional quality of each sub-national statistical office from time to time that are applied for the assessment of other national producers when their inclusion in the statistical programme is discussed.

The chief statistician's authority in a federal country is normally limited to the federal statistical system and does not cover the activities that sub-national statistical offices carry out based on their own legislation. For this reason, the standards issued by the chief statistician are not legally applicable to the state activities of official statistics. However, in most cases, sub-national statistical offices will apply these standards for their own activities for purely professional reasons. However, the regular production and dissemination of official statistics will be an activity based on the sub-national statistical legislation, and the appointment of the head of the sub-national statistical office will be entirely governed by the legal provisions at that level.

4.2.5 Relationship between national and international statistical systems

NSOs and possibly other producers at the national level with international statistical responsibilities, can be members of a multi-national or international statistical system and be responsible for applying the relevant rules and procedures of these. In a supra-national set-up such as the European Union, a common legal basis has been established, containing statistics-specific rules of common approaches, procedures, methods and definitions, as well as on governance and decision-making. Such a system includes a statistical office as the only producer of official statistics at the supra-national level, the NSOs of all member countries, and possibly additional national producers responsible for producing official statistics relevant to the supra-national system.

In practice, the term ‘international statistical system’ is not precisely defined. It may apply to the statistical department(s) of an international organization plus the NSOs (and the relevant

¹⁷ If the sub-national statistical office is not involved in any production process for federal official statistics, it would cease to be member of the national statistical system.

other national producers) of the member countries of a given organization. Or it may refer to the sum of various statistical departments of an international organization but without producers from member countries.

Currently, a number of international organizations have signed up for a mirror set of the UNFPOS that are applicable to their own statistical activities, the [Principles Governing International Statistical Activities](#). The [UN Statistics Quality Assurance Framework](#) includes a definition of official statistics at the international level that is fully in line with the definition of national official statistics given in Chapter 3 - *The Basis of Official Statistics*. However, these principles have not been translated into legally enshrined institutional arrangements specific for international statistical activities in such a way that professional independence of statistical departments within their parent international organizations is protected, or that a distinction between official and other statistical products are made. The above-mentioned UN quality assurance framework requires that statistics disseminated by international organizations, based on statistics provided by member countries, are checked for consistency with international standards by the responsible international statistical department, in order to ensure a sufficient degree of international comparability. Only in this case can such a department be considered a producer of international official statistics. Where the quality of national statistics is uncertain or clearly inadequate, the relevant international statistical department would either have to disregard them or, in consultation with the national producer, adjust them to make them comparable internationally and over time. If made available to users as part of international statistics without adjustment, these products should at least be labelled appropriately.

For national producers, participation in supra- and international systems and networks is important in many respects:

- a) to participate in the development and revision of international statistical standards (see Chapter 4.6.2 - *Coordinating through standards*);
- b) to organize internationally coordinated and funded major data collection activities such as the International Comparison Programme (ICP);
- c) to gain a deeper understanding of the international standards and requirements in order to enhance the relevance, quality, and comparability of their own national statistics;
- d) to assist countries with less developed statistical systems in improving their national statistical capacities.

Yet another type of international statistical activities merits special attention here: the periodic assessment of national statistical systems regarding the compliance with the UNFPOS or similar codes such as the European statistics Code of Practice in the European Statistical System, and concerning their capacity to produce key official statistics. These activities are called peer reviews or global assessments; they are carried out by teams of official statisticians with extended work experience at national and international levels. The reviews and assessments are conducted under the auspices of international or supranational organizations and the final reports are made publicly available. Whereas the NSO periodically assesses other producers at national level for their capability and willingness to comply with the UNFPOS, international assessments are the most efficient way to ensure that NSOs are periodically examined against the same criteria. In the UN context, it is up to a country to request such assessments; they are a necessary input into developing a strategic plan and attracting funds

from donors for this development. In a supra-national context like the EU, all member countries are subject to such assessments periodically.

4.3 Organization of national statistical systems

4.3.1 Centralised vs. decentralised systems for producing official statistics

The organization of official statistics varies considerably between countries. This depends on the institutional structure of the countries, on traditions and on how the official statistics have developed, in particular with respect to multi-national and international requirements and practices. Thus it is up to the countries to choose how many organizations in the national or federal administration should be defined as producers of official statistics; keeping in mind that the main criteria is for each of them the capacity and willingness to comply with the statistical legislation and the UNFPOS. However, if independent statistical offices exist at the sub-national level, it is advisable to keep the production of official statistics at the federal level as centralised as possible.

The importance of separating the NSS clearly and credibly from the rest of the administration has been emphasized. As one of the key elements of institutional quality, Credibility is necessary to enable users, data providers, and respondents to establish and maintain trust in the producers, the processes, and the products of official statistics. Producers have to establish credibility with respect to the exclusive statistical use of individual data referring to natural and legal persons, as well as with respect to impartiality and professional independence of each producer of official statistics.

The organizational separation between official statistics and policy or administrative tasks is more intuitively credible, the higher the hierarchical level at which it is located. In many countries, the NSO is an organization that reports directly, i.e. without any intermediate hierarchical level, to the President, the Prime Minister or to a minister (see Chapter 4.3.3 - *chief statistician*)¹⁸. At this level, the unique characteristics of the NSO's status that differentiates it from administrative organizations at the same level are easier to implement and to convey to the outside, because it is an essential part not only of the legislation but of the common culture of all staff, given that official statistics is the core activity of all NSOs.

The situation is more complicated for a producer of official statistics that is a lower-level organizational department of a parent body whose core function is not official statistics, and where the UNFPOS are not part of the common culture of all staff of this parent body. This is especially the case when the statistical department is also in charge of data processing for administrative purposes. Even if this were not the case, the exclusive statistical use of individual data also implies that no such data would be shared for other than statistical use with the rest of the parent body.

¹⁸ In small countries, the equivalent of the NSO may be a smaller organizational unit that does not report directly to the Prime minister, the President, or another member of the government. In this case, it is very important that the intermediate levels of hierarchy respect the professional independence of the NSO, and that they ensure proper briefing of the responsible minister whenever issues of official statistics are brought to the level of government. This situation also occurs frequently in the case of sub-national statistical offices within their state administration.

This difference is one of the major advantages of centralisation of official statistics at the NSO. The greater the number of other producers, the greater the number of organization-internal borderlines (firewalls) between statistical departments and the rest of their parent bodies that would have to be established at a lower organizational level. The NSS gains from having, alongside the NSO, a relatively small number of other producers of official statistics. Each of these producers should have a sufficient volume of regular statistical operations to raise their hierarchical level within the parent body and to justify the organizational complications of separating internally official statistical activities from administrative tasks. The statistical department of the Central Bank is such an example.

Another major advantage of a high degree of centralisation of official statistics is the recognition of the brand "*official statistics*". The more it overlaps with the brand of an easily identifiable NSO, the easier it is for users to recognise products of official statistics as distinct from the rest of government and guarantee high-quality work based on professional standards. This branding is not easily extended to the output of other producers, which will in most cases be attributed to the parent body, a body that is likely to insist that its own brand is given priority over or at least equal status to the brand of official statistics¹⁹. The maximum overlap between official statistics and NSO requires that the many statistical products published by various administrative bodies without being official statistics are disseminated so that users immediately realise the difference compared to official statistics. This requirement is also valid for any statistical output of the NSO and of other producers within the system that does not constitute official statistics.

One argument frequently put forward in favour of centralisation is that coordination is easier when more subject areas are under the chief statistician's authority. However, coordination in substantive terms requires the same input in centralised and decentralised systems, especially concerning the systematic gathering of information about user needs. The flows of information for the preparation of statistical programmes may appear easier the more activities are concentrated within the NSO, but this may also work well in a decentralised system if all parts perceive a benefit in preparing and exchanging this information. However, monitoring the implementation of system-wide decisions is easier in a more centralised system. Whether coordination is working well or not in a decentralised system depends more on how well the producer in charge of the coordination, typically the NSO, can interact with both governmental users and other producers, and on the extent of the authority of the chief statistician, by law and by his or her professional quality, to set system-wide standards (see Chapter 4.6.2 - *Coordination through standards*). If this authority were to be absent, decentralisation is rather likely to result in uncoordinated activities of official statistics, as well as in a non-homogeneous interpretation of what are considered official statistics and what are not.

In summary, centralising official statistics in the NSO offers the following advantages:

- a) clearer organizational separation between official statistics and administrative or policy tasks, which is central with respect to the principles of confidentiality, impartiality and independence;

¹⁹ An example of the opposite is Finland: the label of official statistics is used by other producers, and Statistics Finland operates a common dissemination platform that enables access to all official statistics.

- b) higher overlap of the branding of products and activities of official statistics with the easily recognisable NSO;
- c) easier building (through training) and commitment to a common staff culture specifically based on the UNFPOS;
- d) increased user-friendliness as more subject areas are covered in the dissemination platform of the NSO;
- e) no need for replicating conceptual and methodological know-how in the coordination department of the NSO for areas of responsibility of other producers (see Chapter 4.6.1 - *The how and why of coordination*);
- f) efficiency gains (up to a certain size);
- g) possibility to resolve co-ordination issues by internal decisions and to monitor implementation by internal follow-up mechanisms;
- h) easier monitoring of compliance with system-wide standards, especially quality management;
- i) simpler relationship between federal and state producers of official statistics;
- j) wider range of data-sets for methods such as data integration and data matching, unless the statistical legislation provides for the NSO to access data sets of other producers at individual level as recommended in the GLOS (see Chapter 4.3.4 - *National Statistics Office*);
- k) comprehensive responsibility for international aspects of official statistics.

The three major advantages of a decentralised statistical system are:

- a) higher capacity to provide in-house statistical services outside of official statistics that are relevant for the parent body;
- b) proximity (organizational, physical, and intellectual) of statistical departments of ministries or similar administrative bodies to the subject-matter policy work;
- c) reduced dependence on outputs of the NSO giving a greater autonomy in implementing the data collections that are necessary to produce the official statistics required by the parent body. In the case of the NSO being ineffective in delivering the output relevant for the ministry in time, a statistical department that is part of the NSS has a higher potential to act, at least, as a partial substitute.

The advantages of a centralized system have to be weighed against the advantages of decentralisation as listed before. However, opportunities to systematically reorganize a statistical system across the board will only occur at certain junctures, such as the preparation, adoption, and implementation of a new statistical law, in the case of a general restructuring of the administration, or after a crisis. The opportunities for smaller changes arise more frequently, such as when a parent body of another statistical producer plans a complete reorganization, or when the data collection methodology for a specific official statistics activity undergoes a significant change. In the context of the multi-annual programme preparation, the chief statistician can also trigger smaller changes in the assignment of responsibilities for specific activities to other producers (see Chapter 4.4.4 - *The multi-annual statistical programme*). A larger organizational change should be based on a professional global

assessment of the system (see Chapter 4.2.5 - *Relationship between national and international systems*), so as to identify the major shortcomings that have to be addressed. In most cases, it is not sufficient to simply reallocate activities between producers, but rather to revise the statistical legislation so as to establish a fully-fledged NSS with all characteristics as defined here.

Economies of scale are an important consideration. They are present in modern official statistics, mainly because of the higher extent of data integration of various sources as opposed to the traditional production in parallel stove-pipes, with one stove-pipe being responsible for one or more data collection activities and the subsequent processing and dissemination of results based almost exclusively on these inputs. However, economies of scale have to be weighed against organization and management difficulties that grow with increasing size of an organization. For this reason, larger countries tend to have functionally decentralised NSSs, but the reverse is not necessarily the case. Many small countries have not been able so far to establish an NSO in charge of producing official statistics in most subject areas, although centralisation in an NSO would not increase the size of the organization to a level where the above-mentioned management problems would show up. For a large group of countries, the history of how official statistics was taken up as a government function still appears to be the determining factor for the present degree of functional centralisation of official statistics, irrespective of the potential of efficiency gains through centralisation.

4.3.2 Governance of national statistical systems

A national statistical system requires rules of governance of which at least a part is different from the general rules of decision-making in the rest of the administration, due to requirements for professional independence specific to official statistics. However, professional independence does not systematically coincide with managerial autonomy. The allocation of resources for official statistics as part of the overall budget appropriation follows the rules applicable to the entire national or federal administration. The same holds for general rules on accounting and procurement. In most countries, the general rules about the salary grid applicable for the central administration are also valid for staff working in the NSO or with other producers except the Central Bank.

Professional independence requires that all issues on definitions, classifications and methodology, as well as decisions concerning data collection, data processing and analysis, timing and content of all forms of dissemination, are made within the statistical system, without interference from any interest group or government organization. Such decisions should be based on consultations with users and follow international standards of official statistics. The statistical law has, therefore, to address two issues of governance:

- a) Where exactly is the interface between purely professional decisions and decisions that are submitted to a body outside the statistical system such as the government, President, or Parliament?
- b) What is the extent of autonomous decision-making on professional issues for the other national producers, or in other words, what kind of professional decisions require national producers to obtain some kind of approval from the chief statistician?

National practices on these two issues differ quite substantially. Concerning the first issue, the greatest extent of autonomy can be found in countries where the general decision making of

government and Parliament only defines the total budget appropriation for official statistics, leaving the allocation of funds for official statistics entirely to the statistical system. This approach can be found in some countries, but it generally applies only to an NSO with a high degree of functional centralisation, especially in countries where the NSO is an autonomous agency outside the main administration (see Chapter 4.3.3.2 - *The chief statistician as head of an autonomous agency*). It does not really apply to a statistical system composed of an NSO and several other national producers. It shows a high degree of confidence in the chief statistician, not only concerning professional competence but also in terms of priority setting among subject areas. In such countries, the government has no role in the process of adopting statistical programmes.

However, some countries provide at least for some role of decision-making bodies outside the NSS, in most cases the government, basically because of three considerations:

- a) ensuring a balanced priority-setting among subject areas;
- b) providing a higher degree of legitimacy for the necessary data collections for statistical purposes from households, businesses, and other respondents outside the government, especially when such an activity is associated with a response obligation;
- c) seeking to ensure that the information needs and data collection are balanced against the need to limit the response burden.

The exact involvement at the government level in such decisions can take two forms, which may be combined: either through the adoption of the various statistical programmes for the whole national statistical system (see Chapter 4.4.5 - *Authority to take decisions on the programmes*), or by adopting legal acts at government level, based on the statistical (and not any other) law, about a set of statistical surveys or activities, or exceptionally, an individual major survey with response obligation. These two forms can be combined. The first form addresses the issue of balance and strategic development, and the second form the two other considerations mentioned above. However, when adopting a statistical programme or deciding on data collection activities through the adoption of lower-level legal acts, the government should not modify any methodological and terminological issues that fall under the statistical system's professional independence. In countries with the NSO as an autonomous agency, most of the objects of decision-making by the government are assigned to the executive board of this agency, thus bringing such decisions to the inside of the NSS.

Concerning the second aspect of governance, the decision making on professional issues within the NSS, it should be noted that producers that together form the NSS are not completely independent of each other. Other national producers, although not subject to the authority of the chief statistician, have not only to respect the full set of provisions contained in the statistical legislation, but also the final system-wide authority of the chief statistician on professional issues, provided this competence is explicitly foreseen in the statistical law. They have to respect and implement in their activities of official statistics any standards that the chief statistician has decided to be valid for the system as a whole (see Chapter 4.6.2 - *Coordination through standards*).

The dual role of sub-national statistical offices as members of two parallel statistical systems is also reflected in differences of system-internal autonomous decision making on professional issues. When carrying out activities for the federal statistical system, their autonomy is even more reduced than in the case of other national producers, because they must comply with all

specifications of the specific activity to which they contribute, and which are fixed by the responsible producer at the federal level (preferably after a participatory process with the sub-national statistical offices). However, concerning their activities as members of the sub-national statistical system, their professional autonomy is defined by the sub-national statistical law and, legally speaking, not constrained by any provision of the legislation at the federal level (see Chapter 4.2.4 - *Relationship between national and sub-national systems*).

4.3.3 Chief statistician

4.3.3.1 Appointment, protection, and reporting

In the great majority of countries, the chief executive of the NSO is also assigned by law the responsibility of chief statistician, i.e. as the leader and coordinator of the whole NSS.²⁰ In particular, at the international level, he or she represents not only the NSO but the entire national statistical system.

In addition to the managerial responsibilities as chief executive officer of the NSO (further discussed in Chapter 5 - *National Statistics Office*), the chief statistician should be made, through a provision in the statistical law, responsible for the professional integrity of the whole system, for securing trust in the statistical system, and not just the NSO. Because of the professional independence of the NSO, the superior of the chief statistician cannot be held politically responsible for any professional errors that may occur within the statistical system. Therefore, a chief statistician does require not only sound experience and professional know-how about statistics from a broad producer or a broad user perspective, but also management and communication skills as it is the case with similar top-level jobs of the civil service. Therefore, this post does not lend itself to be part of a mobility scheme for senior staff in the civil service, through which incumbents would be replaced regularly after a relatively short period. This is one of the reasons why the GLOS recommends that the minimum term of office for a chief statistician should be at least 4 years.

In view of the principle of impartiality, it is furthermore important to avoid that the chief statistician is perceived as directly or indirectly linked to one or the other side of the political spectrum. This requires a transparent, non-political process of hiring the chief statistician to make the final appointment on purely professional grounds. This applies although the appointing body often is a political one, in most cases, the government. To further strengthen the non-political and impartial character of the post, it is recommended that the term of office does not coincide with the terms of office of the appointing body and that the term of office for the chief statistician should not be affected by changes in the government or come automatically to an end when national elections take place or government changes. Provisions of this nature may not apply to other posts in the administration at the same level.²¹ For this reason, it is crucial to include them in the statistical law as an exception to the general rules laid down in some other legislation.

²⁰ Exceptions are the US and the UK, where the head of a separate body in charge of coordinating the national statistical system is the chief statistician.

²¹ There are a few other posts within the national or federal administration that may be subject to specific regulations for the appointment and the protection against dismissal, such as the ombudsperson, the heads of the data protection authority or of the body in charge of auditing the accounts of the government.

The impartiality and professional independence of the chief statistician also has to be protected to discourage threats of dismissal by superior or other influential bodies. Therefore, it is recommended to include another special provision in the statistical law, which exhaustively lists the possibilities by which a term of office can exceptionally be terminated before expiry. The statistical law should also regulate the number of times the term of office for an incumbent can be renewed. The GLOS, article 6, contains a few specific proposals on this and other aspects of the status of the chief statistician, together with a summary list of responsibilities as mentioned in various parts of this and other chapters.

Because of the importance of having a clear borderline of the statistical system to the rest of the administration, (see Chapter 4.2.1 - *Delimitation of the national statistical system*), it is crucial that the chief statistician reports directly to the government. In some countries, the chief statistician operates at the ministerial level and reports to the government (prime minister as head of the government or President of the country). However, because of the non-political nature of the post, it is recommended that the chief statistician is not seen as a regular member of the government and only takes part in meetings at government level only when issues of official statistics are on the table. The same prudence is advisable for the participation of the chief statistician in policy committees.²²

Various countries have set up different solutions as to whom should a chief statistician report. The following conclusions can be drawn:

- a) The reporting line should be a direct one to the government level, without intermediate superiors between the chief statistician and a minister;
- b) The reporting line should be a stable one and not redefined every time a new government is formed;
- c) The line of reporting chosen should minimise the perception of political influence and proximity to the general communication function of the government (which in some countries may exclude direct reporting to the Prime minister);
- d) It is also important to avoid the perception that the superior of the chief statistician biases the activity pattern of official statistics in favour of the narrow purposes of his or her ministry.

Whether the chief statistician in such set-ups can participate in government meetings when issues of official statistics are on the agenda, depends on whether the laws regulating the government functions allow such extensions in special cases, not only for official statistics. In many countries, this is legally impossible. If the chief statistician cannot participate personally in government meetings when issues of official statistics are discussed or decided, his or her government minister has to act as spokesperson for official statistics and for the NSO. This is the case for statistical programmes, statistical legislation, and especially for decisions on financial and staff resources as part of the general budget procedure.

²² An example of a non-statistical assignment for the chief statistician that does not lead to conflicts of interest can be found in Germany and the Czech Republic: the chief statistician is also responsible, because of his or her reputation and status of impartiality, for overseeing the correct determination of the results of national elections. However, in countries where the process of election and campaigning preceding the day of election is not considered fair and free, such a combination of tasks may exhibit a reputational risk.

Countries have in the past tried solutions other than a member of the government being the superior of the chief statistician. As mentioned before, the first is the government as a whole, but without the presence of the chief statistician at government meetings. De facto, this has sometimes resulted in reporting to a deputy prime minister, whose status and/or interest in statistics is likely to be limited. Another solution is the President of the country. He or she may have some role in appointing the chief statistician, in order to buttress the perception of impartiality. This may not be optimal for the regular reporting line unless the President is involved regularly in government meetings. In countries where the government is considered highly politicised and partisan, there have been attempts to have the chief statistician report directly to the Parliament or a parliamentary committee. In this case, there is a risk that no designated person feels responsible enough to act as a spokesperson for the cause of official statistics on a continuous basis. The GLOS recommends reporting to the Prime minister or the President if the latter is an operational part of the executive branch. However, many countries have chosen a member of the government other than the Prime minister or President with an important cross-sectional portfolio like the minister of finance.

4.3.3.2 The chief statistician as head of an autonomous agency

Some countries²³ have the experience of establishing the NSO as an autonomous agency located outside the main administration with a special status defined in the statistical law²⁴. The GLOS mentions this agency model as an option. The main difference with an agency set-up is a decision making and oversight board as the highest level of governance, either specifically for the NSO or the NSS. The exact title of this executive board varies. The statistical law would have to explicitly provide for this solution with all necessary organizational provisions, such as the appointment and office terms for the executive board members. The executive board is meant to take over most of the government's decision-making powers in matters of official statistics other than the provision of resources, e.g. the adoption of statistical programmes and decisions on the strategic developments of official statistics. In some countries, the executive board also plays a role in the process leading to the appointment of the chief statistician by the government or President of the country.

In this agency model, the chief statistician no longer reports directly to a member of the government (except for general issues such as accounting) but reports to the executive board. It is recommended that the chief statistician acts as chairperson, or at least as deputy chairperson, of such a board. If a country opts for the solution of the NSO as an autonomous agency with an executive board, the statistical law is very likely to be a law on this agency only, without due regard to statistics produced elsewhere.

If the executive board's composition is balanced and credible from the point of view of impartiality and independence, such a solution is a solid signal to underline the special status of the NSO in terms of professional independence. However, it implies a very high degree of centralising activities of official statistics in the NSO.

²³ Examples are Armenia, Brazil, Mexico, Portugal. In Brazil and Mexico, the agency is responsible for both official statistics and cartography.

²⁴ Given that autonomy in terms of resources is impossible for an NSO, the term *semi-autonomous* is sometimes preferred to describe the organizational solution presented in this section.

Being outside the main administration under the government, either as an autonomous agency, as part of the presidential administration, or under the Parliament, may also lead to difficulties in establishing and maintaining regular networks with those many parts of the main government administration that are regular users of official statistics or providers of data. This difficulty has to be weighed against the advantages of an agency model. It may also make access to administrative data for the NSO more difficult, in legal, organizational, and practical terms.

4.3.4 National statistical office

As the major producer of official statistics, the NSO is the backbone of official statistics in a country. Official statistics are the core business for this organization, with notably the following responsibilities:

- a) ensuring continuity of production and dissemination of all statistics under its responsibility;
- b) providing an effective performance of the system-wide functions such as setting standards, compiling multi-annual and annual plans, and coordinating the NSS, as well as providing services for other producers (e.g. sampling);
- c) ensuring quality and efficiency of the production and dissemination processes, based on using the best-suited methods and equipment, and carrying out research to enhance quality and effectiveness;
- d) developing and maintaining networks with the various user groups to assess the relevance and capture new and changing information needs sufficiently early;
- e) ensuring trust of users, respondents, and data providers in its institutional quality and in the integrity of the whole NSS through regular monitoring of adherence to the UNFPOS or equivalent principles across the whole national statistical system;
- f) participating in international activities of official statistics.

The division of work between the NSO and other national producers varies across countries. To avoid duplication of efforts by various producers of the national statistical system, notably concerning data collection, data should be shared among the producers of official statistics, including individual data of statistical units that may be subject to confidentiality. The statistical law should contain explicit enabling provisions to facilitate this system-internal exchange of data, however within the strict limits of the principle of exclusive use for statistical purposes of such data. In countries where the NSS is not yet considered to be established strongly enough to allow the exchange of all confidential data between all producers, the statistical law may allow the exchange of confidential data with identifiers of the statistical units only in one direction, from another producer to the NSO, but not the other way round.²⁵ In such cases, it is also recommended that one method frequently used in the production of official statistics, the matching at the level of statistical units of data sets from different sources

²⁵ The GLOS contains in article 23 such restrictions. As an exception, data from statistical registers managed by the NSO can be transferred to other producers including identifiers, as sample of statistical units to be contacted for statistical surveys, given that there are relatively few content variables associated.

by using identifiers, is the exclusive responsibility of the NSO²⁶, with the necessity to follow strict protocols.²⁷

An important systemic function of the NSO is establishing and maintaining statistical registers, i.e., lists of respondents/statistical units that combine direct identifiers and selected content characteristics for relevant target universes of official statistics. Other producers should not engage in keeping parallel registers, even if they were to cover only a subset of units. If they need samples of statistical units for their own production, the NSO has the obligation to provide such services. Statistical registers are an exception to the standard practice where direct identifiers should be removed from sets of individual data generated for statistical purposes as early in the production process as possible. Statistical registers use many sources for updating, both administrative and statistical. For this reason, they may differ from related registers, managed for administrative purposes by other parts of the administration, which are based on legal requirements which are not equivalent in content or coverage to the concepts of official statistics. Censuses are a major source for the establishment and a comprehensive update of statistical registers, but other sources should be identified for being used for more frequent updates of at least part of the statistical units between censuses.

There are a few cases where an NSO is made responsible by law for managing administrative records, such as processing individual data for administrative use (by other administrative organizations). Sometimes, data processing for statistical and administrative uses are mixed in operations like the management of registers assigned to the NSO. In both cases, the principle of exclusively statistical use is violated, and therefore should such an activity not take place within the NSS. An NSO in charge of such activities would have to concentrate them in one department that would not, like the rest of the NSO, be part of the national statistical system. The NSO would, in this case, have the same problem of a credible organization-internal borderline or firewall as the other national producers inside their parent bodies. This combination is a potential reputational risk, and it is therefore not recommended, even if it may offer some efficiency advantages. Where such an arrangement is present, ways should be found for the NSO to shift the responsibility of the administrative part of the activities to an administrative body, but to maintain regular access to this data source for the purposes of official statistics, especially as a main source for keeping up to date the statistical registers for which the NSO is responsible.²⁸

In most countries, the statistical activities related to the functioning of the system as a whole, as opposed to the production and dissemination of statistics in subject areas, have been assigned to the NSO for which official statistics are the core function. This includes strategic and

²⁶ Other producers at national and sub-national level can retain the competence to match data from different periods of the same data source under their responsibility by using identifiers (longitudinal matching).

²⁷ In countries with data protection laws applicable to the government, data matching for administrative purposes is only legal when the data sources used, the purpose, and the limited set of users are listed exhaustively at the level of a law. If data matching is carried out exclusively for statistical purposes, with no risk of harming consequences for individual units, a general enabling clause in the statistical law is normally considered sufficient, but the implementation has to follow strict protocols and to take place only in an organization where the institutional separation between statistical and administrative use is beyond any doubt.

²⁸ Some NSOs are responsible for maintaining registers of units that are not protected by confidentiality, such as registers of territorial units, for both administrative and statistical purposes. As long as the function of the NSO is to update this register based on decisions by other bodies, and to make this register accessible to users or even to the public, there is no conflict with a fundamental principle of official statistics arising from such a task, although it cannot be considered an activity of official statistics.

multiannual programmes, legislation, coordination, setting of professional standards for the whole system, including setting standards for quality management and monitoring the adherence to the UNFPOS. However, this may involve a risk of putting the production and dissemination interests of the NSO ahead of being a non-partisan mediator between the different producers of the system; or of the NSO being too weak to exert sufficient authority over other producers of official statistics in terms of quality and adherence to the UNFPOS. For this reason, in a few larger countries, some or all of these functions have been assigned to an organization that is separate from the NSO and has no production function of its own. The earliest example of this model is the US (though for slightly other reasons), but it has been recently followed by the UK and France.

Such separate entities with programmatic and coordination tasks, but without production functions, are the fourth type of members that a national statistical system may include, in addition to the NSO, the other national producers, and the sub-national statistical offices in federally organized countries. Such an extension would have to be explicitly foreseen in the statistical law. However, NSO staff may perceive the creation of a separate body which, among other tasks, has the role of monitoring their adherence to the UNFPOS as a loss of professional independence and a lack of trust in their professional competence. A less radical approach is to concentrate these activities in a special department within the NSO and assign to it some prerogatives, the essence of which may also be incorporated into the statistical law.

4.3.5 Other producers of official statistics

Other producers of official statistics at the national and sub-national level must be professionally independent, and exclusively or primarily focused on statistical work. The statistical activities can comprise a substantial volume of statistical work outside official statistics, but to qualify as producers within the national statistical system, regular production of official statistics in a given subject area must be part of their responsibility. The NSO may wish to sign bilateral agreements with other producers or parent bodies to increase their personal commitments to see the UNFPOS followed by the statistical department with respect to all its activities of official statistics.

National producers of official statistics should be included in the annual statistical programme when they have demonstrated their capability and willingness to comply with all UNFPOS principles and national statistical system standards. They may also be included at an earlier stage as part of the effort to ensure that they comply with the UNFPOS.

Belonging to the NSS can bring the following benefits:

- a) strengthening the institutional quality, notably the professional independence, of each producer of statistics in line with the statistical law and strengthening the common staff culture within the NSS;
- b) supporting quality improvements and development of statistics;
- c) facilitating professional exchange within the NSS;
- d) increasing awareness and use of common tools and standards as a major element of the common culture of official statistics;
- e) providing a strong mandate for surveys and ensuring access to the necessary administrative data;

- f) providing a higher status as a producer of official statistics in the country with the subsequent labelling of products;
- g) enabling the regulated exchange of individual data for statistical purposes within the NSS;
- h) keeping producers better informed of the latest international developments in statistics.

The GLOS recommends that the heads of other national producers are hired through a non-political process similar to the one recommended for the chief statistician. It may be desirable that the chief statistician is involved to a certain degree in such recruitment processes. Some NSSs may require the chief statistician's explicit consent for the appointment of heads of other national producers.

4.3.6 Overview of the main types of national statistical systems

The organization of NSSs can be grouped into the following categories:

- a) A functionally centralised NSO as the only member, including its executive board if placed as an autonomous agency outside the main administration. The Central Bank's statistical department will also produce official statistics but may not formally be part of a system that comprises all official statistics. In federally organized countries, the NSO acts in this set-up as truly national statistical office and not only as a federal statistical office; there are no independent sub-national statistical offices.
- b) An NSO as the core producer, in most cases located within the national government administration, and a limited number of other national producers, with various degrees of functional centralisation, and with coordination responsibilities for the chief statistician. The Central Bank's statistical department may be a part of such an NSS in which case this will typically be authorised in the law of the Bank. There are no independent sub-national statistical offices.
- c) In federally organized countries, an NSO with a high degree of functional centralisation acting as a federal statistical office, a very limited number of other producers at the federal level, and independent sub-national statistical offices in most or all territories insofar as they are involved in the production of federal statistics. The chief statistician has the mandate to coordinate the system.

These are the main types found in practice, but there are many national variations of the three basic set-ups, either towards more complexity or, because of a relatively old statistical legislation, through some missing elements. For the second and third type, the Central Bank's statistical department should be a member of the national statistical system.

Many developing countries face a range of organizational and institutional difficulties to set up a comprehensive and effective NSS. In addition to a lack of resources, they often suffer from the following:

- a) each department and ministry have started to produce statistics in an uncoordinated way, mainly for in-house information needs;
- b) users in ministries have difficulties in specifying their information needs;
- c) it is not clear which data sources are exclusively for statistical use;

- d) there are no or only weak dedicated organizational units for official statistics in these departments and ministries;
- e) statistical staff, both in ministries and the NSO, may not have a statistical background and adequate training;
- f) statistical standards that are valid for all producers of statistics may be lacking, notably on quality management;
- g) neither data nor intermediate results are shared between producers before they are disseminated, and therefore the use of techniques like data integration or data matching is rare;
- h) dissemination to the public is irregular;
- i) there is no clear conceptual basis like the UNFPOS, and statistical laws are either non-existent or old and insufficient.

In such situations, there is a need to plan for developing official statistics (see Chapter 4.4.4 – *The multi-annual programme*). A development plan should have, as a strategic component, the establishment of an NSS based on a statistical law that contains the clear conceptual basis of the UNFPOS. It should also include an institutional framework for all producers, including the NSO, which is able to strengthen the system and shield the producers from undue interference into professional issues. At the same time, the plan should give a long-term perspective that might attract international donors for supporting the building of all types of capacities and skills necessary for a well-functioning NSS. This is also the opportunity to increase the functional centralisation of official statistics activities at the NSO and concentrate the staff with the required skills in the NSO, especially in small countries.

4.3.7 Including actors from outside the national statistical system

There may be a need to include in the NSS actors that normally wouldn't be part of the system for specific tasks and predetermined periods. In such cases, it is necessary to ensure that these actors are incorporated temporarily in the NSS are bound by the country's statistical legislation and the UNFPOS. This applies in particular to the confidentiality requirements concerning the exclusive use of data for statistical purposes. Such conditions arise typically when an external actor, public or private, is assigned by law or subcontracted for specific tasks related to official statistics, including processing confidential data. An example of the first case is the use of staff from local municipalities in traditional population censuses. Examples of the second case are the sub-contracting of telephone interviews for a given survey to a specialised private company, or the use of an IT centre dependent either on an administrative body or a private company.

In most cases of this type, the rules have to be even more restrictive than simply respecting all relevant provisions of the statistical legislation, by:

- a) including only a limited number of staff and not an organizational unit in its entirety;
- b) limiting the authorised use of data for statistical purposes to the narrow part of a statistical operation contained in the legal act or in the contract;
- c) prohibiting any forwarding of confidential data to other receivers than those prescribed;
- d) excluding any access to such data by non-authorised persons;

- e) handing over all data to the responsible producer at the latest at the end of the mandate.

The legal act or the contract would have to spell out these obligations. The producer listed as responsible in the statistical programme has the obligation to make sure that the involved persons respect these limits. However, the producer still bears the full professional responsibility for the process irrespective of any sub-contracting or delegation based on arrangements of this type. Such restrictions are also applicable to statistical departments of state administrations in federally organized countries that do not qualify as members of the national statistical system if they are involved in the production of a specific activity of federal official statistics.

With regard to IT centres, it is essential that at least the NSO as the main producer has full managerial responsibility for its IT used for the production and dissemination of official statistics. Similarly, the NSO should not be dependent on an IT centre under the responsibility of another part of the national administration for any processing that involves complete sets of confidential data protected by the statistical law²⁹. On the other hand, other national producers will depend on the IT of the parent body in most cases. Hence, the responsible producer must ensure that the staff from these non-statistical organizations and their superiors are aware of and respect the obligations that accompany their work on official statistics.

4.4 Annual and multi-annual planning and priority setting

4.4.1 Annual and multi-annual statistical programmes

In most countries, the NSO and other producers of official statistics spend considerable effort in planning their activities. In well-established NSSs, the planning is coordinated within the system, in most cases by the NSO, and the planning activities and the statistical plans or programmes are seen as important vehicles for coordinating the activities of the NSO and the various other producers of official statistics.

It is customary to distinguish between two types of statistical plans, annual programmes of work and multi-annual strategic plans. Plans for capacity building of NSSs and individual parts thereof belong to the multi-annual programmes. The annual work programmes and the multi-annual strategic plans are typically drawn up under auspices of the NSS and under the leadership of the NSO. Ideally, they should cover the activities and outputs of all producers of official statistics, i.e. all members of the NSS. The main objectives of the statistical programmes are the following:

- a) Plan activities of the national statistical system in a coordinated way in order to ensure total coverage of statistical domains and avoid duplication and overlaps.
- b) Set priorities for the period that are compatible with a realistic overall resource envelope for official statistics. To make such decisions possible, an estimate of the resources for individual activities of official statistics, especially for new activities or extensions, has to be included.

²⁹ However, activities like software development may be carried out by such centres for the NSO.

- c) Obtain a mandate for the proposed set of statistical activities from the body to which the chief statistician reports, i.e. the government in most cases, or in some countries the executive board. The programmes legitimize the priorities proposed, the necessary data collections from respondents, and the necessary transmission of administrative data sets to the NSO or another producer of official statistics. In some countries, government approval or legitimization is not required.
- d) Allocate professional responsibility for a given set of activities of official statistics to individual national producers within the NSS.
- e) Define in federally organized countries, the extent to which the sub-national level must contribute to the production process of selected official statistics activities at the national level.
- f) Set the benchmarks against which the performance of the statistical system and of each producer will be evaluated.
- g) Serve as coherent framework for soliciting external assistance in the case of developing countries.
- h) To define a strategic plan for capacity building in developing countries and countries with major shortcomings in their statistical system.

The statistical programmes should quantify the resources that are necessary for the planned activities, showing at least the total cost of statistical activities for each national producer and, at least for the NSO, the cost of the main sets of statistical activities, e.g. by subject area. This allows the government (or the adopting body of the programme if there is one) to better evaluate the programme and make informed decisions thereon. The chief statistician should ensure that, if the programme is adopted in its entirety, it can be implemented from the resources and management point of view.

The statistical programme's adoption is an important step but is still not a guarantee that the competent authorities will provide the necessary resources in the annual central government budget. The central government budget will not show the appropriation of funds to the statistical system as a whole but to each of the institutions involved in the production of official statistics. Hence, this does not allow funds to be transferred from one national producer to another once the budgets are decided³⁰ (there may be exceptions to this in very special circumstances, such as in cases of transfer of tasks between institutions in very large joint projects, e.g. censuses).

As one of the important system-wide responsibilities, statistical programmes should be prepared by the NSO with inputs from other national producers of official statistics. The chief statistician as leader and coordinator of the NSS should define the process by which the various parts of the NSO and the other national producers prepare and submit their inputs to the relevant department of the NSO or to the distinct body in charge of coordination within the national statistical system in countries where such a body exists. At this stage, all proposals for including activities in the statistical programmes should be assessed in terms of their relevance and

³⁰ If the state level has to contribute to selected activities in the national programme, it is up to the budgetary process of each state to organize the necessary resources. The federal programme would include estimates of resources only if states would be reimbursed for parts or the total of their contribution from the federal budget, but this is rarely the case in practice and would have to be explicitly foreseen in the statistical legislation at federal level.

against the programmes' priority setting. To evaluate the proposals, the NSO has to have a good overview of user needs (see Chapter 4.5.3 - *Interaction with user groups outside the statistical advisory council – capturing information needs*), as well as having an overview of existing official statistics and the data sources (surveys and administrative or other data sources) used in the production processes. It has to be knowledgeable about the multiple relationships between the various data sources and outputs, not only for the areas of responsibility of the NSO but also for those for which other producers are responsible. This means that the NSO has to build up some conceptual and methodological know-how in areas where the main responsibility is assigned to other producers.

The evaluation of proposals is not limited to those activities that are new or for which important modifications are proposed. Preparing the statistical programme entails a critical look at existing products, looking for possible efficiency gains, methodological improvements, and ways to make them compatible with newly developed international standards. One of the main purposes of the programme is to ensure that the producers respond to new information needs and aim to improve statistics that do not yet meet the principles of official statistics. The chief statistician can request changes and decide whether proposed activities should be included in the statistical programme as official statistics.

Concerning the use of new administrative data sources for official statistics or important changes in their use or content, it is desirable to include the administrative owner of the data in these discussions, irrespective of whether the administrative body has a statistical department that is part of the national statistical system or not. Sometimes, adjustments such as the use of economic activities classification are easier to apply before the data set is imported by the statistical system than afterwards. In such cases, the chief statistician has the important task of encouraging the administrative data owner to modify their processes accordingly and offer to assist in the implementation with advice and expertise by NSO staff. In some countries, the statistical law obliges the owner of administrative data to comply with requests from the NSO or chief statistician to make the administrative records as well fit for statistical purposes as possible. While this may not be possible or not fully possible, discussions between the chief statistician and the administrative authority should always be useful and may lead to closer cooperation than before. In some countries, such discussions have led to the establishment of formal agreements or memoranda of understanding, MoUs, on the use of the administrative data. Such MoUs may then involve specifications of the administrative data as well as provisions on the frequency and mode of delivery of the data or the access to the data by the NSO.

The [Guidance on modernising statistical legislation](#) (UNECE 2018), recommends inserting a provision in the statistical law by which providers of administrative data, when planning new data collections or revisions in existing data collections in a way that may significantly affect data provided for official statistics, would be obliged to consult the NSO in advance of the decision.

4.4.2 Types of statistical programmes

The national and federal statistical programmes of countries vary in the coverage, period covered, and focus. The GLOS recommends using both annual and multi-annual programmes. Proposals for their content are given under Chapter 4.4.3 - *Content of the annual statistical programme* and Chapter 4.4.4 - *The multi-annual statistical programme*.

There are several options open for determining the coverage of the statistical programme. The following four possibilities concerning national or federal programmes are discussed here:

- a) The statistical programme covers the statistical activities under the responsibility of the NSO.
- b) The programme covers all activities of official statistics carried out by national producers.
- c) The programme encompasses all statistical activities, whether official statistics or statistical services, carried out by producers of the national statistical system at the national level.
- d) The programme involves all government data collection activities for statistical, administrative, or combined purposes, plus the subsequent processing and dissemination of all kinds of statistical information, whether as official or other statistics.

From the conceptual point of view, the second option is preferable since it matches best the definition of official statistics. However, for national producers other than the NSO, it may be difficult to split the statistical department's total cost between official statistics and other statistical activities. From this point of view, most programmes, de facto, include all statistical activities of those organizational units that are national producers and thus follow the third option above. The first option is valid in countries with only one officially recognised producer of official statistics, the NSO. In both cases, the programme includes the activities of official statistics and other statistical activities in most countries, bringing the total of activities covered as closely as possible in line with the budgets of the national producers. In some countries, only the multiannual programme covers all national producers, whereas the annual programme is limited to the NSO.

However, it is important that in the first and third options above the programmes clearly assign the proposed outputs or activities to be either official statistics or additional statistical activities outside official statistics, with the understanding that in case of the necessity of downscaling the proposed programme because of insufficient resources, priority would be given to official statistics activities over the rest. It is also important that the statistical programmes do not contain any data collection or processing activities for administrative purposes in cases where the clear separation of statistical and administrative tasks has not yet been fully implemented. On the other side, where applicable, programmes should include statistical activities carried out by a national producer but financed from outside the responsible producer's budget (e.g. by international donors).

When sub-national statistical offices are members of the NSS, their contribution is mentioned as part of the national or federal activity under the responsibility of the NSO or another national producer. Statistical activities that sub-national statistical offices plan to carry out based on their own legislation at the state level should not be included in the national programmes. However, it is recommended that each sub-national statistical office has a plan for its statistical activities.

The fourth option mentioned above used to be applied in countries where the concept of official statistics covers all government data collection without distinction between administrative and statistical purposes. This used to be the case in centrally planned economies and some

developing countries. It is not recommended as a good practice and will not be discussed further here.

The focus of the statistical programme can be on one or a combination of several of the following aspects:

- a) statistical activities (both strategic/new and other);
- b) input data (statistical surveys and administrative or other data sources);
- c) outputs (main indicators and major breakdowns, notably the smallest sub-national level for which results should be produced);
- d) strategic developments and capacity building.

In most cases, programmes will be a selection and combination of the options above, to satisfy all stakeholders to a certain extent.

4.4.3 Content of the annual statistical programme

The annual programme, also referred to as the work programme, is an operative plan, preferably for the whole NSS, or separately for each producer at the national level, notably the NSO. The annual periodicity is proposed to provide the basis for the standard budgetary cycle and form a stable annual preparation process. However, countries with a biennial budgetary cycle will prefer a biennial statistical programme. The annual (or biennial) programme should fit into the longer-term framework of the multiannual programme and highlight possible additions to this framework that were not foreseen at the outset of the multiannual programme.

In general, the annual statistical programme covers all main inputs, outputs, and activities in the national statistical system: official statistics to be released; data sources, such as statistical surveys, administrative data, and any other data sets; and annual development activities. The annual statistical programme will also provide a list of producers of official statistics with responsibilities for the relevant inputs, outputs, and activities. For many activities, the outputs are likely to be unchanged from the preceding annual programme, even if some of the inputs or processing methods change. From the user perspective, it is therefore important to highlight significant changes in output from the previous period, including those affecting existing time-series.

Users (with the possible exception of re-users) are mainly interested in the output, especially in new series (or discontinuation or downscaling of existing statistics), and less in the way they are produced. From their perspective, it is up to the statistical system to bundle similar needs from different users into a set of operational activities, each of them covering most information needs of various user groups in a given subject area effectively. The term "effectively" means to make maximum use of data that already exist, not only in the NSS, but in the administration at large, and to minimise extra data collection through statistical surveys with due regard to the response burden. To assess the resource implications, programmes have to present activities, especially data collection activities, in a suitable grouping to which cost can be assigned. If one of the purposes is to provide sufficient legitimacy for collecting data from respondents or accessing data sets from administrative bodies outside the statistical system, data sources must be explicitly mentioned.

All statistical activities and surveys carried out by the NSO, and other national producers should be covered by the annual programme regardless of the source of funding, be it producers' budgets, budgets of other government bodies, or external funding, either from national or international sources. Any statistics that may be under development but are not yet considered official statistics may be covered in the programme under a separate heading.

The annual statistical programme informs about, and in many countries legitimizes, data collection from respondents necessary for the programme's outputs, and that is not already collected elsewhere, e.g. through administrative activities. It also declares surveys voluntary or compulsory. In federal countries, it also indicates the activities the sub-national bodies have to be involved in; typically data collection. Information on the costs of data collection activities and estimates of the response burden should be included. The latter can be based on the approximate number and type of respondents and an assessment of the average time needed to fill in or respond to each questionnaire.

Transmission of administrative data to a producer should be specified in the annual statistical programme if relevant, to ensure smooth access to and use of administrative data in the production of official statistics. The transmission details can subsequently be fixed through bilateral agreements or memoranda of understanding between the administrative data provider and the responsible producer.

4.4.4 The multi-annual statistical programme

In some countries, a multi-annual statistical programme is drawn up at the same time as the annual work programme. These multi-annual activity plans, sometimes termed strategic plans, are not to be confused with major capacity building programmes as are frequently applied in developing countries and are discussed here below.

The purpose of the multi-annual programme is to outline medium-term plans for the statistical activities, particularly the development of statistics on new subject matters and changes in the composition of the statistical services and outputs, reflecting social and economic changes and changes in government policies. Hence, the multi-annual activity plans may reflect or set out specific goals for the activities in the medium term as well as indicate the main strategies for reaching the goals. One main purpose of the multi-annual programme is to ensure a balance between stability in the output on the one hand and changes due to new series or to important reductions in output on the other hand. This is important from the user perspective as it gives assurance that existing series are continued and that at the same time, some new information needs are taken on board. This is also important from the management point of view to avoid that too many simultaneous changes are undertaken and that new projects do not involve a risk of mutually reinforcing delays and other deficiencies.

The multi-annual activity plans normally extend to a period of three-five years. In some countries, the plans are also drawn up at such intervals. Another and better practice is to maintain the multi-annual plans as rolling plans which are renewed every year concomitant with the annual planning process or as an integral part of it.

Capacity building programmes are specific types of multi-annual statistical programmes. These refer to plans for major improvements in the statistical capacity of NSSs as are mainly undertaken in developing countries. Such plans are normally supported by international development partners, such as international agencies or individual countries. They are

frequently divided into strategic plans and implementation plans. The strategic plans are used to define the main shortcomings and needs of the statistical system and lay out the strategies for capacity building for improving the system and the services of the producers of official statistics. The implementation plans seek to spell out how and when the capacity building actions may be carried out and how they are funded.

The main examples of strategic plans for developing countries are the National Strategies for the Development of Statistics (NSDSs). These have been developed in cooperation by the international statistical and development community and advocated as critical first steps in capacity building in official statistics. The NSDSs (in some countries also called master plans or something similar) have come to include analysis of the current situation, setting of objectives and priorities, and discussion and selection of strategies. Plans or scenarios for implementation are often included to indicate the timing of major steps and major activities, but it is more common that those are subsequently developed in detail in cooperation with the development partner involved. The Partnership in Statistics for Development in the 21st Century (PARIS21) has been the main promoter of the NSDSs, working in close cooperation with the World Bank and various other institutions and countries involved in work and funding of NSDSs and similar plans.

The NSDSs or master plans focus on long-term challenges and strategic development of the NSS as a whole. This includes the following aspects:

- a) Strategies and priorities for developing statistics across the whole NSS. This is especially important for countries with major shortcomings in their legal and institutional set-up or their capacity to produce key statistics according to international standards.
- b) Specific issues identified for improvement, in particular horizontal or systemic issues.
- c) Analysis of changes of different user groups needs and changes in the context in which producers of official statistics are operating.
- d) Weighing the development needs against a realistic projection of available resources.

The GLOS recommends that the NSDSs or master plans are aligned with any major national development programmes or plans. It is crucial that the national statistical system's long-term strategic development, particularly for the NSO, gets support from the appropriate political body and access to funds for the overall national development programmes. In this context, the NSDS model developed by PARIS21 offers important guidance that many developing countries have used.

In preparing the programme, the NSO has to make sure that enough scope is given to crucial activities for which there may not be an explicit request from a user group within the country, such as:

- a) information that the public at large needs in a democratic society;
- b) anticipating future needs, notably for the implementation of forthcoming international standards of official statistics;
- c) information needs deriving from national development plans where they exist;
- d) systemic activities for the national statistical system as a whole, such as statistical registers or training activities for staff;

- e) forthcoming information needs of international organizations of which the country is a member;
- f) renewal or major update of key IT systems and other infrastructure;
- g) active participation in international activities of official statistics that have considerable resource implications, such as the ICP or capacity building in other countries.

4.4.5 Authority to take decisions on the programmes

The authority to adopt a statistical programme lies in most cases with either the government or, if the NSO is an autonomous agency, its executive board. In some countries, however, a formal adoption of the statistical programme is not required in which case the NSO just publishes it. In the case of government adoption, care has to be taken that this decision does not extend to issues covered by professional independence. The government should, therefore, neither comment on nor change the way the development and production of statistics will be implemented, including the selection of data sources, concepts, definitions, methods and classifications to be used, and how the timing and content of all forms of dissemination will take place. However, the government may identify priorities for using the limited resources and request the development of new statistics or the reduction of the response burden of specific activities. Some countries foresee the presence of the chief statistician at the government meeting when statistical programmes are discussed; if this is not the case, the minister to whom the chief statistician is reporting has to be the spokesperson.

For activities of autonomous state bodies like the Central Bank covered by the statistical programmes, the government is not authorised to alter any elements agreed by the chief statistician with the Central Bank. Such activities feature in the programme for information purposes and are not for decision by the government.

The preparation of statistical programmes is a process within the statistical system that involves contacts with individual users or user groups (see Chapter 4.5.3 - *Interaction with user groups outside the statistical advisory council – capturing information needs*). In many countries, the draft programme is discussed or reviewed by a high-level body where all important user groups are represented before being submitted to the government for adoption. This review aims to check whether the overall balance of the programme finds support across various user groups. This is one of the functions of an advisory body specific to the national statistical system that is featured in the GLOS and in the [Guidance on modernising statistical legislation](#), UNECE 2018 and is called the statistical advisory council, hereafter SAC (see Chapter 4.5.1 – *The Statistical Advisory Council* for more details). The SAC expresses an opinion on the draft programme that is included in the submission for adoption by the government.

In the agency solution for the NSO, this discussion takes place at the executive board before it takes the decision on adoption. Being part of the national statistical system, the executive board may ask for changes of the draft in all respects within the limits of statistical legislation.

In view of the transparency principle, the adopted programmes and the opinion of the SAC should be made public. In some countries, the draft statistical programme is posted on the website of the NSO while it is under preparation. This is done to inform users and other main stakeholders of the programme's planned content and give them the opportunity to comment on the draft plans and suggest changes.

Some countries in which the government adopts statistical programmes go as far as adopting them in the form of lower-level legal acts. However, this will reduce the flexibility in implementation in the case of unforeseen developments. In countries where certain items of the statistical programme such as censuses, or statistical surveys with response obligation, require an explicit legal basis, these parts should be assembled in a legal act that can be adopted by the government separately³¹, and if the activity is to be repeated periodically, for a period until the end of the multi-annual programme. However, such legal acts should not be too detailed to allow the responsible producer the necessary fine-tuning according to professional standards and incorporate gradual improvements in methodology without having to change the legal act. In countries with the NSO as an autonomous agency with an executive board, the procedure for converting parts of the statistical programmes into legal acts, if it were necessary, would be the same, but it might require more time because of the separate bodies that adopt statistical programmes and lower-level legal acts.

4.4.6 Follow-up and reporting

Once a programme is adopted, and responsibilities have been assigned, there must be monitoring mechanisms for the chief statistician to get information on implementation progress, not only for the activities of the NSO, but for all official statistics. It is recommended to include this function as part of the quality management processes (see Chapter 7 - *Quality Management*) used by the producers of official statistics, notably the NSO. The NSO must keep track of the degree of implementation of all activities in the programme, not only those in the responsibility of the NSO, so as to assess as early as possible the impact a delay in one activity may have on other activities. The NSO is also responsible for informing key users about delays. Changes in the timing of surveys have also to be communicated to the respondents' representatives, especially in the case of enterprises. Some countries require the establishment of interim reports for multi-annual programmes.

It is essential, as a corollary to professional independence and accountability to the government, users and the public to report on activities and deliveries of the NSS, including costs incurred. The adopted programmes are the benchmark against which performance can be assessed. Therefore, most countries with statistical programmes require through the statistical law that the chief statistician prepares at the end of the period covered by a programme, a report evaluating the extent of implementation. The SAC or the executive board should review the report. Together with the opinion of the SAC or the executive board, the report should be made public to honour the principle of transparency. Some countries may ask for such reports to be formally brought to the attention of the government.

³¹ For censuses, many countries require a law adopted by the Parliament rather than a government legal act. This level of legislation is in any case necessary if the census is not a purely statistical one, but is also used to update administrative registers, a use for which the statistical law cannot serve as a legal basis.

4.5 Involving users in the national statistical system

4.5.1 The Statistical Advisory Council

In many countries, the statistical law stipulates that a high-level advisory body assists the NSO or the NSS, referred to in the GLOS as a statistical advisory council (SAC). The SAC's role is to discuss and express views on strategic priorities and the relevance of statistical activities in terms of user needs. Such views may be addressed to the chief statistician, the NSO or another national producer or government. The authority to decide to what extent these opinions will be considered remains with the relevant institutions fixed by the statistical legislation.

The SAC should represent users and user communities, not producers. In institutional terms, it is, therefore, unlike the board in the agency model, not part of the NSS, which defines users as being outside the borderline. For this reason, the SAC should not be used as a body for coordination between producers, nor for the managing of individual statistical processes. Conflicting views on methodological issues should not be brought before the SAC for decision either; this is not an issue for users, but for the professional statisticians within the statistical system, under the final authority of the chief statistician.

The size, role, composition, and effective ways of functioning of a SAC vary considerably from country to country. The rules are laid down in the statistical law and in lower-level legislation based on this law. One of the core functions of the SAC is the discussion of draft statistical programmes, be they multi-annual or annual, and of interim or final reports on their implementation.

Some considerations for an effective SAC, as included in the GLOS, are as follows:

- a) Legitimacy is higher when most SAC members come from outside the national administration. In selecting user institutions, priority should be given to those that use statistics from several domains, such as the government ministries with cross-cutting tasks, mass media, the Parliament, regional and local administrations, or multidisciplinary research institutions.
- b) The persons designated as members of the SAC should have sufficient seniority within the user institution or the user community they represent. For organizations like the Central Bank or the ministry of finance, which are both users and producers of official statistics, the member has to represent his organization's user departments and not the department producing official statistics. The separate fora where the NSO interacts with other producers are described in Chapter 4.6 – *Coordination of the national statistical system*.
- c) The only SAC member who does not represent users of statistics is the chief statistician who acts as an ex-officio member.
- d) The NSO should act as secretariat for the SAC by providing its staff and premises.
- e) It is recommended that the SAC members' appointment is the responsibility of the same authority that appoints the chief statistician, i.e. the government in most cases, upon proposals by the bodies or groups to be represented. All stakeholders should be informed of the possibility to propose members for the SAC.

- f) It is the competence of the SAC to decide how it functions within the limits given by the statistical legislation. It elects a chairperson who preferably represents a user community from outside the government and the national administration. The legislation in some countries may prescribe that the chief statistician also acts as chairperson of the SAC. The SAC can foresee in its rules of procedure the creation of sub-groups for specific questions or domains.
- g) The SAC also acts as the advocate of the principles of official statistics. SAC members have an essential role to play within their communities and in public in terms of advocacy for the cause of official statistics. This may imply that the SAC discusses the interpretation and implementation of the principles and monitors the compliance of products and producers with the principles on its own initiative. The NSO or another producer may also submit a case related to one of the UNFPOS to the SAC for its opinion if it has broad implications beyond the statistical system and helps increase users and the public's awareness of these principles.³²
- h) Since the role of the SAC is to contribute to the relevance of official statistics, it will discuss both the coverage and quality of official statistics. In this respect, it may recommend independent external assessments of the quality of specific statistics or the implementation of the principles of official statistics in specific domains or activities are carried out.
- i) Opinions of the SAC and the results of the assessments should be made public.

Some countries have experienced difficulties in making a SAC work in practice, despite a good legal basis. It is not easy to find outsiders who have sufficient interest in official statistics across subject areas and to make them feel relevant as they are only members of an advisory body. This is especially the case when communication between the NSO and the members of the SAC is limited to one meeting per year. If the chief statistician is the chairperson of the SAC, he or she may take initiatives for activating the SAC. Another way of raising the level of interaction may involve individual members of the SAC as spokesperson to specific user communities (see Chapter 4.5.3 - *Interaction with user groups outside the statistical advisory council: capturing their information needs*). SAC members may also actively communicate with the media and participate in events organized by the scientific community and the social society.

4.5.2 Differences between the roles of SACs and executive boards

There are important differences between the mandates of SACs and executive boards in countries with the NSO as autonomous agency (see Chapter 4.3.3.2 - *The chief statistician as head of an autonomous agency*):

³² Another option is to create in the statistical legislation a separate body for this function, with an advisory role, as is the case in the European Statistical System with the European Statistical Governance Advisory Board (ESGAB). In a few countries, similar bodies exist at national level, but in general, this function is carried out by the NSO (or by the separate administrative body created for coordination of official statistics) with support from the SAC or the executive board as part of the coordination activities for the national statistical system.

- a) The executive board can also decide on various issues that are binding for the NSO and possibly other producers, including, as noted in Chapter 4.4.5 – *Authority to take decisions on the Programmes*.
- b) The executive board members are not, as in an advisory group, mainly spokesperson for a user community, but part of a decision-making body for the NSS and have therefore to put the interests of this system first. For this reason, the statistical legislation can foresee in such situations that, in addition to the executive board with decision-making function, an additional body composed of important users with an advisory role similar to the SAC be set up.
- c) The chief statistician is often the chairperson (or at least the executive board's deputy chairperson).
- d) As decision-making body, the size of the executive board shouldn't be large. Its members should preferably have a sufficiently senior level but also enough time to participate actively in meetings and work of the executive board.
- e) Members of executive boards can be appointed from selected user organizations or communities but also from other stakeholders. In the case of an NSO as an agency and other producers that are officially part of the NSS, the other producers are also members of the executive board.
- f) The executive board is not only advocating for the cause of official statistics but is also monitoring to what extent the producers of official statistics comply with the UNFPOS.

4.5.3 Interaction with user groups outside the statistical advisory council: capturing their information needs

In the context of official statistics, users are typically classified into user groups. This classification may vary between countries.

In the present context, the following user groups are distinguished:

- a) government, Parliament, and ministries with a broad remit such as the ministry of finance at the national level;
- b) specialised ministries such as health, education, agriculture at the national level;
- c) regional and local administrations;
- d) mass media;
- e) large businesses;
- f) small and medium-size businesses;
- g) the scientific community, including research institutions;
- h) schools and universities;
- i) international and supra-national organizations (including their statistical departments);
- j) non-governmental organizations and the civil society.

It is crucial for the NSO and the other producers in their areas of responsibility to establish networks with these user groups to obtain their substantive inputs and feedback regularly. Such

networks allow contacts on an on-going basis and more frequently and less formally than in the context of the SAC. Their function is in the first instance to formulate their needs for statistical information from the NSS. User networks are a key element in minimising the risk of losing touch with changing reality and becoming less relevant over time in the production and dissemination of official statistics (See Chapter 6 - *Users and their needs*).

Information needs are best formulated in terms of quantitative output content, periodicity, and major breakdowns. The extent of sub-national breakdowns between national aggregates and small area results is a dimension with considerable impact on the activity's volume and cost. Sometimes, users cannot express their information needs in terms that can easily be translated into indicators and in subsequent steps into statistical sources or data collection vehicles. The latter is the producers' main task, but the users should be involved so that they can assess the impact of various options. Furthermore, producers should make an effort to invite the representatives of users that are part of these networks to think ahead to anticipate future information needs that may arise, e.g. through new legislation.

As part of what relevance means for the users, many users press for shorter delays in the production of official statistics, up to the extreme of "real-time" statistics. Whereas some gradual improvements in timeliness are possible, this request is difficult to reconcile with the high-quality standards and benchmark function of official statistics. User networks and the SAC are channels by which the difference between official and other statistics can be communicated to users, emphasizing that for requests for "quick and dirty" jobs, they would have to turn to other providers, typically accepting lower quality. One partial solution for increasing the timeliness of official statistics may be the release of key "provisional" results ahead of the full set of final results. Still, quality standards and quality management procedures would have to be set up for such provisional results.

Policymakers have an increasing need to monitor their policy actions and consequences through quantitative indicators. Therefore, the NSO should proactively follow legislative developments and emerging requests for statistics and indicators across ministries to timely address these needs. In some countries, official statistics can even be used to allocate seats or distribute subsidies. Therefore, it is desirable that the NSO plays a role and gives advice about the adequacy of various indicators to monitor or even steer policy actions. However, it should clarify its role as producer of high-quality, timely and disaggregated indicators but not as part of policy decision-making. When policymakers require indicators for this purpose that deviate from definitions and classifications of official statistics, the statistical system should be ready to produce them as tailor-made statistical services but continue to publish as official statistics the results based on the concepts and definitions internationally agreed upon and applied across the national statistical systems³³.

4.5.4 Other aspects related to the UNFPOS in the organized interactions with users

Networking with user groups is not only crucial for gathering knowledge about the demand for new statistics. It should also be used to obtain feedback on the current statistical activities and deliveries as included in the existing programmes, and how statistics are made accessible to

³³ Example: a specific law may provide for funds to be indexed with the consumer price index but excluding certain good or services. The statistical system should provide an index defined in this way, but the main CPI published as official statistics should continue to include the goods and services excluded in the specific context of the non-statistical legislation.

specific user groups (see Chapter 10 – *Dissemination of Official Statistics*). Users identified by the producer within a specific dissemination channel can be surveyed for their satisfaction with the statistical products and how they are disseminated. Additional instruments to obtain information about users can be used for web users.

User networks can also be used for discussing issues of the supply side of official statistics, such as:

- a) access to administrative data in the case of ministries;
- b) response burden caused by statistical surveys in the case of businesses;
- c) with individual large businesses, updating their structure and changes in their structure as an important element in keeping statistical business registers up-to-date;
- d) possible joint ventures to test new methods for official statistics in the case of research institutions.

Networks with the statistical departments of international organizations exist not only to satisfy their data requests. From a national perspective, it is even more important to have the opportunity to participate in international efforts to derive new and revised standards for official statistics, to learn from the experience of other countries, and to engage in other projects led or partly financed by international organizations or donors. Networking with international statistical organizations may also allow the NSO or NSS to participate in peer reviews and assessments, either as systems to be assessed or through enabling experienced staff to be part of a team of experts to assess national statistical systems in other countries.

The statistical system can also help users make good use of official statistics by organizing training events for specific customers, particularly for the media that eventually reach a larger audience. It is also essential to keep privileged relations with more institutional users of statistics such as the government and the administration and inform them in advance about possible disruptive changes in times series due to revisions or the adoption of new international methodologies and standards.

As a public good, the results of official statistics can be used by everybody at his or her own responsibility. The only obligation is to indicate the source. However, according to the fourth fundamental principle, producers are entitled to comment on erroneous interpretation and misuse of statistics, if necessary, also publicly. Erroneous interpretation or misuse takes place, e.g. when a user disregards the limits to the interpretation of a statistical release; in this case, the NSO or the responsible producer should contact the user to prevent this from happening again. Another example would be a ministry communicating about a specific situation using other statistics than those produced for the same subject area by the NSS; without giving reasons.

It is within the chief statistician's authority to set up specific advisory groups for one or several of the above purposes and decide on their mandates and composition. He or she may prefer, in certain cases, to involve the SAC (or the executive board) to adopt the mandate and to act as the body to which such groups report, or to invite members of the SAC (or executive board) to participate in such groups. These groups can be set up for a limited or unlimited duration. In any case, it is important to be clear about the reporting so that their effectiveness can be assessed.

4.5.5 User access to confidential data for their own statistical purposes

Once a specific data set subject to confidentiality is within the NSS, this data set can only be used for statistical purposes, including experimental statistics, research or analytical activities by a producer of official statistics. The access to that specific data set is regulated by the statistical law and is under the responsibility of the producer in charge of acquiring and processing this data set as foreseen in the statistical programmes. Confidential data set can be shared between producers of official statistics only if the producers are unambiguously identified in the statistical programme as producers of official statistics and bound by the statistical legislation. For countries not having the confidential provision explicitly applicable to all producers or a blurred delineation of the NSS, the exchange of confidential data should only operate from an other (pseudo-)producer to the NSO; but not the other way around nor between (pseudo-)producers. A solution to that specific situation or during a transition phase would be to allow the transfer of individual data without identifier from the NSO and other producers of official statistics. It should be the chief statistician's prerogative to decide, on a case to case basis, if the conditions are met to share confidential data with other producers of official statistics; the risk being that confidential data is then shared by the other producers of official statistics with other non-statistical entities within their respective MDAs.

However, most statistical laws also provide for access to anonymised individual data without to be granted to selected users outside the statistical systems, for extensive research or analytical activities, following strict protocols based on a contract. These users must be part of the scientific community, avail themselves of the means and expertise necessary to protect the integrity of the data, have no conflict of interest leading to the identification of statistical units, and commit to the exclusive use of the data transmitted for the described research purposes. Because of these constraints, there is an institutional and legal difficulty in granting the same form of access to government departments, since they may have a conflict of interest in terms of using data beyond the limits of statistical purpose (e.g. through re-identification of statistical units by matching data from the statistical system with their own data sets from administrative data collections).

One solution to this limitation would be for the statistical legislation to allow the producers of official statistics, particularly the NSO, to provide data processing services to government departments and other users beyond the public sector. Statistical processing services should not be funded from the regular budget of the NSO, and therefore customers requesting statistical services would have to pay for the additional costs of the required processing. While statistical processing services are essential for promoting the use of data, producers of official statistics should have the right to decide which processing services to engage in. They should first ensure sufficient resources for the activities mandated through the statistical programmes to ensure the highest quality of the regular production of statistics. Finally, the principle of confidentiality must be strictly observed, and results of data processing services do not allow natural or legal persons to be identified directly or indirectly.

A second solution for ministries is establishing a research department that is organizationally separated from the administrative departments. If this separation is credible, such a department could be considered a research institution covered by the relevant legal provisions of access to confidential data from official statistics for scientific purposes.

4.6 Coordination of the national statistical system

4.6.1 The how and why of coordination

Regardless of the number of producers within a national statistical system, it is necessary to coordinate the activities of the system, for the following reasons:

- a) to ensure comparability between the various outputs, also across subject areas, so that they can be meaningfully related to each other using common target universes, common classifications and unambiguous terminology of concepts;
- b) to avoid duplication of efforts and undue burdening of respondents through collecting data through surveys when similar data exist as part of administrative records;
- c) to ensure that official statistics cover all socially important subject areas;
- d) to enhance the image of official statistics through branding and common release practices;
- e) to ensure that the best possible data are forwarded to international organizations;
- f) to ensure in federally organized countries that the information needs at sub-national level are incorporated efficiently into the national programme to reduce the need for additional statistical surveys to be carried out at the sub-national level.

The scope of coordination should at least cover the scope of the statistical programmes (see Chapter 4.4. - *Annual and multi-annual planning and priority setting*). In federally organized countries, an effort should be made by the NSO to look for coordination issues and possible efficiency gains also between federal and state-level activities. In some other cases, coordination has to go beyond the NSS activities, and include data from other origins, such as indicator sets required for national policies or by international organizations.

To make coordination work in practice is the responsibility of the chief statistician and the NSO (or the separate body in charge of coordinating the NSS). However, the other producers should not have reasons to perceive this function as an infringement of the NSO into "their" affairs, but as a mutually beneficial activity from which all producers benefit. For the NSO, a useful way of building a positive attitude by other producers is to couple coordination with advice and services like sampling, with sharing information about on-going activities at the international level, and with a participatory process of regular meetings with the other producers of the system to prepare the decisions to be made by the chief statistician.

This participatory process can take place either multilaterally in a process involving all producers if the issue is a cross-sectional one, or bilaterally with the producer directly affected by, e.g. a subject-oriented standard. For the multilateral aspects, the chief statistician may set up a coordination body, consisting of the heads of all producers, that meets regularly and advises the chief statistician. The flexibility of such a coordination body is essential, and therefore detail functional and governance modalities should not be ruled in a legal text.

Co-ordination is not only explicitly mentioned as an obligation in the UNFPOS. Recent decisions at the UN level also require NSOs to explicitly ensure coordination in the production

and transmission to the UN of the SDG indicators, produced by various national actors³⁴. A similar obligation for NSOs of Member States is included in the statistical law of the European Union.³⁵

The main mechanism for coordination is the preparation but also the implementation of the multi-annual and annual statistical programmes. Specific mechanisms such as project groups or memoranda of understanding involving all actors could be set up to ensure that a particular activity is followed closely, and operational steps are laid down precisely. A proactive approach is much preferred to some of the traditional mechanisms of coordination, such as the approval of questionnaires since they become active only at a stage in the process that is too late to consider changes that improve outputs and avoid overlaps.

Other coordination instruments complement the preparation of statistical programmes. They have to find a basis in the statistical legislation, mostly at a lower level than the statistical law itself. Only the chief statistician's authority, in consultation with other producers of official statistics, to endorse system-wide standards should have an explicit basis in the law itself. Some mechanisms are listed below:

- a) Standards on the implementation of the UNFPOS;
- b) Content-oriented standards;
- c) Methodological standards;
- d) Dissemination standards;
- e) Standards on metadata, documentation, and archiving;
- f) Standards on statistic-specific processes, notably quality management;
- g) IT standards, including standards on data security;
- h) Approval-based instruments outside the statistical programmes;
- i) Staff-oriented instruments.

However, there are statistical laws that are silent about the system-wide authority of the chief statistician. This case, frequently found in developing countries, is equivalent to a purely voluntary approach to coordination, leaving the decision on respecting a system-internal standard to each producer. Even if the NSO is in charge of preparing statistical programmes, the chief statistician would not have the authority to demand changes in activities proposed by other producers for inclusion in the statistical programme. In this situation, bringing as many activities of official statistics as possible under the line authority of the chief statistician is beneficial, if the legal basis cannot be upgraded in terms of the system-wide authority of the chief statistician. Given the growing interrelationships between statistical activities, such as the same set of data can be an input for more than one statistics, the need for better coordination is essential.

³⁴ [Resolution 71/313](#) on the Global indicator framework for the Sustainable Development Goals and targets of the 2030 Agenda for Sustainable Development, adopted by the UN General Assembly on 6 July 2017

³⁵ [Regulation \(EC\) No 223/2009](#) of the European Parliament and of the Council of 11 March 2009 on European statistics, and the additional provisions based on this law.

4.6.2 Coordination through standards

Coordination through setting standards that are valid for the whole statistical system is the second most important coordination tool. Although the chief statistician has the final authority to decide on such standards and their updating, all relevant producers must prepare these standards before they are formally adopted and generally made applicable through the participatory process mentioned in the previous section. Some countries' legal tradition may require that such standards are also issued as lower-level legal acts, but this is better avoided. If a co-ordination issue involves only one producer in addition to the NSO, agreements or memoranda of understanding between the two organizations may be a good option.

Setting standards, especially content-oriented standards, is greatly facilitated by adopting the standards established at the international level to the maximum extent. Recently, the international statistical community has also developed international standards concerning metadata, data transmission, business architecture, or access to confidential data for research purposes, including in some cases national examples of good practices. The references to such international and national standards are given in the respective chapters of this handbook.

Not all UNFPOS principles need explicit standards to assist producers in respecting them. The principle that may be the first candidate for standards is the principle of confidentiality, notably for the transmission of confidential data between producers and the scientific community (see Chapter 4.5.5 - *User access to confidential data for their own statistical purposes*). Other elements for standards of this type are the suppression of small aggregates with a disclosure risk of information about a single statistical unit that could be identified indirectly, the handling of identifiers in the different forms of data collections, and access to and use of statistical registers. Equally important as setting standards is establishing a mechanism by which controversial issues related to one of the UNFPOS can be discussed and decided. Such a mechanism would apply both internally to the NSO and between producers. Over time this may allow a kind of collection of case law that serves as a model for treating similar cases. Cases that have a wider bearing for users and the public can also be brought before the SAC or the executive board.

The content-oriented standards comprise classifications, terminology, and definitions to be used across all official statistics areas. The purpose is to ensure that the same term is used for one concept and that different terms are assigned to different concepts. A corollary of this task for the NSO is to establish and maintain a glossary of terms and definitions used in official statistics and to work out conversion keys when important classifications undergo changes. In some cases, the national standard-setting consists mainly of fixing the terminology in national languages that corresponds best to the terminology used in an international standard.

Classifications such as the economic activity classifications are fundamental to ensure the coherence of statistics from various data sources in a subject area like economic statistics. When a national statistical system adopts international classifications, national specificities can be incorporated, but preferably in such a way that they do not form an obstacle to international comparisons. This can be a problem when these national specifications reflect legal or administrative categories used in non-statistical legislation, especially when these categories change frequently. Generally, it has to be avoided that classifications used in the NSS and crucial for international comparisons to become dependent on categories fixed in national non-statistical legislation. On the other hand, national users may have a legitimate need for statistics

that reflect the nationally relevant categories. The considerations given in Chapter 4.5.3 - *Interaction with user groups outside the statistical advisory council – capturing information needs* concerning the use of official statistics for administrative allocation purposes are applicable also in such cases to satisfy both types of user needs.

Methodological standards in the narrow sense refer to issues like sampling, treatment of non-response, imputations etc. It is more important that the methodological department of the NSO advises the rest of the NSO and other producers than to issue rigid standards. However, all sample surveys of official statistics should use, when applicable, the statistical registers managed by the NSO as sampling frames.

Dissemination standards are related both to standards about the implementation of the UNFPOS and those on processes. One example related to impartiality in dissemination is setting clear rules to ensure that all users, including those from government or parent bodies, have simultaneous access to results when released and ban any pre-release access to anybody outside the statistical system. Other examples for dissemination standards are about using the label of official statistics, a common internet platform for all results of official statistics, managed by the NSO but open to all producers, or the metadata that must accompany results (see below). A common dissemination platform for all results of official statistics from the entire NSS in the responsibility of the NSO is a very efficient and user-friendly tool to ensure harmonised dissemination by all producers, including metadata.

A crucial part of the standards in official statistics is related to metadata and documentation. For both system-internal purposes and access by users, documentation about sources, methods, and definitions is essential to honour the principle of transparency. The NSO, in cooperation with the other producers, should establish guidance or rules in this respect, both for accompanying sets of individual data from which results of official statistics are generated and accompanying results that are disseminated. The NSO should also be available for advice on how to apply such rules in particular circumstances. Together with the national archive, the NSO should also work out standards for archiving data sets and products from official statistics. However, data sets should be available within the statistical system for some time to facilitate processing any request that would come up at a later stage.

Another important set of standards refers to processes common to the production and dissemination of many official statistics activities. Examples of such standards are:

- a) collection of information about user needs as an input into draft statistical programmes;
- b) quality management, and definition of quality criteria for results to be released as official statistics;
- c) revisions of existing series, e.g. due to new benchmark data such as censuses, or the implementation of a revised international standard also for past periods;
- d) correction of errors in published results;
- e) testing of new or modified data collection vehicles, notably questionnaires;
- f) transmission of data to international organizations.

Concerning data transmission to international organizations from national producers, the NSO has to define a process by which it is ensured that the most authoritative national data are transmitted, together with the necessary metadata. This applies particularly when the data is

not simply a subset of a regular production process within official statistics, or when the transmission involves the selection and transmission of data across different areas of responsibility within the NSS.

4.6.3 Coordination through approval by the chief statistician

The implementation of internal NSO activities follows the management rules of the NSO, which foresee periodic reporting to and approvals by different levels of the hierarchy at appropriate junctures. These are questions of the internal organization of the NSO addressed in more detail in Chapter 5 – *The National Statistical Office*.

It is the producers of official statistics' responsibility to implement the activities and deliver the statistical results assigned to them in the statistical programmes. Where interdependencies exist with activities of the NSO, or any other producer, regular cooperation, collaboration and exchange of information should occur. But formal interventions or explicit approvals by the Chief Statistician are not recommended generally for operational activities conducted by other producers. This could undermine the sense of responsibility of individual producers and cause unnecessary delays. An exception could be the adoption of new terminology and definitions for statistical results that the chief statistician has not endorsed. Consistent terminology and definitions should be used across the NSS. However, the coordination through the chief statistician's approval should not delay, more than needed, the overall production process and eventually, the dissemination of the results.

A traditional approach of coordination is the approval of forms for all data collection for statistical purposes by the NSO. In the modern way of producing official statistics, where many sources are combined for producing results, such a formal approach is unlikely to produce value-added. Piloting a new or modified survey with a small set of respondents would probably contribute more to the improvement of questionnaires than a formal approval by the chief statistician.

4.6.4 Coordination through staff policies

The set of shared standards, rules of procedures, and guidelines constitute a key element of what is referred to as a common culture of official statistics in a country. They transform the intentions of the statistical legislation into operational rules that respond to issues most staff would be confronted with in their respective duties. However, staff will not automatically use such standards if they are not aware of them, or if they remain too abstract to serve them in their daily work. Therefore, training staff on when and how to use the various standards, rules of procedures, and guidelines is essential and can be considered the third important coordination mechanism. Most NSOs organize such training for their staff, but staff from other producers at the national and sub-national levels should be encouraged to participate in these training events for official statistics. In particular, in decentralised NSSs, the statistical departments of other national producers of official statistics are confronted with the cultural environment of their respective MDAs and such training courses mingling, statisticians from the NSO and the other producers of official statistics may contribute to the development of a common official statistics culture within the NSS.

Some countries with a substantial number of other national producers use a system of exchange or rotation of staff between producers to ensure that the culture of official statistics is effectively

spread to all members of the national statistical system. If this takes place at a sufficiently high level, it is an effective way of strengthening the notion of a system of official statistics as a single-family. However, this would not replace other coordination instruments necessary at a more operational level.

Chapter 5. The National Statistical Office

5.1 Introduction

Official statistics are the responsibility of central governments in most countries. In most countries, the main tasks related to official statistics are entrusted to a specialized government agency, office, or institution with official statistics as its main or core function. The name of such an agency would typically reflect its function: common names are national statistical office (NSO), which is used in this Handbook, central statistical office (CSO), national statistical institute (NSI), national institute of statistics (NIS), central bureau of statistics (CBS), and shorter names linking the function and the country, such as Statistics Canada, Statistics Sweden etc.

Box 1: Mission statement, vision statement and values statement

A mission statement is a sentence or short paragraph that defines the existence of a business, non-profit, government organization, or any other entity. Mission statements get at the heart of why an organization exists, rather than how it exists. A mission statement articulates the organization's purpose both for those in the organization as well as for the public and other stakeholders. Some organizations prefer providing a vision statement. The difference is that a mission statement focuses on an organization's present state while a vision statement focuses on an organization's future. A mission statement answers the question "Who are we?" and the vision statement answers the question "Where are we going?". Finally, an organization's values statement highlights the organization's core principles and code of ethics. The organization's core values shape daily culture and establish standards of conduct against which actions and decisions can be assessed and philosophical ideals.

Mission, vision and values statements of NSOs reflect the core undertaking of an organization entrusted with developing, collecting, processing, analysing, and disseminating essential demographic, economic, social, and environmental statistics to supports public and private decision-making. For more information, Annex 4 provides a few examples of mission, vision and values statements of selected national statistical offices.

In the last few decades, the development of the NSOs in the various countries has many common traits, especially regarding its legal basis and main functions, but also shows many variations depending on the countries' administrative systems. Originally, most NSOs operated on the basis of legislation that was specific to each country. Following the development and adoption of the United Nations Fundamental Principles of Official Statistics, UNFPOS, since the early 1990s, the statistical legislation in a large number of countries has come to be based on these principles. Thus, as an increasing number of countries adopted and applied the UNFPOS, the legal basis of national official statistics has converged to the extent that despite different national traditions and legal structures, statistical legislation in a great number of countries is quite similar in content.

The mandates and functions of the NSOs are normally spelt out in the statistical laws, as well as the scope of their operations, their obligations and rights, and their place within the national administrations. Acknowledging that there may be considerable differences between NSOs in different countries as regards size, technical infrastructure and capacity, the similarities in their roles, functions and main activities are much more pronounced and more important.

5.2 Characteristics of NSOs

Among the main characteristics of NSOs the world over are the following:

a) **Main role:**

The role and obligations of NSOs are to provide the government and the society with statistical information. The UNFPOS describe this role as an integral part of the democratic processes of society.

b) **Core function:**

The NSO is almost everywhere unique because it is the only government institution with official statistics as its core function. Furthermore, it is generally recommended that the activities of the NSO are restricted to the core function of producing and providing statistics and that the NSO does not engage in administrative or politically related activities. This is necessary for maintaining the integrity and neutrality of the statistics.

c) **Main producer of official statistics:**

In most countries, the NSO is the main producer of official statistics but normally by no means the only producer. There are countries where more or less all official statistics are entrusted to the NSO, but it is much more common that other government agencies are engaged in official statistics alongside the NSO. Typically, these institutions, generally termed *other producers of official statistics*, are units of government departments/ministries that provide statistics on their special subject. Irrespective of the speciality of the producers, their activities in official statistics are all equally bound by the UNFPOS and by the statistical law of the country.

d) **Leader and coordinator of official statistics:**

In many countries, the NSO has the function of leading and coordinating the national statistical system (NSS), composed of all producers of official statistics. The leadership function involves taking the initiative to ensure that the various institutions engaged in official statistics work together. Their combined statistical production covers all main fields and interests of society and caters to all main user needs for official statistics. Furthermore, the leadership and coordination role of the NSO involves ensuring that the different producers follow appropriate methods and procedures which is mainly understood as ensuring that the activities follow international recommendations on the application of standards, classifications, procedures, methods, concepts and definitions. The coordination role of the NSO also includes ensuring that the activities of the various producers are coordinated to avoid under coverage as well as undue overlaps in the provision of statistics and statistical services.

e) **National representative and participant in international cooperation:**

In many countries, the NSO is the designated national representative in international statistical cooperation. This requires the NSO to be responsible for providing international organizations with comprehensive national data sets based on international recommendations and are fit for comparisons with those of other countries. The international role of the NSO also requires it to participate in or at least follow closely the work on developing official statistics carried out under the auspices of the international organizations in terms of extending and improving their coverage, quality, applicability, and usefulness. In some countries, participation in international cooperation is regarded as irrelevant, unimportant and a kind of luxurious activity. The reality is the direct opposite; international statistical cooperation is the most efficient way of informing the national statistical activities, providing the most modern knowledge, teaching the most relevant and modern methodologies, and making sure that the national statistics develop in harmony with those of neighbouring countries and do not stagnate and become irrelevant and of scant use.

f) **Centre of knowledge:**

The central place of the NSO in official statistics of a country entails that the institution has to consider itself and act as a centre of knowledge of official statistics. This applies to knowledge of modern standards, procedures, methods, concepts and definitions and to development of new or extended statistics to cover emerging needs. It also involves knowledge of the principles on which the statistical operations are based, their content and application as well as the restrictions and obligations they involve. These restrictions and obligations are mainly ethical in nature, in particular regarding the obligation to ensure confidentiality. Without a comprehensive knowledge of statistical procedures and principles, the NSOs would not be able to fulfil the requirements of the UN Fundamental Principle no. 2 of making decisions “according to strictly professional considerations, including scientific principles and professional ethics, on the methods and procedures for the collection, processing, storage, and presentation of statistical data”.

g) **Legal basis:**

As discussed above, countries' statistical laws have become quite similar in coverage and content following the development and adoption of the UNFPOS. While the statistical law may focus on the NSO as the core institution of official statistics, the law encompasses all producers of official statistics irrespective of their place in the administrative structure. Typically, the statistical law would include main provisions on the following:

- main principles of official statistics;
- the organization of the NSO and place in the government administration;
- the main function of the NSO to produce and provide statistics;
- the mandate for data collection and for accessing data for the purposes of official statistics;
- obligation to process statistics and disseminate the statistical outputs;
- obligation to safeguard the data and ensure the confidentiality of individual data.

Statistical legislation issues are discussed in detail in Chapter 3 - *The Basis of Official Statistics*. For further guidance on statistical legislation see also [The Generic Law on Official Statistics](#), GLOS, UNECE 2015.

5.3 National statistical office as an organization

5.3.1 Administrative structure and finance of the national statistical office

5.3.1.1. Administrative structure of the NSO

NSOs are organized in different ways, and their administrative solutions depend not only on the history, political and legal environment but also on specific national circumstances of each country. The [Guidance on modernising statistical legislation](#) (UNECE 2018) states that producers of official statistics should in principle, be distinct from the government and be organized as separate entities from other government departments. The Guidance describes three types of basic distinctions that differentiate statistical systems and in turn, influence the way an NSO is organized. It distinguishes between centralised systems (such as in Australia, Canada, or Mexico), partially decentralized (such as in the US and UK) as well as regionally decentralised statistical systems.

The UNECE Guidance differentiates statistical systems in relation to reporting lines to the government. Although an NSO can be referred to as ‘office’, ‘bureau’, ‘agency’, ‘institute’, ‘body’ or ‘authority’, the administrative status varies from country to country, and the name is not helpful in determining the administrative status of the authority. In any event, an NSO should be a state body, and for issues that are not covered by professional independence, it may report either to the Government (directly to the Prime Minister or indirectly through a responsible Minister), to the Parliament (directly or through an appointed managerial body) or to the President of the country. Alternatively, it can report to a body (management board) appointed by the Government, Parliament, or the President – in which case it can be considered an autonomous (or semi-autonomous) agency.

The various administrative solutions have their respective advantages and disadvantages, and these can be related directly or indirectly to the following factors:

- a) the legislative authority of the office: level of autonomy in drafting and proposing statistical laws and bylaws that regulate the whole statistical system;
- b) budgetary autonomy: ability to reallocate the assigned funds within a budgetary year without external interference;
- c) staffing: the ability to hire the required staff without external administrative barriers, non-related to budgetary issues;
- d) wages (ability to pay competitive salaries to staff, i.e. IT or statistical experts); and
- e) organization: ability to implement internal organization structure without external barriers.

Any changes to the administrative status, particularly those enacted through the national statistical law, should be handled with care. The process of creating or amending the law can

take considerable time and creates an opportunity for other actors to influence statistical legislation.

Amendments in the scope and range of activities within the NSS require a specific high-level policy decision by the central government and may even involve special legislation. Such a decision is not likely to be influenced entirely by the results of an objective analysis of the alternatives. Inevitably, past practices, interdepartmental rivalries, the structure and size of government, the impact of tradition and personalities, and so on come into play. Moreover, when possible changes in the organization of the NSS or the NSO are considered, short-run disruptions in service caused by the change must be weighed against the long-run gains.

5.3.1.2. Organizing the NSO

NSOs have generally been organized either according to subject matter or function, but most commonly by combining the two approaches. A review undertaken by the Turkish Statistical Institute under the auspices of the Conference of European Statisticians 2014/2015 classifies NSOs organizational structures into three most common basic types of organization ([In-depth review of process-oriented approach to statistical production](#)):

- a) Divisional structure: a division is a collection of functions which produce a specific product. The divisional structure or product structure consists of self-contained divisions. This type of structure is close to stovepipe structuring, where units are based on statistical domains, responsible for the production of a certain product.
- b) Functional structure: in functional organizations, units are based on functions. In the case of NSOs, these functions could be specified as data collection, processing, dissemination, etc.
- c) Matrix structure: this type of structure is a mix of functional and divisional organizational structure, with dual reporting lines.

The divisional structure - commonly referred to as stovepipes - commonly used in various parts of government administration may lead to inefficiencies. It should be noted, however, that this approach has significant benefits. Communication from the Commission to the European Parliament and the Council on the production method of EU statistics ([COM \(2009\) 404 final](#)) states:

The stovepipe model is the outcome of a long historical process in which statistics in individual domains have developed independently. It has several advantages: the production processes are best adapted to the corresponding products; it is flexible in that it can adapt quickly to relatively minor changes in the underlying phenomena that the data describe; it is under the control of the domain manager, and it results in low-risk business architecture, as a problem in one of the production processes should normally not affect the rest of the production.

The advantage of the stovepipe model is that it can create specialized substance knowledge developed and maintained in the team, thus leading to improved quality of statistics. On the other hand, a stovepipe model would inevitably lead to differences in quality, response burden and costs between statistical domains. The Commission communication also states:

However, the stovepipe model also has several disadvantages. First, it imposes an unnecessarily heavy burden on respondents. Given that data collection in different domains is done in an independent and uncoordinated manner, respondents are regularly asked for the

same information more than once. Second, the stovepipe model is not well adapted to collect data on phenomena that cover multiple dimensions, such as globalisation or climate change. Finally, this way of production is highly inefficient and costly, as it does not make use of standardisation between areas and collaboration between Member States. Redundancies and duplication of work, be it in development, in production or in dissemination processes are unavoidable.

The most common interpretation of subject matter versus function leads on the one hand to the creation of divisions such as trade, industry, health and education, and on the other hand to functions such as sample survey design, data entry and data editing, field operations, quality, analysis and dissemination. From a production perspective, some functions can be grouped into agency-wide functional units, such as sample design and fieldwork. Other functions that generally require the direct involvement of a subject-matter specialist would be better placed with subject-matter units.

It should be well noted that data collection should be organized as efficiently as possible in order to minimise the burden, both, for the respondents and the collecting agency. Statistical dissemination should be user-focused rather than based on statistical sources and processes.

The in-depth review of the process-oriented approach to statistical production mentioned above also stipulates that “Stovepipes and silos may exist no matter how the organization is structured. Therefore, looking for a structural solution for silos may not always be the right approach. Creating bridges across silos, improving communication between departments and ensuring that they are working efficiently toward the same goals are more important than the structure of the organization. If there is organization-wide encouragement to work well across divisions, then silos could disappear. In addition, process improvement and re-engineering also bring widespread change in the organization, and organizations move toward a matrix or process-based functioning.”

Examples of simple re-engineering and taking steps towards a process-oriented organization can be found in many NSOs. It was noticed that due to seasonality in data collection, savings could be achieved by grouping data collection, editing and processing into dedicated units. Leaving them in the subject area organizational units can be inefficient and lead to excessive capacity during certain periods. For example, data collection in a certain monthly survey finishes around the 15th of each month, and data editing must be finished within the next 10 days. If data editing and processing are performed exclusively by the subject matter unit, this leads to the need for additional human resources, that are fully utilised only during the data processing phase. If the tasks within the data processing phase are performed in the data editing and/or processing unit, the workflow between various data collection processes can be distributed, and significant savings can be achieved. The most common argument against this is that processing outside of the subject unit would reduce quality. This could be remedied by the introduction of quality checks or by combining only similar types of processing.

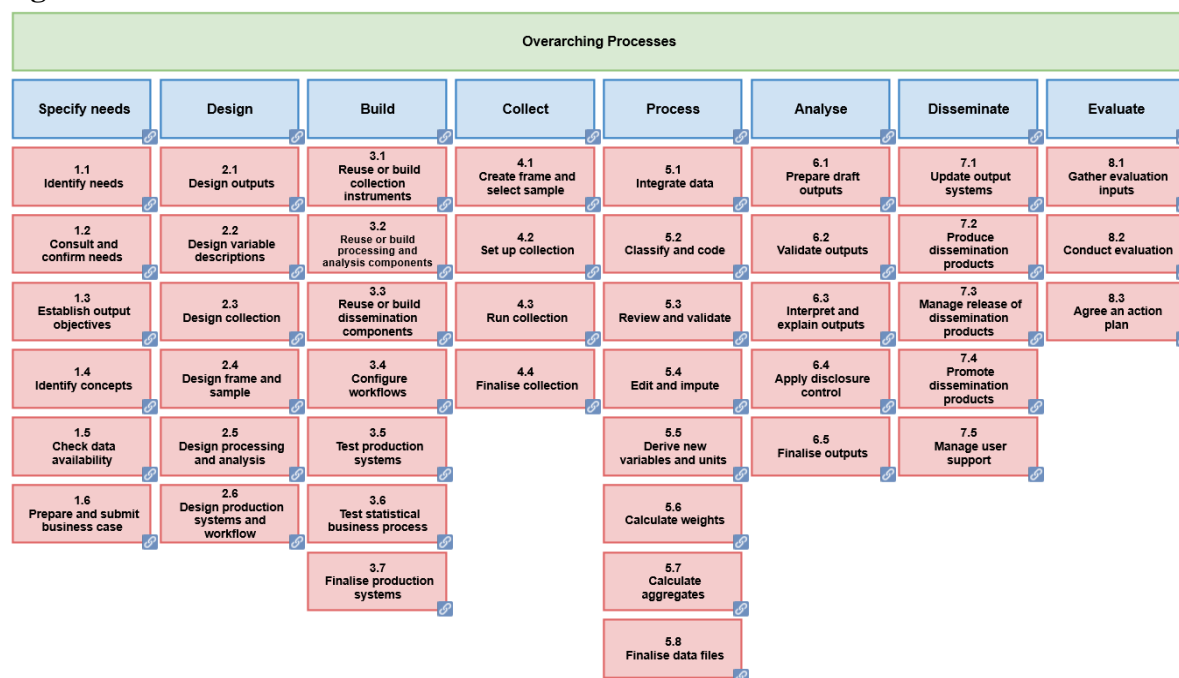
Analytical frameworks such as national accounts and environmental accounts have been the driving force for introducing horizontal approach into NSOs. National accounts produce a wide array of interlinked products, with varying deadlines. Therefore, organizing their production into a one-dimensional structure is often inefficient and may lead to inconsistencies and interpersonal conflicts. A common way around this issue is to establish cross-domain committees, that can bridge and interconnect to mitigate the stovepipe impediments. National

accounts departments organized according to the divisional approach may lead to stovepipes and suboptimal prioritisation. The focus of the work would naturally be on the improvement of individual products, rather than on an integrated approach that can lead to overall improvements in consistency and quality. By introducing a matrix organization, or by mimicking it with the introduction of product-related committees, production can be optimised for each domain while simultaneously enhancing coordination and increasing consistency (see Chapter 9 - *Analysis and analytical frameworks*).

5.3.1.3 Reorganizing the production process – the GSBPM

In view of the deficiencies of the stovepipe organization and production system, efforts have been made in the last few years to create a more functional system for the statistical production processes. A major milestone in these efforts was the development of the [Generic Statistical Business Process Model \(GSBPM\)](#). This model has been developed under the coordination of the Statistical Division of the UNECE in Geneva, based on innovative practices in a few leading NSOs. The GSBPM seeks to describe and guide the overall process of the statistical production as well as the individual production processes. The idea behind the GSBPM is that statistical production is better organised around functions than subject matters and that the same procedures can be utilised for the generation of several subject matter statistics. Thus, as an example, the same procedures for collecting data apply to several subject matter areas. Also, instead of designing and building specific methods and IT tools for each subject matter area, the idea is to build methods and tools for the different functions that can be utilised in many subject matter areas.

Figure 4: GSBPM



The GSBPM provides a systematic overview of tasks and activities that need to be undertaken when converting input data into statistical information. Initial versions of the GSBPM were oriented mainly around survey collection, while the most recent revision (v.5.1) also reflects the business processes for administrative data, commercial Big Data, geospatial data and other

data sources, as well as statistical products using mixed data sources such as national accounts. The creators of the GSBPM note that it should be applied and interpreted flexibly. It is not a rigid framework in which all steps must be followed in a strict order. Instead, it identifies the possible steps in the statistical business process and the inter-dependencies between them.

GSBPM standardises process terminology. This allows an NSO to compare and benchmark processes within and between organizations. It can help identify synergies between processes in order to make informed decisions on systems architectures and organization of resources. GSBPM is not a linear model – instead, it should be seen as a matrix through which there are many possible paths, including iterative loops within and between processes and sub-processes.

GSBPM contributes to a common vocabulary used within an NSO and between statistical organizations - having a standard terminology makes it much easier to communicate on collaboration projects. It can be used as a reference in planning, mapping, documentation and self-assessment of capacity needs.

The GSBPM identifies and describes eight phases of the overall statistical production process (*specify needs, design, build, collect, process, analyse, disseminate, and evaluate*) each of which is divided into sub-processes, 44 sub-process in all.

- a) **Specify Needs phase:** The ‘Specify Needs’ phase is probably the most important phase of any statistical activity, as it is used to define the scope of data collection activities and often transpose, vague demands into concrete plans. This is the phase of planning, identification of user needs, establishing research objectives, specifying information needs and consultation with the users. Investigation of concepts, data availability (such as administrative records) and practices in other countries are particularly important as they might prevent placing an unnecessary burden on respondents. This phase often requires direct involvement of the chief statistician, particularly during user consultations when it might be important to reduce the pressure of the users for collecting too many variables – which can reduce the quality of the results. It also includes the planning of survey stages and determining the role of administrative data. It ends with the approval or disapproval of the business case, usually done through appropriate sponsors and governance committees (see Chapter 5.4.2 - *Internal advisory and decision-making bodies*).
- b) **Design phase:** The ‘Design’ phase describes the development and design activities, and any associated practical research work needed to define the statistical outputs, concepts, methodologies, collection instruments and operational processes. It determines the most appropriate collection method and generally includes all the design elements needed to define or refine the statistical products or services identified in the business case (IT, sampling, collection, dissemination...). This phase specifies all relevant metadata (including extractions from statistical, administrative, geospatial and other non-statistical registers and databases), ready for use later in the business process, as well as quality assurance procedures. Design activities make substantial use of international and national standards in order to reduce the length and cost of the design process and enhance the comparability and usability of outputs. Reuse and adaptation of design elements from existing processes are also encouraged. The ‘Design’ phase is a time of intensive inter-departmental cooperation - ideas must be turned into concrete plans and specialists for various processes have to be included.

- c) **Build phase:** The ‘Build’ phase builds and tests the production solution to the point where it is completely ready for use. The outputs of the previous phase are assembled and configured to create a complete operational environment to run the process. Workflows are configured, routines and procedures are tested and documented. Pilot data collection is typically performed in this phase, and the training of users is performed. For statistical outputs produced regularly, this phase usually occurs for the first iteration, following a review or a change in methodology or technology, rather than for every iteration.
- d) **Collect phase:** The ‘Collect’ phase contains the collection of all necessary information, but also covers the preparatory processes that are intended to ensure that people, processes and technology are ready to collect the required data and metadata. It includes the creation of the frame and selection of sample, training of collection staff, ensuring the availability of collection instruments, providing information to respondents, minimizing non-response and loading the collected information into an environment suitable for processing. Depending on the geographical frame and the technology used, geo-coding may need to be done simultaneously with the collection of the data by using inputs from GPS systems, putting a mark on a map, etc.
- e) **Process Phase:** The ‘Process’ phase describes the processing of input data and their preparation for analysis. It is made up of sub-processes that integrate, classify, check, clean, and transform input data to be analysed and disseminated as statistical outputs. For statistical outputs produced regularly, this phase occurs in each iteration. The sub-processes in this phase can apply to data from both statistical and non-statistical sources (apart from sub-process 5.6 (Calculate weights), usually specific to survey data). The ‘Process’ and ‘Analyse’ phases can be iterative and parallel. Analysis can reveal a broader understanding of the data, making it apparent that additional processing is needed.
- f) **Analyse Phase:** In the ‘Analyse’ phase, statistical outputs are produced and examined in detail. It includes preparing statistical content (including commentary, technical notes, etc.), and ensuring outputs are ‘fit for purpose’ prior to dissemination to users. The preparation of maps, GIS outputs and geo-statistical services can be included to maximise the value and capacity to analyse the statistical information. This phase also includes the sub-processes and activities that enable statistical analysts to understand the data and the statistics produced. The outputs of this phase could also be used as an input to other sub-processes (e.g., analysis of new sources as input to the ‘Design’ phase). For statistical outputs produced regularly, this phase occurs in every iteration. The ‘Analyse’ phase and sub-processes are generic for all statistical outputs, regardless of how the data were sourced.
- g) **Disseminate Phase:** The ‘Disseminate’ phase manages the release of the statistical products to users. It includes all activities associated with assembling and releasing statistical products via different channels, such as formatting and loading information into output systems, preparing the product components (explanatory texts, tables, charts, maps, quality statements etc.), promotion and managing user support. These activities support users to access and use the products released by the statistical organization. For more information see Chapter 10 - *Dissemination of Official Statistics*.

- h) **Evaluate Phase:** The ‘Evaluate’ phase manages the evaluation of a specific instance in a statistical business process. It can take place at the end of the instance of the process but can also be done on an ongoing basis during the statistical production process. It relies on inputs gathered throughout the different phases. It includes evaluating the success of a specific instance of the statistical business process, drawing on a range of quantitative and qualitative inputs, and identifying and prioritising potential improvements.

See also Chapter 14.4 - *Use of Standards and Generic Models*

5.3.2. Central office and regional network

Statistical systems vary from country to country. Some countries, particularly small ones, have an NSO, normally located in the capital city, operating on a country-wide basis. Many countries have the NSO headquarters located in the capital (in some countries the NSO head office is located in another city) and a network of regional offices controlled by the central office. In this form, the role of the regional offices is usually mainly to undertake and oversee data collection as prescribed by the central office. Coordination in such systems should proceed smoothly provided the central office has sufficient resources for training regional staff. (For an overview of Federal systems see Chapter 4 – *The National Statistical System*). There are examples of countries with a number of sub-ordinate offices, located in different regions of the country, that are specialized in particular statistics or subject matters. Thus, one such sub-ordinate or regional office may be responsible for the entire production process in a given subject or domain, such as labour market statistics (including conducting labour force surveys), environment statistics or health statistics.

Statistical systems vary considerably regarding the extent to which the official statistics are collected by the NSO and by other producers of statistics. This is referred to as having different degrees of functionally centralized or decentralized statistical systems (see further discussion in Chapter 4 – *The National Statistical System*).

Although many statistical processes have been redesigned as a result of the introduction of modern technology, some official statistics require or benefit from direct contact with respondents. Due to historical reasons, administrative arrangements and territorial divisions often make regional presence mandatory or unavoidable. In the past, when data collection was done mainly via paper format, the regional presence was more or less unavoidable or at least preferable. The work process was commonly carried out in both the head office and the regional offices. Thus, the regional offices would be responsible for data collection, data entry, basic checks and data editing while the head office undertook the processing and analysis. With the introduction of online, electronic forms and automated transfer of data (machine to machine), the data entry phase was transferred to the respondent. Many quality checks and corrections are now performed by automated logical controls embedded into data collection systems, while the use of databases encourages central processing and preparation of data. This has led to the strengthening of the central office's role and responsibilities while reducing the importance and scope of work in the regional offices. The increasing use of administrative data for statistical purposes, replacing or augmenting survey data, has had a similar effect on reducing the need for regional offices. The use of computer-assisted telephone inquiries also reduces the need for regional presence.

Regional presence remains important in large countries and in large-scale data collection activities such as censuses and price collections for the compilation of the Consumer Price Index (CPI). Therefore, many NSOs have tried to find a way to redistribute tasks locally or to find new activities for staff employed in the regional offices. The most common example of new activities is the introduction of additional controls and quality checks of register information, such as validation of local unit information in the business register and for follow-up activities of business surveys, even those carried out through portals. For tasks such as telephone data collection, regional offices can perform additional checks or telephone reminders. In addition, some NSOs have transferred entire functions to be undertaken at the regional level, for example, Canada and France, where regional offices play a key role as dissemination centres. In Australia, the regional offices act as national centres for certain areas of statistics, for example, the office in Victoria (Melbourne) is responsible for the compilation and dissemination of statistics on the services sector for the entire country. The same system is applied in Poland. Regional offices often compile or disseminate regional statistics and thus have an important role in customer service.

The relationship of an NSO with regional bodies remains an important issue. Depending on the country's administrative arrangements, data collection or supplying of statistical information at the regional level might play an important role. This is discussed further in Chapter 4 – *The National Statistical System* concerning the division of responsibilities in federal states.

5.3.3 Finance of the NSO

Adequate funding of statistics is a key issue in sustained statistical capacity-building around the globe. Even though it could appear that financing for official statistics is stable as regards the regular statistical programme of work, IT and other statistical infrastructures generally require significant investments in order to keep pace with modern technology and growing users' requirements. Unfortunately, this is not always achievable through regular financing, and NSOs are encouraged to use large activities (such as population censuses) or external (project) financing (e.g. from international donors) to finance the system-wide infrastructure upgrades.

Internationally comparable official statistics are a public good that provides relevant information necessary for the functioning of a democratic society. Therefore, official statistics must be (directly or indirectly) funded from the government budget. The process of securing sufficient budgetary funding is country-specific, but there are many similarities. Although financing official statistics is often not a government priority, statistical offices have an advantage over other administrative bodies in that their programs are clear, transparent, systematic and are based on international cooperation, manuals and recommendations. This makes lobbying for funding easier, as the chief statistician and management of the office can provide persuasive arguments when requesting additional funding. Ideally, a statistical office should know exactly how much each statistical product costs (which can be achieved through cost-accounting) or at least provide a reasonable estimate. This approach also helps fight budget reductions, as an argument can be made that statistical activities need to be cut if a significant reduction of budgetary allocation is demanded. In addition, the process also generally involves ensuring political support for planned activities, which can be achieved through engagement with the user community, statistical council or personal engagement of the chief statistician.

The status of the NSO can have a significant impact on its position within the government budget. Some NSOs have a dedicated budget line, while for others the budget of the NSO is included in the budget of another government entity (ministry, parliament, the office of prime minister or general administration). The regular budgetary procedure is usually based on what was allocated in the previous year +/- a certain percentage, and therefore having a dedicated line may lead to more stable financing, while having a joint line may lead to more frequent decreases and increases. In any event, the best way to secure additional funding is by introducing new specific activities.

Box 2: Statistics Australia successful bid for additional funding

In 2014, the Australian Bureau of Statistics presented a [detailed plan for modernizing the Australian statistical system](#), arguing that the data landscape had changed and that it could not continue to produce high quality official statistics with decreasing budgets and outdated IT infrastructure. The Bureau outlined a detailed plan and managed to persuade the government to secure a significant increase in funding over the next 5 year-financial cycle (in total 257 million AUD – which is about 12% of ABS 5-year budget, excluding census). The plan included a procurement of new IT systems with significantly improved security features, improvements in administrative data acquisition and integration, web page redesign, improvement to metadata management, training of staff and new services.

Some NSOs are able to secure additional funding by selling more statistical products and services on the market, while in some countries this revenue goes to the national treasury and statistical offices cannot use it as part of their budget. Even though additional sources of funding can be used to finance various activities, public service organizations should not compete on the market and production of public goods should be publicly funded. However, NSOs are in possession of datasets not held by others. These datasets may be underused as NSOs do not have the resources to make all combinations and aggregations of data readily available. Many user needs are also so specific that it would not be acceptable to use public funds to compile statistics to serve a narrow user need. As NSOs are public organizations, chargeable services cannot produce profit. They can only cover the costs of the additional work and the required infrastructure, such as IT and staff training. Use of those resources should be transparent (see Chapter 10.8 - *Recovering dissemination costs*).

The NSO may provide statistical services to other government bodies, international organizations and the private sector. Such statistical services may include sample selection from a public register, data collection, weighting of survey results, aggregation and compilation, composite indicator creation, seasonal adjustment, drafting of metadata, advisory services, anonymisation of data, disclosure control, data linking, preparation of tables, analysis and others. However, some NSOs may not be motivated to perform these kinds of activities as their administrative systems do not allow retention of recovered costs.

Additional income can in some countries be secured through selling statistical “goods” defined as “self-contained arrays of quantitative information, with or without interpretation, which can be stored for future retrieval. The medium in which these arrays are recorded is immaterial.” Such goods might include a yearbook of national accounts; a removable media with the standard industrial classification; and tables on exports and imports by commodity groupings,

downloadable from a web site. Additionally, statistical goods might include applications that can be used by the government or the public or pre-prepared microdata for scientific purposes, accessible via encrypted and coded media, remote access or safe room access. Microdata access for scientific purposes might also, in some cases, include statistical services – such as data linking. (See Chapter 10.5.3 - *Microdata*). Pricing of statistical goods and services should be dealt with particular care as the main motive for putting a price on them should be recovering the costs for additional service and not on earning additional income.

5.4 Governance and leadership

5.4.1 Chief statistician

The chief statistician is the highest authority of the national statistical system (NSS) with respect to substantive statistical matters. The chief statistician is usually the head of the NSO. In some statistical systems (e.g., the UK) the chief statistician is the head of the National Statistical Authority, while in highly decentralised systems (such as the US) the chief statistician is the president of a coordinating body (such as the Statistical Policy Branch within the federal government's Office of Management and Budget). Although in some statistical systems it may be difficult to identify the chief statistician, it is usually the person who has the authority to represent the NSS internationally. The rest of this section will primarily refer to the chief statistician as the head of the NSO, but the text may also be useful for other institutional setups.

Responsibilities of the chief statistician

The responsibilities of the chief statistician can be described in a number of ways. Common element 3.6 in Chapter 4 of the UNECE (2018) Guidance on modernizing statistical legislation describes the main responsibilities of the chief statistician as follows:

- a) The chief statistician shall lead the strategic development of official statistics, partnerships and stakeholder relations to enhance the value of official statistics.
- b) The chief statistician shall represent the NSS at the national and international levels and coordinate the international collaboration of the NSS.
- c) The chief statistician shall be responsible for the general management and development of the national statistical office and its staff, including its central and regional offices (if applicable), in full conformity with national legislation and professional independence.
- d) The chief statistician shall independently decide on the structure, use of resources, tasks, and staff appointment.
- e) The chief statistician shall decide on the content of the draft multi-annual and annual statistical programmes including the statistical outputs and the implementation reports in consultation with users of statistics and other producers of official statistics.
- f) The chief statistician may issue standards and guidelines to be applied across the NSS for the development, production, dissemination and communication of official statistics.
- g) The chief statistician may promote the use of the standards, classifications and terminology applied in official statistics and by respondents, to administrative data providers.

- h) The chief statistician shall facilitate the correct interpretation of statistics and is entitled to comment on the use and misuse of statistics.

5.4.1.1 Authority of the chief statistician

Responsibility for the functioning of an NSO lies with the chief statistician, and the Government shall not intervene with matters pertaining to the professional independence of the NSO.

The main responsibilities of the chief statistician can be divided into two segments - professional and coordinative. On both of these issues, the authority of the chief statistician should be enshrined in the law, reinforced by personal attitude and competences. The [Guidance on modernising statistical legislation](#) states:

“the Head of the NSO should have the authority to take professional decisions (without any kind of interference), especially regarding the scope, content and frequency of data compiled, personnel management, management of the operations of the NSO, release of statistical information and press releases and direct communication with policymakers and authorities. The Head of the NSO should also be at the most senior official level in a country, they should be considered a peer by the heads of other government departments and should be included in any regular meetings of such officials in order to promote and enforce decisions;”

Further, the guidance states:

“Statistical legislation should clearly designate the coordination of the NSS to the chief statistician of the NSO or another statistical authority. Official statistics produced by different producers of official statistics all need to meet the same quality requirements, professional ethics and principles. The chief statistician should promote the use of internationally agreed statistical standards, definitions and classifications in the NSS and have the possibility to establish a national Code of Practice and put in place measures to support statistical authorities in applying the Code. The chief statistician should also be assigned the responsibility to represent the NSS internationally and coordinate international activities within the NSS.”

5.4.1.2 Skills and qualifications of the chief statistician

A chief statistician should possess the following attributes:

- a) proficient in statistics or have a profound understanding of statistics;
- b) capable of running a large professional organization;
- c) understand and be sensitive to the needs of users;
- d) communication skills required for public communication and user relations;
- e) the ability to understand complex processes essential for day to day decision-making;

In terms of profession, chief statisticians are most commonly economists, statisticians and demographers with a proven track record of relevant professional experience. In recent years, data scientists, IT experts or other specialists as the chief statistician are becoming more common. Choosing a chief statistician is a difficult task, as the post requires a combination of skills that is not easy to find in one person.

A chief statistician is expected to provide expert opinion on many different subjects, and any gaps in expertise may diminish the perception of professionalism expected from an NSO. For these reasons, a wise chief statistician would rely on specialists who can provide helpful recommendations and consult them as much as possible. The job of the chief statistician is not only about professional competences. A successful chief statistician must also be a strategist who can recognise threats and opportunities, understand and address the problems of people working in the NSO and at the same time understand interests of the environment in which the NSO is functioning. Being professionally independent, the chief statistician should not be seen protecting the interests of the Government but servicing the user community at large – which is in the interest of the state. Therefore, another important qualification should be a clear sense of public good and behaviour in line with the Fundamental Principles of Official Statistics. In any debriefing on various options, the chief statistician must respond quickly at times and patiently at other times and must always demonstrate an enormous capacity to listen.

5.4.1.3 Appointment of the chief statistician:

The [Guidance on modernising statistical legislation](#) identifies the appointment and dismissal procedures of the chief statistician as one of the most common weaknesses of current statistical legislation in countries. The Guidance states that:

“The strong position of the Chief will enable compilation of statistics on an impartial basis and increases trust in official statistics. The chief statistician’s appointment should be non-political and based on professional competence only. Deciding on issues of professional independence, such as data sources and statistical methods, requires specific professional experience and knowledge. The chief statistician’s position should be filled following a published vacancy announcement with professional requirements and an open competition among applicants. Ideally, the position of chief statistician would not be part of mobility schemes in the public administration. In addition, the term of office of the Chief must be respected independently of changes in the government”.

Many recent international efforts have tried to strengthen the appointment procedures of the chief statisticians. The [European Statistics Code of Practice](#) in its 2017 revision includes indicator 1.8 which states *“the procedures for the recruitment and appointment of the heads of the National Statistical Institutes and Eurostat and, where appropriate, the statistical heads of other statistical authorities, are transparent and based on professional criteria only. The reasons on the basis of which the incumbency can be terminated are specified in the legal framework. These cannot include reasons compromising professional or scientific independence.”* A similar formulation has been added to Article 5a of the [European Regulation on European statistics](#) in its 2015 revision, which states under point 4: *“Member States shall ensure that the procedures for the recruitment and appointment of heads of NSIs³⁶ and, where appropriate, statistical heads of other national authorities producing European statistics, are transparent and based only on professional criteria. Those procedures shall ensure that the principle of equal opportunities is respected, in particular regarding gender. The reasons for dismissal of heads of NSIs or their transfer to another position shall not compromise professional independence.”*

³⁶ NSI is abbreviation used in the EU to denominate National Statistical Institute, in this Handbook referred to as NSO.

A more detailed elaboration of the procedure that should be implemented in national statistical laws can be found in the article 6. of the [Generic Law on Official Statistics](#) (GLOS), and key characteristics for the appointment of a chief statistician should be the following:

- a) publicly announced vacancy and open competition based on relevant professional competences only;
- b) defined conditions for appointment (usually qualifications and years of experience);
- c) defined duration of the mandate and specified rules for extension;
- d) defined list of reasons for dismissal, as the term of office of the chief statistician cannot be terminated before its expiry for any reasons compromising statistical principles.

5.3.1.4 Terms of the office of the chief statistician

There are three standard variations related to terms of the office:

- a) The chief statistician's office term is the same as the term of the government's executives (this is the case with the chief statisticians in several countries in Latin America).
- b) The chief statistician is appointed for a fixed term of office that can be renewed (this is the case with the Government Statistician of New Zealand; the Commissioner of the Bureau of Labour Statistics of the United States; and the National Statistician of the United Kingdom Statistics Authority and the National Statistician of the Philippines).
- c) The chief statistician serves an unlimited term, which ends either with his/her resignation, retirement or removal from office or for other defined reasons (e.g. in case of the chief statistician of Canada, President of the Central Statistical Bureau of Latvia and in many countries in Asia-Pacific).

However, it should be noted that short terms of office interfere with continuity as statistical programmes tend to extend over significant periods of time. A series of chief statisticians may not share a common vision, and programme commitment could be unlikely to produce a consistent approach to statistical policy or predictably adapt to new circumstances. On the other hand, excessively long stays in office may produce stagnant programmes, lacking energy and innovation. While such a situation may keep the statistical organization out of potential conflicts, it may also marginalize the statistical organization and constrain its staff, eventually leading to reduced budgetary support.

The [Generic Law on Official Statistics](#) (GLOS) suggests that the chief statistician should be appointed for a term of office fixed in the statistical law for underlining professional independence and that the term of office should be different from the term of the government. The GLOS further suggest that the term of office should be renewed once and that it should be further renewed exclusively based on a new publicly announced vacancy and an open competition.

The GLOS also notes that the chief statistician should not be a member of the government and that the terms of office should be respected independently of changes in the government. However, the chief statistician would need to have direct access to ministers and other senior-level authorities in carrying out his duties.

Common element 3.5 in Chapter 4 of the UNECE (2018) Guidance on modernizing statistical legislation considers conditions for terminating the term of office of the chief statistician and

states that the term of office cannot be terminated before its expiry for any reasons compromising statistical principles. The term of office may be terminated only for the following reasons:

- a) own resignation of the chief statistician;
- b) termination of citizenship;
- c) a court decision declaring the chief statistician incapable or of limited capacity to work;
- d) a lawful sentence of the court for an intentional crime, or imprisonment according to the lawful sentence of the court;
- e) death of the chief statistician.

5.4.2 Internal advisory and decision-making bodies

An NSO is typically a relatively rather large public sector organization that produces a wide range of statistical products and services. Thus, management processes can be quite complex. To alleviate this, specific management and substantive bodies or committees may be established to promote cross-division and cross-domain exchange of information and the coordination and consultation processes needed to support decision-making within the statistical office.

Large NSOs, similar to other public administration organizations, generally have an internal management committee consisting of senior managers such as the chief statistician, who presides over the committee, deputy(s), chief of staff, executive secretary, heads of highest organizational levels and heads of independent units (if any). Committee meetings are held regularly, on a weekly, monthly or bi-monthly basis, to discuss management, development and coordination issues. These meetings run according to a standard agenda with items such as reports on important activities at national and international levels, joint projects, major decisions, key administrative and management issues, and other issues. At these meetings, the chief statistician will delegate tasks, seek advice on management decisions and share important information. The agenda and minutes with decisions and action items should be made available to all staff. The tasks of the management committee vary depending on the size of the organization but are generally oriented around two types of issues – managerial and technical. Issues affecting only one organizational unit are usually discussed outside of these meetings, bilaterally with the chief statistician or at the level of main organizational units. In some cases, such as when the chief statistician is not responsible for the administrative management of the statistical office (e.g., Austria), managerial issues are addressed separately from the technical issues by different high-level committees.

Regular meetings at the level of main organizational unit chiefs encourage a focus on decisions related to subject matter issues, organization of work, development projects, upcoming changes or revisions, modernisation of specific activities, or preparing for the dissemination of new statistical products or services. Although it is not expected that the chief statistician attends this type of meeting, occasional attendance can provide in-depth insights and can be motivational to the staff. In addition to this, regular team meetings contribute to smooth and effective work. NSOs may also have some standing and ad-hoc committees to advise the chief statistician. These committees may deal with cross-cutting issues such as statistical confidentiality and

microdata access for scientific purposes, dissemination of special releases, modernisation of processes, quality management, coordination of work, among others.

Typically, internal committees are mandated by the chief statistician to provide advice in their area of competence. The committee needs a chairperson and when necessary, a secretary and terms of reference defining its objective, composition, expected outputs and timeline. The chair should be a person whose judgement is respected, even though his/her statements do not systematically carry the weight of an official decision. The committee's purpose is to advise the chief statistician. While the chief statistician has the power to ignore the committee's advice, in practice, and possibly with slight modifications, the committee's voice will be heard.

Committee membership offers an opportunity to contribute to agency-wide policies. Such activity can serve as a training ground for future senior managers in the sense that it provides members with a broader perspective than they could acquire from their regular jobs and makes them aware of the wide range of considerations important to the organization. Ideally, committees should not grow too large, or else they become cumbersome and incapable of reaching closure on the issues they debate. Generally, committee meetings and activities represent a heavy burden on their members' time. To maximize the training benefits that such committees confer on their members, some system of membership rotation could be adopted, but some stability is also required.

5.4.3 Internal communication and coordination

NSOs are usually relatively large organizations. In small countries, the NSOs tend to have lean management arrangements while the largest countries may have highly developed hierarchical structures. In large and complex offices, getting messages across can sometimes prove to be challenging. Hence, special efforts may be needed to strengthen two-way communication in larger statistical offices. Two-way communication involves feedback from the receiver to the sender instead of one-way communication which refers to sending a message without any feedback. Two-way communication may occur horizontally or vertically. When information is exchanged between superior and subordinate, it is known as vertical two-way communication.

On the other hand, when communication occurs between persons holding the same rank or position, it is called horizontal two-way communication. In effective organizations, communication flows not only downwards but also upwards and sideways in the organization. Before important decisions are made, prior two-way communication ensures that staff are consulted to consider their ideas and concerns. After decisions are made, it is important that they are communicated effectively to staff. The chain of meetings is important for the effective functioning of an organization. Information should flow efficiently from the management committee to chiefs' meetings and further to team meetings, and also to the other direction to provide feedback.

While hierarchical structures have their benefits, without the direct engagement of the middle-management, they can lead to halts in communication and tensions between departments. It can thus be useful for the organization if the chief statistician can periodically take part in management meetings at lower organizational levels, particularly when a strategic topic has to be discussed. This can bridge the gap in communication and allow direct engagement on subject matters and problems that are not visible from the top of the hierarchy.

Another way of supporting this bottom-up flow of information is to ensure that minutes of chiefs' meetings, held even at team level, are made available, for instance through the intranet, to the entire staff including senior management and the chief statistician. Middle- and lower-management may sometimes consider meetings a waste of time; therefore, it is important not only to find the right topics to be addressed, but also adequate target participants, frequency, and duration.

Statistical offices frequently carry out activities that include multiple organizational units, and in such situations, tensions that arise as a result of misunderstanding are quite common. Usually, these can be resolved through firm involvement of the management, and if problems persist, an ad hoc body can be formed with the main task of proposing concrete solutions. Further, coordination can be fostered by using bodies set up for specific tasks, such as modernisation of specific activities through a project or preparation of large operations such as censuses.

5.4.3.1 Relationship with trade/staff unions and other staff committees

Fostering good relations and trust with trade and staff unions and representatives is important. These staff representative bodies are key to resolving staff issues, and it is critical, and in some countries even mandatory, to consult them before any major management decisions affecting staff, including changing the organizational structure. An important area where staff union's involvement can be expected is occupational health and safety, flexible working arrangements such as telecommuting, and other issues related to work-life balance, motivation, and well-being that impact staff accountability and productivity. For all these reasons, the chief statistician needs a direct conduit to the staff, just as staff members need direct access to the NSO executive. This can be ensured by holding regular meetings with staff representatives, or, when relevant, staff unions. It is a good practice to have a staff representative participate in the management committee meetings. In some countries, it is obligatory to form a staff-management relations committee, where staff issues are regularly discussed. The committee's agenda depends partly on which elements are handled on a government-wide basis and left for each agency head to solve.

Elected staff representatives may also be affiliated to trade unions that commonly have their respective central offices providing support, analytics and legal advice to their members. Therefore, it is in the interest of the chief statistician to foster relations with trade unions (or trade union association) as they can advocate for and contribute to strengthening the statistical system.

5.4.3.2 Sharing of information and communication through the hierarchy and across the organizational structure

Regular exchange of information is a part of corporate culture that should be promoted and fostered since the success of any organization depends upon the sharing of information. This is particularly important for an information compiler such as a statistical office. Although modern technology can facilitate the exchange of information, traditional exchanges of information through formal meetings should not be underestimated. Direct interpersonal contact is the most effective means of two-way communication exchange. One way to ensure regular flow of information is to set up a meeting schedule and to encourage the organization units to make short minutes of the meetings and make them accessible on the intranet. The

chief statistician should use these meetings to listen to directors, chiefs and experts to form a vision for developing the statistical system. The NSO and its management then share and discuss the vision and how to implement it and then further develop the ideas. On the other hand, some information, such as news regarding changes in the environment, i.e., regulations on civil service or accounting standards that may influence the office can be discussed at physical meetings, but also be communicated directly via e-mail, the intranet or newsletters. Exchange of best practices should also be encouraged, as solutions used in one statistical area can often be used to improve another. Unfortunately, due to silos and extensive workloads, it often happens that statisticians are not aware that there are specialists or practices from another unit who can help them solve their problem. More information on knowledge sharing can be found in Chapter 13 - *Data, information, and knowledge management*.

5.4.3.3 Use of the intranet

In recent years, the intranet has become an essential part of any knowledge-driven organization. Typically, it is used to communicate basic staff related information such as the structure of the organization, a directory with office locations, email and telephone contacts, and collection of forms needed to perform administrative tasks and compliance with relevant legislation. But the intranet can and is often used to do much more. Currently, most statistical offices use it as a place for exchange of information, informal and formal discussions and for storing the minutes of meetings, sharing information on projects, international meetings and conferences, and exchanging relevant literature. Furthermore, the intranet can include “how to?” process instructions for various tasks, such as recruitment, project management and administrative tasks.

The advantage of the intranet is that information is searchable, and this allows the intranet to become a powerful tool for knowledge management. The intranet can be customised to be used for many things, from blog posts on innovative practice, collaborative creation of documents to small applications that can be used to simplify bureaucratic procedures (i.e., travel forms). The key to building a good intranet site is to have a dedicated intranet administrator who can create engaging content and motivate others to do so by themselves. Ideally, each directorate should have its dedicated intranet page that is regularly updated with relevant information. Being well informed of current events and discussions in the statistical office, helps people get engaged in the work and contribute to development.

5.4.3.4 Development and communication of internal policies and decisions

Internal policies, procedures and guidelines can help ensure consistency of practices in an organization. In NSOs, they are most beneficial in standardising work processes, especially communications with users and respondents. Clear and transparent rules help standardise work and are essential for maintaining a good reputation and creating a strong brand for official statistics. Standardised approaches are particularly beneficial for organizations with a high turnover of staff, which is, unfortunately, becoming quite common due to relatively low salaries of statistical staff and the unique skillset of statisticians in demand by the private sector. Most commonly, statistical offices have created a range of policy and guidance instruments, such as confidentiality policy and guidelines, data access policy, microdata access policy, pricing policy for tailored statistical services, press relations guidelines, government relations guidelines, dissemination and revision policy and many others. Internal policies are usually the

initiative of an employee, manager or chief statistician and are either created individually or through a dedicated working group or a standing committee. Policy creation through a working group or a committee is a good exercise for training and selecting future senior management as it requires a broad perspective and reaching a compromise with other members.

Signing an internal policy and posting it on the intranet is not enough to ensure that it is regularly enforced. Often, both soft and hard approaches are needed to ensure awareness and compliance. The chief statistician can address all employees in explaining the new policy, reasons behind its creation, and major changes, thanking the drafting team and linking to the intranet location where all internal policies can be found. This increases attention to new and existing policies, possibly leading to revising or updating some of them. On the other hand, enforcing the application of policies is not an easy task and the person who has to remind staff of their existence and ensure compliance will certainly not be the most popular person in the office. Enforcing compliance should be ensured by the responsible directors and chiefs as part of their regular management and decision-making tasks. As this is often an uphill battle, frequent reminders from the management and the chief statistician can be quite beneficial.

In recent years NSOs have become increasingly aware of the need to be transparent with respect to both their data providers and users. Many NSOs have partly responded to this need by posting key policy documents and guidelines on their websites. Nowadays, this is encouraged internationally as standard good practice. The thinking behind this is that there are no secrets in the statistical operations and processes and that increasing information to respondents and users is likely to enhance relationships with them, improve the NSO's data sources, and the use the statistical outputs.

5.4.4 Role of the national statistical office in planning monitoring and coordination

While the purpose, coverage, process and content of multiannual and annual planning, priority setting and monitoring was discussed in Chapter 4 - *The National Statistical System*, this section will focus on the role and specificities of the NSO in those processes but also refer to the coordinative role of the NSO and its relevance to the whole NSS.

Apart from being the leading national statistical agencies, most NSOs are at the same time coordinators of the NSS and as such are expected to coordinate and lead the planning processes for the whole NSS. Most commonly, statistical programmes are prepared by the NSO while other national producers of official statistics provide inputs to the programme or prepare their parts, as guided by the NSO. Preparation of the programme is usually organized through a dedicated unit within the NSO that coordinates the process, seeks inputs from both inside and outside of the NSO, filters and analyses those inputs and converts them into realistic and well-documented plans. These units are often also tasked with monitoring the implementation of statistical activities throughout the whole NSS, and often deal with other strategic issues, such as analysis of user requirements (see Chapter 6 - *Users and their needs*), consultation with stakeholders and evaluation of plans and performance. Strategic planning units should also be involved in cost accounting and other similar exercises that provide estimates of costs for each statistical activity (if they are performed in NSOs). It is a good practice that such estimates are included into strategic plans.

An essential role of the NSO is the promotion of common practices across the NSS. This can be achieved by promoting cooperation and including representatives of other producers of

official statistics, when possible, into relevant committees, working groups, task forces and other advisory bodies. An example that can be used to improve cooperation within NSS and strengthen the coordinative role of the NSO is the formation of the National Committee of producers of official statistics³⁷ (as mentioned in the [Guidance on modernising statistical legislation](#), UNCE 2018). This committee can transform and adapt policies and guidelines based on international recommendations that are used within the NSO into national policies and guidelines that aim to ensure quality in the development, production, and dissemination of all statistics produced by the NSS. Furthermore, producer committees at operational levels should be established in different statistical domains to promote cooperation, reuse data, and standardise practices within the NSS. Units that are tasked with the preparation of strategic documents often serve as the secretariat for such committees. Cooperation within the NSS should be actively maintained and developed, and the task and obligation of the NSO is to promote and ensure cooperation with (and among) other producers of official statistics. Ensuring cooperation is not only a matter of capacity (which may vary quite considerably among the producers of official statistics) but also specialised knowledge and access to sector-specific information. Strengthening the coordination function of the NSO is also important for facilitating the verification and production of indicators needed for monitoring the progress towards Sustainable Development Goals.

NSOs and other producers of official statistics are government-financed institutions and as such are expected to be transparent and cost-effective in terms of the use of resources. Procedures aimed at monitoring and measuring the use of human and financial resources should be put in place to promote cost-effectiveness. Some statistical offices have set up systems that link statistical activities with the cost they have incurred through accounting and records of working hours (cost accounting systems) and through them can provide precise estimates of costs for each statistical activity. This type of information provides valuable insights into the allocation of budgets and helps with prioritisation and evaluation of plans and performance.

Link to guidelines, best practices and examples:

- a) The PARIS21 [Advanced Data Planning Tool \(ADAPT\)](#) is a free cloud-based tool for NSOs and other data producers that can be used to adapt their data production according to the data needs of policymakers and to adjust their existing data plans to any changes in priorities.
- b) The UNITAR [StaTact](#) tool was developed in partnership with the UN Statistics Division to enable countries to address measurement gaps that impede monitoring national policies and resolve problems tactically. It provides an analytical framework and a multi-stakeholder methodology to enable national experts from national statistical offices, concerned Ministries and other parts of the data community, including non-traditional data sources, to design a short-term action plan with a focus on addressing institutional impediments to data collection, production and utilization.

³⁷ Different NSSs have different names for this committee (i.e. coordination committee, NSS committee, interagency committees...) but its main purpose should be to promote and encourage coordination in the NSS.

5.5 Statistical Business Architecture

5.5.1 Definition of a Statistical Business Architecture

A statistical business architecture covers all of the activities undertaken by an NSO to conceptualize, design, build and maintain information and application resources used in the production of statistical outputs. It is a formalized collection of practices, information, and tools to assess and implement business design and business change.

The statistical business architecture defines what the statistics “industry” does and how it is done. It consists of the information, application and technology architectures for a statistical organization. The information architecture describes the information, its flows and uses across the organization, and how that information is managed; the application architecture describes the set of practices used to select, define or design software components and their relationships. The technology architecture describes the infrastructure technology underlying and supporting the information and application architectures.

5.5.2 The need for a Statistical Business Architecture

A statistical business architecture is needed to drive the information, application and technology architecture for an NSO. It is a critical input to IT planning, technology architecture, and business solution delivery. Business architectures focus on business processes, and business uses cases, which are prerequisites to delivering an IT business solution. Therefore, the business architecture must reflect the entire business design from the business itself rather than that of the IT solution.

Business architecture represents a bridging function between the enterprise architecture level and the operational level and supports an integrated and ordered implementation of all the innovations necessary for any modernisation process.

The statistical business landscape can change rapidly, as in any other business. To stay relevant during such changes, the business needs to adopt a new model that allows it to adapt accordingly – and for this, agile business architecture is needed.

The agile method is a particular approach to project management utilized in software development and allows organizations to respond to the unpredictability of developing software solutions. It uses incremental, iterative work sequences that are commonly known as sprints.

The agile model uses assessments to determine what capabilities are available in the organization, identifies what is needed to pull the appropriately skilled staff, processes, and technology together. It uses small experiments to promote quick learning and allows an organization to quickly adapt through decentralized decision making.

Link to guidelines, best practices and examples:

- A [Business Architecture framework](#) for industrialisation and standardisation in a modern National Statistical Institute.

5.5.3 The Common Statistical Production Architecture

Business architecture includes elements of the information, application and technology architectures. The Common Statistical Production Architecture (CSPA) provides a reference architecture for statistical organizations. CSPA has been developed in recent years by the international statistical community under the auspices of the High-Level Group for the Modernisation of Official Statistics (HLG-MOS).

CSPA is a framework for developing statistical processing components reusable across projects, platforms and organizations - it is often referred to as 'plug and play'. A formally defined business architecture can reference CSPA.

CSPA is covered in more detail in Chapter 14.2.12 – *Common Statistical Production Architecture (CSPA)*.

Links to guidelines, best practices and examples:

- Definition of a [business architecture](#) from HLG-MOS.

5.5.4 The Generic Activity Model for Statistical Organizations

The Generic Activity Model for Statistical Organizations (GAMSO) is the model covering activities at the highest level of the statistics organization. It describes and defines the activities that take place within a typical organization that produces official statistics. GAMSO was launched in 2015 and extends and complements the Generic Statistical Business Process Model (GSBPM) by describing overarching and cross-cutting activities that are needed to support statistical production. It is part of the common vocabulary of collaboration.

The GAMSO standard covers four broad areas of activity within an NSO: production; strategy and leadership; capability management; and corporate support. As with related international standards, GAMSO contributes towards creating a common vocabulary for these activities and a framework to support international collaboration activities, particularly in the field of modernisation. It can be used as a basis for resource planning within an NSO. GAMSO can contribute to the development and implementation of enterprise architectures, including components such as capability architectures, and also support risk management systems.

GAMSO is also covered in Chapter 14.4.2 - *Generic Activity Model for Statistical Organizations*.

Links to guidelines, best practices and examples:

- A [description of the GAMSO](#) and how it relates to other key standards for statistical modernisation.

5.5.5 Definition of an integrated production system

In recent years, many NSOs have initiated developments to restructure their statistical production processes, improve efficiency, and produce outputs that better satisfy user needs. These developments manage the evolution from the classic insular 'silo' approach, where specific domains have their own customised processes and architecture to a more integrated and modular approach where processes are shared and reused.

An integrated production system is an IT environment that can support the whole statistical data production cycle as defined by the GSBPM and meet the requirements of a large part of the various statistical surveys maintained by an NSO. An integrated system enables an NSO to transition from a fragmented stove-pipe oriented production with specific systems for each domain, to the modern generic and standardised statistical production environment. A fully integrated system uses applications and processes that use standards and metadata to talk to each other in order to make the whole production cycle less burdensome, easier to manage and less expensive to operate.

5.5.6 Importance of an integrated production system

There are a number of reasons for an NSO to adopt an integrated production approach.

An integrated production system can help reduce the time, cost, and risk-related barriers for implementing innovations in statistical production processes by working in a more efficient and optimised way. NSOs constantly need to improve the production of statistical information and its quality, while simultaneously reducing both the total cost for its production and the respondent burden.

In a silo-based production system, each specific domain has its own set of custom processes that lead to duplication of effort and other inefficiencies. There is often a lack of common terminology and understanding across applications and a lack of process-orientation. Because of these differences, such production systems are difficult to modernise and automate, and it is difficult to reuse information, methods, and technology. Together these difficulties result in a lengthy time-to-market for new statistical products.

An integrated production system involves the development and application of common methods and information technologies. This approach leaves freedom of choice in regard to underlying technologies and is a key enabler for collaborating, sharing and the flexible re-use of IT components within individual agencies and across the community of producers of official statistics as a whole: new statistical production processes can be assembled by selecting and configuring existing modules (also more widely known as ‘plug and play’) in using whatever applications (or parts thereof) that best respond to their particular requirements.

Applying such a modular approach allows and encourages NSOs to reuse and integrate existing statistical data and metadata to deliver new products and services. Managing new developments through a robust, flexible and stable platform can in turn, facilitate the greater automation of statistical production processes, thus leading to reduced production costs, easier maintenance and less expensive development.

Links to guidelines, best practices and examples:

- Example from Slovenia NSO of [transition from stove-pipe oriented production to an integrated processing system](#).
- Example from Korea NSO of the development of a [generic Statistical Information System](#).
- Example from Statistics South Africa of using [innovative technologies for statistical production](#).

5.6 Project management approaches

In any given NSO, there will almost always be several projects relating to methodological development of statistics and modernisation of production processes and systems. Depending on the methods used and the scale of a given project, several different project management strategies and methodologies can be adopted. Some of the most widely used and emerging approaches are described below.

- a) **Agile project management** is based on a set of principles and consists of a flexible, iterative design and building process. Agile projects are characterized by a series of conceived, executed, and adapted tasks as the situation demands, rather than by a pre-planned process. This helps project teams respond to unpredictability through incremental, iterative work processes and a cycle of planning, executing, and evaluating as they go along. Agile methodologies emphasize adaptability to changing situations and the potential for changing or evolving requirements, such as software and game development.
- b) **Lean** is a project management methodology focused on efficiency and eradicating inefficiency by removing anything from the process that is not conclusively adding value to the client. Lean originated in manufacturing to eliminate waste and inefficiency, but its principles can be applied to any process. Examples of waste are defined as excessive documentation, planning and control, unproductive meetings and overly detailed requirements.
- c) **Kanban** is a project management methodology based on lean principles with a focus on releasing early and often with a collaborative and self-managing team. It is fitted for operational or maintenance environments where priorities can change frequently. Kanban is well-suited to work that requires steady output, like production or support and maintenance.
- d) **PMBOK** (Project Management Body of Knowledge) is a reference guide for project managers covering a set of standards which refer to the five process steps of initiating, planning, executing, controlling, and closing a project. PMBOK is a framework of standards, conventions, processes, best practices, terminologies, and guidelines recognised as standards within the project management industry. PMBOK is formulated around processes that coincide and impact each other to complete a project.
- e) **PRINCE2** (PRojects IN Controlled Environments) is a well-established process-oriented project management methodology. It divides projects into multiple stages, each with their own plans and processes to follow. PRINCE2 defines inputs and outputs for every stage of a project and stresses the business motives such as identifying a clear need for the project, target customers, benefits, and cost assessment. A project board owns the project and is responsible for its success. This board defines the structures for the team, while a project manager oversees the lower-level day-to-day activities. This methodology gives teams greater control of resources and the ability to mitigate risk effectively. PRINCE2 is widely used for large scale IT projects.
- f) **Scrum** is a project management process which proposes principles and processes to improve delivery. It is one of many agile processes and aims to improve communication, teamwork and speed of development. Scrum is considered a light approach to project

management and defines a simple set of roles, meetings, and tools to deliver outputs iteratively and incrementally. It recommends using small, cross-functional teams working on a collection of requirements ('user stories') that have been defined and prioritized by a product owner. Work is divided into 'sprints', a development cycle of usually 2-4 weeks, during which, daily 'scrums' take place where the team report on progress and obstacles.

- g) **Waterfall** is a project management methodology where work is planned extensively upfront and then executed, in strict sequence, adhering to requirements, to deliver the project in a single cycle. Requirements are defined in full before any work starts. Project tasks cascade through subsequent phases of the project each phase must be completed before the next phase can begin and there is no overlapping in the phases, and the outcome of one phase acts as the input for the next phase. In a waterfall approach, a project will flow through the process from requirements, through design, implementation, testing and into maintenance. Once a project plan is approved, there is little flexibility to make any changes.
- h) **Extreme programming (XP)** is a software development project management methodology which defines values and processes to improve software quality and ensure responsiveness to evolving customer requirements. As a type of agile software development, it advocates frequent "releases" in short development cycles intended to improve productivity. XP includes elements such as programming in pairs, extensive code reviews, unit testing of all code, a flat management structure, expecting changes in the customer's requirements and frequent communication with the customer and among programmers.
- i) **Six Sigma** methodology focuses on understanding customers' requirements better and eliminating defects and waste. These objectives are achieved through in-depth knowledge of statistics, engineering, project management, and the underlying processes and systems. Six Sigma aims to identify and remove the causes of defects via a set of quality management methods, which use both empirical and statistical approaches – unlike in other methodologies data and statistics are the basis of decision-making rather than assumptions or guesses.

5.7 Change management

All NSOs have to deal with change. Change involves an organization moving from its current state to some desired future state. Modern demands towards statistical offices require them to implement changes almost constantly if they are to remain competitive. Change management provides a systematic approach to dealing with such transformations within an organization. These transformations cover strategic objectives, processes and technology and change management consists of a number of formal procedures to help plan and control change and staff to adapt to change.

An effective change management strategy needs to focus on the human behaviour element. Resisting change is a natural reaction when those affected by the change are not involved in the process. Staff resistance can have a significant negative impact on the short- and long-term success of a business improvement project. Resistance is a very normal part of change

management, but it can threaten the success of a project. Most resistance occurs due to a fear of the unknown risk associated with change – hence the importance of involving all concerned staff in any change process.

Change management should start at the top management level and ensure the involvement of all staff who are concerned. Senior management should be seen to be involved and committed to the changes and to communicate this clearly and regularly. A clear business case should be presented to stakeholders at all levels both within and outside the NSO as all stakeholders have different expectations, and there must be a high level of buy-in across the spectrum.

Good communication is vital. The goals and objectives of the changes should be clearly identified as well as issues to be improved as a result. It is critical to identify the focus and to clarify goals.

Change needs good planning to put it in place. This involves outlining the project roadmap using clear steps with measurable targets, incentives and measurements.

5.8 Risk management

Risk management is the process of identifying, assessing and controlling disruption during periods of change to an organization.

Actions in the context of risk management undertaken by NSOs are based on well-established theoretical and practical knowledge. The objective of these activities is to develop, implement and then improve the system of identification and response to emerging threats.

Agile risk management is an emerging methodology using an evolutionary set of measures to build a model combining the need to obtain a stable and predictable response system to emerging threats with a constant need to identify and exploit new opportunities.

Link to guidelines, best practices, and examples:

- Guidelines on [Risk Management Practices](#) in Statistical Organizations.

Chapter 6. Users and their Needs

6.1 Introduction

This chapter covers how a national statistical office (NSO) can meet the needs of a range of users that include governments (central and local), research institutions, journalists and the media, businesses, educational institutions, and the general public.

Meeting user needs is an important aspect of quality assurance as covered by the United Nations [National Quality Assurance Framework](#) (UN NQAF) principle 2 ‘Managing relationships with data users, data providers and other stakeholders’. This principle states that statistical agencies should build and sustain good relationships with all their key stakeholders, including users, data providers, funding agencies, senior government officials, relevant community organizations, academia and the media. It notes that statistical agencies should have access to all data necessary to satisfy the information needs of society, that stakeholders are identified and consulted regarding their interests, needs and obligations, and that statistical agencies have a strategy, and institutional arrangements are in place to engage with their users.

As noted in the [UNECE recommendations for promoting, measuring and communicating the value of official statistics](#), statistics are intended to be used to make an impact on society by contributing to and improving openness and transparency, while at the same time ensuring confidentiality and equal access to information.

Official statistics are a key source of evidence-based decision-making for both governments and private citizens. Official statistics have (in principle) the comparative advantage in that they are produced in professional independence based on scientific methods using rigorous quality criteria based on the United Nations [Fundamental Principles of Official Statistics](#) (UNFPOS).

There is an increasing demand for official statistics. In the past an NSO was generally the only producer of statistics: this is no longer the case. Today, there are also various types of users and many different dissemination channels, meaning that statistics are more widely accessed and come from different sources. This makes the task of meaningful user engagement more challenging, and an NSO consequently needs to develop strategies for engaging with the different users and responding to the increased expectations for data access in the age of the so-called “digital natives” – those who have grown up during the age of digital technology. These users are confident in their use of data and have high expectations of user interfaces, and they expect that data resources should be easy to find and simple to use. In addition, awareness creates demand, and the more data an NSO produces, and the better it is communicated and disseminated, the more the demand for data grows. The public has a legitimate demand that their information needs can be met conveniently and easily and asks for more customized products that are easy to use.

A high-profile example of such data needs is the monitoring of the Sustainable Development Goals (SDG) that respond to both international and national policy needs and the interest of the civil society and the general public. Official statistics are key to the monitoring of SDGs as well as national development policies across all sectors, such as health, education, the

environment, economic and social. Users need statistics to develop, design, implement, monitor and adjust these policies. The need for statistics to support the 2030 Agenda for Sustainable Development has also contributed to the pressure on the NSOs, which play a key role in the coordination of the compilation of official statistics and SDG indicators.

NSOs are fully accountable to the public for the data they disseminate and need to manage relations and build trust with a number of different user types. Users today expect statistical information to address their specific needs and as the ubiquity of the Internet brings news and other information to users in real-time, people want immediate answers to their questions along with the data to back it up. Users may consider that all official statistics should be available immediately with no long delays between the collection of data and its publication. An NSO can be open to criticism if they are perceived to take too long to conduct their analyses and share analytical results and insights. This has the effect of increasing the burden on an NSO to meet the demand of users. Thus, an NSO needs to continuously identify and respond to user needs. Failure to do so can attract adverse feedback which can create a negative public image of the NSO. This may even lead users to turn to alternative data sources which may be of inferior quality and leave valuable datasets of official statistics underused.

An NSO requires a strategy on how best to engage with users, identify and respond to their requirements and issues as they arise, and to measure user satisfaction levels. Such a strategy would ideally be approached in a coordinated way throughout a national statistical system (NSS), led by the NSO. A coordinated user engagement strategy for the NSO and the NSS can help share resources and reduce duplication of effort. As proposed by the [Generic Law on Official Statistics](#) (GLOS), the chief statistician may use the Statistical Council to set up advisory bodies with members from within and outside of the NSS to support such strategic activities as coordinating user needs.

Each user group has its own specific requirements that need to be addressed in the strategy so that it becomes possible to develop products and services that meet specific user needs better. Providing a good service can help motivate users to understand the value of official statistics and participate more fully in surveys, leading to better quality statistics. This is valid for all user categories.

Statistical messages must use precise concepts whose meaning is widely known to the public, and the statistical concepts should be familiar to users. For this reason, educating users to statistical concepts and language is necessary. NSO statisticians have an important role to play in educating users in their own domains.

6.2 Measuring and analysing user satisfaction and needs

Users can be classified into different groups. This chapter describes users as belonging to the categories of central government, including the central bank, the general public, businesses, the media, and education, research and international institutions. There are other ways to categorise users - the European Statistical Advisory Committee (ESAC) has noted in its paper on the [role of communication in statistical science and the strategies of communication for statistics users](#) the importance of identifying different types of users of statistics, understanding their needs and creating a strong communication strategy.

An NSO needs to constantly measure and analyse their response to user needs, monitor how statistics are used and by whom, and gather user feedback and commentary from among the various user groups of statistical data. This is not only to know the users better; it is also to know better how an NSO is performing in the eyes of its users. An NSO also needs to assess how it is reaching potential new users.

User surveys are an important tool to assess user confidence and trust in official statistics, the usefulness of available statistics and accessibility of official statistics and related services. Surveys can be web-based and should phrase questions using language that respondents can be expected to understand. Survey questions should cover the usability, functionality, and availability of any online statistics dissemination platforms. It should seek to get user feedback on the quality of the statistics, based on the quality dimensions of relevance, accuracy, coherence, credibility, timeliness, accessibility, and interpretability.

The following areas could be measured by user surveys:

- a) Satisfaction with products and services. This analysis could be further deepened by an analysis of the characteristics of official statistics (e.g., timeliness, accuracy, trustworthiness, (inter)national comparability, etc.). Questions on preferences for the type of access (online, phone, in-person), device type(s) used and preferred media further inform the picture of our customers.
- b) User support quality could be measured by asking about the user's perception of user services provided, what works and what should be improved.
- c) Design, communication and metadata: Here, questions could be raised on the design of the official statistics website in general, and the statistical warehouse in particular: how easy/difficult it is to navigate and find the relevant information, how satisfied the user is about the visualizations offered (videos, infographics, maps, graphs, indicator sets), etc.
- d) Relevance, responsiveness and innovation: How effectively does the statistical office inform the public debate on current issues, are they innovative (e.g., using new technologies, methods and data sources), how important are official statistics in helping to understand societal developments.
- e) Awareness of brand and message could include analysis of the trust in official statistics, the perceived lack of political interference, and the overall satisfaction with the statistical office and the understanding of its remit.
- f) Specific products and services: This could be measured after a user has received a tailored statistical service, or by asking if the user has heard of a particular statistical product (e.g., provide a list) and then ask how satisfied the user was with the quality of the product or service.

A number of indicators can also be compiled using data that accumulate online. Tools such as Google Analytics and media monitoring can help to measure the use and reach of official statistics. User profiling techniques can be employed to identify the data about different user domains.

It may be useful to collect user feedback and compile indicators to assess adherence to the Fundamental Principles of Official Statistics. These are listed in the annex 3 of the UNECE Recommendations for promoting, measuring and communicating the value of official statistics:

- a) Use of statistics with indicators such as the number of visits to the website and data downloads, by topic. On a sample basis, these data could be complemented by information on the type of users, and whether or not the users could (easily) retrieve the statistics, and whether or not they are satisfied with the service.
- b) Relevance of statistics such as the number of citations in the main newspapers/news-websites, radio and television channels to assess the impact of statistical “news”, their relevance for public debate, the branding of and the trust in official statistics. The number of citations in research and policy would provide a different viewpoint. An analysis of the alternative data sources used may provide additional information on why users did not use official statistics.
- c) Transparency of statistical production measured by the publication of an advance release calendar and the adherence to this calendar. In addition, one could collect information on the availability of metadata and other materials and resources about statistics.
- d) Quality of statistics indicators could be multiple, for instance, one could look at the magnitude and direction of regular revisions, e.g., in economic statistics or a continually updated list of international best practices implemented by the statistical office.

The following activities could form part of the user engagement strategy to measure and analyse user satisfaction and needs:

- a) Having a unit responsible for relations with users can help an NSO improve response to the needs of different categories of users. Although many NSOs do not have sufficient capacity for such a unit, they may still initiate or coordinate the implementation of such activities. Such units or activities may be used to coordinate community consultation, public sentiment research and user research, to survey the views of stakeholders and measure their satisfaction levels. User service is part of all statistical work, as statistics are intended for use, and their relevance and ease of use should be a key consideration. Users may also request expert support for the use and interpretation of statistical data. It is key to maintain constant interaction with users.
- b) To ensure relevance, the focus should be on analysing the experiences and perceptions of users, to gauge whether the statistics they are looking for are available at the right level of detail, of sufficient quality and in the right format. An NSO should evaluate the number of users, how they use statistics, how useful the statistics are for them. Efforts should be made to discover why potential users are not using official statistics, whether they are not aware of the statistics, or if they are not in the right format or timely enough. It is important to understand what kind of statistics people are looking for, what it is they actually need and value.
- c) Depending on the capacity of the NSO, there may be a published commitment to respond to a query within a given time period as is the case where the government has an open data policy. In some instances, a query may require the involvement of a subject specialist for a technical request and such special queries would usually require a longer response period.
- d) User satisfaction surveys coordinated across the NSS can avoid duplications, save time and costs.

Links to guidelines, best practices and examples:

- [User Survey](#) of the Turkish Statistical Institute (TurkStat) 2020.
- UNECE (2018) Recommendations for [promoting, measuring and communicating the value of official statistics](#).
- Statistics Portugal [Quality assessment of user satisfaction](#).
- National Institute of Statistics of Rwanda [User Satisfaction Survey](#) 2018/2019.
- INE (Spain) [User satisfaction survey](#).
- UK Office of National Statistics - [making sure that statistics are relevant to user needs](#).

6.3 Organizing and setting up contacts

As noted in Chapter 4.5.3 - *Interaction with user groups: capturing their information needs*, it can be useful for an NSO to establish and maintain networks and links with user groups, or with important individual users, in order to obtain their substantive inputs and feedback on a regular basis. Establishing close contacts with the experts of the various domains in ministries can help monitor and react to their current and future data needs. An NSO needs core data from ministries, and to ensure this, each ministry needs access to NSO experts. Maintaining close links with policy analysts in ministries can help an NSO to stay abreast of current demands for statistics and any ad hoc requirements for new data. Interagency committees consisting of experts in statistics and various domains may be convened to discuss recurring and emerging statistical issues/concerns.

The following activities could form part of the user engagement strategy to measure and analyse user satisfaction and needs:

- a) Holding regular stakeholder workshops with key government users allows an NSO to assess the relevance of their current product offerings as well as future needs and any emerging new trends. In this way, users have a platform to give the NSO feedback on any specific data items they need and to ensure its products are responsive to what is needed throughout all levels of government. Different products also have their own key user groups that use and interact with the data regularly, and these users will also have statistical data requests and contributions. These inputs gathered from stakeholder workshops help confirm that products of an NSO remain relevant and can inform a response if they do not.
- b) User groups can be organized by statistical areas comprising of the most important users in order to collect detailed feedback.
- c) Using tools such as virtual interaction platforms, contact forms or social media.
- d) Establishing eternal partnerships and service agreements as frameworks for organizing and establishing contacts.

6.4 Needs of Government and administration

The main purpose of an NSO is to provide data to all their stakeholders, the largest and most important of which is the Government. Availability of trustworthy and timely statistics is crucial, for instance, for a correct assessment of the monetary and economic situation of a country. Census data inform decisions to allocate resources across programmes and plan public services, such as building new hospitals, schools or roads. Statistics influence the direction of fiscal, economic and trade policies, social welfare and environmental policy decisions, and target efforts to improve efficiency and productivity and identify cost savings.

An NSO supports users and provides capacity at all levels of governments – from the highest echelons of the national government to ministries, regional, provincial and municipal levels. This support includes anything from providing statistical profiles to informing strategic plans and helping departments with indicator frameworks and data for reporting.

Governments need an NSO (as well as other compilers of official statistics) to meet their data requirements either in the form of regular, planned statistical collections or via specific, ad hoc data collection exercises. Regular data collection can be high frequency, such as consumer prices, annual data such as annual growth rate international migration, or less frequently collected data, such as a population census. Ad hoc data collections are also needed to provide answers to specific questions that arise and require compilation of new information and perhaps reorganization of existing data.

6.4.1 The needs of ministries, government departments and agencies

Government ministries, departments and agencies are responsible for defining and implementing government policies in their specialised sector. They need official data and statistics to prepare and monitor their national development plans and sectoral plans. Maintaining good relations with government units is obviously an important part of the work of the chief statistician and the NSO. The structure and organization of the various ministries, government departments and agencies can vary greatly according to the situation of each country. Most countries, however, will have ministries of the interior, foreign affairs, defence, justice, finance, education, economy, labour, administration, education, agriculture, environment and health, each of which an NSO will need to interact with.

The ministries responsible for health and education tend to be the largest of the service ministries, with portfolios that cover both public and private sectors. The information requirements of these ministries have become increasingly dominated by the notion of effectiveness, which requires measuring the outcomes of their policies and actions administrative records are insufficient to measure outcomes. As a result, questions about effectiveness lead to demands for supplementing administrative records with independently generated statistical information within an analytical framework.

The needs of ministries responsible for finance are long-standing, even though the form in which data must be presented changes along with advances in economics and accounting. Their needs range from measuring the wealth of the country to balancing the State ledgers and setting aside resources for future generations. A ministry responsible for finance must know how changes in quantities and prices interact to change value. By and large, a ministry responsible for finance is more interested in statistics that relate to rapidly changing variables, such as the demand, rather than the supply, side of the overall balance. For this reason, its questions tend

to be clustered around the behaviour of the major demand aggregates: consumers, the confidence with which they behave in the marketplace, and the portion of their incomes they are prone to save; investors and the structures and equipment they wish to acquire; businesses abroad and the willingness they display to purchase nationally produced goods and services. Other ministries are more interested in looking into the supply side of the balance.

The data management needs of the various ministries are linked to the organization of the NSS and the role of the NSO. Of particular importance is whether the national system is centralised or decentralised (see Chapter 4.5.3 - *Interaction with user groups: capturing their information needs*).

In a centralised NSS, the NSO has specialised subject area units that manage a number of statistical activities of interest to line ministries. Depending on the degree of centralisation, a unit may play an advisory role or be responsible for liaison or dialogue with a particular ministry if the ministry is a source of data. The unit would have the subject-matter expertise needed to predict statistical requirements.

In a decentralised NSS, the data management expertise in ministries that produce official statistics would reside in a statistical unit within the ministry itself. Depending on the degree of decentralisation, these units could have their own data collection capability or alternatively, the ministry could request the NSO to carry out data collection on its behalf. In cases that the NSO does not carry out the surveys or censuses, it may review and evaluate them to ensure that they conform with standard definitions, concepts and classifications and that the statistics generated from these surveys are reliable, accurate, and comparable. (As an example, the Philippine Statistics Authority adopts a mechanism called the Statistical Survey Review and Clearance System where surveys and censuses sponsored or conducted by agencies are evaluated), An NSO could also commission a third party, such as an international organization or private sector, to take charge of any data collection operations.

The following activities could form part of the user engagement strategy for ministries:

- a) Prioritising activities and communicating the information to its users.
- b) Establishing formal agreements between the NSO and ministries for the compilation of tailored statistical services or the provision of source data from the ministry to the NSO.
- c) Promoting regular formal consultations for ministries.

6.4.2 Regional and local government

The interactions an NSO has with regional and local government lead to similar issues to those it has with ministries, the key difference being that ministries are related to subject matter whereas regional government cuts across geography. Local governments face an intensified need for local policymaking and need reliable regional statistical information to support their evidence-based policymaking.

The issues arising for an NSO in its work with local government can vary enormously from country to country depending on its size, infrastructure, capacity and other variables. Problems can be caused by the difficulties of communication and gaining access to officials in remote areas, or to satisfy the information needs of various layers of government.

It is important that the NSO has good communications with regions and that the relationship with the local government does not become imbalanced and lead to the evolution of alternative data collection agencies. This may result in the overall coordination becoming much more difficult to manage. Where a network of provincial and district statistical offices is in place, there is the capacity within these offices to support provincial and local government stakeholders and serve to link these to the national office. It is also important that the NSO has the same approach for regional and local governments, even though their needs might be different in scope and type of requested information. Staff can be seconded to various regional agencies to help connect them with official statistics, data and insights. A statistics committee may be convened at the sub-national level to provide guidance and direction to statistical development activities in regions and provinces. This committee, with members composed of line agencies, academic, private sector and local government, can serve as a venue to improve statistical planning, programming, and coordination at the sub-national level.

An NSO does not usually have a requirement to address all regional needs for statistics unless resources are specifically provided for that purpose. Many NSOs provide regionally detailed statistics and also perform additional tailored statistical services for regional bodies that are chargeable.

The following activities could form part of the user engagement strategy for regional and local government:

- a) Providing nationally compiled statistics to regions accompanied by regional and local breakdowns.
- b) Defining the conditions of access to regional and local databases.
- c) Providing support for regional and local agencies that wish to supplement their own databases with resources available at the national level.
- d) Providing guidance on ways to ensure the reliability of regional statistics on issues such as the use of geographic classifications.
- e) Promoting regular formal consultations for regions.

Links to guidelines, best practices and examples:

- Statistics Poland [STRATEG system](#) for programming and monitoring of development policy – an example of meeting stakeholders' needs:

6.5 Needs of the Central Bank

Central banks are government institutions but are independent of the ministry or department of finance with the role of ensuring the stability of a country's monetary or financial system. Central banks can be part of the NSS and are both a producer and a user of statistics. Producing statistics is a core activity of central banks both for policymaking and for communicating and explaining their decisions. The statistical activities of central banks are often a by-product of its supervisory functions and are generally confined to the monetary and fiscal spheres of the economy, particularly monetary statistics, the balance of payments and economic forecasts. As well as being responsible for these financial statistics, in some cases, a central bank may also be responsible for the compilation of national accounts, the production of foreign trade in

services statistics and the organization of business surveys and some household surveys. In many recent examples, financial accounts are being transferred from central banks to the NSO in order to improve the quality of national accounts (Note: In conformity with UN Statistical Commission decision 51/108 c, it should be noted that in order to comply with the Fundamental Principles of Official Statistics, the compilers of the National Accounts should be independent of the users of these statistics such as the monetary authorities).

A central bank will usually have a statistical unit. It is in the interests of both the central bank and the NSO to maintain a high level of cooperation as this provides key mutual benefits given that each organization is the user of the other's data. This unit frequently has a research function and is recognised as a scientific unit.

In many cases, the NSO provides data collection for the central bank - particularly in cases when surveys are required, such as household finance and consumption survey. The role of the NSO in providing guidance in data exchange standards to facilitate interoperability and joined up systems applies to the Central Bank as much as to the line ministries making up the NSS.

The following activities could form part of the user engagement strategy for the central bank:

- a) As the lead organization of the NSS, an NSO can provide coordination. Coordinating between the two NSO and central bank on statistical activities and defining a clear division of tasks with respect to the responsibilities for data collection, data processing, data exchange, compilation of primary and derived statistics, reporting to international institutions and the publication of statistical results. Sharing of information between NSO and the central bank due to different confidentiality requirements.
- b) Providing guidance to the central bank on the adoption and use of the latest statistical standards at the international level, and on methodologies and best practices on data production processes.
- c) Provide training events to facilitate the proper understanding of changes in statistical output and the underlying reasons.

6.6 Needs of the public

Society's seemingly insatiable demand for fact-based information continues to increase. The general public - ordinary people in society who do not belong to any of the more formal groups of statistics users covered in this chapter - require statistics to respond to a wide range of questions affecting their daily lives, to better understand events both local and global and to meet other, individual needs. Modern official statistics help the public to hold policymakers and the government to account, and equal access to official statistics is intended to offer the same benefits to everyone similarly to basic human rights.

Official statistics give the general public a basis for thinking about the future, grounded in good information about the present and the past.

For most of the general public with access to the internet, the first instinct when seeking the data, they need, is to use a search engine which may direct them to the NSO website. From here, users can access the NSO database, view recent statistical releases, access headline indicators and also find the contact details of the NSO experts.

The following activities could form part of the user engagement strategy for the general public:

- a) The general public needs user-friendly products (focused products, data stories, short and simple texts, etc.).
- b) Making NSO data sufficiently easy to find, access and understand for all users. Making the data searchable with comprehensive metadata and a robust search engine can go a long way to achieving this. Separate interfaces can be developed for expert-level and more basic users with different levels of functionality and analytical tools (see Chapter 10.7 - *Dissemination methods*).
- c) Maintaining a dedicated unit to respond to enquiries from the general public and stakeholders, which can come via email, social media, telephone or walk-in visits. Users can subscribe to receive news about latest releases via a notification service or be advised when updates are available for the various topics, they are interested in.
- d) Providing the general public with access to the data they need with infographics to make the data more understandable and increasing awareness of its availability and high quality is an important way to build confidence and trust in official statistics.
- e) Redesign the website to improve visibility based on analysis of web search results analysis.
- f) Use social media to increase engagement (see Chapter 10.7.2 - *The use of social media in dissemination*).
- g) Leverage other groups to increase outreach (for example, ONS in the UK have a syndication arrangement with BBC). This can be an effective way to ensure the general public gets access to the data rather than assuming they will get it through the NSO website.

6.7 Needs of businesses

Businesses are both providers of data and users of official statistics. Businesses look to an NSO to obtain the information they need to help them run efficiently and effectively. In particular, they need data to ascertain their business position compared to their competitors in the marketplace and to identify any trends that will have an impact on their operations. An NSO commonly provides data derived from business surveys censuses and trade data that cover economic and demographic characteristics for businesses that can help an analyst to better understand a particular industry, prospective customers, competitors, internal problems, and markets. NSO user support to businesses is generally organized to consider the differences between large and small businesses respondent burden (see Chapter 8.2.2.2 - *Business Surveys*).

6.7.1 Large businesses

In many countries, big businesses represent a disproportionately large share of GDP and therefore neither its requirements for information nor the accuracy and promptness of its responses can be ignored.

For this reason, a number of statistical agencies have instituted a special unit with the exclusive function of managing relations with large businesses. Not surprisingly, the first agencies to institute such units were in those countries with the highest concentration of large businesses. However, the payoff has been so significant that others have followed suit. Today, there are examples of big business units in large and small statistical offices and in industrially advanced as well as emerging industrialised countries.

6.7.2 Small and medium sized businesses

Small businesses or small and medium-sized enterprises make up the bulk of businesses in most countries. Satisfying the information needs of these businesses can be a challenge for an NSO for a number of reasons. The chief reason is the sheer number of small businesses, meaning that the effort required to respond to their queries will be that much higher than for the relatively much smaller number of large businesses. If a request for data concerns comparable small businesses, for which the specifications could be very detailed, the data can be time-consuming to locate and compile for the NSO support unit that manages business surveys.

The following activities could form part of the user engagement strategy for the businesses:

- a) Interacting with (sectoral) business associations to, among others, communicate messages that are of the interest of the industry. Businesses supply raw data. At the same time, they are users of statistical products and are not always aware of the services provided by an NSO. An NSO can identify and communicate what statistics are used by businesses. With an awareness of the special service provided to business users, survey response rates can improve as a consequence.
- b) Providing guidance to large businesses as to how best to use statistical information. NSOs need to find out whether large businesses are using statistical information, and if not, to find out the reasons why not. NSOs also need to promote the use of statistics for business decision-making.
- c) Arrange training courses, seminars and other events for small businesses in order to help business users, get the best advantage out of business statistics and to better locate, extract and make use of this data.

6.8 Needs of education

An NSO can play an important role in helping children get the best out of statistics from an early age and to stress how these data could help them make decisions throughout their lives. Many schools and high schools have introduced statistics into the curriculum. School visits to the NSO are quite common in many countries, although the degree to which an NSO participates in the design of these courses or invests in statistical outreach to schools varies considerably from country to country.

The following activities could form part of the user engagement strategy for schools:

- a) Defining courses on statistics that use examples of familiar situations that take place in daily life and then apply statistical analysis to them or use existing collections of data such as sports league tables to help build statistical literacy using real-world data.

Statistics can be incorporated into the school mathematics courses (as they are already in many countries). Courses may also include training on infographics.

- b) Creating online sites specifically aimed at children. Initiatives can include story-telling techniques with graphics to explain statistical phenomena, online statistical quizzes and essay competitions to underline the value of using statistics.
- c) Conducting career orientation seminars and statistical advocacies that are comprehensive and engaging in students.

Links to guidelines, best practices and examples:

- ISI/IASE: [International Statistical Literacy Project \(ISLP\)](#).
- Eurostat – The [European Statistics Competition](#).
- Measurement and analysis of user needs using the Malawi customer satisfaction survey, and the establishment of a statistical training school to serve statistical staff across the NSS. (awaiting link)
- Nigeria youth exchanges with schools, the training school for entire NSS in-service training, the annual retreat with media and dissemination using social media. (awaiting link)
- Rwanda. National Institute of Statistics of Rwanda [annual competition](#) intended for University students in the framework of the celebration of the African Statistics Day to raising public awareness about the importance of statistics in the economic and social development of the continent.
- Cayman Islands Economics and Statistics Office [web page for students](#).

6.9 Needs of researchers and academia

The research community is an essential adjunct to economic innovation and improved social and environmental outcomes. Much of the sector's work is possible, however, because of its access to wide-ranging official statistical datasets. A testament to this fact is underlined by the pressure from research institutes in many countries for the availability of further statistical information.

Some NSOs are able to serve researchers by providing them with complex and easily linkable datasets in technically advanced environments. Integrated large unit-level datasets enable universities, policy analysis institutes, research institutions, ministries, municipal agencies and individual researchers to do empirical analysis to inform future decisions. The datasets assist in studying complex problems that have multiple causes and cut across many areas of government, such as productivity, innovation, gender pay gap, income deprivation, climate change, joblessness, homelessness etc.

Where it has sufficient capacity, an NSO can provide researchers with data that have been collected, classified, combined, edited and corrected as part of the compilation of official statistics. Data come from multiple sources, such as censuses, surveys and population and business registers, tax registers, school systems, social protection and health systems, and as such enable a multitude of longitudinal and cross-sectional analysis. Accessible metadata

together with a suite of research tools, applications and software, can be offered for processing and analysing data. These services enable researchers to focus on the key issues with which they are concerned, rather than on the preparation of the data itself.

Working with researchers and academia can be both beneficial and demanding for an NSO. As a benefit, academia can promote the use of official statistics by making it more widely known in the research domain and among the general public, which in turn can boost the credibility of the NSO as the source of data. Researchers can provide useful input to an NSO by giving important feedback on the quality of its data and methodologies due to the fact that they have more in-depth access to the data production processes than other types of users. In addition, collaboration with researchers on specific topics can have the knock-on effect of leading to new areas of research for an NSO.

The academic world can put demands on an NSO given the often very complex demands for data required for research projects. In many cases, the aggregate statistics made available by the NSO through its web site or other publications are not sufficient for researchers who instead prefer to use the underlying microdata to feed into their own preferred analytical tools and algorithms. This can require quite a significant effort given the confidentiality concerns and the practical issues involved in gaining physical access to this kind of data via secure microdata labs or their equivalent. The needs of academic users often require significant time and repeated involvement of NSO experts.

Statistical offices, universities and research institutes have a long record of working closely together to develop statistical methods on one hand and empirical research on the other. The following activities could form part of the user engagement strategy for researchers:

- a) Offer traineeships to students and carry out training on survey techniques and statistical methodologies, adding to the overall endowment of research capability.
- b) Develop common principles and tools for access to microdata for research purposes and are sharing best practices across countries. Such initiatives increase the scope for productive research on international phenomena and allow for comparative analysis across a range of subjects.
- c) Establish a specific unit dedicated to supporting the work of researchers and requirements are covered on a case-by-case basis following individual requests according to general rules and regulations; however, there is often a committee that deals with requests to access confidential statistical information.
- d) Establish formal cooperation programmes with academic institutes. Cooperation programmes can take the form of secondments, placements, fellowships or memoranda of understandings. In cases where such cooperation programmes are possible, seconded academics provide a useful complement to an NSO, bringing up to date and in-depth knowledge and analytical skills.

Links to guidelines, best practices and examples:

- Example: A strategic partnership has been launched between Cardiff University and the Office for National Statistics (ONS), which has students taking part in developing new data science techniques that aim to inform top government decisions. The new partnership places a strong emphasis on developing skills, career pathways and creating graduate opportunities. (awaiting link)

- Senegal NSO [centre to access statistical data](#) at the Cheikh-Anta-Diop University of Dakar
- Canada has established 32 [research data centres](#) in universities across the country and three federal research Data centres in the National Capital Region where researchers become deemed employees and can access a vast selection of Statistics Canada microdata fields for research purposes.
- Eurostat provides researchers with several public-use files containing data from EU countries, and other international organizations have similar projects aimed at promoting this type of exchange. The survey on income and living conditions (EU-SILC) is a good example where the microdata is an end-product of its own and can be accessed by researchers globally.

6.10 Needs of the media

An NSO should pay special attention to the needs of the media given the importance of their role in transmitting statistics to a mass audience and the important roles they can play in image-building activities of an NSO. It is important that the media are informed of all statistical releases in advance, and that they receive or can get access to the relevant data in a format that they can easily use. The data should be clearly described to prevent any misinterpretation so that any report based on it will be as balanced and accurate as possible. By using official statistics in a news story, the media can help build public confidence and trust in the NSO and increase awareness of its statistics and methods.

An NSO needs to be particularly responsive to questions from journalists and to provide any explanations, given the global aspect of modern news media. To achieve this, most NSOs have a communication or press office dedicated to the needs of the media with trained staff who are able to handle media queries and to manage product launches and releases. This office is responsible for sending out the press releases that accompany all major releases and reports to alert the media. Requests for statistical information from journalists and the media are handled by this unit and would normally coordinate any media requests for television or radio interviews with NSO members. It would also support the response to the requests of the media and journalists concerning the comments made or the clarifications requested in relation to results of surveys or figures published in press conferences, including tailoring information to the specific needs of media.

Press conferences can be held when statistical releases contain news, such as a large change in the economy, for the most important releases such as census results or GDP figures. In some NSOs the unit is responsible for promoting official statistics to the media, including suggesting potential stories and facilitating interviews with NSO staff. In an ideal world, everybody should get access to data at the same time as stated in the UNFPOS principle of '*universality and equal access*'. In some cases, this is possible, and a limited early release for certain users under embargo can be considered. This case is an exception and should be strictly regulated and transparent. In these cases, transparency must be ensured with the NSO publishing a list of all entities having access to data before the embargo.

The following activities could form part of the user engagement strategy for the media:

- a) Improve communication of statistical releases in a way that appeals to the media. This often requires training of NSO staff to help the media use statistics for checking facts and for writing interesting articles about their data. This practically may mean multiple publications for each output (e.g., a media release, a main publication etc.).
- b) Organize training seminars covering analytical techniques and how best to interpret data in support of investigative stories and visualisations in order to help journalists better understand and use statistics.
- c) Assess the use of statistics by media in order to identify domains or topics where data are misused and therefore develop capacity building and training programmes for journalists.
- d) Develop online training modules. This can lead to a reduction of the costs linked to training seminars and extensive coverage of journalists.
- e) Develop training courses in data journalism. Data journalism goes hand in hand with Big Data, which aims to exploit data and other information generated by businesses and other sources. Data Journalism has emerged as a new branch of journalism that can show journalists how to use data to elucidate and give deeper insights into the important issues of the day as well as to provide context to a news story. The Data Journalism Handbook shows how data can serve as the tool used to tell a story, the source upon which a story is based, or both.
- f) Development of a virtual press centre/room where journalists can interact with NSO. Such an activity reduces costs for workshops and seminars and covers a wide range of journalist, particularly those who do not reside where the NSO is located.
- g) Establishing an awards system to recognize any significant contributions of media in the statistical community.

Links to guidelines, best practices and examples:

- UNECE [Making data meaningful](#) guides.
- Australian Bureau of Statistics, [Understanding Statistics](#).
- Al Jazeera Media [Institute of Data Journalism](#).
- Zambia user engagement with media and schools (Awaiting link)
- Ghana media interactions via user workshops (Awaiting link)

6.11 Needs of international institutions

An NSO works extensively with international institutions. These are made up of the UN organizations (UN Secretariat, specialised agencies, funds and programmes, regional commissions), intergovernmental development banks, intergovernmental central banks and regional intergovernmental organizations (see Chapter 16 - *International activities and collaboration*).

The relationship between an NSO and international institutions works in two directions. The NSO provides statistics to the international institutions and contributes to discussions in

international fora while international institutions provide technical capacity building and guidance on the use of standards and methodologies. International institutions support collective action in a number of ways, particularly through the development of common rules, standards, and international instruments.

For an NSO, the focus of their work with international institutions is the provision of statistics that are comparable across countries, whose compilation requires collaboration between the NSO and other agencies in the NSS. Depending on the mandate of each international institution, the provision of this data can be either a legal obligation resulting in a penalty if not fulfilled, or it can take the less binding form of a cooperation agreement or memorandum of understanding. The workload of an NSO can increase when multiple requests are made for the same, or similar, data through lack of coordination between different international institutions. This has been addressed by both sides and efforts have since been made by NSOs to publish data online using agreed international standard formats in order that international institutions can ‘pull’ the data themselves from a single source rather than have the NSO ‘push’ a separate data extract for request.

6.12 Needs associated with the Sustainable Development Goals

Comparable and harmonized official statistics are a powerful tool for implementing international policy frameworks which are increasingly evidence-based and come with a measurement framework. This is true for the 2030 Agenda for Sustainable Development. An NSO is often responsible for the compilation and reporting of SDG data, although this is not always the case as country practices on SDG data collection and coordination mechanisms vary. An NSO needs to put in place specific data management systems to collect data from all of its stakeholders in a standard format that are then reported – often via a specialised SDG data portal. The NSO must ensure interoperability of SDG data with all its international partners for the monitoring of progress on its SDG targets. An NSO may have the overall responsibility, but much of data may come from other NSS data producers.

The necessary monitoring of the many SDG indicators has brought to light many data gaps that conventional data collection methods cannot bridge. As a result, NSOs are increasingly engaging with other data producers within the official statistical system, and in the civil society, academia and the private sector, and are called to provide advice on methods to ensure high quality of statistics. This is also engaging NSOs in new tasks, and wider coordination of data flows on SDG indicators to provide easier access to data, but also to review the quality. Official statistics provide an independent and impartial means for assessing progress (or the lack of it!). An NSO needs to implement the necessary software systems and to work extensively with stakeholders in order to close any data gaps. For an NSO, such multi-stakeholder processes can be challenging and resource-heavy in their nature.

Agenda 2030 also brings opportunities for capacity building and a strategy to assist NSOs in addressing these challenges was developed by the HLG-PCCB and is at the centre of the [Cape Town Global Action plan](#) (CTGAP) for sustainable development data. The Sustainable Development Goals have created a number of specific needs for an NSO associated with the production and use of the SDG indicators. As noted in the CTGAP, all NSS face the urgent need to adapt and develop in order to meet the widening, increasing and evolving needs of data users, including for the full implementation of the 2030 Agenda for Sustainable Development.

An NSO plays a key role in collecting, coordinating, validating as well as reporting, disseminating and communicating statistics for the SDGs. This role includes the following tasks:

- a) Identifying appropriate data sources and methodologies to produce the SDG indicators;
- b) Compiling national statistics from NSOs and other stakeholders, including ministries and civil society organizations;
- c) Data disaggregation of SDG indicators;
- d) Verifying country data and metadata;
- e) Ensuring international comparability;
- f) Providing statistics to international agencies to help measure the progress on SDGs;
- g) Analysing data and identifying data gaps and key trends;
- h) Reporting data and metadata to the annual Sustainable Development Goals Report;
- i) Designing and leading effective communication strategies for SDG statistics;

6.13 Needs of other international policy frameworks

Other international policy frameworks include human rights reporting under international human rights treaties, the Paris Climate Change Agreement, the Sendai Framework for Disaster Risk Reduction and many others. They are all reaching out to NSOs to provide the basis for the reporting and monitoring, impelled by the strong international comparability offered by official statistics.

The international statistical system works in collaboration across countries, thereby bringing the best experts together to develop new statistics and statistical methods. The pressure to increase coordination within the NSS is coming from users, including the government and international organizations, who are looking for compatibility, high quality and easier access to the required information.

6.14 Statistical communication

In today's world, it is no longer enough for an NSO to simply make official statistics available to users, but it is also necessary to communicate in order to reach both existing and potential new users. The practice of communication is a relatively new field for many NSOs. With limited resources and in an increasingly competitive environment, however, communication can no longer be viewed as 'nice to have' but as a 'must-have'. To stay relevant, NSOs need to communicate the value and importance of official statistics consistently and clearly through a strategic approach to communication to ensure that the NSOs products and services are reaching the right audiences at the right time using the most appropriate channels.

6.14.1 Statistical communication strategy

A communication strategy should create sustainable communication systems, processes and skills that will ensure a consistently high quality of communication between the NSO and its

stakeholders. This includes adapting communication outputs to suit particular communication channels.

An NSO needs to communicate that the data it disseminates meets requirements of timeliness, disaggregation and reliability. NSOs need to build internal expertise in the field of communication. To meet these challenges, an NSO requires appropriate dissemination and communication strategies.

The following text in this section is summarised from the UNECE [in-depth review of emerging issues in statistical communication](#). Communication is essentially about targeting and messaging key audiences. An effective dissemination and communication strategy are essential for maintaining the relevance of official statistics.

A communication strategy is not covered in the Generic Statistical Business Process Model ([GSBPM](#)) because this would normally be handled at the corporate level rather than the individual process level. It is covered in the Generic Activity Model for Statistical Organizations (GAMSO) that describes and defines the activities that take place within a typical organization that produces official statistics, under the topics Corporate support / Manage consumers.

A dissemination and communication strategy will need to address the following issues:

- a) tailoring and framing messages to suit particular audience cohorts;
- b) designing tools and channels that suit a particular audience's needs;
- c) audience engagement initiatives and outreach programmes;
- d) customer consultation;
- e) media relations programmes;
- f) creating issue management response protocols; and
- g) measuring the results and impact of communication.

Measuring the effectiveness of communication strategies is essential in order to ascertain whether implemented communication activities have enabled an NSO to meet its goals and enable it to face future challenges. The use of web analytics (such as Google Analytics) to monitor use against defined goals and objectives is fundamental to any communication programme, whether it be a single campaign or an on-going effort where the results are incremental over time.

6.14.2 External communication

Communication to the users of official statistics can be divided into two types: proactive and reactive communication.

- a) **Proactive communication:** Proactive communication includes holding press conferences, releasing videos to the media and improving statistical release material. Such communication techniques can strengthen the public image of the NSO and improve its perceived credibility.

Press conferences can be held by the chief statistician or subject matter specialists and are an easy way to give additional explanations to the public without extra cost. Some

NSOs produce commentaries on statistical releases and make the video material available to the media. This can improve statistical releases by making them more informative and more understandable to the general public.

Statistical releases may also be redesigned with the aim of capturing attention, encouraging users to continue reading and making it more likely that a release will get media attention. As a precondition to such communication, the training of staff involved in writing releases is needed.

- b) **Reactive communication:** Reactive communication involves the chief statistician having to publicly explain an issue concerning a release of statistics and asking for correction. Many statistical laws in these cases make such reactions an obligation of the chief statistician. This is necessary in order to preserve the public image of the NSO and to prevent misuse or misinterpretation of official statistics.

To help meet the needs of dealing with the media, an NSO could ideally maintain a pool of statisticians and other analysts who are trained to answer media queries and give broadcast interviews.

Links to guidelines, best practices and examples:

- UNECE Recommendations for Promoting, Measuring and [Communicating the Value of Official Statistics](#).

6.14.3 Internal communication

Official statistics are usually organized into subject areas, and even though statisticians in an NSO may use similar methods, quite often they are unaware of activities such as modernisation or new developments in other subject areas. In order to encourage knowledge sharing and cooperation, an NSO can promote methods of internal communication such as regular meetings with the chief statistician and management to discuss current issues. Many statistical offices use their intranet pages to inform employees of their activities. Internal communication is also an important tool for change management within an NSO (See Chapter 5.8 - *Change Management*).

Chapter 7. Quality Management

7.1 Introduction

7.1.1 Overview

This chapter discusses quality management for a national statistical office (NSO), including general quality management principles, the development and administration of a statistical quality assurance framework, definition and implementation of quality monitoring and evaluation, user surveys, the labelling of official statistics, the quality certification of the NSO, and the relationship of quality management to other strategic initiatives, such as risk management.

Quality management is essential in building the value of official statistics and a key element in increasing user confidence. NSOs should have institutional arrangements that ensure compilation of high quality, objective and independent statistics that are not influenced by any interest. As stated in the ECE's [Recommendations for Promoting, Measuring and Communicating the Value of Official Statistics](#), the unique value of official statistics lies in the rigorous quality criteria and professional ethics of statistical production in accordance with the [Fundamental Principles of Official Statistics](#). The benefits of official statistics compared to data from other sources flow from the application of these principles.

A *quality management framework* takes, as its initial starting point, the mission, vision, values and strategic objectives of an NSO. Its basic objective is to build quality into all processes within the organization that are pertinent to its core business of producing statistics. As this requires a significant investment of resources, such a framework has to be justified in terms of benefits it brings, which may be articulated as follows.

- a) It provides a basis for creating and maintaining a culture of quality within the organization and, more generally, within the national statistical system (NSS).
- b) It is focused on users and their needs and thus calls for regular review of changes in society and among stakeholders that may affect the work of the organization.
- c) It provides a systematic mechanism for ongoing identification of quality problems and possible actions for their resolution, whether by incremental improvement or re-engineering.
- d) It supports a continuous review of processes and quality improvement actions.
- e) It stimulates staff participation, engagement and interaction throughout the organization and the NSS.
- f) It documents guidelines, processes and tools for assuring quality and for training statisticians.
- g) It draws attention to synergies and interconnections within the organization and helps to integrate processes, systems and tools.

- h) It gives greater transparency to the processes by which quality is assured and reinforces the image of the organization as a credible provider of good quality statistics.
- i) It is the mechanism for the promotion of quality assurance across the NSS.
- j) It is the mechanism for the exchange of ideas on quality management with international statistical organizations.

More generally, a quality management framework is a mechanism by which an NSO can ensure that, given the resources at its disposal, the value of the statistics it produces is optimised. As further stated in the [Recommendations for Promoting, Measuring and Communicating the Value of Official Statistics](#) referenced above:

- a) “Producers of official statistics are by no means the sole supplier of information. The world is awash with data. There is a growing confusion between official statistics and less reliable data. This may give more weight to opinions and impressions. *Official statistics need to stand out as a trustworthy source of information.* This is also crucial for persuading respondents about the importance of replying to statistical surveys...”
- b) “Demand for statistics is rapidly growing. An increasingly globalized and interconnected world *creates new needs for accurate information* about economies and societies...”

A quality management framework is the mechanism by which an NSO can ensure that it recognises such opportunities and challenges as they arise and can respond to them.

7.1.2 Terminology

It is important to establish a common understanding of the terminology as quality-related terms tend to be used with a variety of meanings. For example, consider *quality management framework*, *quality management system*, *quality assurance framework*, and *data quality assessment framework*. Are these all the same thing? If they differ, how do they differ? The following paragraphs define the key terms used in the chapter. The starting point is the [ISO 9000:2015 Quality Management System](#) standard (further described in Chapter 7.2 - *Generic quality management systems and other relevant standards*). The definitions are then specialised to the specific context of NSOs, drawing heavily on the [United Nations National Quality Assurance Frameworks Manual for Official Statistics \(UN NQAF Manual\)](#), which is elaborated in Chapter 7.3 - *Quality assurance frameworks, guidelines and tools*.

Quality: degree to which a set of inherent characteristics of an object fulfils requirements.

This rather succinct, even opaque, definition from ISO 9000:2015 is widely used. *Inherent* means *existing* in the object, as opposed to *assigned* (like a price). The *object* may be anything that is perceivable or conceivable. Specifically, in the context of an NSO, the object may be a *statistical output*, the *statistical process* that produced it, the *institutional environment* housing the process, or the *whole statistical system*.

A simpler characterisation of quality is *fit for use* or *fit for purpose*.

It is users’ needs that define output quality. Different users may have different needs that must be balanced against each other to provide the quality concept with concrete content. Over the past 20 years, NSOs have arrived at the consensus that quality is multidimensional and that there is no single measure of quality. Thus, the definition of output quality is operationalized by specifying a set of dimensions that characterize it, typically *relevance*, *accuracy* and

reliability, timeliness and punctuality; accessibility and clarity; and coherence and comparability, as further discussed in Chapter 7.3 – *Quality assurance frameworks, guidelines, and tools*.

- a) **Quality management:** coordinated activities to direct and control an organization with regard to quality. Quality management includes establishing quality policies and objectives, and processes to achieve these objectives through quality planning, quality assurance, quality control, and quality improvement.
- b) **Quality management system:** a set of interrelated or interacting elements of an organization to establish quality policies and quality objectives, and processes to achieve those objectives. In the context of an NSO, a quality management system is more commonly referred to as a *quality management framework*, or simply a *quality framework*.
- c) **Generic quality management system:** a quality management system model or standard that can be applied to any type of organization. Examples are the [ISO 9001:2015 Quality Management System - Requirements](#) and the [European Foundation for Quality Management \(EFQM\) Excellence Model](#), both of which are further described in Chapter 7.2 – *Generic quality management systems and other relevant standards*.
- d) **Quality management principles:** a comprehensive set of principles on which a quality management system is based. The most widely used articulation of quality management principles is included in the ISO 9000:2015 and accompanying documents. In the context of NSOs, and in this chapter, a distinction is made between *general quality management principles*, which are associated with an organization as a whole, and *statistical quality principles*, which are associated with the core statistical infrastructure and processes.
- e) **Quality assurance:** the part of quality management focused on providing confidence that needs or expectations regarding quality will be met. Quality assurance provides an organization's guarantee that the product and service it offers meet accepted quality standards. In the context of an NSO, it comprises a planned and systematic pattern of actions necessary to provide confidence that a product, and the process that produces it, conform to established requirements. It is achieved by identifying statistical quality principles, by applying them to the core statistical infrastructure, processes, and outputs, and to the institutional environment and whole statistical system within which they are embedded, and by measuring the extent of their achievement.
- f) **Quality assurance framework:** the procedures and systems that support quality assurance within an organization. The term *quality assurance framework* is used in the context of NSOs to mean the part of the quality management framework that provides confidence that the stated needs or expectations of users are being met. It is based on the definition of quality, the statistical quality principles, and the methods and tools that are used to ensure the principles are implemented. A quality assurance framework together with the procedures for application of general quality management principles constitute a quality management framework.
- g) **Quality assessment:** the part of quality assurance that focuses on assessing the extent to which quality requirements have been fulfilled. In the context of NSOs, *quality assessment*, *quality evaluation*, and *quality review* are regarded as synonyms and for

brevity are referred to simply as *evaluation*, the term used in the Generic Statistical Business Process Model ([GSBPM](#)).

7.1.3 Developing a quality management framework

In line with the definitions above, development of a quality management framework involves consideration of two elements.

The first and most significant element is a *quality assurance framework* that specifically addresses the core business of the NSO. Many countries have developed their own individual *national* quality assurance framework (NQAF), often making use of an already existing generic quality assurance framework or taking advantage of NQAFs of other countries.

The second element is focused on *implementing general quality management principles* for the organization as a whole. It concentrates on promoting a culture that ensures quality. It can be based on a generic quality management system, which may then be used as the basis for quality certification of the organization. Alternatively, it can be achieved simply by supplementing the NQAF with general quality management principles. Most NSOs choose this latter approach and define a single quality management framework embracing both elements, typically still referring to it as a *quality assurance framework*. A few NSOs choose to separate the elements and introduce two parallel systems:

- a) a **quality assurance framework**, which focuses on individual statistical production processes and the statistical infrastructure that supports them; and
- b) a **quality management system**, based on a generic system, which deals with the organization as a whole.

If an NSO makes the latter choice, it is typically because it wants the discipline of seeking certification for the entire organization based on an international or supranational quality management system standard such as ISO 9001 or the EFQM Excellence Model.

7.2 Generic quality management systems and other relevant standards

This section summarises the generic quality management systems that an NSO should consider in formulating its quality management approach, whether it builds general quality management principles into its quality assurance framework or makes use of a separate generic quality management system. The chapter also references some standards that are closely related to quality management and should be considered, in particular standards associated with *risk management* and *metadata management*.

7.2.1 ISO 9000 family of quality standards

The [International Organization for Standardization \(ISO\)](#) is the most prolific source of international standards, including quality-related standards, in the world. Particular prominence is given in this document to the *ISO 9000 family of quality standards* as they articulate general quality management principles and provide the basis for quality certification. The members of the family are.

- a) [ISO 9000:2015 Quality management systems - Fundamentals and vocabulary](#);

- b) [ISO 9001:2015 Quality management systems – Requirements](#);
- c) [ISO 9004:2018 Quality management - Quality of an organization - Guidance to achieve sustained success](#).

They form a *family* in the following sense: ISO:9001 and ISO 9004 each depend upon ISO 9000 for underlying quality principles and vocabulary; jointly ISO 9000 and ISO 9001 constitute a general quality management system (although actual certification is in terms of ISO 9001); and implementation of ISO 9004 typically follows ISO 9001.

The standards have to be purchased from ISO. However, ISO 9000:2015 is [accompanied by two explanatory documents](#), both of which are freely available, namely [the ISO 9000 Glossary and Quality Management Principles](#).

As the standards are expressed in generic terms and not always easy to understand, [ISO 9000:2015 Plain English Definitions](#), written by Praxiom, is another useful supporting document.

7.2.1.1 ISO_9000: 2015 Quality management systems – Fundamentals and vocabulary

[ISO 9000:2015](#) provides the fundamental concepts, principles and vocabulary used for the family of quality standards. It is the starting point for the definition of quality-related terms in Chapter 7.1.3 – *Developing a quality management framework*. It defines and describes seven *quality management principles* as follows.

- a) **Principle 1 – Customer focus:** Organizations depend on their customers and therefore should understand current and future customer needs, should meet customer requirements and strive to exceed customer expectations.
- b) **Principle 2 – Leadership:** Leaders establish unity of purpose and direction of the organization. They should create and maintain the internal environment in which people can become fully involved in achieving the organization's objectives.
- c) **Principle 3 – Engagement of people:** People at all levels are the essence of an organization, and their full involvement enables their abilities to be used for the organization's benefit.
- d) **Principle 4 – Process approach:** A desired result is achieved more efficiently when activities and related resources are managed as a process.
- e) **Principle 5 – Improvement:** Improvement of the organization's overall performance should be a permanent objective of the organization.
- f) **Principle 6 – Evidence-based decision making:** Effective decisions are based on the analysis of data and information.
- g) **Principle 7 – Relationship management:** An organization and its external providers (suppliers, contractors, service providers) are interdependent, and a mutually beneficial relationship enhances the ability of both to create value.

[ISO Quality Management Principles](#) provides the *rational*, *key benefits* and *action items* for each of the seven principles. Many NSOs have been influenced by this expression of general quality management principles, also referred to as *total quality management (TQM)*.

7.2.1.2 ISO 9001: 2015 Quality management systems – Requirements

[ISO 9001:2015](#) specifies requirements for a quality management system when an organization (a) needs to demonstrate its ability to consistently provide products and services that meet customer and applicable statutory and regulatory requirements, and (b) aims to enhance customer satisfaction through the effective application of the system, including processes for improvement of the system and the assurance of conformity to customer and applicable statutory and regulatory requirements.

The standard incorporates the notions of the *plan-do-check-act (PDCA) cycle* and the *process-based* approach (see quality management principle four above). It also aligns with risk-based thinking. It comprises the ten sections of which the first three provide context and the following seven provide the basis for audit and certification.

- a) **Context:** Scope, Normative references, Terms and definitions;
- b) **Audit and Certification:** Context of the organization, Leadership, Planning, Support, Operation, Performance evaluation, and Continual improvement.

Several NSOs have adopted ISO 9001 as a quality management system and applied for ISO 9001 certification. They include the Statistical Office of the Slovak Republic, Statistics Lithuania, the Philippine Statistical Authority, and the Palestine Bureau of Statistics.

7.2.1.3 ISO 9004: 2018 Quality management - Quality of an organization - Guidance to achieve sustained success

[ISO 9004:2018](#) gives guidelines for enhancing an organization's ability to achieve sustained success, consistent with the quality management principles in ISO 9000:2015. It provides a self-assessment tool to review the extent to which an organization has adopted the concepts articulated in the standard. It is not a certification standard. It does not appear to have been greatly adopted by NSOs.

7.2.2 ISO 10004: 2012 Quality management – Customer satisfaction

[ISO 10004:2012](#) provides guidance in defining and implementing processes to monitor and measure customer satisfaction. It is not a certification standard. It is focused on just one aspect of quality management, namely, customer satisfaction. It has potential for application within NSOs, where *customers* are more commonly referred to as *users*.

7.2.3 ISO 20252: 2012 Market, opinion and social research -- Vocabulary and service requirements

ISO 20252:2012 establishes terms and definitions and service requirements for organizations and professionals conducting market, opinion and social research. It covers the management and delivery of research, data management, analysis, document retention, security, recruitment and the effectiveness of the quality system. It is a certification standard.

The standard is evidently quite closely tuned to the core business of NGOs and thus, in principle at least, is of potential use in developing a quality management framework. However, no NSO has reported adopting it or using it for certification.

7.2.4 ISO 31000:2018 Risk Management

Risk is a necessary part of doing business, and, in a world where enormous amounts of data are being processed at increasingly rapid rates, identifying and mitigating risks is a challenge for an NSO. As previously mentioned, ISO 9001 is aligned with risk-based thinking. Thus, [ISO 31000](#) is included here to draw attention to its utility in building a quality management framework.

ISO 31000 is an open, principles-based standard, not a basis for certification. It recommends risk management as a part of an organization's structure, objectives, strategy, processes, and activities. It provides guidance for organizations in developing a risk management strategy to identify and mitigate risks. It places emphasis on the involvement of senior management and the integration of risk management into the organization. Its overarching goal is to develop a risk management culture where employees and stakeholders are aware of the importance of monitoring and managing risk. It recommends having a policy that assigns authority, responsibility and accountability for risk management at the appropriate levels within the organization and that ensures the necessary resources are allocated.

It is becoming increasingly clear from the above description that risk management and quality management should be harmonised and developed in tandem, if not actually merged. The notion of quality gates discussed in Chapter 7.5.6.2 – *Quality gates* is an application of risk management.

Risk management terminology is defined in the accompanying [ISO Guide 73, Risk Management – Vocabulary](#).

7.2.5 European Foundation for Quality Management (EFQM) Excellence Model

The [EFQM Excellence Model](#) refers to eight *fundamental concepts* of excellence, which lay the foundation for achieving sustainable excellence in any organization. They are:

- a) Succeeding through the talent of people;
- b) Sustaining outstanding results;
- c) Adding values for customers;
- d) Creating a sustainable future;
- e) Developing organizational capacity;
- f) Harnessing creativity and innovation;
- g) Leading with vision, inspiration and integrity;
- h) Managing with agility.

These fundamental concepts are entirely equivalent to the ISO 9000 quality management principles. They are an alternative expression of the principles.

The Excellence Model provides a basis for certification using nine criteria, five of which are *enablers* (covering what an organization does and how it does it) and four of which are *results* (covering what an organization achieves).

- a) The enabler criteria are: Leadership; People; Strategy; Partnerships and Resources; and Processes, Products and Services.

- b) The results criteria are: People results; Customer results; Society results; and Business results.

Each criterion is supported by a number of *criterion parts*, which describe what can be seen in excellent organizations and which are further divided into *guidance points*. The Excellence Model is well known to NSOs in Europe.

7.2.6 Lean, Six Sigma, and Lean-Six Sigma

Lean, Six Sigma, and Lean-Six Sigma are not proprietary products like the ISO 9000 quality family or the EFQM Excellence Model. They are approaches to quality and performance management. They are used in national statistical offices in Ireland, the Netherlands and Scandinavian countries.

7.2.6.1 Lean - concepts and coverage

Lean is about minimizing cost, cycle time, and waste, and maximizing value. At the kernel of Lean is *systems thinking* that the value of a system or process is more than the value of its individual components; that value is affected not only by individual activities but also by the way these activities work together.

Though Lean is focused on efficiency rather than quality, it is relevant here as quality management includes efficiency considerations. Specifically, inefficient use of resources results in fewer resources available for quality assurance.

7.2.6.2 Six Sigma – concepts and coverage

Six Sigma is a business management strategy. A Six Sigma process is one in which a very high proportion of the products manufactured are free of defects. A Six Sigma project follows a defined sequence of steps and has quantified targets, which can be financial (like cost reduction) or driven by customer requirements. Six Sigma seeks to improve the quality of process outputs by identifying and removing the causes of *defects* (interpreted as *errors* in the case of an NSO) and minimizing process variability. It involves the use of quality management related methods and the creation of a team of people within the organization who are experts in these methods.

7.2.6.3 Lean Six Sigma - concepts and coverage

Lean and Six Sigma are complementary and are combined in *Lean Six Sigma*, which has been an acknowledged certification standard since 2004. Over the past decade, it has been further improved by incorporating new ideas and tools. Further details are available in [A Brief Introduction to Lean, Six Sigma and Lean Six Sigma](#).

7.2.7. Balanced Scorecard

The *Balanced Scorecard* is a strategic planning and management approach that is used extensively in business and industry, government, and non-profit organizations worldwide, including NSOs:

- a) to build a consensus regarding the organization's vision and strategies;
- b) to align business activities, the vision and strategy;

- c) to improve internal and external communications;
- d) monitor organizational performance against strategic goals (the *scorecard*).

Whilst the Balanced Scorecard has broader goals than quality management and cannot be considered a quality management system, it is closely related. Quality management builds on organizational mission, vision and strategies. It includes improvement in communications with users and providers, and strategic goals often include quality goals.

Further details are available in [Total Quality Management and Balanced Scorecard, A Comparative Analysis](#)

7.3 Quality assurance frameworks, guidelines, and tools

Chapters 7.3.1 – 7.3.3 describe generic quality assurance frameworks, quality guidelines and other quality tools developed by international and supranational statistical organizations for use by NSOs.

- a) **Chapter 7.3.1** summarises the generic *UN National Quality Assurance Framework (NQAF)*, which is a core feature of *the UN Quality Assurance Frameworks Manual for Official Statistics* developed under the guidance of the UN Statistical Division.
- b) **Chapter 7.3.2** summarises the quality-related standards and tools developed within the European Statistical System (ESS).
- c) **Chapter 7.3.3** includes quality standards and codes of statistical practice developed by other international and supranational organizations, including the IMF and the UN statistical commissions.
- d) Finally, **Chapter 7.4** describes some specific quality assurance frameworks, guidelines and tools that have been developed by individual NSOs. Obviously, not all NSO quality frameworks and tools can be included. Those described are ones that are well documented, that are readily accessible via the Internet, and that can be seen as representing good practice.

7.3.1 United Nations National Quality Assurance Frameworks Manual

7.3.1.1 Objectives, structure and content

The United Nations National Quality Assurance Frameworks Manual for Official Statistics ([UN NQAF Manual](#)), including recommendations, framework and implementation guidance, was adopted by the UNSC in 2019. It is directed at assuring the quality of official statistics throughout an entire NSS. It builds on and replaces the generic United Nations National Quality Assurance Framework ([UN-NQAF](#)) template and guidelines adopted by the UNSC in 2012.

The Manual is the single most useful guidance document for an NSO that does not have a quality assurance framework and would like to develop one, or for an NSO that wants to revise and improve its framework. It does not aim to replace existing statistical quality assurance frameworks and guidelines. Producers of official statistics that are already fully engaged in quality assurance in accordance with existing quality frameworks may view the Manual as a reference that supports what they are already doing, and as a source of information on the application of quality assurance in different situations.

There has been a significant uptake of ideas from the NQAF by developed and developing NSOs alike, including, for example, Lithuania, Poland, Palestine and Jamaica.

The structure of the Manual is shown in Figure 5.

Figure 5: Structure of the UN NQAF Manual for Official Statistics

Part	Chapter	Title
Introduction	Chapter 1	Contents of the Manual
Recommendations	Chapter 2	Recommendations on quality assurance for official statistics - relating quality assurance to the Fundamental Principles of Official Statistics
UN-NQAF	Chapter 3	United Nations National Quality Assurance Framework: principles and requirements
Implementation	Chapter 4	Assessment tools and risk management
	Chapter 5	Development and implementation of a national quality assurance framework
	Chapter 6	Implementation of quality assurance within the NSS
	Chapter 7	Quality assurance for statistics compiled from different data sources
	Chapter 8	Quality assurance for data and statistics on SDG indicators
Global System & References	Chapter 9	Quality assurance in the global statistical system
UN NQAF Elements	Annex	Detailed list of elements to be assured

7.3.1.2 UN NQAF principles, requirements and elements

Chapter 3 of the Manual presents *19 UN NQAF principles*, and the *requirements* for their implementation, organized in four *levels*, as indicated below. Each requirement is complemented in the annex to the Manual by a detailed list of *elements to be assured*.

- a) **Level A: Managing the statistical system:** Coordination of the NSS and managing relations with all stakeholders is a precondition for the quality and efficient production of official statistics. Ensuring the use of common statistical standards throughout the system is an important aspect of this management.
 - **Principle 1 - Coordinating the NSS:** coordination of the work of the members of the NSS is essential for improving and maintaining the quality of official statistics.
 - **Principle 2 - Managing relationships with data users, data providers and other stakeholders:** the statistical agencies should build and sustain good relationships with all their key stakeholders, including users, data providers, funding agencies, senior government officials, relevant community organizations, academia and the

media. The statistical agencies should have access to all data necessary to satisfy the information needs of society in an effective and efficient way.

- **Principle 3 - Managing statistical standards:** standards refer to the full set of statistical concepts, definitions, classifications and models, methods and procedures used to achieve the harmonised treatment within and across processes and across time and space. The use of standards promotes the consistency and efficiency of statistical systems at all levels.
- b) **Level B: Managing the institutional environment:** The quality of the institutional environment affects the quality of the processes it embraces and the outputs they produce.
- **Principle 4 - Assuring professional independence:** NSOs should develop, produce and disseminate statistics without any political or other interference or pressure from other government agencies or policy, regulatory or administrative departments and bodies, the private sector or any other persons or entities. Such professional independence and freedom from inappropriate influence ensure the credibility of official statistics. This applies to the national statistical office and to other producers of official statistics.
 - **Principle 5 - Assuring impartiality and objectivity:** statistical agencies should develop, produce and disseminate statistics respecting scientific independence and in a way that is professional, impartial and unbiased, and in which all users are treated equitably.
 - **Principle 6 - Assuring transparency:** NSOs' policies and management practices, and the terms and conditions under which their statistics are developed, produced and disseminated and, if applicable, subsequently revised (including the legal basis and purposes for which the data are required), are documented and available to users, respondents, owners of source data and the public.
 - **Principle 7 - Assuring statistical confidentiality and data security:** NSOs should guarantee that the privacy of data providers (persons, households, enterprises and other data providers) will be protected and that the information they provide will be kept confidential, will not be able to be accessed by unauthorized internal or external users and will be used for statistical purposes only.
 - **Principle 8 - Assuring commitment to quality:** NSOs should be dedicated to assuring quality in their work, and systematically and regularly identify strengths and weaknesses to continuously improve the process and product quality.
 - **Principle 9 - Assuring adequacy of resources:** the financial, human, and technological resources available to NSOs should be adequate both in magnitude and quality, and sufficient to meet their needs regarding the development, production and dissemination of statistics.
- c) **Level C: Managing statistical processes:** International standards, guidelines and good practices are fully observed in the statistical processes the NSO uses to develop, produce and disseminate official statistics. The credibility of the statistics is enhanced by a reputation for good management and efficiency.

- **Principle 10 - Assuring methodological soundness:** in developing and producing statistics, NSOs should use sound statistical methodologies based on internationally agreed standards, guidelines or best practices.
 - **Principle 11 - Assuring cost-effectiveness:** NSOs should assure that resources are effectively and efficiently used. They should be able to explain to what extent set objectives were attained, that the results were achieved at a reasonable cost and are consistent with the principal purposes of the statistics.
 - **Principle 12 - Assuring appropriate statistical procedures:** effective and efficient statistical procedures, underpin quality and should be implemented throughout the statistical production chain.
 - **Principle 13 - Managing the respondent burden:** individuals, households or businesses that provide the data upon which statistical products are based are fundamental contributors to the quality of outputs. The requirement to collect data should be balanced against production costs and the burden placed on respondents. Mechanisms to maintain good relationships with providers of data and to proactively manage the respondent burden are essential to improving quality.
- d) **Level D: Managing statistical outputs:** Statistics serve the needs of national governments, research institutions, businesses, the general public and the international community.
- **Principle 14 - Assuring relevance:** statistical information should meet the current and/or emerging needs and expectations of its users. Without relevance, there is no quality. However, relevance is subjective and depends upon the varying needs of users. The NSOs challenge is to weigh and balance the conflicting needs of current and potential users to produce statistics that satisfy the most important and highest priority needs within the given resource constraints.
 - **Principle 15 - Assuring accuracy and reliability:** NSOs should develop, produce and disseminate statistics that accurately and reliably portray reality. The accuracy of statistical information reflects the degree to which the information correctly describes the phenomena it was designed to measure, namely, the degree of closeness of estimates to true values.
 - **Principle 16 - Assuring timeliness and punctuality:** NSOs should minimize the delays in making statistics available. Timeliness refers to how quickly after the reference date or the end of the reference period, the outputs are made available to users. Punctuality refers to whether outputs are delivered on the promised, advertised or announced dates.
 - **Principle 17 - Assuring accessibility and clarity:** NSOs should ensure that the statistics they develop, produce and disseminate can be found and obtained without difficulty, are presented clearly and in such a way that they can be understood, and are available and accessible to all users on an impartial and equal basis in various convenient formats in line with open data standards. Provision should be made for allowing access to microdata for research purposes, in accordance with an established policy that ensures statistical confidentiality.

- **Principle 18 - Assuring coherence and comparability:** NSOs should develop, produce and disseminate statistics that are consistent, meaning it should be possible to combine and make joint use of related data, including data from different sources. Furthermore, statistics should be comparable over time and between areas.
- **Principle 19 - Managing metadata:** NSOs should provide information covering the underlying concepts and definitions of the data collected and statistics produced, the variables and classifications used, the methodology of data collection and processing, and indications of the quality of the statistical information—in general, sufficient information to enable the user to understand all of the attributes of the statistics, including their limitations.

7.3.1.3 NQAF implementation

Chapters 4 to 8 of the UN NQAF Manual deal with all aspects of implementation

- a) Chapter 4 lists the various tools and instruments for quality assessment, including a section on risk management;
- b) Chapter 5 is concerned with the development and implementation of an NQAF at an NSO or another statistical organization;
- c) Chapter 6 discusses the role of NSS-wide bodies in the implementation of an NQAF throughout the NSS;
- d) Chapter 7 approaches quality assurance from the perspective of the data source being used, which is particularly pertinent in the discussion of new data sources; and
- e) Chapter 8 introduces quality assurance for statisticians involved in the compilation of SDG indicators.

7.3.1.4 Quality assurance in the global system

Chapter 9 of the UN NQAF Manual provides reference materials for statisticians who are interested in the links between quality assurance at the national and global level. It discusses collaboration within the global statistical system in assuring data quality at the global level, taking into consideration the need for international comparability of data, especially in the context of the compilation of the indicators for monitoring progress towards national, regional and global goals and targets of the 2030 Agenda for Sustainable Development.

7.3.2. European Statistical System – quality management standards, guidelines and tools

The European Statistical System (ESS) comprises the NSOs of 27 European Union (EU) Member States, four EFTA countries, and Eurostat. The ESS is a prolific source of quality-related regulations, standards, guidelines and tools, as summarised in the following sections. For an NSO in an EU Member State or EFTA country, these documents are the natural starting point and basis for developing a quality assurance framework.

7.3.2.1 European legislation and regulations relating to quality

The [Amended Regulation \(EC\) No 223/2009 on European Statistics](#) includes two articles on quality:

- a) **Article 11:** The ES CoP shall aim at ensuring public trust in European statistics by establishing how European statistics are to be developed, produced and disseminated in conformity with the statistical principles as set out in Article 2(1) and best international statistical practice. The CoP shall be reviewed and updated as necessary by the ESS Committee.
- b) **Article 12:** To guarantee the quality of results, European statistics shall be developed, produced and disseminated on the basis of uniform standards and harmonised methods. In this respect, the following quality criteria shall apply: i) relevance, ii) accuracy, iii) timeliness, iv) punctuality, v) accessibility and clarity, vi) comparability, and vii) coherence.

Specific quality requirements, such as target values and minimum standards for the statistical production, may be laid down in sectoral legislation.

The Member States shall provide the Commission (Eurostat) with reports on the quality of the data transmitted. The Commission (Eurostat) shall assess the quality of data transmitted and shall prepare and publish reports on the quality of European statistics.

The [Inventory of regulations in the field of statistics containing provisions on quality and quality reporting \(2010\)](#) comprises a list of domain-specific regulations, each of which contains a quality management reference or references. The list is currently being updated.

7.3.2.2 European Statistics Code of Practice (ES CoP)

The [ES CoP](#) has been, arguably, the most influential statistical quality-related document in the last 20 years. It was most recently updated in November 2017. It is the cornerstone of ESS quality management. It is a self-regulatory instrument. It includes the ESS Quality Declaration and 16 statistical quality principles.

- a) **ESS Quality Declaration:** “The European Statistical System is a partnership in which Eurostat and the national statistical authorities of each EU Member State and EFTA country cooperate. Together, our mission is to provide independent, high-quality statistical information at European, national and regional levels and to make this information available to everyone for decision-making, research and debate...

We operate under a strict legal regime supplemented by a robust, world-class and self-regulatory quality framework, the backbone of which is the European Statistics Code of Practice. Our compliance with the Code of Practice is periodically assessed by means of review mechanisms and strict follow-up of the improvement actions identified.

We see quality as the basis of our competitive advantage in a world experiencing a growing trend of instant information which often lacks the necessary proof of quality...

We are committed to statistical excellence by systematically identifying our strengths and weaknesses, as well as related risks which we duly take into account by the continuous development of our common quality framework...”

- b) **ES CoP Principles:** The 16 ES CoP principles, reproduced below, are closely related to the 19 UN NQAF principles. Some are essentially identical. Collectively they cover the same ground. This is not at all surprising as the initial (2012) version of the UN NQAF drew on the ES CoP (2011), and neither set of principles has been greatly changed in subsequent revisions.

The 16 principles are organized into three groups, covering the a) *institutional environment*, b) *statistical processes*, and c) *statistical output*. These groups are closely related to the four levels of the UN NQAF, the main difference being that the ES CoP *institutional environment* group includes the UN NQAF *statistical system* and *institutional environment* levels.

Each ES CoP principle is exemplified by *indicators* of best practices and standards (not included here) that provide guidance and reference material for reviewing ES CoP implementation.

- **Institutional Environment**

Principle 1: Professional Independence.

Principle 1bis: Coordination and cooperation.

Principle 2: Mandate for Data Collection and Access to Data.

Principle 3: Adequacy of Resources.

Principle 4: Commitment to Quality.

Principle 5: Statistical Confidentiality and Data Protection.

Principle 6: Impartiality and Objectivity.

- **Statistical Processes**

Principle 7: Sound Methodology.

Principle 8: Appropriate Statistical Procedures.

Principle 9: Non-excessive Burden on Respondents.

Principle 10: Cost-Effectiveness.

- **Statistical Output**

Principle 11: Relevance.

Principle 12: Accuracy and Reliability.

Principle 13: Timeliness and Punctuality.

Principle 14: Coherence and Comparability.

Principle 15: Accessibility and Clarity.

For EU Member States and EFTA countries, the ES CoP is the cornerstone of the quality assurance framework. It may be used without change, or it may be incorporated in modified form, in a national statistical code of practice, as, for example, by the NSOs of the UK, Ireland and Hungary.

7.3.2.3 Quality Assurance Framework of the European Statistical System

The [ESS quality assurance framework](#) accompanies and complements the ES CoP. It identifies possible activities, methods and tools that provide guidance and evidence for the implementation of the ES CoP.

7.3.2.4 European Central Bank - Statistics Quality Framework

The [European Central Bank Statistics Quality Framework \(ECB SQF\)](#) was developed in 2008. It is compatible with the ES CoP. It sets out the main quality principles and elements guiding the production of ECB statistics. It is a statement of intent, not a standard. However, most elements are fully reflected in current practices.

The quality assurance procedures included in the ECB SQF cover programming activities and development of new statistics, confidentiality protection, data collection, compilation and statistical analysis, data accessibility and dissemination policy, monitoring and reporting, and monitoring and reinforcing the satisfaction of key stakeholders.

7.3.2.5 ESS Handbook for Quality and Metadata Reporting

The latest version of the [ESS Handbook for Quality and Metadata Reports \(EHQMR\)](#) (EHQMR) was disseminated in 2020. It superseded the [ESS Handbook for Quality Reports, 2014](#) and the [Single Integrated Metadata Structure and its Technical Manual, 2014](#).

The EHQMR is based on the [Single Integrated Metadata Structure \(SIMS\) v 2.0](#), which provides definitions and reporting guidelines for all ESS quality and reference metadata concepts. SIMS includes a two-component reporting structure:

- a) the Euro-SDMX Metadata Structure (ESMS) for user reports; and
- b) the ESS Standard for Quality Reports Structure (ESQRS) for quality reports.

SIMS streamlines and harmonises metadata and quality reporting in the ESS. It minimises the reporting burden on NSOs by facilitating *once for all purposes* reporting, whereby the concepts covered in both quality and user reports are reported upon only once. It facilitates storage of all reports in a single database.

The EHQMR incorporates the [ESS Quality and Performance Indicators](#). These indicators are accompanied by guidelines which, for each indicator, give the definition, applicability, calculation formulae, target value, aggregation levels, interpretation, and references.

7.3.2.6 Other ESS Quality Management Tools

The [ESS Quality Glossary](#), first published in 2003, covers many technical terms in ESS quality documentation, providing a short definition of each term and indicating the source of the definition. It was transferred to the [Concepts and Definitions Database \(CODED\)](#), where it is now available as a *theme*. Other glossaries containing quality-related terms are also available as themes in CODED, namely the [SDMX Glossary Version 1.0 \(2016\)](#) and [General Statistical Terminology](#).

The [Quality Guidelines for Multi-source Statistics](#) provide practical support for the design and implementation of multisource statistics within a comprehensive quality framework. For each ES CoP output quality dimension, the guidelines are developed around three objectives:

- a) error prevention;
- b) monitoring/correction/adjustment of possible errors during the statistical production process; and
- c) assessment of the impact of the errors on the final estimates.

The [Handbook on Data Quality - Assessment Methods and Tools](#) details the full range of methods for assessing process and output quality and the tools that support them. The [Handbook on improving quality by analysis of process variables](#) describes a general approach and useful tools for identifying, measuring and analysing key variables associated with a statistical process. The [European Self-Assessment Checklist for Survey Managers \(DESAP\)](#) enables the conduct of quick but systematic and comprehensive quality assessments of a statistical process (survey, census or administrative process) and its outputs and identification of potential improvements. The documents are also available in electronic form: [Electronic DESAP-E checklist](#) and [Electronic DESAP user guide](#) and an abbreviated version is available as [DESAP condensed](#).

7.3.3 Other internationally developed quality assurance frameworks

7.3.3.1 International Monetary Fund - Data Quality Assessment Framework

The International Monetary Fund (IMF) first developed its [Data Quality Assessment Framework \(DQAF\)](#) in 2001. Its aim is to complement the quality dimensions of the IMF Special Data Dissemination Standard (SDDS) and the Enhanced General Data Dissemination System (eGDDS) and to underpin the assessment of the quality of the data provided by countries as background for IMF Reports on the Observance of Standards and Codes (ROSC). The SDDS, its new version (SDDS Plus), and the eGDDS provide guidance to member countries on the provision and relevance of their economic and financial statistics.

The DQAF is designed for use by IMF staff and NSOs in assessing the quality of specific types of national datasets. It covers the national accounts, the consumer price index, the producer price index, government financial statistics, monetary statistics, the balance of payments and external debt. It has been very widely used by the IMF and by the NSOs with which the IMF has been involved in ROSC activities. It has also influenced quality assurance framework developments in other countries such as Italy, Netherlands and Finland.

It is a process-oriented quality assessment tool. It provides a structure for comparing existing practices against best practices using five *dimensions* of data quality: *integrity, methodological soundness, accuracy and reliability, serviceability and accessibility*, in addition to the so-called *prerequisites for data quality*. It identifies three to five *elements of good practice* for each dimension and several *indicators* for each element. Furthermore, in the form of a multilevel framework, it enables datasets to be assessed concretely and in detail through *focal issues* and *key points*. The first three levels of the framework (dimensions, elements and indicators) are generic, that is, applicable to all datasets, the lower levels are specific to each type of dataset.

The DQAF dimensions, elements and indicators are rather different from the quality dimensions and indicators in the UN NQAF and the ES CoP. Although mappings between the DQAF, ES CoP and UN NQAF dimensions and indicators have been prepared, an NSO cannot readily design a quality assurance framework incorporating both. In essence, it has to make a choice between a UN NQAF/ES CoP approach and a DQAF approach.

7.3.3.2 African Charter on Statistics

The [African Charter on Statistics](#) was adopted in 2009 and entered into force in 2015. It presents six *quality principles* expressed in the form of 25 quality statements covering most of the quality principles in the ES CoP but reorganized and tailored to the African situation. The principles are:

- a) **Professional independence** – comprising scientific independence, impartiality, responsibility and transparency;
- b) **Quality** – comprising relevance, sustainability, data sources, accuracy and reliability, continuity, coherence and comparability, timeliness, topicality, African specificities, and awareness building;
- c) **Mandate for data collection and resources** – comprising mandate, resource adequacy and cost-effectiveness;
- d) **Dissemination** – comprising accessibility, dialogue with users, clarity and understanding, simultaneity, and correction;
- e) **Protection of individual data, information sources and respondents**- comprising confidentiality, giving assurances to data providers, use for statistical purposes, and rationality; and
- f) **Coordination and cooperation** – comprising coordination and cooperation.

7.3.3.3 ECLAC – Code of Good Practice in Statistics

The [Code of Good Practice in Statistics for Latin America and the Caribbean](#) was developed with support from the Economic Commission for Latin America and the Caribbean (ECLAC) and Eurostat by a working group of ECLAC countries in 2011. It was modelled on the European Statistical Code of Practice (2008) and extended to include coordination of the NSS as a whole (as subsequently incorporated in the 2017 ES CoP).

7.3.3.4 Caribbean Community – Statistics Code of Practice

The Caribbean Community (CARICOM) developed its [Statistics Code of Practice](#) with support from the European Union. It is based on the ES CoP and has 15 principles and 78 indicators.

7.3.3.5 ASEAN Community Statistical System Code of Practice

ASEAN Community Statistical System (ACSS) adopted its [Code of Practice](#) in September 2012. It is modelled on the ES CoP (2008) but with fewer principles and indicators.

7.3.3.6 UNECE Quality Indicators for the Generic Statistical Business Process Model

As detailed in Chapter 14.4.3 – *Generic Business Statistical Process Model*, the [Generic Statistical Business Process Model \(GSBPM v5.1\)](#) provides the standard template for describing surveys and administrative data collections in terms of 8 phases and 44 subprocesses. [Quality Indicators for the GSBPM Version 2.0 - For Statistics derived from Surveys and Administrative Data Sources](#) provides a set of indicators to monitor the quality of the production processes for each phase.

7.3.3.7 United Nations Statistical Quality Assurance Framework

At its first meeting, the Committee for the chief statisticians of the United Nations System (CCS-UNS) decided that a generic quality assurance framework would be developed for use by United Nations agencies in managing their statistical data. Several UN agencies already had a quality framework or a code of practice of some sort and, while these differed from one another, there was a high degree of overlap.

The resulting [United Nations Statistical Quality Assurance Framework \(UN SQAF\)](#) was developed by a UN Task Team and adopted by the CCS-UNS in March 2018. It is based on a broad concept of quality that incorporates institutional, process and output dimensions. It is not prescriptive. It provides a template and guidelines that can be adapted by a UN agency to suit its circumstances. It is expected that UN agencies without a quality framework will adapt this generic version to the situation of their agency.

Whilst the UN SQAF is designed for international statistical organizations, the ideas it incorporates are also informative for NSOs.

7.4 National quality assurance frameworks, guidelines, and tools

Several NSOs have developed and implemented their own quality assurance frameworks more or less from scratch. The benefit of starting with a clean sheet is the feeling of ownership. Others have taken advantage of the UN NQAF, the ES CoP, or the quality assurance frameworks of NSOs. This section outlines some national quality assurance frameworks, guidelines and tools that are well established and readily available on the Internet.

7.4.1 Statistics Canada's Quality Assurance Framework and Quality Guidelines

[Statistics Canada's Quality Assurance Framework](#) was one of the first such frameworks introduced (2002). The most recent version (2017) serves as the highest-level governance tool for quality management at Statistics Canada. It gives an overview of the quality management and risk mitigation strategies used by the organization's program areas. It is used in conjunction with the organization's management practices, as described in its Quality Guidelines.

[Statistics Canada's Quality Assurance Guidelines](#) (first published 1985, most recent version 2009) bring together guidelines and checklists on the many issues that need to be considered in the pursuit of quality objectives. The focus is on how to assure quality through effective and appropriate design or redesign of a statistical project or program from inception through to data evaluation, dissemination and documentation. The guidelines are useful to staff engaged in the planning and design of surveys and other statistical projects, as well as to those who evaluate and analyse the outputs of these projects.

Statistics Canada also publishes a [Compendium of Management Practices for Statistical Organizations from Statistics Canada's International Statistical Fellowship Program](#). Chapter 1.5 focuses on quality management and is an excellent source of advice for developing NSOs.

7.4.2 Statistics Finland Quality Guidelines

[Statistics Finland's Quality Guidelines for Official Statistics](#) (2nd edition, 2007) is intended for all who are interested in the functioning of statistical systems, as well as for the users and

producers of statistics. As suggested by its title, it presents quality guidelines. In addition, it outlines the framework within which the field of statistics operates in Finland and describes the relevant legislation, as well as current best methods and recommendations. The aim of the document is to improve the usability of the skills and competence required in the designing and implementing of statistical systems by gathering the existing principles into common knowledge capital.

7.4.3 Australian Bureau of Statistics Data Quality Framework

The [ABS Data Quality Framework \(ABS DQF\)](#) provides the standards for assessing and reporting on the quality of statistical information. It is designed for use by a range of data users and providers in different settings, including government agencies, NSOs and independent research agencies. It improves a user's ability to determine whether a statistical product is fit for purpose and to interpret data. It can also assist in the development of statistical processes.

The ABS DQF is based on Statistics Canada's quality assurance framework and the ES CoP. It defines seven dimensions of quality, namely: institutional environment, relevance, timeliness, accuracy, coherence, interpretability and accessibility.

7.4.4 UK Office for National Statistics Quality Management Strategy and Framework

The [ONS Quality Management Strategy](#) (last revised 2015) sets out the organizational commitment and approach to quality and quality goals. It helps to ensure that ONS meets its obligations under the UK Code of Practice for Official Statistics. It commits the organization to further develop a culture of quality to ensure that it:

- a) produces statistical outputs that meet user needs for quality;
- b) explains the quality of outputs to users by providing up to date metadata;
- c) improves the quality of outputs and processes through standardisation, continuous improvement and quality reviews.

The [ONS Statistical Quality Framework](#) supports the Quality Management Strategy by setting out the initiatives and activities that support, improve and assure the quality of outputs. It describes the day-to-day activities that are in place at an organizational level for:

- a) **quality assurance** - anticipating and avoiding problems by walkthroughs of statistical outputs, providing guidance and training in quality assurance practices;
- b) **quality control** - responding to observed problems, using policies for describing how corrections and revisions are handled;
- c) **quality improvement** – undertaking improvements identified during methodological and quality reviews on a rotating basis; and
- d) **quality reporting** - informing users of the quality of our outputs.

7.4.5 South African Statistical Quality Assurance Framework

Statistics South Africa first developed its [South African Statistical Quality Assurance Framework \(SASQAF\)](#) in 2008 and revised it in 2010. It serves as a toolkit for the certification of statistical products as official, and the maintenance of the quality of the statistical products.

It is primarily geared towards serving the needs of data producers and data assessors. However, it may be a useful tool for any agency concerned with data quality. Its formulation allows for easy integration with other national and international quality reporting tools.

It presents background information on the quality of statistics and the certification process applicable in South Africa. The eight quality dimensions are defined (nine including Prerequisites for Quality). They are based on the IMF's DQAF quality dimensions and the ES CoP output principles. Each quality dimension is supported by quality indicators, each of which is broken down into standards that need to be implemented to ensure conformance with the indicator. Associated with each standard is an assessment level expressed in the form of four mutually exclusive categories. Guidelines to meet standards are provided for each dimension.

7.4.6 Italian National Institute of Statistics Quality Guidelines

In 2012 Istat introduced its [Quality Guidelines for Statistical Processes](#), which build on the ES CoP, also taking into account the IMF's Data Quality Assessment Framework, especially in relation to economic statistics and the National Accounts. Following the ES CoP output principles, the requirements for statistical outputs are:

- a) to be relevant with regard to users' information needs;
- b) to be accurate, that is to provide estimates or indicators that are as reliable as possible;
- c) to be timely in measuring the phenomena being observed;
- d) to be easily accessible and supported by metadata allowing for a full understanding of data; and
- e) to enable comparisons over time or among different sources.

The Guidelines aim at describing the principles to be followed when planning, running and assessing a statistical process, as well as at illustrating quality requirements of statistics. They are in two parts.

- a) The first part is dedicated to process quality and follows the phases of the statistical production process. For each phase, the principle or target to be achieved is stated, and it is accompanied by summary instructions or guidelines to be followed in order to accomplish it.
- b) The second part concerns product quality. It describes and explains the quality requirements but does not contain guidelines for measuring quality, which are found in the first part.

The Guidelines are addressed to survey managers responsible for statistical production. They provide benchmarks for assessing process and product quality (as well as the degree of compliance with other European and national standards) using self-assessment and internal statistical audit. In each case, quality assessment is based on ascertaining the degree of compliance of statistical processes and products with the Guidelines' principles and requirements.

7.4.7 Statistical Institute of Jamaica Quality Assurance Framework

The [Quality Assurance Framework of the Statistical Institute of Jamaica \(SQAF\)](#) is structured in accordance with the first four sections of the UN NQAF, comprising:

- a) **Quality context** – the circumstances and key issues driving the need for quality management, benefits and challenges, and relationships to other quality frameworks and code of practice.
- b) **Quality concepts** – comprising methodological soundness, integrity and eight data quality dimensions.
- c) **Quality assurance guidelines** – comprising 18 SQAF lines, generally following the UN NQAF lines but without coordination of the NSS or metadata management.
- d) **Quality assessment and reporting** – as in the UN NQAF.

7.4.8 Palestinian Central Bureau of Statistics Code of Practice

Through the [Code of Practice for Palestine’s Official Statistics](#), the Palestinian Central Bureau of Statistics (PCBS) seeks to develop nationwide statistical practices and strengthen confidence in the Palestinian Statistical System. The Code draws on the experiences of statistically developed countries. It touches upon legal framework, the areas covered by official statistics, the importance of utilizing data compiled by PCBS, the importance of the media in statistics, and the role of statistical units in ministries and government agencies in addition to the PCBS.

The Code discusses best practices for statistical work based on the Fundamental Principles of Official Statistics, including the relationship between the PCBS President and the statistical units at ministries and government agencies, the role of the Advisory Council for Official Statistics, and interpretation and implementation of the Code.

In line with the Code, the PCBS:

- a) applies the European Self-Assessment Checklist for Survey Managers (DESAP);
- b) received ISO-9001:2008 certification in 2010;
- c) received a Committed to Excellent certificate from EFQM in 2017; and
- d) prepared guidelines for a Palestinian NQAF based on the UN NQAF in 2018.

7.4.9 Philippine Statistics Authority Quality Management System

The [Philippine Statistics Authority \(PSA\) Quality Management System \(QMS\) Manual](#), disseminated in 2016, is based on the ISO 9001: Quality Management System - Requirements. It includes:

- a) PSA profile - mandate, vision, mission, and core values;
- b) PSA organizational structure and function descriptions (including the description of the Systems Quality Assurance Division);
- c) QMS scope, coverage and process map;
- d) Management process descriptions;
- e) Quality policy;

- f) Statistical planning, policies and standards development descriptions;
- g) Risk registry and action plan.

The QMS Manual demonstrates PSA's ability consistently to provide products and services that meet the needs of users and the applicable statutory and regulatory requirements. It identifies the processes needed for the quality management system, their interactions and the criteria and methods required to ensure effective operation and control.

It does not contain the sort of material typically found in a quality assurance framework focused on statistical operations, such as quality concepts, guidelines and evaluation procedures.

7.5 Designing and developing a quality management framework

An NSO has to develop a quality management framework appropriate to its unique situation as defined by the legislation that it enacts, its mission, vision, core values and strategic objectives, demands from users and stakeholders, criticisms regarding lack or relevance or timeliness or publication errors, and so on. However, although these may well vary from one country to another, there is no point in completely re-inventing the wheel in designing an appropriate framework. Rather than start from scratch, it is easier and more effective to select general quality management principles from those described in Chapter 7.2 - *Generic quality management systems and other relevant standards* and a quality assurance framework, guidelines and tools from those described in Chapter 7.3 - *Quality assurance frameworks, guidelines, and tools*, customise them as needed, and use them as the starting point for framework design and development or revision and implementation.

The starting points for development are the existing quality framework (if any), the regional quality framework, and the UN NQAF Manual. Of course, the NSO should also take advantage of quality tools, wherever developed. For example, an NSO in an EU Member State will inevitably base its framework on the ES CoP, the ESS Quality Assurance Framework and accompanying tools.

7.5.1 Organizational context

A prerequisite for a quality management framework is an understanding of the organizational context within which the framework will operate. This includes the NSO vision, mission, core values, and strategic objectives. Assuming that these are aligned with the UN Fundamental Principles of Official Statistics, they are not to be questioned, but rather to be reviewed and understood as the base on which to build the quality management framework.

The next step is to identify the particular reasons for, and objectives of, quality management within the NSO and the benefits that are expected to be derived from it. Many of these may be shared with other NSOs; some may be unique to the organization.

Published errors that caused embarrassment and potential damage to the credibility of the organization and its outputs may be a catalyst or large changes in resources may be the impetus for the shift towards managing quality in a more formalized and systematic way. Similarly, government-wide reform initiatives, changes in NSO management, NSO restructuring, or the need to comply with legislation or regulations are examples of other driving forces leading to a decision to embark upon the formulation of a quality assurance framework. Statistics

Canada's first quality assurance framework arose from the need to provide evidence to an externally imposed government audit.

As noted in the UN NQAF Manual, the process of developing a quality management framework is typically best carried out by an NSO task force comprising experts from a variety of areas, for example: programme planning; survey design; survey operations; dissemination; infrastructure development and support. The framework development process has intrinsic benefits of its own since it obliges staff from various disciplines to come together to confront and tackle quality issues, to think through the requirements, to agree upon priorities, and to evaluate the costs and benefits while keeping in mind that not everything can or should be undertaken.

7.5.2 Quality concepts

7.5.2.1 General quality management principles

Underpinning a quality management framework is a set of *general quality management principles*. Regarding a choice of such principles, there seems to be every reason to adopt one of the formulations associated with the generic quality management systems summarised in Chapter 7.2 - *Generic quality management systems and other relevant standards*. The ISO 9000 general quality management principles are probably the most common choice. However, an NSO in a European country may well opt for those associated with the EFQM Excellence Model, especially if that is the preferred option for other government agencies in the country.

Of course, an NSO can mix and match principles from two or more generic systems, or it can invent its own from scratch. There seems little point in doing this. Each of the various generic systems has been carefully thought through and is supported by implementation guidelines and a body of experience.

The major decision is whether to build general quality management principles into the quality assurance framework or to introduce a separate generic quality management system into the NSO. In essence, the answer depends upon whether the organization wants to seek quality certification. For example, it may be a government prerogative that all government agencies in the country seek quality certification.

- a) If the organization decides to seek certification, then it is imperative to have a quality management system based on standards that provides certification. It can be selected from amongst the options presented in Chapter 7.2 – *Generic quality management systems and other relevant standards*.
- b) If the organization decides that certification is not necessary, then it is preferable to design a quality assurance framework that includes general quality management principles rather than to have a separate quality management system.

7.5.2.2 Defining/adopting statistical quality principles and associated indicators

At the core of a quality management framework is the definition of quality and a set of statistical principles and corresponding elements/indicators. Whilst an NSO may choose its own particular definition and set of principles, again, there is no great virtue in reinventing the wheel. The sets of principles outlined in Chapter 7.3 - *Quality assurance frameworks, guidelines, and tools* are a good starting point. In the absence of any particular reason to the

contrary, there is a lot to be said for defining the quality principles in accordance with the principles in UN NQAF, or the ES CoP or other regional framework. These frameworks have very similar coverage.

If alignment with the IMF DQAF is important for an organization, then the DQAF can be used as it stands, or in a hybrid form with the ES CoP as, for example, in the case of Statistics South Africa's SASQAF, summarised in Chapter 7.4.5 - *South African Statistical Quality Assurance Framework*.

7.5.3 Instilling a quality culture

As noted in the UN NQAF Manual, quality assurance activities – monitoring, documenting, standardizing and reporting in particular – are time-consuming and labour intensive, with payoffs that are not immediately obvious. Thus, staff reluctance to accept an increase in their workload associated with the introduction of a quality framework and no corresponding increase in resources to carry out their “regular” responsibilities has to be overcome. Furthermore, quality work has to be reviewed, maintained and enhanced over time, which requires a long-term commitment, not only from management and the quality team but from the staff at all levels. To obtain this commitment, the promotion and communication of the quality management features, benefits and requirements are necessary. This can be accomplished through sharing of information and training, both of which should be tailored to the various levels of staff. The NSO must publicise quality principles, explain how they are to be implemented and what the impacts are likely to be. Quality must become a core value, embedded in the culture of the organization.

The main tool is quality training. Development and implementation of a quality training programme is essential. It may well be in two parts.

- a) The first part focuses on general quality management principles and their application in the organization. Such training can readily be purchased from a reputable management consulting company. It is likely to be one of their standard offerings. Provided the company is supplied with appropriate documentation about the NSO, it will most likely be prepared to illustrate the application of the principles with concrete examples from the NSO itself.
- b) The second part focuses on statistical aspects of the quality management framework – the statistical quality assurance framework – incorporating the definition of quality, the statistical quality principles and the quality tools to support their implementation. Such training is specialised to NSOs and thus has to be developed in house or borrowed from another NSO or international statistical organization.

7.5.4 Developing guidelines on statistical quality

Quality guidelines are a vital aspect of a quality management framework. They provide quality-related practices and reference material that support the application of the statistical quality principles. The starting point for developing quality guidelines for an organization are the sets of quality principles, indicators/elements and guidelines that have already been developed. These include:

- a) the quality principles, requirements and elements in the [UN NQAF Manual](#);

- b) the quality principles, indicators and methods in the [ESS Quality Assurance Framework](#), which accompanies the ES CoP;
- c) the dimensions, elements and indicators in the IMF's Data Quality Assessment Framework ([DQAF](#)); and
- d) the various country QAFs summarised in Chapter 7.3 – *Quality assurance frameworks, guidelines, and tools*, and available from the corresponding websites.

In all cases, the guidelines must be tailored to the specific situation of the organization as they need to take into account the legislation, statistical infrastructure, skills and resources that are particular to the organization and the country in which it operates.

Quality guidelines may be *principle oriented*, or *process-oriented*, or a mixture, as further discussed in the following subsections.

7.5.4.1 Quality principle-oriented guidelines

Quality principle-oriented guidelines are organized around the quality principles. They provide advice, tools and reference documents for each of the indicators/elements associated with the principles. The ESS Quality Assurance Framework and the UN NQAF are examples.

The virtue of a principle-orientation is that the guidelines can be very readily converted into a quality checklist (as further described below) that is aligned with the output quality principles that are the basis for a user quality report. The disadvantage relative to process-oriented guidelines is that they are not so readily applicable to process design, development, production and evaluation.

7.5.4.2 Process-oriented guidelines

Process-oriented guidelines are organized around the phases of a generic statistical process, preferably as defined by the [Generic Statistical Business Process Model \(GSBPM v5.1\)](#). As statistical infrastructure and cross-cutting activities such as programme design, classification management and metadata management are not effectively covered by the GSBPM, the set of process phases has to be supplemented by groups of activities such as professional independence, transparency, coordination of the NSS, management of statistical standards and metadata management to provide a complete set of headings for the guidelines.

The advantage of process-oriented guidelines is that they can be readily applied during process design, execution and evaluation. The disadvantage is that they do not so readily lead to quality evaluation from a user perspective as they do not align with the output quality principles.

7.5.4.3 Mixture of quality principle and process-oriented guidelines

Istat's [Quality Guidelines for Statistical Processes](#) are an example of a mixture of quality principle and process-oriented guidelines. As noted in Chapter 7.3 – *Quality assurance frameworks, guidelines, and tools*, they are in two parts.

- a) The first part is dedicated to process quality and follows the phases of the statistical production process.
- b) The second part concerns output quality, with some output quality measures actually coming from the first part.

7.5.5. Quality monitoring and evaluation overview

It is important to have an overall strategy for quality monitoring and evaluation of statistical processes and their outputs to ensure that all aspects are covered. Note that in this context, *quality evaluation*, *quality review* and *quality assessment* are regarded as synonyms and for brevity are referred to simply as *evaluation*, as this is the term used in the GSBPM.

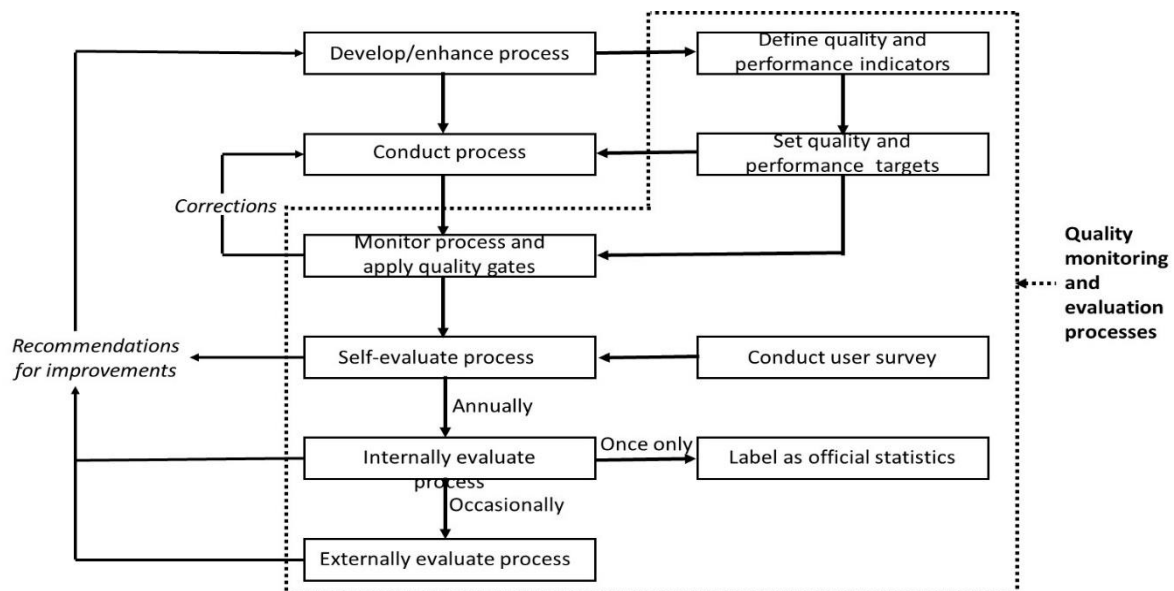
Evaluation is undertaken after a statistical process has been completed, in contrast to monitoring which is undertaken as the process takes place. Evaluation is much more in-depth than monitoring. It typically covers several cycles of a monthly or quarterly process, whereas monitoring takes place during the course of each cycle.

Six types of quality monitoring and evaluation of a process may be distinguished. They are:

- monitoring of quality and performance indicators during each cycle of the process;
- application of quality gates during each cycle of the process;
- self-evaluation of the process, typically annually;
- internal, peer-based evaluation of the process on a rotating or as-needed basis;
- external evaluation of the process, on an as-needed basis;
- labelling of process outputs as official statistics, once only, or with periodic renewal.

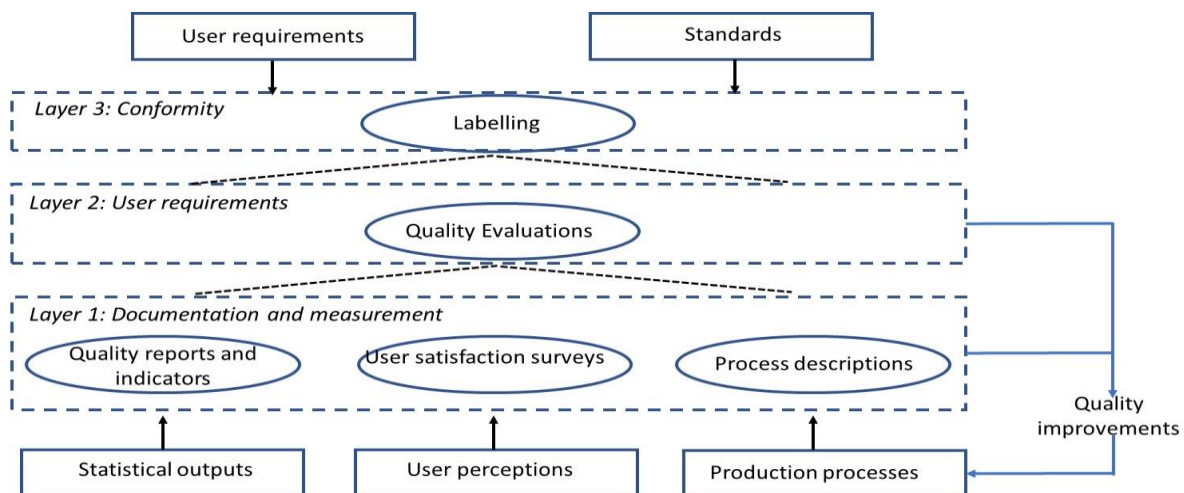
Figure 6 indicates how these types relate to one another and to the development, conduct and enhancement of a statistical process.

Figure 6: Relationships of monitoring, evaluation and labelling



A slightly different perspective is presented in Figure 7, which shows Eurostat's approach to quality assurance. Monitoring and evaluation are represented by three layers. Layer 1 is at the level of the process manager. On the way from Layer 1 to Layer 3, information about process quality is increasingly summarised, making it more appropriate for senior managers and users.

In developing countries, resources may limit the scope of monitoring and evaluation of the elements in Layer 1.

Figure 7: ESS monitoring, evaluation and labelling

7.5.6 Monitoring quality and applying quality gates

7.5.6.1. Quality and performance indicators

The objectives of identifying and monitoring quality and performance indicators (sometimes referred to as *key performance indicators*) are to check ongoing operations *as they take place* in order to:

- monitor quality (i.e., effectiveness) with respect to target objectives, identify sources of operational errors and correct them; and
- monitor performance (i.e., efficiency) with respect to target objectives, identify sources of operational blockages and correct them.

Quality and performance indicators may relate to the statistical process or to its outputs. They should be very carefully chosen as their main purpose is to monitor the process in real-time. Too few quality and performance indicators, or the absence of quality and performance indicators covering key aspects of the process, results in ineffective monitoring. Too many quality and performance indicators, or ill-chosen ones, burden the process and waste resources.

The procedures involved in the development and use of quality and performance indicators are to:

- define a suitable set of indicators based on a generic list;
- designate selected indicators as being **key** and set targets for each of these;
- monitor the values of quality and performance indicators and act on operational problems;
- analyse the values of key quality and performance indicators on a regular basis and compare the values with targets;
- take action to address operational problems thereby identified; and
- document structural problems, i.e., problems that cannot be solved at the operational level, and provide them as input to the next quality evaluation.

Examples of generic *quality indicators* are i) response rates by stratum; ii) sampling errors by stratum; iii) error rates during data capture and primary editing; iv) number of outliers detected during secondary editing/analysis; and v) the number of days after the reference period that data are published.

Examples of generic *performance indicators* are the average time required by a respondent to complete a questionnaire; the number of unsuccessful follow-up attempts, and the number of staff days required to complete editing.

The ESS maintains a standard set of [Quality and Performance Indicators](#).

[Quality Indicators for the GSBPM Version 2.0](#) provides indicators to monitor the quality of the production processes for each phase.

7.5.6.2 Quality gates

The objectives of quality gates are to ensure significant errors are detected as soon as possible after they have occurred, for the underlying causes to be determined, for the errors to be corrected, and (in the case of a repeating process) for the process to be adjusted to prevent or reduce similar errors in the next cycle. They are, in essence, quality control.

Quality gates are placed at key points in the process. To identify appropriate key points, it is necessary to consider what can go wrong, when it can occur, what impact it can have, and how it can be detected. To facilitate detection, quality gates are typically placed at natural beginnings or endings of sub-processes within a process. For example, after sample selection, but before data collection. This is essentially risk management.

Problems uncovered by quality gates are addressed at the time that they are discovered. The action taken can vary from *stopping the process entirely* until the underlying problem is fixed to *delaying the process*, to *proceeding with caution*.

Examples of quality gates for a statistical production process are:

- a) data collection does not commence until the sample has been verified;
- b) data collection is not closed off until an acceptable response rate has been obtained;
- c) statistical tables and commentary are not released until they are verified and signed-off by the head or a deputy head of the organization.

7.5.6.3 Quality dashboard for senior management

The aim of a dashboard is to provide senior management with a monthly/quarterly review of ongoing statistical operations, thereby enabling:

- a) overall monitoring of quality and performance with respect to target objectives;
- b) identification of areas of generally poor quality or performance.

This encourages and facilitates decisions regarding short-term changes that are needed.

7.6 Evaluation of a statistical process and its outputs

Evaluation of a process and its outputs may be of several types, each of increasing complexity, with increasing demands on resources, as indicated in Figure 6 and described in the paragraphs

below. However, *all types of evaluation should result in a quality report* detailing the findings, identifying quality and performance problems and making recommendations to senior management for quality and performance improvements that cannot be undertaken with the resources currently available to the process.

Abbreviated versions of evaluation reports may be made available to users. The ESS Handbook on Quality and Metadata Reporting (described in Chapter 7.3.2.5 - *ESS Handbook for Quality and Metadata Reporting*) indicates the quality and metadata that should be disseminated to users and outlines how they should be described.

7.6.1 Self-evaluation

The objectives of self-evaluation are to help the manager and staff responsible for the process to assess its quality and the quality of its outputs, to identify structural weaknesses, and to propose quality improvements.

Self-evaluation is undertaken by the process manager and persons involved in the design and implementation of the process. Depending upon the process and the resources available, it may be conducted annually or biennially. It typically starts with the completion of a standard evaluation checklist that is cross-referenced to the quality principles and guidelines. During completion of the questionnaire, areas of concern that arise are further probed. A set of *improvement action items* is a primary output. These are typically divided into two groups: those that can be implemented immediately without additional resources; and those that require allocation of additional resources and that will be referred to senior management.

Supported self-evaluation is a form of self-evaluation in which a quality expert sits in on the self-evaluation process and helps guide it. This is the recommended approach for a first-time self-evaluation.

7.6.2 Internal peer-based evaluation

Experience has shown that self-evaluation has its limitations. Those responsible for a process may be too close to see some of its deficiencies or possibilities for improvement. This is the reason for a peer-based or external evaluation.

The objectives of the peer-based evaluation are similar to those for self-evaluation but with the understanding that the evaluation is more penetrating, and the target audience includes senior management.

The procedures are also similar to self-evaluation but with the important distinction that the evaluation team contains members of staff having no connection to the process, the so-called *peers*, one of whom typically manages the evaluation. The team is supported by the process manager and other experts involved in its design and implementation.

7.6.3 External evaluation

7.6.3.1 External evaluation initiated by the NSO

The need to conduct periodic external evaluations of processes and their outputs may be built into an organization's quality framework. Another trigger for external evaluation is significant criticism of its outputs by users or other stakeholders. In organizations that are receiving

support from donors or partners, the need to evaluate the efficacy of a donor or partner intervention is also a common trigger.

The target of an external evaluation may be the process or a particular part of the process. The evaluation objectives are to provide the senior management and process manager with an objective view of the quality of the process or some part of it, and hence to identify structural weaknesses and to propose quality improvements for addressing them.

The procedures are similar to internal peer-based evaluation but with the important distinction that the evaluation team is largely or entirely from outside the organization. The team is provided with information by the process manager and other experts involved in its design and implementation.

Given that there may be a need to identify and make use of evaluators from outside the organization, it is useful to establish relationships with other NSOs in the NSS and in other countries with the aim of exchanging evaluation services.

7.6.3.2 External evaluation initiated by a regional organization

An external evaluation may also arise in the context of a regional programme to check compliance with a regional quality standard, in which context it is often referred to as a *peer review*.

For example, external evaluations, termed *peer reviews*, form part of the [European Statistical System \(ESS\) strategy to monitor implementation of the ESCoP in the EU and EFTA Member States](#), administered by Eurostat. The object of each review is to evaluate the compliance/alignment with the ESCoP in the Member State and to help the NSO and other producers of statistics comprising the NSS to further improve compliance. A first-round of peer reviews was carried out in 2006-2008 and a second-round 2013-2015. The third round of peer reviews is being prepared and will take place in 2021-2023. More details are provided in [Peer reviews in the European Statistical System](#).

This type of peer review programme has been adopted by African countries, as described in [Peer reviews of national statistical institutes and national statistical systems in African countries](#). The reviews are centred on compliance with the African Charter on Statistics, adopted in 2009, which provides a set of principles and standards for the functioning of African statistical systems.

7.6.4 User surveys and other user feedback

User surveys and other user feedback are not another type of evaluation, rather they are essential inputs to all types of evaluation, especially in relation to the relevance of outputs, and to obtain user perceptions of other aspects of quality.

A *user survey* is a survey that assesses the satisfaction and/or the perceptions of the users. As regards its coverage, the UNECE's [Recommendations for Promoting, Measuring and Communicating the Value of Official Statistics](#) identify six groups of items

- a) *General satisfaction with products*: relevance, accessibility, access preferences and what characteristics of official statistics the user considers the most important.
- b) *General satisfaction with user support*: level of current service and improvements to service.

- c) *Design, communication and metadata*: general design of the official statistics website design of statistical warehouse, interpretability, navigation and visualization.
- d) *Relevance, responsiveness and innovation*: how effectively official statistics inform the public debate on current issues; the importance of official statistics in helping to understand societal developments and use of new technologies, methods and data sources by the NSO.
- e) *Awareness of brand and message*: level of trust in official statistics; understanding the mandate of the NSO; perceived presence or absence of political interference and overall satisfaction with the organization.
- f) *Satisfaction with specific products and services*: knowledge, use and quality of a particular product and use of anonymized microdata.

Users are divided into groups according to their needs, as discussed in Chapter 6 – *Users and their needs*. A user survey can be targeted to one or several groups, as appropriate.

A user survey can take different forms, for example, using mail-out – mail-back questionnaires, personal interviews or web-based surveys. The choice depends on the nature of the information being sought, and on the resources available.

The [ISO 10004:2012 Quality management – Customer satisfaction](#) standard provides further ideas, and the UNECE’s Recommendation cited above include a generic user survey.

Other sources of user feedback include sector committees set up by the organization and comprising experts in the various subject matter areas, and focus groups convened to address particular issues.

7.6.5 Labelling

The *labelling* of a statistical output follows from and depends upon a favourable evaluation. It is intended to convey a general message to users about its quality. This is important in a world of multiple suppliers. It is a means of distinguishing official statistics from other sources. It enhances the visibility and credibility of the output. The label may be brief, for example, *official statistics*, or *experimental statistics*. It should always be accompanied by an explanation of its meaning.

A label can also be given to an NSO as a whole, reflecting its capacity to produce high-quality statistics, as demonstrated, for example, by certification in terms of a generic quality management systems standard.

7.7 Quality evaluation and certification of NSOs

7.7.1 Quality Evaluation

Quality evaluation may be conducted for organizations as a whole, not just individual statistical processes and their outputs. Typically, such an evaluation is conducted with reference to a code of practice or similar standard. A good example is the programme of [Peer reviews in the European statistical System](#) with the immediate aim of determining the degree of compliance to the ES CoP and the ultimate objective of enhancing the integrity, independence and

accountability of the NSOs that make up the ESS. A first round of peer reviews was carried out in 2006-2008; a second round was launched in 2013 and completed in 2016.

7.7.2 Certification

Quality certification applies to an NSO as a whole and refers to conformance with an internationally recognised standard or other formal criteria, typically a generic quality management system, such as the ISO:9001, or the EFQM Excellence Model, or Lean Six Sigma. It is awarded by an independent external body that specialises in certification.

As previously noted, the decision of whether or not to seek quality certification depends upon the particular circumstances of the organization. It may want the discipline of seeking certification primarily as a means of inducing a culture of quality. It may be expected to seek certification as part of a government-wide quality initiative.

Due to the general nature of the quality management standard on which certification is based, it is almost certain that the activities, tools and document associated with certification will not, by themselves meet the detailed needs associated with quality assurance at the statistical process level. Thus, an accompanying and complementary quality assurance framework is necessary.

7.8 Relationships with other organizational policies, strategies, and frameworks

As noted in the UN NQAF Manual, a quality management framework is one of several policies, strategies, and frameworks that are likely to be in place in an NSO. These other mechanisms are likely to have a much less direct but still significant effect on quality management. In any case, for effective planning and functioning of the organization as a whole, all such mechanisms should be harmonised. A quality management framework is most effective when it has been built into the organizational structure in such a way that quality practices and procedures are integral parts of other mechanisms.

Thus, the formulation of a quality management framework requires an in-depth and thorough review of these other mechanisms. The following paragraphs outline some of the mechanisms that should be considered.

7.8.1 Top management meetings

Every NSO is likely to have weekly or fortnightly meetings of top management at which key decisions regarding ongoing operations are made. It is important that quality management has a voice at such meetings. This can be achieved by ensuring that one member of the top management is the “quality champion” and/or that there is a quality committee that can expect access to the meetings on a regular, say quarterly, basis to review the quality dashboard and any significant quality problems and proposals for improvement, and that can obtain immediate access to the next meeting in the event of a major quality issue that must be addressed immediately.

7.8.2 Multi-annual planning process

Every NSO is likely to conduct periodic discussions of the multi-annual plan, covering the extent of its achievements, and its extension to future years. It is important that quality management is included herein, to ensure that consideration is given to quality improvements that have been identified and need an injection of resources. Further, resources should be set aside to support the quality team in promoting a culture of quality and in developing quality tools.

This can also be achieved by ensuring that one member of the top management is the “quality champion” and/or that there is a quality committee that can expect access to the multi-annual discussions.

7.8.3 Performance management/audit

Performance management typically includes quality goals. Quality management typically includes performance management goals. Thus, it is vital to ensure that, if a performance management/audit programme exists, it should be coordinated with the quality management framework to avoid any inconsistency in messages or overlap in activities.

For example, program management can take advantage of the outputs of quality monitoring and evaluation. Conversely, evaluation of statistical process quality may be conducted jointly with performance management. For example, in 2006, Statistics Canada commenced evaluation of statistical processes, on average about five processes per year. The activity contributed to a growing awareness of quality assurance and a shift in attitude from fear of exposing weaknesses to a more constructive view of risk identification and mitigation. By 2014, the organization had reached a point where it did not need such a labour-intensive mechanism. Thus, it discontinued the evaluation process on the grounds that the measurement of program performance and delivery gave sufficient oversight into quality.

7.8.4 Risk management

Risk is defined as *the effect of uncertainty*, where an *effect* is a deviation from what is expected, whether positive or negative, and *uncertainty* is the state of deficiency of information related to the likelihood or consequences of an *event*. Risk is often expressed as a combination of the consequences of an event and the associated likelihood of occurrence.

Risk management is the identification, evaluation, and prioritization of risks accompanied by coordinated and economical application of resources to minimize, monitor, and control the probability or impact of events with negative consequences. Many NSOs have a risk management framework. While it traditionally focuses on financial management, security and safety, risk management can be applied to statistical production. Quality gates are a particular example.

As noted in Chapter 7.2.4 ‘*ISO 31000:2018 Risk Management*’, risk management and quality management are closely related. Quality practices are easier to understand and their value easier to recognise when they are framed in terms of the risks they mitigate. Quality indicators can be inverted to become risks. Quality management and risk management are both more likely to succeed when they are coordinated and jointly incorporated in day-to-day activities. They should not be independently developed and actioned.

7.8.5 Metadata management

Quality and performance indicators are metadata. Quality evaluation depends on metadata. Quality reports are metadata. Thus, quality management and metadata management are closely related and should be harmonised. Quality related metadata should be maintained in accordance with organizational metadata management policies and make use of organizational metadata management tools. Conversely, metadata management facilities should address quality management needs, for example, for storage of, and ready access to quality and performance indicators and quality reports.

For example, Eurostat published the 2020 version of the [ESS Handbook for Quality and Metadata Reports \(EHQMR\)](#). It combines and supersedes the [ESS Handbook for Quality Reports, 2014](#) and the [Single Integrated Metadata Structure and its Technical Manual, 2014](#), as was discussed in Chapter 7.3.2.5 - *ESS Handbook for Quality and Metadata Reporting*.

As stated in the UN NQAF Manual, metadata management can be facilitated and guided by the use of standard models such as the GSBPM and the [Generic Statistical Information Model \(GSIM\)](#). The GSIM is a reference framework of internationally agreed definitions, attributes and relationships that describe the information objects used in the production of official statistics. It covers all the information objects used in phases of a statistical process and is consistent with [Common Metadata Framework, Part A](#), which identifies 16 core principles of statistical metadata management applying the design and implementation of a statistical metadata system. Further details of metadata management are provided in Chapter 13.3 - *Managing statistical data and metadata*.

7.8.6 Human resource management

Quality management needs should be considered in human resource management, in particular, the needs for recruitment and training of staff for a quality unit, the training of methodology and survey staff in the use of quality guidelines and tools, and the training of all staff in quality management principles.

7.9 Implementing a quality management framework

7.9.1 Appoint a quality management team and manager

In an organization with a quality culture, quality is everyone's responsibility. However, in order to sustain the culture and to provide the tools to support it, there is a need for a dedicated quality management team. The functions of the team include:

- a) continually promoting a culture of quality, keeping everyone, senior managers and statisticians alike, on their toes;
- b) developing, promoting and supporting the implementation of the QF;
- c) providing incentives to follow quality guidelines and monitoring their use;
- d) organizing and administering quality training;
- e) developing or obtaining quality tools and making them readily available;
- f) checking that quality gates are working as they should;

- g) ensuring ongoing quality evaluation on a rotating and as-needed basis;
- h) investigating serious errors in published outputs;
- i) draw attention to quality gaps and potential quality gaps; and
- j) following up on proposed quality improvements.

The functions of the quality manager are to lead the team and to liaise with senior management.

In large NSOs, the quality team may be a dedicated quality unit. In smaller organizations, there may be no quality unit per se, and the quality team may comprise one or more staff belonging to a unit with other core functions (often a methodology unit) that has been assigned responsibility for quality. In very small organizations, the team may comprise a single person nominated to handle quality, possibly on a part-time basis.

7.9.2 Identify quality management framework committee/champion

To ensure that senior management is kept fully aware of quality initiatives, responds to quality concerns and dedicates resources to quality improvements, it is vital that the NSO has a high-level *quality committee* or, at the very least, a *quality champion*, amongst the top managers. Without such support from the highest-level decision-making committee in the NSO, quality concerns and initiatives are likely to take second place to more urgent but less important matters.

7.9.3 Establish a quality training programme

Set up a quality training programme for NSO staff as the first step in introducing a quality management framework. The programme should cover general quality principles, statistical quality principles and quality tools.

Subsequently, the programme should be extended to other national producers of statistics.

7.9.4 Establish quality monitoring and evaluation programme

Set up a programme for rotating evaluation of statistical production and infrastructure processes and for review and revision of quality and performance indicators and targets, and quality gates.

7.9.5 Establish NSS coordinating bodies

It is imperative to be prepared to address NSS-wide quality issues. This requires an inter-organizational advisory board (or equivalent), sectoral committees, and other cross-agency bodies to:

- a) prepare a national strategic plan for the development of statistics;
- b) monitor survey design and coordinate data collection;
- c) discuss and address common quality issues;
- d) approve the adoption of common standards and methods; and
- e) ensure adherence to regional and international quality principles.

An example is the [Statistical Clearing House \(SCH\)](#), which was operated by the Australian Bureau of Statistics (ABS) from 1997 to 2017. Its goal was to promote good survey practice and to minimise respondent burden by requiring the clearance of any business survey that was conducted by or on behalf of the Australian Government and that approached more than 50 businesses. It involved assessing methodology and survey materials. In its final years, the SCH was receiving submissions from around 150 surveys per year. It was reducing respondent burden by some 4000 hours per annum as well as improving the quality of the statistics for the surveys reviewed.

Another example is the Philippine Statistics Authority's [Statistical Survey Review and Clearance System](#).

7.10 Relevance to other producers of official statistics

In the process of undertaking its coordination role, an NSO should consider how its quality management framework and supporting quality procedures and tools can best be adapted to other producers of official statistics. For example, the NSO may develop and promote a version of its quality guidelines especially tailored to organizations producing statistics based on administrative data.

Other producers of official statistics can be divided into two types:

- a) government organizations whose sole function is to produce official statistics in a particular area, for example, agriculture, justice, education or health; examples are the Australian Institute of Health, whose core function is production and analysis of statistics about health, and the US Bureau of Labour Statistics whose core function is production and analysis of statistics about employment.
- b) statistical units located within government organizations that do not have statistics as their core function, for example, the central bank, or the department of education.

For an organization of the first type, all the information provided in Chapter 7 – *Quality Management* is relevant with the exception of NSS coordination, which is the responsibility of the NSO. The organization should consider, and draw on, what the NSO uses as a quality assurance framework, including the application of general quality management principles, statistical principles, quality guidelines, monitoring and evaluation. The organization should adopt a similar approach, tailored as needed to its own particular situation, for example, simplified to reflect its smaller size relative to the NSO.

More commonly, other producers of official statistics are of the second type, i.e., a statistical unit embedded in an organization that has core function other than statistics. Such a unit can also draw on the NSO's quality assurance framework including the application of statistical principles, quality guidelines, monitoring and evaluation. It would not, however, want to define its own set of general quality management principles as these should belong to the organization (within which it is embedded) as a whole.

Chapter 8. Data Sources, Collection and Processing

8.1. Introduction

Although a chief statistician does not need to know all the details of every statistical activity, a general understanding of statistical concepts and statistical processes is vital for effective decision-making. The starting point is the Generic Statistical Business Process Model (GSBPM) described in Chapter 5 – *The National Statistical Office* and Chapter 14.4.3 – *The Generic Statistical Business Process Model (GSBPM)*. The GSBPM describes a statistical process in terms of eight *phases*, namely, *Specify Needs*, *Design*, *Build*, *Collect*, *Process*, *Analyse*, *Disseminate* and *Evaluate*. Chapter 6 covers *Specify Needs* and this chapter deals with the next four phases, i.e., *Design*, *Build*, *Collect*, and *Process*, leaving chapters 7 and 9 to discuss the *Analyse* and *Evaluate* phases, respectively.

For the purpose of the chapter, statistical processes are divided into four groups according to the input data source, namely:

- a) Survey, including census as a special case;
- b) Administrative data;
- c) Geospatial data; and
- d) Big Data.

Surveys and censuses are the traditional data source and are still very much used. Chapter 8.2 - *Sample surveys and censuses*, the longest section in the chapter, details all aspects of the design, build, collect and process phases. It also includes subsections on respondent relations and staff training, which cross phases.

Although well established and precisely targeted to address specified needs, surveys and censuses are time-consuming, labour-intensive and expensive. At the same time, NSOs are having to deal with shrinking budgets and emerging requests for more timely and disaggregated statistics and for indicators covering new domains, in particular in relation to monitoring the 2030 Sustainable Development Agenda and other regional and national development policies. To address these challenges, NSOs and other producers of official statistics are beginning to use the vast amounts of data that have become available in our digital society to supplement existing survey inputs. Indeed, the ‘datafication’ of society together with cost-efficient storage capacity and a rapid increase in computing performance have opened new opportunities for combining statistical surveys and censuses, and administrative records, and non-traditional data sources such as geospatial information and Big Data.

The most dramatic increase has been in the use of administrative data. Indeed, faced with a new data request, the first step an NSO should take is to check whether the need can be met by the use of an existing administrative data source. Chapter 8.3 - *Administrative sources* describes the particular features of the design, build and collect phases of processes using administrative data that distinguish them from surveys and censuses.

Geospatial data means data that have a geographic component. The most prolific source of such data is satellite imagery. Geospatial data can be used to greatly enrich other data sources. Chapter 8.4 - *Geospatial data* describes the types of geospatial data, their uses and the challenges faced in such uses.

Chapter 8.5 – *Big Data* deals with Big Data, the Internet-of-Things (IoT) sensors, wearables and mobile devices as tools that can complement traditional ways of collecting data due to their potentially high population coverage and use in daily life. The section draws on a vision paper by CBS Netherlands and Statistics Canada entitled [Future advanced data collection](#), presented at the 62nd ISI World Statistics Congress 2019. It is crucial for NSOs to consider implementing advanced data collection capabilities to increase their value for the societies they serve. Data platforms and other infrastructure usually referred to as the *Cloud* could be valuable tools in bringing together and processing traditional and non-traditional data from public and private sources.

Box 3: new role for official statistics in Estonia

Estonia is well known for its innovative practices and the introduction of digital technologies and processes into its public administration. To facilitate more effective use of data sources and prevent duplication of information collected, Statistics Estonia (SE) proposed changes to its statistical law. Through this change, it has taken on the role of national data steward, tasked with coordinating data governance in Estonia. This function of SE will provide an overview, and the possibility to use a central database more efficiently for various statistical analyses since data providers (enterprises, institutions as well as and individuals) do not have to be burdened with responding to multiple questionnaires. The amended law requires all government authorities administering state databases to appoint persons responsible for data governance.

It is expected that a data-sharing service will be added shortly to the statistical legislation, allowing SE to better coordinate data sharing of existing state data with other state authorities. This cross-usage of data between state authorities reduces duplication of data. It will enable SE to link data collected from different data sources and produce domain-specific data analyses and statistics while preserving statistical principles and confidentiality of data. SE provides this service only within the public sector and to research institutions. Link to [Statistics Estonia, data science competence centre](#).

8.2 Sample surveys and censuses

The [Generic Law on Official Statistics](#) (GLOS), UNECE (2018) defines a statistical survey as *‘the primary collection of individual data from respondents of a given population carried out by a producer of official statistics exclusively for statistical purposes through the systematic use of statistical methodology’*.

Two approaches used to collect information directly from respondents in different circumstances are *sample surveys* and *censuses*. A sample survey is a data collection activity involving only a part (sample) of the total population, while a census is generally a study of every unit (everyone or everything) in a population. Censuses are often referred to as a complete enumeration or a complete count. Both approaches are used to draw conclusions

about the whole population. Censuses and sample surveys are complementary in a statistical system. They are each considered to be a special case of a survey.

Censuses are the oldest of statistical activities that serve to make a snapshot of the whole population. Due to their complete coverage population censuses are the most broadly known activities of an NSO and are usually the first association that comes to non-statistician mind when thinking about official statistics. Many materials are available that deal with the management of a census of population, including detailed reports on actual experiences of census-taking. The United Nations Statistics Division has developed a series of handbooks and guidelines to assist countries in their preparation for population censuses. These include:

- [Guidelines on the Use of Electronic Data Collection Technologies in Population and Housing Censuses](#) (2019);
- [Handbook on Geospatial Infrastructure in Support of Census Activities](#) (2009);
- [Handbook on the Management of Population and Housing Censuses, Rev. II](#) (2016);
- [Handbook on Population and Housing Census Editing](#) (2009);
- [Measuring the Economically Active in Population Censuses: A Handbook and Collection of economic characteristics in population censuses: technical report](#) (2010);
- [Principles and Recommendations for Population and Housing Censuses, Rev. III](#) (2017).

Due to the availability of extensive high-quality and up-to-date UN materials, population and other censuses are not discussed in detail in this handbook.

Apart from population censuses, NSOs conduct other exhaustive enumeration activities in order to gather characteristics and data on the size and structure of housing, economic units, buildings or farms. Due to their complete coverage of the target population, those activities are most commonly also called censuses. Economic censuses are particularly useful when other reliable statistics (particularly about the structure of the economy) and reliable register and administrative information are not available. See Chapter 11.5 - *Statistical farm register and other frame sources for agricultural censuses and surveys* for more information on agricultural censuses, and also, on the webpage of the [FAO World Programme for the Census of Agriculture](#).

With the advent of the sample theory, censuses have gained additional purposes as they have become a source of information for sampling frames and the basis of estimators for sample surveys. This has led to a reduction of both cost and response burden, thus enabling a more detailed and more frequent data collection. Data from sample surveys are usually more complex than the basic data collected through a census. Surveys are often used to expand on the characteristics of census topics (and add additional topics) and to measure change between censuses. Choosing a right approach may depend on the characteristics of the population and other factors that are discussed below.

The Australian Bureau of Statistics lists the following [advantages and disadvantages of Sample Surveys compared with Censuses](#):

Pros of a CENSUS	Cons of a CENSUS
<ul style="list-style-type: none"> • provides a true measure of the population (no sampling error) • benchmark data may be obtained for future studies • detailed information about small sub-groups within the population is more likely to be available 	<ul style="list-style-type: none"> • may be difficult to enumerate all units of the population within the available time • higher costs, both in staff and monetary terms, than for a sample • generally, takes longer to collect, process, and release data than from a sample
Pros of a SAMPLE	Cons of a SAMPLE
<ul style="list-style-type: none"> • costs would generally be lower than for a census • results may be available in less time • if good sampling techniques are used, the results can be very representative of the actual population 	<ul style="list-style-type: none"> • data may not be representative of the total population, particularly where the sample size is small • often not suitable for producing benchmark data • as data are collected from a subset of units and inferences made about the whole population, the data are subject to 'sampling' error • decreased number of units will reduce the detailed information available about sub-groups within a population

Detailed census information on small area populations is used to design sampling frames and selections for the survey units. While survey programmes may collect different information from the census, several topics are usually common to both. Therefore, to maximize the usefulness of the data from both sources, it is important to standardize concepts and definitions. Standardisation also enables uses of modern approaches, such as small-area estimation which allows the creation of estimates for survey results on spatial levels that are unreliable by using traditional approaches. Small area estimation is a procedure where survey data is combined with census data, or administrative records and survey results are then, according to common characteristics, modelled for every respondent in the entire population. This approach allows the creation of econometric estimates of survey results on otherwise unreliable spatial levels. An example of this approach in official statistics is the estimates of poverty at county level (usually level 3 of the territorial classification) from a survey that is representative at municipal level (usually level 2 of the territorial classification) level.

8.2.1 Description of survey functions

A survey is the most commonly used data collection mechanism in official statistics, it is versatile, relatively cheap and fast (at least when compared to the census), can answer a wide variety of questions about various characteristics of a population and is used in almost every statistical area. It is usually motivated by the need to study the characteristics of a population,

build a database for analytical purposes or test a hypothesis. Surveys are therefore usually used as a method of decision-making support in private companies and in government, and as an important part of the scientific method in research activities. It is important to note that surveys in official statistics are also used to make international comparisons. NSOs ensure international comparability of survey results by applying a common methodological framework, by using similar methods and procedures and by monitoring the quality of processes and results through quality management systems and quality assurance frameworks (see Chapter 7 - *Quality management*).

Surveys can be used to provide relevant insights about most questions, but statisticians should clearly communicate that surveys are a tool for aggregating the results from the population and that asking technical questions to the general public may not always give relevant answers. The key to a successful survey is a well-defined set of questions than can be realistically answered by a defined population. When planning a survey, it is important to find a balance between satisfying user needs and avoiding undue burden on respondents.

8.2.2 Survey types

Surveys are versatile instruments that can be used for various purposes. They are the basis of any statistical programme and alongside censuses and processed administrative information form the foundation of official statistics. Surveys can be cross-sectional and longitudinal. Cross-sectional surveys are those in which a fresh sample of respondents is interviewed each time they are carried out, and they are therefore best served to measure the prevalence of a characteristic within the population. Longitudinal surveys are those that follow the same sample of respondents over time and therefore are best served to measure the incidence of a characteristic. Statistical surveys are usually grouped into statistical domains referring to particular populations. They may also be divided by type of observation unit into two main categories – household surveys and business surveys. Some surveys are a combination of both categories, for example, agricultural surveys, which can be both household and establishment surveys.

8.2.2.1 Household surveys

Household surveys are the basis of social research and are used to determine the basic characteristics of the population (people). The topics cover many socio-economic areas, including poverty, health, education, employment, gender equality, food security and access to services.

Household is a basic residential unit in which economic production, consumption, inheritance, child-rearing, and shelter are organized and carried out. The classification of ‘household’ is broader than the classification of ‘family’ since family refers only to a group of people related by blood or marriage, such as parents and their children only.

A ‘Household Survey’ is the process of collecting and analysing data to help us understand the general situation and specific characteristics of individual household or all households in the population.

Two types of questionnaires are usually used for household surveys: a) household rosters; and b) detailed (or individual) questionnaires. A household roster includes listing of all household members and their characteristics, such as each member’s age, sex, relationship to the head of

household, education and literacy status, employment activity, schooling status (for the population aged 5-24) and marital status.

A detailed (or individual) questionnaire explores the main theme of the study. This questionnaire is usually only completed by specific respondents, such as the head of household, married couples, and mothers of children under five, out-of-school children, or disadvantaged children, etc. As it has to yield reliable results for the whole population, such a survey requires a substantial number of respondents and therefore tends to be quite expensive to administer. It may be carried out as frequently as monthly, or only occasionally, depending upon how quickly the data being collected are likely to change value and, on the budget, available for conducting the survey.

8.2.2.2 Business surveys

Business surveys are the basis of economic research and are used to determine the basic characteristics of enterprises and the economy. They can be divided into *short term* and *structural* surveys. Short term business surveys serve to determine the change of output within an industry or phenomena between measurement periods and are used for tracking the business cycle. They are conducted monthly or quarterly if resources permit, otherwise less frequently according to the budget available.

Short term business indicators usually cover production, turnover, hours worked, number of people employed, wages, exports and imports and producer and import prices in various sectors such as industry, construction, trade and services. Structural business surveys, on the other hand, are usually performed annually or less frequently and are aimed at providing detailed information about the structure, type of activity, competitiveness and performance of economic activities within the economy or a sector. While structural business surveys are mainly used for the compilation of the annual national accounts, short term monthly or quarterly business surveys measure change and therefore provide input for assessing volume change in the quarterly national accounts.

Ideally, every business survey uses the statistical business register as the source of the survey frame (as further detailed in Chapter 11.3 - *Statistical business register*). According to the statistical unit used a business survey may be an *enterprise survey* or an *establishment survey*.

a) **Enterprise business surveys**

According to [Eurostat's glossary of statistical terms](#), an enterprise is an *organizational unit producing goods or services that has a certain degree of autonomy in decision-making. An enterprise can carry out more than one economic activity, and it can be situated at more than one location. An enterprise may consist of one or more legal units.*

A legal unit may be a natural person or a legal person whose existence is recognized by law independently of the individuals or institutions which may own it or of which it is a member. Examples are general partnership, private limited partnership, limited liability company and incorporated company. Most enterprises consist of one legal unit. However, in many countries, the few enterprises that comprise more than one legal unit account for a huge part of the economy in terms of employment or value-added.

A legal unit may own a second legal unit and this second legal unit may carry out activities solely for this first legal unit. Both units may even have the same management.

In this case, they are seen as one single enterprise. Another example may be that legal unit C employs the staff, and legal unit D owns the means of production like machines and buildings. A third legal unit E may own and manage these two legal units. Only the units C, D and E together can produce something and hence are to be counted as one enterprise. The reasons for splitting the organizational unit enterprise into more than one legal unit can be manifold: avoiding taxes or liabilities, different salaries according to the collective wage agreement or avoiding the publication of annual reports are among them.

Globalisation has contributed further to more complex structures of enterprises. Being active on the market in a country often requires an enterprise to have a legal unit in that country. The legal units of such an enterprise may be centrally managed from one country; book-keeping may be carried out centrally from another country; research and design may be done in a country with high wages, and; parts of the production in countries with low wages. Multi-national enterprises are often very large enterprises with a huge impact on statistics in terms of employment and value-added. Thus, good quality multi-national enterprise data is crucial for good quality business statistics and necessitates a stepping-up of the collaboration among the various national statistical authorities. This collaboration is often performed via profiling, a process to delineate complex and large enterprises.

b) Establishment business surveys

An establishment is an enterprise or part of an enterprise that is situated in a single location and in which only a single productive activity is carried out or in which the principal productive activity accounts for most of the value-added. Establishment surveys are any surveys where data is collected from local units. Data collection for each local unit is often difficult as it poses a significant burden for both respondents and the NSO. Due to this fact, the number of establishment surveys is often limited. However, as establishment surveys provide accurate and detailed information on the lowest level, performing them is important for the quality of national accounts. When an establishment survey is not available for a particular statistical area, data from an establishment survey that are available (usually employment and wages) may be used to derive estimates for other variables.

8.2.3 Types of statistical units that can be subject to the survey

The [Generic Law on Official Statistics](#) (GLOS) defines ‘*statistical unit*’ as a bearer of statistical characteristics. It is the basic *observation unit*. According to [UNECE Common Metadata Framework](#), statistical units are entities, respondents to a survey or things used for the purpose of calculation or measurement. They are units of observation for which data are collected or derived. They may be, amongst others, businesses, government institutions, individual organizations, institutions, persons, groups, geographical areas or events. They form the population from which data can be collected or upon which observations can be made.

UNSD publication [Statistical Units](#) (2007) offers a distinction between *statistical*, *collection* and *reporting units*. It defines a *collection unit* as the unit from which data are obtained and by which questionnaire survey forms are completed. With this definition, a collection unit is more of a *contact address* than a *unit*. For example, a questionnaire may be completed by a central

administrative office or an accountancy firm that provides this service to its client (the observation unit). Such information providing entity is termed a collection unit.

A *reporting unit* is a unit about which data are reported. Reporting units are those entities for which information is collected by means of questionnaires or interviews. In most cases, reporting units coincide with the units for which statistics are compiled, i.e., observation units.

According to [International Standard Industrial Classification of All Economic Activities \(ISIC\) Rev. 4](#) statistical units in economic statistics can be divided into the following categories:

- a) enterprise;
- b) enterprise group;
- c) kind-of-activity unit (KAU);
- d) local unit;
- e) establishment or local kind-of-activity unit;
- f) homogeneous unit of production.

8.2.4 Survey design

Survey design is typically an iterative process that identifies the target population and assesses the sources available to provide the survey frame. The survey frame comprises the list of units that most closely match the target population and the data needed, first, to stratify these units for sample selection and, second, to identify and contact the selected units. Thus, as further detailed in Chapter 11 – *Common statistical infrastructure*, the frame contains names, and other data need for the identification (identification data) such as addresses, telephone numbers and e-mail addresses (contact data) as well as other metadata used for stratification and sampling.

8.2.4.1 Specifying population and constructing sampling frame

The choice of survey frame may lead to a definition of a survey population that is different from the target population – i.e., persons with non-permanent addresses or enterprises with 0 employees being excluded from the survey, but it can also affect the methods of data collection, sample selection and estimation, as well as the cost of the survey and the quality of outputs. Further, the surveyed population might exclude areas with extremely high collection costs (such as a remote island) if they cover an insignificant portion of the target population. There are two main categories of frames: list and area frames. A list frame is a list of all units in the survey population, while area frame is a special kind of frame with a hierarchy of geographical areas as units. A typical household survey uses both types of frames as sources for sample selection (Multi-stage sampling), where first a sample of regions are selected from the area frame and then a systematic sample of dwellings (usually stratified) are selected from each of the selected regions.

In official statistics, the survey frame (which is called sampling frame in sample surveys) is usually derived from statistical registers or censuses, but various administrative registers are also increasingly used for this purpose (independently or as a method of improving the frame quality). Using a consistent survey frame is recommendable for surveys with the same target population or a subset of the target population. When the same sample frame is used for different surveys, it is termed a master sample frame or master sample. In this approach, the

first stage of sampling (selecting the areas), for household surveys, is often performed once for all conducted surveys, while the final selection of households is performed for each specific survey. This avoids inconsistencies across surveys and reduces the costs associated with frame maintenance and evaluation. More information on master samples can be found in Chapter 11.7.1 - *Household master samples*. Having a reliable survey frame is essential to any survey, and thus the nonexistence of a reliable frame can lead to choosing a census (based on area enumeration) rather than a sample survey.

8.2.4.2 Types of sampling

The two main types of sampling are probability sampling and non-probability sampling. Probability sampling describes procedures where every unit in the population has a chance of being selected in the sample, and this probability can be accurately determined. Non-probability sampling is any sampling method where some elements of the population have no chance of selection, or where the probability of selection can't be accurately determined. Non-probability sampling is of limited use for surveys conducted by NSOs since the biased selection of units may lead to false conclusions about the survey population as the findings cannot easily be generalized to the population. However, there are statistical areas where a non-probability sample is useful – such as short-term business statistics, where cut-off sampling is often used. Cut off sample is a method in which all units above a certain threshold are surveyed. However, a non-probability sample can be useful for exploratory studies or during the development phase, such as a pilot survey.

Probability sampling should be used when inferences about the population are to be made based on the survey results. In a probability sample, every unit on the frame has a non-zero probability of being selected, and the units are selected randomly. As a result, the selection is unbiased, and it is possible to calculate the probabilities of inclusion, calculate the sampling variance of estimates and make inferences about the population. The main disadvantage of probability sampling is that it requires more time and is more costly than non-probability sampling. It also requires a high-quality sampling frame and at least one sampling specialist within the NSO.

8.2.4.3 Sampling designs

There are various methods and types of statistical sampling designs. Selecting the appropriate and effective design depends on the nature of the available sampling frame and the material costs, time allocated for implementing the survey and the nature of the complexity of the sampling units. Sample design can also influence the required sample size, and thus it has a significant influence on the total cost of data collection. The simplest probability sample designs are simple random sampling and systematic sampling, which result in equal probabilities of inclusion. More complex designs that can result in unequal probabilities of inclusion and most of which require auxiliary information include stratified, probability-proportional-to-size, cluster, multi-stage and multi-phase sampling. Unequal probability sampling designs are typically used to reduce the cost of sampling and the data collection cost. When deciding between the various possible designs, the first thing to determine is what designs are feasible given the survey frame, units in the survey frame, domains of interest, response burden, data collection method, budget, international experience and support, etc. More information on sample design and sample selection can be found in Chapter 11.8.2 - *Sample design and estimation*.

Links to guidelines, best practices and examples:

- Eurostat: [Survey sampling reference guidelines](#);
- Statistics Canada - [Survey methods and practices](#);
- Statistics Netherlands - [Sampling theory: Sample design and weighting methods](#);
- Statistics Netherlands - [History of Sampling](#);
- UNSD [Sampling frames and master samples](#).

8.2.5 Data collection and capture modes

Selecting an appropriate method of data collection is essential to the success of the survey. The data collection method should be chosen to achieve a large coverage, high response rate, and gather accurate information while minimising collection burden and having a reasonable cost. All of these cannot be achieved simultaneously and therefore selecting the right approach out of many available options is usually specific to a particular survey. According to [Survey methods and Practices \(2003\) – by Statistics Canada](#), data collection methods can be divided into Self-completion and Interviewer assisted methods.

8.2.5.1. Self-completion

With self-completion, the respondent completes the questionnaire without the assistance of an interviewer. There are different ways a questionnaire can be delivered to and returned by a respondent. It can be done by post, facsimile, electronically or by an enumerator. When paper-based, this method is called Paper and Pencil Interviewing (PAPI); when computer-based it is called Computer-Assisted Self Interviewing (CASI); Computer-Assisted or Computer Assisted Web Interview (CAWI).

The main advantage of self-completion over other methods is that it is cheaper than interviewer assisted methods and much easier to administer. Self-completion is also useful for sensitive issues since the questionnaire can be completed in private without an interviewer's presence.

The disadvantage of self-completion is that response rates are usually lower than for interviewer-assisted methods since there is no pressure for the respondent to complete the questionnaire. Also, the quality can be worse than for interviewer-assisted methods since the respondent may misinterpret questions or skip some of them. For this reason, self-completion often requires follow-up after collection to correct errors and omissions.

Three methods of self-completion are commonly used:

a) Self-completion using paper questionnaire

Paper questionnaires were up to a few years ago, the most widely used method of data collection. Due to its relatively low cost, a self-completion paper questionnaire was mainly used in large-scale data collection operations, censuses, and recurring surveys such as monthly or quarterly business surveys and household budget surveys. This method is often slow, yields rather low response rates, and requires follow-up reminders and clarifications. Even though NSOs have significantly reduced the number of paper questionnaires in recent years, they are still widely used in less advanced NSSs. Questionnaires can be delivered and sent back via mail, via facsimile, delivered or picked

up by interviewers, or a combination of these options. A self-completion paper questionnaire sent and returned via mail is certainly the slowest data collection method. Furthermore, self-completion using paper questionnaire also requires data entry, which must be performed manually or checked manually after optical character recognition (OCR). It can be argued that web interviewing may be cheaper and faster in some cases, but it depends on the access to the internet among the population and in particular among the sub-population-group that the survey aims to target.

b) Self-completion using electronic questionnaire

In recent years, many statistical offices have replaced most of their paper questionnaires with electronic questionnaires. Electronic questionnaires are often made available through an encrypted and password-protected access system. This method is often called CAWI (computer-assisted web interview). For statistical offices, the main advantage of CAWI over paper questionnaire is eliminating the manual data entry, since this is done directly by the respondent. Furthermore, electronic questionnaires provide the ability to integrate logical controls to prevent errors and enforce answers.

A disadvantage of electronic questionnaires is the inability to distribute forms electronically, as countries seldomly possess a comprehensive list of e-mail addresses or official digital mailboxes for every person, household and business. Therefore, the most common way of introducing electronic questionnaires is to mail out the initial login information and require respondents to provide their respective email addresses. Even though the collection process is much faster, and the quality and completeness of the collected data are superior to paper questionnaires, high response rates should not be expected. Follow-up reminders to complete the questionnaire are often necessary but can be foreseen in the design phase of the data collection and automated. Self-completion using electronic questionnaire is currently the most common method of data collection in reoccurring business surveys.

c) Machine to machine transfer

Although machine-to-machine transfer may be classified as a new and separate data collection method, it has many self-completion survey characteristics. A machine-to-machine transfer is an automated transfer of information from an IT system of the respondent to the data collection system of the NSO. The initial setup of the recurring data transfer has to be agreed with the respondent, who provides access to predetermined sets of information in predetermined collection periods, through a predetermined communication method. The process is usually done by writing a manually or automatically run script that sends the data through the application programming interface (API) that the statistical office opens. There are examples where accounting software providers have automated statistical reporting for businesses by writing scripts that automatically prepare the requested data, which is then automatically uploaded to the data collection website. This method's main advantage is that it eliminates the reoccurring response burden on businesses and that it is the fastest method of data collection. The main disadvantage is its costs, as preparation and documentation for APIs can be costly. It requires IT staff's direct involvement on both sides and often requires persuasion to be widely deployed among businesses. A machine-to-machine transfer may

also be used to transfer information on reporting units from collection units (such as accounting firms) or for accessing Big Data sources.

8.2.5.2 Interviewer assisted data collection

The interviewer-assisted methods' main benefit is that the interviewer can increase the response rate and the overall quality of the collected information by personalising the interview and interpreting questions and survey concepts. Interviewer-assisted methods are particularly useful for surveying populations with low literacy rates or when the concepts or the questionnaire are complex, or at any time self-completion would be difficult. Specific cases for which interviewer assisted methods are preferred are surveys to collect information about sensitive topics such as violence against women surveys or gender-based violence surveys. In these cases, special protocols are developed and followed. An interviewer can increase the response rate by showing official identification and stimulating interest in the survey and reassuring the respondent of any concerns he or she might have regarding privacy and confidentiality, and the survey's purpose. The interviewer can prevent errors by immediately identifying and correcting them in the presence of the respondent.

Some disadvantages of interviewer-assisted methods are that they are expensive and difficult to manage. Some of the expenses may include interviewer salaries, interviewer training, transportation and lodging costs for interviewers or office space and telephones in the case of centralised telephone interviewing. The main problem with personal interviews is that it may be difficult to locate the respondent, so the interviewer may be required to make several trips before successfully contacting the respondent. Other disadvantages of interviewer-assisted methods are that poorly trained interviewers can induce response errors, and respondents may be reluctant to answer questions about sensitive topics. If well-trained interviewers are unavailable, other methods of interviewing may be preferable.

Three methods of interviewer assisted interviewing are most commonly used:

a) Personal interviews using paper questionnaires (PAPI)

A significant advantage over self-completion using paper is that, if the interviewers have been properly trained and selected for good quality handwriting, accuracy and completeness of the responses can be significantly improved and more readily captured using optical character recognition (OCR). However, personal interviews using PAPI are being gradually replaced, when possible, with computer-assisted methods. In many countries, in particular less advanced ones, the PAPI is widely used for the population and housing censuses

b) Computer-assisted personal interview (CAPI)

Computer-assisted personal interview (CAPI) combines the advantages of interviewer and computer-assisted methods by speeding up data collection, enabling more complex skip patterns, automating editing and quality checks, and closely monitoring and managing the interviewing staff. CAPI systems can be designed to generate management reports on the status of the interviews (e.g., response rate, number of interviews completed, number outstanding, length of time per interview, etc.), which help quality monitoring survey management.

A significant advantage of CAPI methods is automatically collecting additional data (such as geolocalisation) and metadata (such as time of interviewing), which can be used for data linking and controlling the interviewers. The main disadvantage of the CAPI method is the cost of the equipment and the fact that interviewers must be trained and comfortable using the computer and the data collection application. Therefore, using CAPI may not prove to be the ideal solution for surveys with a large number of interviewers or surveys with a high rate of interviewer replacement.

The computer may be a laptop, tablet, or even mobile phone; the latter two devices are smaller, consume less power, and have a significantly better battery life which are important factors for the interviewers' autonomy. However, input through touch screens is generally slower and less precise than keyboard input to a laptop. Choice of technology is further discussed in Chapter 14.8 - *Questionnaire design tools*.

c) **Computer-assisted telephone interview**

Computer-assisted telephone interview (CATI) is a method of interviewer assisted data collection where information is gathered over the telephone and directly imported into the computer system. Telephone interviews offer reasonable response rates at a reasonable cost. Telephone interviews are faster and cheaper than personal interviews since there is no travelling and associated costs. Less time is wasted for contacting the respondent, and quality control of the interviewing process can be easily implemented since telephone interviews can be easily monitored. The disadvantage of telephone surveys is that they are limited by the length of the interview and complexity of the questionnaire, as respondents have less patience for long, complex interviews over the telephone than in person.

Usage of mobile phones has also influenced telephone interviewing by increasing costs as calls to mobile lines tend to be more expensive than calls to landlines and has made the preparation phase, particularly constructing a survey frame with good coverage much more difficult and complex. Further, it has somewhat decreased the response rates as mobile phone users have the caller ID feature enabled by default and are less likely to answer calls from unknown callers than landline users. This drawback can be mitigated if a communication and awareness campaign is carried out just before the survey, but a letter announcing a phone call for the survey can also be a good solution. Further, CATI is an excellent data collection method for reoccurring surveys and follow-ups, where the respondent has already provided reliable contact information and has consented to respond. There are many examples where the initial contact is done in person via CAPI, and further data collection is done via CATI (either by the interviewer who performed the initial collection or through a call centre).

Technological developments like speech synthesis and natural language recognition combined with Artificial Intelligence (AI) systems have been tested to collect information from respondents via telephone (example can be found [here](#)). Such technologies can be used particularly for simple and recurrent surveys. However, it is expected that more complex surveys could be conducted through fully automated telephone assisted interviews soon. More information on the potentials of AI systems can be found in chapter 14.2.15 - *Artificial Intelligence*.

8.2.5.3 Appropriate choice of mode

According to [Survey methods and Practices \(2003\) – by Statistics Canada](#), the following issues should be considered when selecting an appropriate method of data collection:

- a) The information available in the survey frame. If the frame does not include mailing addresses, then self-completion questionnaires cannot be mailed to respondents. If up-to-date telephone numbers are not available telephone interviews cannot be conducted.
- b) The characteristics of the target population influence the data collection method. If the literacy rate of the population is low, or if the language is a consideration (i.e., there are two or more language groups), interviewer-assisted methods may be the only option. If the population and sample are widely dispersed across the country, personal interviews may be too expensive and difficult to manage.
- c) The nature of the survey may influence data collection. If the subject matter is sensitive, then a collection method that builds in anonymity such as self-completion or telephone interviews may be the most appropriate. If complex questions are asked, an interviewer may be needed to explain questions and concepts. If the interviewer needs to make observations or measurements (e.g., administering a literacy test to children) or showing the respondent material (e.g., graphics or diagrams), personal interviews might be required.
- d) Available resources heavily influence the choice of the data collection method. These resources include available budget, personnel, equipment and time. To use an interviewer-assisted method, sufficient budget must be available to pay for the training, hiring and travelling of interviewers. The national statistical office also needs to be able to find the required number of interviewers. If a computer-assisted method is selected, then IT experts are required along with the necessary computer equipment.
- e) Data quality requirements should be considered when selecting a data collection method. Well-trained Interviewers in the concepts being used in the survey can reduce response errors and nonresponse. Precision requirements should also be considered: larger samples generally yield more precise estimates, but this is the more expensive data collection method.
- f) Selecting the appropriate method is usually survey specific, and alongside factors mentioned above, often depend on the corporate culture and the survey manager. Some survey managers are reluctant to innovate, while others are actively seeking new methods. It is certainly necessary to promote new practices and encourage the modernisation of survey methods, typically for those representing the highest costs and the highest burden on respondents.

In summary, personal interviews are often the most expensive method and self-completion surveys the least expensive. Using computer-assisted methods increases quality and improves speed, but may sometimes increase costs. The ability to measure quality and implement quality control procedures may also be important. It is easier to monitor the quality of telephone interviews than personal interviews. However, the most efficient solution may be a combination of different methods. This approach is often referred to as the mixed-mode data collection. Mixed-mode is particularly useful for surveys which require multiple interviewing of the same respondents. The mix-mode method may start with the interviewer's visit who

informs the respondent, answers the questions, and collects the first set of requested data. After this first visit, further data collection could be processed information could be collected via CAWI or CATI methods. Mixed-mode data collection can also be combined with administrative data to further reduce costs and the response burden.

8.2.5.4 Questionnaire design

The questionnaire should be designed to minimise possible response errors. This includes standardising the questions, but also standardising the explanations for respondents and interviewers. The questionnaire layout is also important, but it often depends on the method of data collection. The introduction and sequencing of questions starting with questions relevant to the survey topic, but easy to answer can improve respondent participation. Statements that introduce new topics should be used, and the respondent or interviewer's instructions should be clear, short and easy-to-find. The questionnaire's general format and design should be assessed for their impact on the respondent and interviewer; including the font, section headings, colour of the questionnaire, format of response categories, and visual aids, etc. Finally, how the questionnaire is to be processed should be considered: it should be designed to facilitate data collection and capture, which is particularly important for paper-based collection.

A draft version of the questionnaire should be tested and revised thoroughly before finalising the questionnaire. Testing can include informal testing, cognitive testing, focus groups, interviewer debriefings, behaviour coding, split-sample tests and a pilot test – methods of testing are described in detail in links provided below.

Designing a good questionnaire is a combination of science, experience and sometimes a bit of art. A well-designed questionnaire collects data efficiently with minimum errors and is at the same time easy to answer and administer, without posing an unnecessary burden to the respondent and the national statistical office. Achieving a good balance between those objectives can be achieved through an iterative questionnaire design process, which includes multiple consultations, reviews, testing and revision.

The process usually starts by examining all the information requirements that must be met, followed by an individual review of each question to find an explicit justification for being on the questionnaire. It must be known why each question is being asked and how the information is to be used. The wording of the question must be clear. The questions must follow a sequence that is logical for the respondent. The questions must be designed so that they are easily understood and can be accurately answered by respondents.

Questions can be of two types: open or closed. Open questions allow for self-expression but can be burdensome and time-consuming as well as difficult to analyse. Closed questions may be two-choice questions, multiple-choice and ranking or rating questions. Closed questions are usually less burdensome for the respondent, and data collection and capture are cheaper and easier. However, a poor choice of response categories can cause response distortion.

When wording a survey question, the following guidelines should be followed:

- a) keep it simple;
- b) define acronyms and abbreviations;
- c) ensure questions are applicable;

- d) be specific;
- e) avoid double-barrelled questions;
- f) avoid leading questions;
- g) avoid using double negatives;
- h) soften the impact of sensitive questions;
- i) ensure that questions read well.

Questionnaire design is often performed in coordination with various departments of the national statistical office, and it is often wise to appoint a person (or a unit) to be responsible for the final approval of questionnaires. More information on the tools to support questionnaire design can be found in Chapter 11.8.1 - *Questionnaire design*.

Links to guidelines, best practices and examples:

- Statistics Canada - [Survey methods and practices](#);
- Statistics Netherlands - [Questionnaire development](#);
- Statistics Sweden - Design your questions right - [How to develop, test, evaluate and improve questionnaires](#).

8.2.5.5 Minimising response errors

Response errors represent a lack of accuracy in responses to questions. They can be attributed to different factors, including a questionnaire that requires improvements, misinterpretation of questions by interviewers or respondents, and errors in respondents' statements.

One of the common strategies for reducing the response errors is using terminology that is understandable to the respondent, as the language used by statisticians may not be familiar to the respondent (household or business). Use of electronic questionnaires can also lead to a significant reduction in the number of response errors, as various conditions can be included in questions (i.e., age limit 0-120 for the question about the respondent age, that revenue must be greater than profit, or that the total must be the sum of its parts).

Response errors should be reviewed in the processing phase, and if a common response error is identified, measures should be taken to minimise it in subsequent data collection.

Links to guidelines, best practices and examples:

- [Reducing Response Error in Surveys](#).

8.2.6. Processing survey

Once collected, survey data require additional processing before they are analysed and aggregated into statistical results, and the same is true for administrative data used for statistical purposes. Processing transforms survey responses obtained during collection into a form that is suitable for tabulation and data analysis. It includes all data handling activities – automated and manual – after collection and before estimation. According to the GSBPM data processing phase is divided into sub-processes that integrate, classify, check, clean, and transform the input data. The focus of this chapter will be on editing, coding, imputation and outlier detection,

which are covered in more detail in Chapter 11.8.1.2 - *Questionnaire design guidelines, tools and systems*.

8.2.6.1. Editing

Editing is the application of checks to identify missing, invalid or inconsistent entries that point to data records potentially in error. The purpose of editing is to better understand the data to ensure that the final data are complete, consistent and valid. Edits can range from simple manual checks performed by interviewers in the field or administrative clerks for administrative data to complex verifications performed by a computer program. The amount of editing performed is a trade-off between getting every record ‘perfect’ and spending a reasonable amount of resources (time and money) achieving this goal. While some edit failures are resolved through follow-up with the respondent or a manual review of the questionnaire, it is nearly impossible to correct all errors in this manner, so imputation is often used to handle the remaining cases.

a) **Point of collection editing**

Point of collection editing is used to detect mistakes made during the interview by the respondent or the interviewer and to identify missing information during collection to reduce the need for follow-up. Editing during collection is considerably easier to implement when it is automated through a computer-assisted collection method. For self-completion questionnaires, respondents may edit their answers. In most interviewer-assisted surveys, editing is performed during the interview. Interviewers are instructed and trained to review the answers they record on a questionnaire immediately after the interview is concluded – either after leaving the dwelling or after hanging up the telephone. This way they still have an opportunity to detect and treat records that failed edit rules, either because the correct information may still be fresh in their mind or because they can easily and inexpensively follow-up with the respondent to ascertain the correct values.

Edits can be carried out automatically by software applications in the case of computer-assisted collection methods. For paper questionnaires with manual data capture, it is economical to use data capture as an opportunity to apply rules to clean the data sufficiently to make the subsequent processing stages more efficient. Generally, editing during data capture should be minimal since responding to an editing failure slows down data capture. Edits during this stage of processing are mainly validity edits and simple consistency edits.

When working with administrative data, it is often useful to suggest to the data provider the inclusion of automated editing rules within the collection systems, as this can lead to a dramatic increase in the quality of the administrative data. Statistical offices should use this as often as possible, as they could directly or indirectly benefit from the increased quality of administrative information.

b) **Primary and secondary editing**

The most comprehensive and complicated edits are usually carried out after data collection is completed, and material reaches the office. In some NSOs this process is performed in multiple phases, most commonly referred to as primary and secondary editing. The first phase is usually performed in regional offices, immediately after data

collection, when an interviewer can re-contact the respondent and follow up after performing a basic check and identifying an error or inconsistency. More complex edit rules are generally reserved for the separate edit stage after data capture – along with validity edits, more complex consistency edits are often performed along with selective editing and outlier detection.

For edit failures after data collection, the usual procedure is to flag the field that failed an edit and then either impute the field or exclude the record from further processing. Most edit failures at this stage are flagged for imputation. Values that fail an edit should be flagged with a special code to indicate that an unacceptable value or invalid blank was reported. These flags are particularly useful when assessing the quality of the survey data. In some cases, the record or questionnaire may fail so many edit rules – or a small number of critical edits – that it is rendered useless for further processing. In such cases, the record is usually treated as a non-respondent, removed from the processing stream and a nonresponse weight adjustment performed.

8.2.6.2 Coding

Coding is the process of applying numerical values to given responses to facilitate data processing. Coding can also be done in the phase of survey design when questionnaires are being prepared. This means that every possible answer is given a predefined numerical value before the questionnaire is administered. It is done as a part of the questionnaire design, and it is quite easy to enforce and administer for closed questions and electronic data collection. Application of statistical classifications to the core data is also referred to as coding. GSBPM provides the following example: automatic (or clerical) coding routines may assign numeric codes to text responses according to a pre-determined statistical classification to facilitate data capture and processing. Some questions have coded response categories on the questionnaires or administrative source of data, and others are coded after collection using an automated process (which may apply machine learning techniques) or an interactive, manual process.

8.2.6.3 Outlier detection and treatment

An Outlier is an observation or subset of observations that appear inconsistent with the remainder of the dataset. Outlier detection is performed by analysing the complete dataset and identifying unexpected or extreme values, usually by measuring their relative distances from the centre of the data.

Outliers detected at the editing stage of the survey process can be treated in various ways. In a manual editing system, the outliers are examined or followed-up and corrected if identified as errors. In an automated editing system, replacement values for outliers are often imputed. In some cases, no special treatment of outliers is performed if it is believed that they are not influential.

The following approaches can be used to treat outliers:

- a) change the value;
- b) change the weight;
- c) use robust estimation.

It is also understood that extreme values detected as outliers are not errors - one such example is a sector where there are one large company and many small ones.

More information on outlier determination methods and tools can be found in Chapter 11.8.1.2 - *Questionnaire design guidelines, tools and systems*.

8.2.6.4 Imputation

Imputation is a process used to determine and assign replacement values to resolve missing, invalid or inconsistent data. This is done by changing some of the responses to ensure that a plausible, internally consistent record is created. Imputation is usually performed via a carefully designed automated system, that uses the entire dataset's characteristics and additional data (if available) to propose the replacement value. Good imputation has an audit trail for evaluation purposes. Imputed values should be flagged, and the methods and sources of imputation clearly identified. The original and imputed values of the record's fields should be retained so that the degree and effects of imputation can be evaluated.

Although imputation can improve the quality of the final data, care should be taken to choose an appropriate imputation methodology. Some imputation methods do not preserve the relationships between variables or distort underlying relationships in the data, while a dataset that requires a significant amount of imputed values is usually a result of a failure in the survey design. The adequacy of the method chosen depends on the type of survey, its objectives and the nature of the error. More information on imputation principles, methods and tools can be found in Chapter 11.8.1.2 - *Questionnaire design guidelines, tools and systems*.

8.2.6.5 Macro-editing

Macro editing, namely, editing on the basis of a review of aggregated data, is a set of strategies that aim to reduce the number of micro-edits and manual checks that the clerks have to perform. The rationale of macro-editing is to provide preliminary results before the editing phase and check the consistency of the results before proceeding to the editing phase. Macro editing is usually done by performing the dataset analysis and identifying the upper and lower limits of the data that requires verification and perform additional checks based on the importance of the item at the total level. Macro editing can reduce the total cost of editing, as it can be used to prioritise and reduce the verification of the collected data (micro-level).

An overview of macro editing methods can be found [here](#).

8.2.6.6. Estimation

Estimation is how an NSO calculates estimates that apply to the overall population based on the sample data. The principle behind estimation in a probability survey is that each sample unit represents itself and a number of other similar units in the surveyed population. Estimation involves assigning a (final estimation) *weight* to each unit's response in the sample, where the weight indicates the number of units the sample unit represents in the overall population.

The starting point for determining the appropriate weight of a sample unit is the inverse of the unit's probability of selection. This depends upon the sample design and is commonly referred to as the *design weight*. Determining this weight is an important part of the estimation process. The total of the design weights is the size of the population from which the sample was selected. In the case of a multi-stage sample design, the probability of selection is taken over all selection

stages. The design weight is then adjusted to produce the (final estimation) weight. The two most common reasons for making adjustments are, first, to account for nonresponse and, second, to improve the estimate's reliability by using auxiliary data.

Once the final estimation weights have been calculated, they are applied to the sample data to compute estimates. The total of the weights is the total population size estimated from the sample data. Summary measures of the population such as totals, averages and proportions are typically estimated for the characteristics collected from the sample units. These characteristics often referred to as *variables* in statistical theory, may be qualitative, for example, sex or marital status, or quantitative, for example, age or income. There are various formulae for estimating summary measures depending on the characteristics being estimated and the sample design.

Information on estimation tools can be found in Chapter 11.8.2 - *Sample design and estimation*.

Links to guidelines, best practices and examples:

- ABS - [Weighting and Standard Error Estimation for Household Surveys](#).
- Memobust Handbook - [Weighting and Estimation](#).
- Reengineering the Census Bureau's Annual Economic Surveys (2018) – [sampling and estimation](#).
- Statistics Canada - [Survey methods and practices](#).

8.2.7 Respondent relations and communications

A key challenge of any statistical organization is continually improving relevance and improving and preserving credibility. As the quality of statistical products in many cases relies on the quality of inputs, ensuring respondent cooperation is essential. Methods of ensuring this cooperation are usually divided into two main approaches, often simultaneously used: using legal instruments to force compliance or discourage disobedience and actively communicate and try to appeal to the sense of morality to encourage cooperation.

A statistical organization must earn public trust by treating respondents with respect, not just to reach its statistical goals. It is important to remember that, even in the presence of laws that make response to one or more data collections mandatory, participation by the public in statistical organization is a largely voluntary process. Even when the survey process is not voluntary, a statistical organization should treat respondents in an ethical manner, minimise their response burden, respect their privacy, and maintain the confidentiality they were promised when they provided the information.

In larger NSOs, respondent relations are often centralized into a specialized unit organized within a user communication department, as respondent relations are often similar to handling difficult users. The unit could manage the following tasks:

- a) handling the public relations required for potential respondents to understand why they have been selected, what is asked of them and what is the public good that is served as a result of their cooperation;
- b) exercising special care and taking all the required precautions in cases where the announced survey is either unusually long (for example, surveys of family expenditure)

or unusually intrusive (for example, surveys of harmful drug consumption and surveys of fertility);

- c) keeping a register of respondents contacted and survey interviews completed so that recalcitrant respondents can be identified and persuaded to participate;
- d) sharing information with respondents, so that they feel not only that they have contributed to the public good but that there is some personal benefit as well;
- e) accomplishing these tasks requires tact and diplomacy, together with firmness and determination. There will always be people in either the household or the business sector who will refuse to comply, no matter how good a case for cooperation has been put forward.

The following section will provide examples of good practices in respondent relations and advise how to communicate with respondents.

8.2.7.1 Use of the law to enforce response

Approaches to this issue differ from country to country. In some, compliance with statistical collection is obligatory - if respondents do not provide information in the form in which it is requested and in a timely fashion, they violate the law. In other countries, some requests for certain classes of information are mandatory and supported by legal requirements, whereas others are made on a voluntary basis. This is probably the most common situation, where the law recognizes a restricted set of compulsory surveys or provides a procedure through which a survey can be made compulsory. If this is the case, statistical agencies usually declare economic inquiries as compulsory and others voluntary. Finally, there are cases where the law is unclear on the subject. When this is true, the statistical organization may be fearful of demanding too much information: if challenged, the court might rule that no information is to be demanded compulsorily, and the resulting publicity might adversely affect response rates. Whatever the legal basis, all agencies find that the most important objective is to secure a cooperative attitude on the respondents, particularly from small businesses and households, as compulsion can rarely alleviate the response problem.

Links to guidelines, best practices and examples:

- The [Generic Law on Official Statistics](#) (GLOS), UNECE (2016);
- The [Guidance on modernising statistical legislation](#), UNECE 2018.

8.2.7.2 Respondent policy and charter

As noted earlier, maintaining good relations with respondents is a critical factor of success for any statistical organization. As in other areas, standardized, transparent and uniform approach to respondents usually yields best results. An example of good practice is having a clear and easily accessible document, sometimes presented in the form of a *respondent charter*, that provides basic information to respondents in order to notify them about the general purpose of official statistics, inform them that data collection is necessary because requested information cannot be obtained through other means, and assure them that the information will be kept secure and will remain confidential. This is usually achieved through a dedicated webpage to which respondents are directed via letters or electronic messages accompanying data collection. Respondent charters are particularly useful for business surveys, as they can be used

to ensure businesses that the appropriate method of data collection is used and that the response burden is not excessive. Having a respondent charter is a good way of ensuring commitment, as it can oblige the organization respond to any respondent query within a given time period.

Some NSOs also have a dedicated respondent policy unit, with the objectives of helping to raise response rates and ensure that respondents provide information willingly. The staff of the dedicated unit must be equipped to answer questions about the use of the information, the care with which it is handled and the general attitude of their organization. They must avoid the appearance of annoyance and carelessness in quoting from the law and must be fair and consistent in the way they treat businesses and households. If there is a perceived crisis in relations with respondents, the chief statistician is advised to address the matter at his level. Reporting directly to the chief statistician at this level may be a good way to show reluctant respondents the seriousness with which the organization views the matter.

Links to guidelines, best practices and examples:

- UK ONS - [Respondent Charter for Business Surveys](#).

8.2.7.3 Managing key respondents and business profiling

a) **Managing key respondents**

Some very large businesses are of particular interest to NSOs due to their large contributions to estimates of the total economy, a particular statistical region, domain, or segment of a classification. Accurate and prompt responses from such businesses are crucial in producing good quality estimates. Assigning a single point of contact within the NSO for a particular business for all surveys can result in big improvements in accuracy and timeliness. For this reason, several NSOs have introduced a special organizational unit, typically called the *Large Case Unit* or the *Large Business Unit*, with the exclusive function of managing relations with large businesses.

Such units have proven to be useful as they can gather more detailed information from businesses while at the same time reducing the total burden on the enterprises through a more efficient data collection. Furthermore, such units are particularly appropriate for the conduct of *business profiling*, which (as further described below) involves tracking the boundaries and structure of large businesses and validating or modifying their survey reporting arrangements. As large businesses are subject to quite frequent changes in boundaries and structure, without such action, reported values may become incomparable over time. Large case units are also important for tracking accounting practices, particularly to distinguish internal transfer pricing and market pricing, which is particularly relevant in tracking multinational enterprises and globalization related economic phenomena.

b) **Business profiling**

According to the [Eurostat Business Register Recommendations Manual](#) profiling is ‘a method to analyse the legal, operational and accounting structure of an enterprise group at national and world level, to establish the statistical units within that group, their links, and the most efficient structures for the collection of statistical data’. The process requires conducting in-depth interviews with senior company representatives to obtain all the company's relevant financial information, relationships, and structures. Profiling is used

to improve the quality of the business register and the quality of all surveys that use it as a survey frame and source of information. More information on business profiling can be found in Chapter 11.3.4.1 - *Profiling*. The main benefit of profiling is having clear delineation of activities within a company that are separated into ‘virtual’ statistical units that can provide a more detailed overview of company activity. Once a company is profiled, it is of paramount importance that data is collected in accordance with the profiled structure, or at least that the procedure of imputing the missing values is defined.

Links to guidelines, best practices and examples:

- Guide to sharing economic data, UNECE 2020 ([provisional link](#));
- [LCU in Ireland](#);
- [LCU in Italy](#);
- [Profiling in European Business statistics](#);
- [Profiling in the Netherlands](#);

8.2.7.4. Minimizing non-response and follow-up procedures

a) **Minimizing non-response**

The key to minimising non-response is to reduce the number of non-contacts and refusals. Causes of non-contact depend on the specific survey design. In face-to-face surveys, non-contact can result from the interviewer's inability to reach the respondent within the prearranged number of contact attempts. Increasing the number of contact attempts not only increases the number of ‘contacted’ and therefore the response rate, but also increases the costs. Alternatively varying the days and times at which contact is attempted also increases the response rate, without significantly affecting the cost. This is done by defining the follow-up procedures in cases of non-contact, usually, if a respondent is not reached within normal operating hours, the second contact is attempted in the afternoon or during the weekend.

b) **Follow-up procedures**

In self-completion surveys, non-contacts can be the result of errors in the survey frame. As most statistical surveys use statistical registers as a survey frame, the solution would be to keep the statistical registers up to date by using administrative data. Another solution would be to check the information from the enterprises themselves, usually, through a register survey, that is intended to update the information stored in the statistical register. Further information on frame improvements and statistical register can be found in Chapter 11.3.7 - *Producing statistics directly from the SBR*. Tools to reduce refusals also depend on the data collection mode used. For instance, interview surveys may use specially trained interviewers to convert refusals, while mail and Internet surveys rely on incentives or special contacts to counteract explicit refusals. When faced with particularly difficult data collections, such as household budget survey or time-use survey (which both require detailed annotation of activities in diary form) statistical agencies often resort to special incentives offered to respondents. These incentives can be monetary amounts, gifts or participation in a lottery with special prizes. Ability to organize incentives may depend on local laws and regulations.

8.2.7.5 Measuring the response burden, individual and total

Many countries are making efforts to measure and reduce the administrative burden on businesses. Even though providing data for official statistics comprises a small fraction of the total administrative burden, NSOs are giving significant focus to reduce the response burden. The time spent on responding to a questionnaire (including the time needed to retrieve the required data and to fill in the questionnaire) is a quality and performance indicator (QPI) that should be monitored for every survey, as further discussed in section 7.5.6.1. Even if the questionnaire does not measure the time spent completing the questionnaire, the survey manager can usually provide a reliable estimate based on a desk study or questionnaire testing exercises.

Measurement of the response burden in hours can be translated into monetary terms by multiplying the hours by the average hourly wage in a sector subject to the questionnaire. Multiplying the average response burden by the number of respondents to a survey gives the survey's total response burden. Summing the figures for all surveys within a year gives an overall annual total response burden imposed by the NSO. Having a list of surveys and their response burdens is useful in setting development priorities for the NSO, particularly those that can lead to the modernisation of data collection activities, through which the response burden can be reduced. Examples are (i) modernisation of a paper-based survey to web-based data collection, and (ii) use of administrative data to reduce the total number of questions within a survey questionnaire or eliminate the survey.

Some NSOs also measure the individual burden of each business respondent and/or flag the respondents of each survey in their statistical business register to momentarily exclude them, if possible, from future survey samples. For household surveys, gradually rotating the sample rather than replacing it can be an effective method of spreading response burden equitably and while at the same time having a longitudinal component in what would otherwise be a cross-sectional survey.

8.2.8. *Designing integrated survey programmes*

Although continuous improvements in survey taking can be noted throughout the world, improvements have mainly been focused on improving individual surveys rather than integrating different surveys into a modular and unified collection system. The result is that the speed of development might be unequal, different frames and their update procedures may be used, sampling, collection and processing methodologies may be different – resulting in unnecessary burden for some respondents (usually large enterprises).

8.2.8.1 Integrated suite of surveys

A solution to the issues mentioned above is to design an integrated suite of surveys. Integration in the context of survey programmes implies linkages between different surveys or between rounds of a single survey. There are three main objectives of integration: enhancement of survey results, reduction of costs, and reduction of response burden.

Integrated surveys have the following common characteristics:

- a) harmonized concepts and questionnaire content;

- b) use of a common survey frame, such as statistical register, master sampling frame or master sample, as further described in Chapter 11- *Common statistical infrastructure*; and
- c) adopting generic sampling, collection and processing methodologies, as also further described in Chapter 11.

The approach has been tested in different statistical areas and has proven to be particularly useful, as it leads to a significant reduction in response burden, while at the same time allowing more detailed insights on a lower territorial level. Examples of an integrated suite of surveys can be found in business, social, agricultural and environmental statistics and have been successfully implemented in many countries. Integrated survey programs, particularly those that involve a significant proportion of the overall NSO budget, should be included in strategic plans and carefully planned and evaluated.

Links to guidelines, best practices and examples:

- FAO - The Agricultural Integrated Surveys Programme – [AGRISurvey](#).
- Philippines PSA - [BLES Integrated Survey](#).
- Statistics Canada - [The Integrated Business Statistics Program](#).
- Statistics New Zealand - [Integrated household surveys](#).
- Toward an [Integrated Annual Business Survey System](#).

8.2.8.2 Core survey vehicles and supplementary modules

A usual approach to an integrated survey programme is to introduce a core set of questions addressed to all respondents together with a set of specific modules and/or rotating supplements containing additional questions. For business surveys, this enables appropriate tailoring of questionnaires by industry using industry-specific modules as well as rotating supplements on topical questions. By utilising this approach, core information (such as the number of employees or turnover for business statistics, or employment status or sources of income for social statistics) can be gathered coherently from multiple sources, thus allowing representativeness at a lower territorial level than could otherwise be achieved without increasing respondent burden.

A similar approach is also used in household surveys, which are often used for multiple purposes. For example, a labour force survey often has a core module and supplementary (ad-hoc) modules used for more detailed inquiries on sub-topics using the same master sample. There are also examples of surveys designed to collect data on multiple purposes comprising loosely connected modules.

Using supplementary modules also enables imputation of missing variables and construction of estimates using small area estimation methods. This approach is particularly useful in combination with administrative information (both in business and household surveys) used for record linkage and further reducing the response burden. It implies that unique identification numbers that enable record linkage should always be collected as further discussed in section 14.2.11 '*Linked data*'.

8.2.8.3 Responding to urgent requests

One of the comparative advantages of NSOs relative to other data providers is the trust that users have in official statistics. This trust is, amongst other things, built on the accuracy of the data outputs, which, in turn, depends upon the good design and careful execution of statistical processes. Thus, the NSO faces a challenge when confronted with a new and urgent demand for statistics. Being unable to deliver quickly has potentially negative consequences for the NSO. On the other hand, a new and urgent data demand can be an opportunity to gather much-needed resources, tap into a new data source, increase the visibility and/or credibility of the NSO and compete effectively with alternative data providers.

High-profile, urgent requests most commonly come from the government, but may also arrive from international organizations. The NSO should be swift to respond and use the limited window of opportunity to negotiate additional resources allocation. The chief statistician should use his authority to explain to all parties the particularities of statistical data collection.

An NSO should not automatically initiate a new survey in response to every new data demand. Rather, it should systematically explore whether the demand could be fully or at least partly satisfied using regularly collected data or administrative data. The sense of urgency from the users, typically if the user is the Government, may open new opportunities for accessing new data sources. It should be noted that not all requests have to be accepted by official statistics, particularly those that can be easily obtained from private-sector survey companies.

Although the request might be one-time-only, the NSO should bear in mind that periodicity is an important feature of statistical activities and plan and communicate (to ones that are requesting the data) accordingly. Urgent requests may be disseminated under the ‘experimental statistics’ label if there is no certainty that the effort will be repeated or if the results do not satisfy the usual statistical standards as further elaborated in Chapter 4.5.5 - *User access to confidential data for their own statistical purposes*.

8.2.8.4 Flexible survey-taking capability

To respond to urgent new data demands, some NSOs have introduced an organizational unit that can design and conduct a quick survey, either as the first cycle of a permanent new survey or as a one-time exercise. The responsibility for feasibility tests can be assigned to such unit, so that its staff become accustomed to launching quick efforts designed to settle basic questions, prior to what might be a more substantial survey. By developing such a capability and periodically demonstrating its power and scope, an NSO can increase its relevance.

Integrated survey programmes also increase the capacity of an NSO to respond quickly to new requests, as a module or additional questions may be added more quickly to an existing survey rather than setting up an entirely independent data collection.

8.2.9 Survey staff training and expertise

Successful planning, design, implementation, and evaluation of a survey requires cooperation and coordination of various specialists with different technical skills. Due to their specificities, these skills are often not easy to obtain outside of the statistical system and therefore often have to be developed and maintained internally (more information on options for organizing staff training can be found in Chapter 12 - *Human Resources Management and Development*). As proper training of survey staff is key to ensuring the quality of statistics, it is important to invest

time and training resources. Training also enables standardisation of approaches and should promote process optimisation and use of new methods. Organizing efficient training is particularly important for interviewers, as well-educated interviewers can significantly improve the resulting statistics. Subsections below list the staff expertise and skills for efficient survey taking. Survey teams are usually organized interdisciplinary and are typically composed of a survey manager, an expert in the field of study covered by the survey (a subject matter specialist), a methodologist, a computer systems analyst, and a data collection and operations expert. All members of the survey team plan, manage and coordinate activities within their scope of expertise and responsibilities covered within this chapter.

8.2.9.1. Survey managers

The survey manager is responsible for the management of the survey. He or she is usually a senior expert with extensive experience of participating in multiple phases of multiple surveys. The survey manager ensures that the objectives, budget and schedule are respected. The survey manager is usually responsible for determining the required resources for the survey, developing a preliminary plan, coordinating the preparation, preparing the budget and monitoring resource utilisation and progress. The survey manager presides over team meetings and should understand and represent the interests of the users. The survey manager liaises with and reports progress to senior management and the client. He or she ensures adherence to legal and regulatory commitments and departmental policies, standards, guidelines and regulations.

The survey manager should be an excellent organizer, with substantial personal authority, that has a deep understanding of the main survey processes. Survey managers usually come from their respective subject matter units, but sometimes a methodologist or IT specialist can also perform the tasks of the survey manager. Interpersonal and organizational skills should be the main selection criteria for the task of the survey manager, but subject matter knowledge and understanding of processes should not be overlooked, as gaps in those areas may undermine the authority and cause significant problems in survey implementation.

8.2.9.2 Subject matter specialists

The subject matter specialist is responsible for the content of the survey. He or she conducts or co-ordinates the preparation of definitions and concepts, questionnaire development and testing, preparation of data collection and processing specifications, design of statistical outputs, development and implementation of data analysis and preparation of analytical texts. He or she also co-ordinates the validation of survey results and provides subject matter expertise for the evaluation of data quality and preparation of related documentation.

Subject matter specialists should have a deep understanding of the subject matter and underlying processes required for a reliable response (such as accounting). He or she should also fully understand survey processes and results, as he or she is responsible for preparing content and its transformation into statistical output. Subject matter specialists should possess advanced analytical knowledge, that will allow them to prepare and interpret results. Further, subject matter specialists should understand the fundamentals required for questionnaire design, know data manipulation and understand basic programming concepts. Understanding of related methodological and IT issues is necessary as it simplifies the cooperation with methodological and IT experts and departments. This often includes knowledge of econometrics (at least basic) and understanding of other data manipulation techniques. Finally,

language and data visualisation skills are also valuable as they can increase the quality and understanding of the data presented.

8.2.9.3 Methodologists

A survey methodologist is responsible for conducting and coordinating the design and development of the statistical methodology to be used for the survey. He or she is responsible for the sample design, weighting and estimation, quality control design, data quality evaluation designs and measures, the design of edit and imputation mechanisms or strategies, and statistical aspects of data dissemination and analysis. The survey methodologist also acts as a consultant and adviser to all other survey team members on matters of statistical methodology and ensures adherence to the use of sound and efficient statistical methods.

Survey methodologist should possess advanced statistical knowledge as well as advanced data manipulation knowledge. He or she should understand econometrics (for imputation and modelling) and possess at least intermediate programming skills, as he or she is often forced to write programming code and code modification requests for all aspects of survey processing.

8.2.9.4 Data collection and follow-up specialists

The data collection specialist is responsible for the development of data collection specifications and procedures. He or she is also responsible for coordinating the recruitment, training, monitoring and control of interviewers and supervisors. His or her responsibilities include developing, implementing, and managing collection operations and preparing material and logistical support. He or she also acts as an adviser to all other members of the survey team on operational matters and ensures the specifications and requirements developed by other team members are properly built into the procedures. The role of the data collection specialist may include the coordination of field collection through Regional Offices, as well as the implementation of manual and automated operational activities performed at the Head Office.

Processing specialist is responsible for the development of capture and coding specifications and procedures. He or she is also responsible for coordinating the recruitment, training, monitoring and control of the data input, editing and processing staff. His or her responsibilities include the development, implementation and management of capture and coding activities as well as coordination of logistical support related to data processing.

For smaller projects, the role of the data collection and processing specialist may be combined.

Essential skills for both roles are the ability to effectively coordinate a large team, have the organizational authority and the ability to enforce and observe deadlines. Both data collection and processing specialists should have a deep understanding of the data collection process as well as a basic understanding of all previous and following phases, so he/she can propose improvements if necessary.

8.2.9.5 Interviewers

[Survey methods and practices by Statistics Canada](#) lists the following keys to effective interviewing:

- a) **Confidence:** The interviewer must have confidence in his or her abilities. This is only possible with a good understanding of the survey and the interviewer's role.

- b) **Listening skills:** The interviewer should wait for the respondent to finish speaking before they stop listening. The interviewer can indicate that he or she is listening with an occasional 'I hear you'. However, the interviewer should not make assumptions about what a respondent will say or try to finish a sentence. It is better to ask questions if the interviewer feels that the respondent or the interviewer missed the point.
- c) **Empathy:** The interviewer should be sensitive to a respondent's situation at the time of the call or visit. If the respondent describes a personal incident, the interviewer should show interest (but never pass judgment) and then try to refocus the respondent back to the interview.
- d) **Speech:** Vocal expression is important, and particularly so in telephone interviews. The interviewer should speak very clearly and try to speak at a moderate speed. If the interviewer speaks too quickly, respondents could miss parts of a question. Speaking too slowly causes respondents to begin answering before the interviewer has finished the question. Lowering the head lowers the pitch of the voice. A lower pitch voice is clearer and carries better, particularly on the telephone. The proper speed and pitch should be demonstrated during training.
- e) **Know the questionnaire:** The interviewer must know the questionnaire, concepts and terminology used by the survey. There will not be time to look up definitions or answers to questions in the manual during an interview. Nothing breaks the rapport more quickly than long pauses, especially in telephone interviews.

8.2.9.6 Data Entry and Editing Clerks

Even though modernisation of statistical processes has reduced the need for manual editing, this activity is still necessary as it significantly increases the quality of official statistics. Data entry and manual editing are often performed by personnel without higher education, but significant benefits can be achieved through education and specialisation. A common skill needed in both data entry and editing is high levels of concentration, as the tasks are repetitive, and workers need to spend a lot of time on the same task. This kind of job, therefore, requires a very high level of concentration and patience. Lack of this attribute may lead to poor quality of results. Data entry, but also editing clerks are expected to have exceptional typing speed as they will have to input and check huge amounts of data in a very short time. They need to be comfortable with all forms of data entry devices and be comfortable using a mouse, keyboard, scanners, etc. It is also important that they are versed with the use of basic software such as word processing and spreadsheets, but they must also be accustomed to using the specialised data entry and editing software, and hence basic computer usage knowledge is a must.

8.3 Administrative sources

The United Nations' Fundamental Principles of Official Statistics (UNFPOS) state that "Data for statistical purposes may be drawn from all types of sources, be they statistical surveys or administrative records."

The term administrative data refers here to data collected by a government ministry, department or agency primarily for administrative (not research or statistical) purposes. These administrative purposes are related to the corresponding executive or lawful functions such as

authorisations, registrations, permits, payments, sanctions, control etc. Administrative data may include both data in administrative registers and data in other administrative sources.

Using administrative data for statistical purposes is not a recent phenomenon – there are examples of compiling statistics from data on the number of births and deaths dating from the early 17th century. However, it has become increasingly widespread during the last two decades as progress in technology and increased computing capacity have permitted statistical agencies to overcome many of the limitations previously associated with the processing of large administrative datasets. This together with advances in data linking methods has provided NSOs with the opportunity to make better use of administrative data in the production of official statistics, both in replacing existing data collection methods, in supplementing statistical survey data and in the creation of new statistical products.

In 2011, the UNECE published a handbook entitled [*Using Administrative and Secondary Sources for Official Statistics – A Handbook of Principles and Practices*](#). It gives an overview of administrative data sources and data collection issues, and it is used as a basis for this section. The rapid development during the last decade has increased the common knowledge of administrative sources among statisticians. Further information on the latest experience can be found on NSOs' and international statistical organizations' websites, joint projects and various statistical conferences.

The use of administrative data and the production of register-based statistics are covered in Chapter 11.2 - *Register-based statistics*.

8.3.1 Types of administrative data

Public authorities in all countries collect a large amount of data as a part of their ongoing operations. Administrative sources cover a wide range of activities such as collecting taxes, social security and health care, employment and unemployment policies, and registration systems for civil events (births, deaths, marriages etc.), businesses, properties and vehicles. This administrative data has become increasingly available to NSOs, and in consequence, there has been a significant impact on how data are collected, and official statistics are compiled.

Administrative data come from many different sources depending on the structure of the public sector in the country. The most common way to utilise administrative data in statistics production is to combine data from different administrative sources with or without data from statistical surveys. In this data integration process, some administrative data sets have a principal role and are widely used by many NSOs. Below, administrative data sources are grouped according to their coverage and content to illustrate their importance and usefulness for the production of official statistics.

- a) Large and complex administrative data systems contain both registration data and data of transactions. Typical examples are data from population and business registration systems, social security and health care systems, taxation systems, customs systems and building and property registration systems. Usually, these data are complete, exhaustive by nature covering all citizens, enterprises, or the entire stock of properties and buildings. Basic information in the administrative registers in this group may contain identification code, name, address, registration date and other identification and classification information. The authorities responsible for these registers have created systems for continuous (often on-line) updating of the basic content of registers. The authorities

keeping these large administrative registers may also have other data systems to carry out their main administrative functions. For example, tax authorities may have basic registers of people and enterprises liable to taxation and separate systems for personal and enterprises' income tax, value-added tax and property tax. Data from the producers of these large data systems are usually used as source material in many different statistical systems varying from population and social statistics to business, economic, and environment statistics.

- b) Administrative data with a more specific scope include typically registers and data from transport and traffic authorities, justice and electoral authorities as well as education and school systems. Often this data is an important, or only, source, e.g., in production of transport statistics, statistics on justice and crime, statistics on general elections and statistics on education. Administrative data from this group is also used as an additional source for business and economic statistics as well as population and social statistics. This group also belongs to a vast amount of specific administrative data useful in compilation of environment, energy and waste statistics, and administrative data for public sector activities and finances. Some administrative data have the scope and content which may be difficult to obtain through surveys.

8.3.2 Advantages in collecting administrative data

The data collection arrangements and the potential advantages vary from country to country depending on the national circumstance and on the extent to which an NSO plans to use administrative registers and data. The most commonly discussed advantages of using administrative sources in statistics production are presented below.

- a) **Cost-effectiveness:** an important advantage in using administrative data to compile statistics is that the cost of data collection is relatively small in relation to the costs that are incurred in conducting censuses, creating and maintaining statistical base registers and conducting direct surveys as essentially the costs of data collection have already been covered by the administrative process itself. Use of administrative data, however, is not cost-free to NSOs. There may be a need to invest in ICT- and production systems, coordination mechanisms, and statistical methods and new competences. The NSO may also be obliged to pay data transfer and transmission costs to administrations even though data itself is free of charge.
- b) **Reduced response burden:** respondents may react negatively to a survey if they feel they have already provided similar information to public authorities. The increasing reluctance of both firms and individuals to participate in statistical surveys, not least surveys of small and medium-sized businesses, may threaten the quality of statistics. Use of administrative data leads to reduced response burden and at the same time may solve the problem of growing non-response rates and increasing the quality of incoming source data and statistics.
- c) **Timeliness and frequency:** when governments are developing their ICT-systems and moving towards on-line data collection and mobile services, administrative registers are continuously updated, and administrative data are available relatively quickly. Consequently, statistics based on administrative data can be prepared more quickly and can be released earlier than from data collected through statistical censuses and surveys.

Due to the continuous on-line or other updating systems of administrative registers, administrative data may also increase the frequency with which statistics are traditionally compiled and published.

- d) **Coverage and completeness:** administrative sources often give complete coverage of the target population, whereas sample surveys often directly cover only a relatively small proportion of it. Use of administrative data sources may diminish or eliminate the errors due to non-response and other typical errors of sample surveys. Administrative registers and data offer good sources for creating and maintaining statistical base registers, better coverage of target populations for sample surveys, and can make statistics more accurate. Use of administrative data instead of surveys can also improve regional and small-area data and more detailed information.
- e) **Relevance:** an NSO can improve its ability to respond to new data needs and increase the relevance of statistics by seeking and taking into production new administrative data sources. Administrative registers and data combined with survey data can improve the flexibility of the NSO to react quickly to new statistics demands. Administrative data can play an important role, e.g., in filling data gaps needed to measure progress on the Sustainable Development Goals (SDGs) of the 2030 Agenda for Sustainable Development that cannot be satisfied through traditional methods alone.

8.3.3 Challenges and issues in collecting administrative data

Although there are many good reasons to use administrative data, several challenges and problems are associated with data collection. These relate to the data collection arrangements, the preparedness of the data providers and the NSO, and the quality of the data itself. The national statistical legislation usually gives a sound basis to NSOs to collect and process statistical surveys and publish statistics. As to the acquisition of administrative data, legislation is often inadequate and may cause many problems or even prevent acquisition.

The challenges are related to the administrative culture and traditions. Administrative authorities may be reluctant to grant access to “their data” for statistical purposes. This may happen even in a country with appropriate statistical legislation in place. Administrative authorities may have a strong proprietorship regarding administrative registers and data for which they are responsible. In some cases, legal restrictions or confidentiality provisions may be imposed that restrict access to administrative data. In some countries, the desire and proposals of the NSO for minor changes to the administrative data collection arrangements that would improve the usefulness of the data may be impossible to implement in practice.

To meet the common challenges and be better prepared for data acquisition from administrative sources Chapter 8.3.4 - *Requirements for access to and acquisition of administrative data* summarises the basic requirements based on the current knowledge and practice of the countries.

Appropriate data collection arrangements make it easier to assess and respond to the problems relating to the quality of administrative data and the use of these data in statistics production. In each country, the quality of administrative data varies across the sources. Before collecting and using any administrative data set, it is necessary to conduct a thorough quality assessment and plan corrective measures. Often this quality assessment requires that the NSO get access

to record-level administrative data. Poor quality administrative data should not be used in the production of statistics.

Below are listed often mentioned quality problems, doubts and perceived attitudes towards collecting and using administrative data in statistics production together with some solutions used in current practice.

- a) **Differences in units, concepts and definitions of variables:** units, concepts and definitions of variables used in administrative data often differ from the statistical ones. This is especially a big problem in the field of business and economic statistics. There are many case-by-case studies on how these problems can be solved made by NSOs and international organizations. Sometimes good proxies can be used; sometimes, additional survey data are needed. Differences and possible correction methods should be published together with published statistics.
- b) **Differences in classifications:** often the classifications used in administrative sources differ from the statistical standards. This may confuse users of statistics. By statistical law, the NSO decides and confirms classifications to be used in official statistics. In some countries, the national classification of economic activities, based on the international statistical standard and confirmed by the NSO, is given an official national standard to be also used by all administrative data producers. This may not entirely prevent wrong coding as the codes used for units may be erroneous. Creating and using link tables is an often-used method to adjust for differences in classifications even though it adds to the NSO's workload.
- c) **Inadequate data quality:** data included in administrative registers and data files may be incomplete or inaccurate, or data can be missing. In some cases, the staff of an authority responsible for the administrative data may not be properly trained, or methodology for recording appropriate information may be flawed. The corrective measures may include good quality control systems and correction methods of incoming data, training of staff and discussions of quality issues with the administrative authority.
- d) **Lack of statistical know-how:** the authorities providing administrative data do not generally have the same levels of statistical knowledge and capacities as an NSO. As a result, inconsistent data may occur. For example, some of the data may not be accurately or carefully recorded and could be incomplete or inaccurate for items of secondary interest or value to the primary administrative purposes. In these cases, close co-operation between the NSO and the producers of data in question and training activities of the NSO may help.
- e) **Need for additional data checking:** depending on the source, administrative data require comprehensive validation checks. Furthermore, a reconciliation process between different data sources may be necessary. This can involve considerable effort and costs to the NSO.

8.3.4 Requirements for access to and acquisition of administrative data

Challenges relating to data collection arrangements are related to the general administrative and legal structure of the country. Access to administrative data, the preconditions for data collection and the possibilities to use these data vary from country to country. Various

frameworks are needed to facilitate the access of the NSO to administrative data. These frameworks include legal, policy, organizational and technical dimensions. All these dimensions should be considered when the NSO is planning data collection from administrative sources. Short descriptions of the main requirements for successful data collection are briefly summarised below.

8.3.4.1 Legal frameworks

Use of administrative data in the compilation of official statistics requires a firm legal basis. A mandate ensuring the NSO access to administrative data is seen as one of the key issues in modernising statistical legislation. Depending on the national legislation structure, it is important to note that the mandate of the NSO to collect data from administrative sources may also require changes in other legislation. Chapter 3.4 - *Legislative Frameworks* gives further guidance on sound statistical legislation. The principal issues are highlighted in the following paragraphs.

The legislation must provide the NSO with the right to acquire the administrative data free of charge and ensure that the NSO provides the appropriate level of data safeguards such as data protection and confidentiality. This is vital in gaining and maintaining the public approval of the NSO's ability to properly manage administrative data and for the public to have confidence in the official statistics disseminated.

Simply to be allowed to collect data from an administrative source, or to have access to them, is a rather vague/rough provision and needs more precise interpretation. Ideally, the NSO should have access to record-level administrative data and relevant metadata, it should have the right to combine administrative data with survey and other data, and it should be informed about the administrative data sources and changes in them in due time.

Access and use of administrative data in statistics production have raised important questions regarding whether this increases the probability of violating privacy or breaching business secrets or breaking statistical confidentiality rules. Therefore, it is important to synchronize other legislation with the statistics law. Legislation must ensure the implementation of watertight data security, protection of privacy and statistical confidentiality. These rules should be made known to the administrative authorities and the society at large. It should also be guaranteed that when the NSO acquires administrative data, it is handled strictly according to the statistical confidentiality principles. Data flows go only in one direction, i.e., from administrative authority to the NSO.

8.3.4.2 Public approval for the government use of administrative data

Even if an NSO is an autonomous organization, it is at the same time part of the governmental sector. The NSO cannot operate alone in its efforts to use administrative data in statistics production. Instead, it needs support from other authorities, political masters, the general public, and the society.

Public opinion about sharing data between different government departments varies from country to country. It may be in favour due to the increasing efficiency of administration, and it may be even hostile in fear of diminished privacy and 'Big Brother Syndrome'. It is important to make clear that the use of administrative data for statistical purposes does not mean sharing data within the governmental sector. The NSOs should be active in explaining the protective

measures taken in accordance with the confidentiality principles and the law. Open discussion and debate, explaining the rationale and benefits of using administrative data in statistics production should be a key principle of the NSO.

One of the most important users of official statistics is the government sector with its growing needs for new and relevant, high-quality statistics. At the same time in many countries, there is growing pressure for budget cuts. In this situation, the governments may be willing to support NSO's efforts to develop sound infrastructure, lower the costs of statistics and increase conditions to meet the new data needs. In return, NSOs should advocate for getting access to administrative data for statistical purposes as it reduces the costs of the production of statistics without altering the quality of the final products.

8.3.4.3 Technical frameworks

Technical frameworks refer to the mechanisms by which data and metadata are transferred. The data transfer mechanisms can vary between countries and sometimes between administrative authorities of the same country. This depends mainly on the maturity and sophistication of the ICT-systems of the data providers, on one side, and the NSO on the other side. Data providers may send the data files to the NSO, or the NSO may extract the data directly from the administrative source database. Machine-to-machine access for Big Data sets and on-line access are becoming more common. Broader open data initiatives at the government level may further support direct access in the future.

From a technical perspective, it is becoming easier for NSOs to access data from administrative sources when governmental organizations are developing IT-systems and digitalizing their processes. Further, providers of administrative data may also use international statistical standards for data and metadata transmission. In addition, the transmission of data to the NSO may benefit from common national standards applied across the entire government sector.

8.3.4.4 Cooperation with administrative authorities that are data providers

The use of administrative data for the production of official statistics creates a strong link, or sometimes even interdependency, between the NSO and administrative data providers. Therefore, the NSO needs to follow up on changes in the administrative structures, in legislation relating to administrative data and any e-government initiatives.

Good co-operation between the NSO and providers of administrative data is needed to ensure that the administrative registers and data are suitable also in the long run as sources of data for the production of official statistics. In return, administrations can benefit from the know-how and expertise of the NSO in collecting, processing and analysing data and eventually improve the timeliness and coverage of their administrative data. In some countries, NSOs have set up working groups to enhance collaboration and regular dialogue with administrative data providers. These collaborations mechanisms are often governed by memoranda of understanding between the statistical office and the administrative data providers which foresee that the NSO would be informed and consulted well in advance about any changes on the structure, coverage and timeliness of the administrative data set used for statistical purposes.

Such policies and agreements can lead to positive outcomes on both sides. The NSOs can build relationships with administrative data providers by offering expertise in collecting, editing, and

storing data by promoting statistical standards and providing guidance in quality issues. These measures, in return, may improve the quality of administrative data. However, the borderline between the producer of official statistics, typically the NSO, and the administrative data providers has to remain clear; in particular when it comes to the principles of confidentiality and professional independence as presented in Chapter 4.2.2 - *Legal frameworks, obligations and restrictions*.

8.3.4.5 Preparation and facilities of the NSO

Acquisition from administrative sources needs to be carefully planned and monitored to detect any potential hindrances and issues; in particular when such data is going to replace or has replaced data collection through surveys conducted by the NSO. When administrative data is used for the time, NSO should carefully assess its impact and, when relevant, adapt its internal production processes. These changes may take some time as they require adequate staff, infrastructure and IT technology.

The NSO with established use of several administrative sources may consider creating a specific functional unit for administrative data in the data collection department through which all data coming from administrative sources should go before they are processed. This unit would be responsible for checking that incoming data files are acceptable and conducting the first validation and quality checks. The unit may also be responsible for managing the system of data collection agreements (ToR) between the data providers and the NSO. The aims and development of this kind of unit are described in the paper '[*The system of collecting administrative data and how it responds to the quality guidelines of the code of practice and the peer review*](#)' published in 2017.

8.3.5 Processing administrative data

The Generic Statistical Business Process Model (GSBPM) is designed to be applicable regardless of the data source. It can be used for the description and quality assessment of processes also based on administrative data. GSBPM is discussed in Chapter 5.3.1.3 - *Reorganizing the production process* and Chapter 14.4.3 - *The Generic Statistical Business Process Model*. Before planning the use of administrative data for statistical purposes, it is recommended to take a closer look at this model which covers all phases of the statistical production process.

At a general level, an NSO should have a clear understanding of what specific administrative data are needed and for which statistical purposes. It is important that for each administrative data set the underlying administrative process and relating legislation have been carefully analysed. A thorough understanding of the content of administrative data, including definitions of units, concepts and variables as well as updating systems is equally of great importance.

There are many variations regarding the use of administrative data in the production of statistics. For example, these data can be utilised to substitute for or supplement survey data, construct statistical registers, generate and update sampling frames, and create integrated statistics such as national accounts and as a part of register-based statistics. Some administrative sources, e.g., the administrative population register, can be used simultaneously for many statistical purposes.

Processing of administrative data is not a specific part or a separate sub-process of the GSBPM, but it is embedded in all process phases. Even though the GSBPM identifies possible steps in the statistical process, it does not require any strict order in which these steps or sub-processes are to be conducted. However, it is important when processing administrative data as one data source for statistics that all necessary steps and sub-processes have been considered and taken into account in the process planning. An illustrative example of the processing of administrative data in the framework of GSBPM is described in the paper: [*Methodologies for an Integrated Use of Administrative Data in the Statistical Process*](#).

Processing administrative data in the context of register-based statistics is further discussed in Chapter 11.2 - *Register-based statistics*.

Links to guidelines, best practices and examples:

- [Using Administrative and Secondary Sources for Official Statistics](#): A Handbook of Principles and Practices, UNECE, (2011);
- [The system of collecting administrative data and how it responds to the guidelines of the code of practice and the peer review](#), Statistical Journal of the IAOS 33 (2017), Statistics Finland;
- Eurostat - [Methodologies for an Integrated Use of Administrative Data in the Statistical Process](#).

8.4 Geospatial data

The term geospatial data refers to data that has a geographic component. This means that the records in a geospatial dataset have implicit locational information such as an address, city, or a postal code. A geographic information system (GIS) is a system designed to capture, store, manipulate, analyse, manage, and present geospatial data.

GIS data comes from satellite imagery that can create data-rich images with extracted vector features and attribute data. They can be used in mapping applications to achieve a multi-layered result for many types of analysis. Satellite imagery has significant potential to provide more timely statistical outputs, reduce the frequency of surveys, reduce respondent burden and other costs, and provide data at a more disaggregated level for informed decision-making.

The value of linking statistical information to location has long been recognised and implemented by NSOs for many years. This began with the use of GIS by the Canadian statistical office in the 1980s and has evolved over time as improved infrastructure, tools and skills have facilitated more advanced geospatial analysis. Such data has the potential to reveal new insights and data relationships that would not have been possible by analysing data in isolation.

It is now readily accepted that integrating statistical and geospatial information can play a key role in providing the data for decision-making processes at local, sub-national, national, regional, and global levels. In particular, this is vital for measuring and monitoring the targets and global indicator framework for the SDGs. It will also be a vital element for future censuses. Such integrated information will also allow for comparisons within and between countries in a more harmonised manner.

Before using geospatial data, an NSO will need to consider the strategic questions as to what value can it provide, what risks are involved, how to work together with mapping agencies, the ways to improve location coding of statistics and how best to harmonise methods between statisticians and mapping agencies.

8.4.1 Types of geospatial data

There are two basic types or forms of geospatial data:

- a) **Vector** - This form uses points, lines, and polygons to represent spatial features such as cities, roads, and streams. Vector models are useful for storing data with discrete boundaries, such as country borders, land parcels, and streets.
- b) **Raster** - This form uses cells (computer often use dots or pixels) to represent spatial features. Cities are single cells, roads are linear sequences of cells, and streams are collections of adjacent cells. Raster models are useful for storing data that varies continuously, as in an aerial photograph, a satellite image, a surface of chemical concentrations, or an elevation surface.

Links to guidelines, best practices and examples:

- Eurostat - [Geospatial analysis at Eurostat](#) - a set of techniques and tools to study space-time relationships inherent in data using examples where spatial analysis has been conducted with statistical data of the European Union (EU).
- FAO Guidelines on the use of [remote sensing products](#) to improve agricultural crop production forecast statistics in sub-Saharan African countries.
- UNSD - [Crop Density mapping Land cover and land use statistics Spatial and Statistical Analysis](#) of Historic Climate Data Urban-Rural Systems population density distribution map.

8.4.2 Challenges for NSOs in using geospatial data

As for many areas of technology, the main challenge for NSOs in the use of geospatial data is to recruit and retain staff with the necessary skills. There is a high demand for GIS specialists and NSOs are often not able to compete with other public bodies and the private sector in the employment market.

An additional challenge is the cooperation with mapping authorities, which lead to the formation of the United Nations Global Geospatial Information Management ([UN-GGIM](#)). UN-GGIM aims to ensure that the national mapping and cadastral authorities work jointly with NSOs to contribute to a more effective management and availability of geospatial information, and its integration with other information, based on user needs and requirements.

GIS specialists (also referred to as GIS Analyst, GIS Technician, and Cartographers) are needed to build and maintain GIS databases and to use GIS software to analyse the spatial and non-spatial information they contain. They also analyse GIS data to identify spatial relationships, perform geospatial modelling or spatial analysis, and create thematic maps.

The ideal for an NSO is to have a specialised in-house Cartography or GIS unit, but this is beyond the means of many NSOs, especially in developing countries. However, there are many open-source desktop GIS software products available as well as free GIS data sources.

To enable interoperability of data sources, survey data should where possible be geo-referenced and linked to geospatial data.

Examples of GIS open-source software:

- a) [GRASS GIS](#) – software suite used for geospatial data management and analysis, image processing, graphics and maps production, spatial modelling, and visualisation.
- b) [ILWIS \(Integrated Land and Water Information System\)](#) – is a geographic information system and remote sensing software for both vector and raster processing. Its features include digitising, editing, analysis and display of data, and production of maps.
- c) [OpenJUMP](#) is an open-source GIS that can read and write map files. It can also read from spatial databases and can be used as a GIS data viewer.
- d) [MapWindow](#) – is a set of programmable mapping components for analysis and modelling.
- e) [QGIS](#) is a cross-platform desktop geographic information system application that supports viewing, editing, and analysis of geospatial data.
- f) [SAGA](#) is a geographic information system used to edit spatial data.

GIS Data Sources:

- a) [Esri Open Data](#) provides access to more than 67k open data sets from organizations worldwide. Data can be searched by topic or location and download in multiple GIS formats.
- b) [NASA Earth Observations \(NEO\)](#) can browse and download imagery of satellite data from NASA's constellation of Earth Observing System satellites.
- c) [NASA Socioeconomic Data and Applications Center \(SEDAC\)](#). SEDAC is the Data Center of NASA's Earth Observing System Data and Information System (EOSDIS) and provides libraries of downloadable maps and data.
- d) [Natural Earth](#) is a public domain map dataset featuring integrated vector and raster data and the means to create maps with cartography or GIS software.
- e) [OpenStreetMap](#) collects geodata and makes it available free of charge. It is a community of mappers who edit the geography as OpenStreetMap daily.
- f) [Open Topography](#) provides a portal to high spatial resolution topographic data and tools. Open Topography facilitates access to high-resolution, earth science-oriented, topography data, and related tools and resources.
- g) [Sentinel Satellite Data](#). The European Space Agency's Sentinel satellite high-resolution spatial data is available to the public for free. The Copernicus Open Access Hub provides complete, free and open access to user products.
- h) [Terra Populus \(TerraPop\)](#) incorporates and integrates both census data from over 160 countries around the world, as well as environmental data describing land cover, land use, and climate.
- i) [UNEP Environmental Data Explorer](#) is the source for UNEP's data sets and its partners in the Global Environment Outlook (GEO) report and other integrated environment assessments. Its online database holds more than 500 different variables, such as national,

sub-regional, regional and global statistics or geospatial data sets (maps), covering themes like Freshwater, Population, Forests, Emissions, Climate, Disasters, Health and GDP.

- j) [USGS Earth Explorer](#) is a source of Geographic Information Systems (GIS) Data. USGS collects, monitors, analyses, and provides science about natural resource conditions, issues, and problems.

Links to guidelines, best practices and examples:

- Central Statistical Bureau of Latvia [thematic maps](#);
- European Forum for [Geography and Statistics \(EFGS\)](#);
- [Eurostat - Merging statistics and geospatial information in the European statistical system \(ESS\)](#);
- [Merging statistics and geospatial information](#) in the European statistical system (ESS);
- Standards and data infrastructure for [statistical and spatial frameworks](#). Statistics Estonia -[examples of spatial analysis](#);
- National Institute of Statistics of Rwanda [Geodata Portal](#);
- [Statistics Korea - GIS, Maps and Statistics](#);
- Statistics Poland: [Statistical Atlas](#) of Poland;
- Statistics Sweden - [Implementing a Statistical Geospatial Framework](#);
- United Nations Expert Group on the Integration of Statistical and Geospatial Information - Global Statistical Geospatial Framework [Linking Statistics and Place](#);
- [UN Task Team on Satellite Imagery and Geo-Spatial Data](#) provide strategic vision, direction and development of a global work plan on utilising satellite imagery and geospatial data for official statistics and indicators for post-2015 development goals;
- UNICEF [Guidelines on the use of geospatial technologies](#).

8.5 Big Data

The term Big Data refers in general to data generated by business transactions, social media, phone logs, communication devices, web scraping, sensors etc. (see Chapter 14.2.7 - *Big Data*). For a general introduction to the notion of Big Data, see the book *Big Data* by Viktor Mayer-Schönberger and Kenneth Cukier (2013).

Big Data has attracted considerable and increasing interest from NSOs regarding the potential to complement traditional statistics. This is particularly important in the context of the need to measure and monitor progress towards the Sustainable Development Goals (SDGs) and other targets.

Big Data has the potential to supplement, complement or partially replace, existing statistical sources such as surveys, or provide complementary statistical information but from other perspectives. It could also improve estimates or generate completely new statistical information in a given statistical domain or across domains.

Big Data is widely used in the commercial sector for business analytics³⁸, but there is less evidence of its use thus far in the world of official statistics. Despite the high expectations for using Big Data, the reality is that while the technology needed to process these huge data sets is available and maturing, the biggest obstacle for an NSO is often to gain access to the data. This lack of access can be due to reluctance of a business to release their data, legal obstacles, costs or concerns about privacy. However, where Big Data is accessible for an NSO, such as websites or sensors administered by public administrations, such as road sensors, it is already successfully used for experimental or even official statistics.

8.5.1 Types of Big Data

There are several categories of Big Data.

- a) **Structured data:** all the data received from sensors, weblogs and financial systems are classified under machine-generated data. These include medical devices, GPS data, data of usage statistics captured by servers and applications and the huge amount of data that usually move through trading platforms, to name a few. Human-generated structured data mainly includes all human input data into a computer, such as his name and other personal details. When a person clicks a link on the internet, or even makes a move in a game, data is created.
- b) **Unstructured data:** while structured data resides in the traditional row-column databases, unstructured data is the opposite- they have no clear format in storage. The rest of the data created, about 80% of the total, account for unstructured Big Data. Until recently, there was not much to do to it except storing it or analysing it manually. Unstructured data is also classified based on its source, into machine-generated or human-generated. Machine-generated data accounts for all the satellite images, the scientific data from various experiments and radar data captured by various facets of technology. Human-generated unstructured data includes social media data, mobile data and website content. This means that the pictures we upload to Facebook or Instagram the videos we watch on YouTube and even the text messages we send contribute to the mass of unstructured data.
- c) **Semi-structured data:** information that is not in the traditional database format as structured data but contains some organizational properties that make it easier to process is included in semi-structured data. For example, NoSQL documents are considered semi-structured since they contain keywords that can be used to process the document easily.

³⁸ <https://alltimestech.com/2019/10/22/big-data-and-business-analytics-market-outline-and-pipeline-review-from-2019-2025-international-business-machines-ibm-corporation-oracle-microsoft-corporation/>

8.5.2 Big Data sources

There are broadly four sources of Big Data.

- a) **Transactional data** is generated from all the daily transactions that take place both online and offline. Invoices, payment orders, storage records, delivery receipts – all are characterized as transactional data. However, data alone is almost meaningless, and most organizations struggle to make sense of the data they are generating and how it can be put to good use. Business transactions: Data produced from business activities can be recorded in structured or unstructured databases. With a big volume of information and the periodicity of its production (because sometimes this data is produced at a very fast pace), thousands of records can be produced in a second when big companies like supermarket chains are recording their sales.
- b) **Sensors/meters and activity records from electronic devices:** the quality of this kind of source depends mostly on the sensor's capacity to take accurate measurements in the way it is expected. Machine data is defined as information generated by industrial equipment, sensors installed in machinery, and even web logs that track user behaviour. This type of data is expected to grow exponentially as the Internet of Things (IoT) grows ever more pervasive and expands around the world. Sensors such as medical devices, smart meters, road cameras, satellites, games, and the rapidly growing Internet of Things will deliver high velocity, value, volume, and data variety shortly.
- c) **Social interactions:** this covers data produced by human interactions through a network. The most common is the data produced in social networks. This kind of data relies on the accuracy of the algorithms applied to extract the meaning of the contents commonly found as unstructured text written in natural language. Some examples of analysis made from this data are sentiment analysis, trend topics analysis, etc. Social data comes from the Likes, Tweets & Retweets, Comments, Video Uploads, and general media uploaded and shared via the world's favourite social media platforms. This data provides invaluable insights into consumer behaviour and sentiment and can be enormously influential in marketing analytics. The public web is another good source of social data, and tools like Google Trends can be used to improve the volume of Big Data.
- d) **Citizen-generated data (CGD)** is data produced by non-state actors under the active consent and participation of citizens to primarily monitor, demand or drive change on issues that affect them directly. Citizen generated data can be an innovative data source (secondary data source) for the production of official statistics and be leveraged to support the effective tracking of progress on the Sustainable Development Goals (SDGs).

UNECE has developed a multi-layer [classification of Big Data sources](#) with 24 categories at the lowest level.

8.5.3 Challenges accessing and processing Big Data

8.5.3.1 Accessing Big Data

According to the GLOS guidance, Article 6.1 'Producers of official statistics shall be entitled to access and collect data from all public and private data sources free of charge, including identifiers, at the level of detail necessary for statistical purposes. In the longer term, the goal is to regulate this access in the statistical law.'

There are several potential barriers an NSO has to overcome in gaining access to Big Data sources. These include the following:

- a) concerns on the part of private companies about losing their competitive advantage;
- b) legal constraints concerning privacy and confidentiality of client information;
- c) businesses have recognised the value of their data and are not prepared to just give it away;
- d) the costs of setting up the necessary infrastructure and training staff for a non-core business-related activity.

NSOs need to overcome such legal requirements and seek agreement with businesses to gain access to Big Data for statistical purposes. If agreements can be struck with the businesses that own the data, several business models can enable data exchange between private corporations and an NSO. The PARIS21 paper '[Access to New Data Sources for Statistics: Business Models and Incentives for the Corporate Sector](#)' lists the following models:

- a) **In-house production of statistics:** the in-house production of statistics model is, in many ways, the most conventional or standard model. It is used by most NSOs today and, as such, comes with a known set of risks and opportunities. On the positive side, the model allows the data owner to maintain total control over the generation and use of its raw data. User privacy can be protected through deidentification, and generated indicators can be aggregated sufficiently to be considered safe for sharing. From a safety or security point of view, the in-house production of statistics is the preferable option.
- b) **Transfer of data sets to end users:** in this model, data sets are moved directly from the data owner to the end-user. The model gives the end-user significantly more flexibility on how the data is used. In general, raw data is de-identified, sampled and sometimes aggregated to avoid possible re-identification. Efforts to de-identify need to ensure that data cannot be re-identified by crossing it with external data. Because de-identification is never absolute, even when the most sophisticated anonymizing techniques have been deployed, data in this model is generally released to a limited number of end-users, under strict non-disclosure and data usage agreements ensure a level of control and privacy.
- c) **Enabling remote access to data:** in the remote access model, data owners provide full data access to end-users while maintaining strict control on what information is extracted from databases and data sets. In this model, personal identifications are anonymized, but no coarsening is made on the data. The data does not leave the premises of the data owner; rather, the end-user is granted secured access to analyse the data and compute the relevant metrics. The end-user is then permitted to extract only the final aggregated metrics once the data analysis has been completed. This method is often used in research, in specific partnerships between the data owner and a group of researchers, under very strict non-disclosure and data usage agreements. Strict monitoring of the input and output traffic on data storage devices is carried out to ensure no data is removed. The main incentive in this type of model is that users benefit from free research resources on their data.
- d) **Using trusted 3rd parties (T3Ps):** in the Trusted 3rd party (T3P) model, neither the data owner nor the data user supports the security burden of hosting the data themselves. Instead, both parties rely on a trusted third party to host the data and secure access to the data source. The data is anonymized in the sense that hashing techniques protect personal

identifiers. In addition, the end-user does not have direct access to the raw data. Instead, end-users must make a request for reports or other intermediate results to the T3P, which ensures protection of the data.

- e) **Moving algorithms** rather than data. In this model, shared algorithms allow the reuse of software by several private data owners wishing to perform similar analytical functions on one or several data sets. For example, such a model may be effective when several national telecoms operators wish to estimate population density (or other population patterns) based on their collective data. The data sets from different operators do not need to be necessarily merged. Instead, while the analytical functions performed on each data set may be identical, the data sets themselves can remain separate and under separate control. Results can be arrived at independently by each operator, and the aggregated results can later be merged to arrive at a comprehensive national or regional analysis.

To gain reliable and sustainable access to Big Data sources, NSOs need to form strategic alliances with the data producers, which can be a lengthy process with no guarantee of success. Private corporations are aware of the value of their data, are unwilling to expend resources on activities that are not mission-critical, and that carry potential risks of business information and confidentiality breaches. Governments must enact legislation obliging corporations to make their data available to NSOs to use for the public good. However, this can take many years to put in place.

The issue of gaining access to privately held Big Data sources needs to be addressed at a supranational level, particularly as many of the companies generating Big Data are multinational concerns. The legal aspects are complex and difficult to solve legally at the country level. Moreover, NSOs are not the only organizations interested in gaining access to Big Data for public purposes. In the EU, for instance, a [broad expert group](#) is looking into this issue. The EU has also provided some [guidance](#), specifically mentioning statistics.

8.3.5.2 Challenges in processing Big Data

- a) **Data privacy:** with Big Data, the biggest risk concerns data privacy. Enterprises worldwide make use of sensitive data, personal customer information and strategic documents. A security incident can not only affect critical data and bring a downward reputational effect; it can also lead to legal actions and financial penalties. Taking measures for data privacy is vital - as recent high-profile cases have shown, if not sufficiently protected this information can be used to profile individuals and be passed on to third parties leading to loss of consumers' trust. Thus, NSOs need to ensure that data sources and indicators used are obtained without violating privacy or confidentiality regimes.
- b) **Costs:** NSOs must also invest in security layers and adapt traditional information technology techniques such as cryptography, anonymisation, and user access control to Big Data characteristics. Even though that the access to data for NSO should ideally be free of charge as with access to administrative data, it may be necessary to pay the one-off cost of preparing the data transfer system such as an API.
- c) **Data quality:** Big Data is often largely unstructured, meaning that such data sources have no pre-defined data model and does not fit well into conventional relational databases. Diverse structures also cause data integration problems as the data needed for analysis

comes from diverse sources in various formats such as logs, call-centres, web scrapes and social media. Data formats will differ, and matching them can be problematic. Unreliable data: Big Data is not always created using rigorous validation methods which can adversely affect quality. Not only can it be inaccurate and contain wrong information but can also contain duplications and other contradictions.

- d) **Methods:** using Big Data may require new methods and techniques. For instance, new modelling techniques may be called for, especially if Big Data is used for producing early indicators or even nowcasting. Artificial Intelligence and deep learning techniques may be used for processing unstructured text messages or satellite images.
- e) **Data impermanence:** an NSO cannot guarantee that a data source will be reliable as it has no control over or relationship with the data owner as with traditional data sources. Formats can change at any time without warning that can render data capture and subsequent processes that have been put in place by the NSO unworkable. Data sources can even disappear completely if the business rules generating the data are changed.
- f) **Data gaps:** the SDGs have a fundamental commitment to leave no-one behind. Vulnerable populations may not be covered by Big Data if using sources such as mobile phones are not available to the poorest and most marginalised groups of society.

A vision paper CBS Netherlands and Statistics Canada on [future advanced data collection](#), presented at the 62nd ISI World Statistics Congress 2019 in Kuala Lumpur, discusses how sensor data and data originating from data platforms (public or private) hosted outside NSOs can play an increased role in the future of data collection and to maximize the benefit of these data sources to produce “smart statistics”.

Smart Statistics can be seen as the future extended role of official statistics in a world impregnated with smart technologies. Smart technologies involve real-time, automated, interactive technologies that optimize appliances and consumer devices' physical operation. Statistics would then be transformed into a smart technology embedded in smart systems that would transform “data” into “information”.

Some of the main challenges and opportunities outlined in the vision paper are as follows:

- a) **Methodology:** linking different data sources and validating data that were not collected specifically for official statistical purposes (administrative and sensor data) requires completely new and advanced methodological concepts. Changing from a survey methodology toward a data methodology is key.
- b) **Quality:** timeliness will become an important characteristic of the quality of statistical products and, of course, timeliness might influence the accuracy of statistical information. Accuracy is not a synonym for quality, but it is one characteristic that determines the quality of statistical products. As long as the accuracy of information is known and specified to the end-user, this will not be a problem. Research into reducing the potential trade-off between timeliness and accuracy would, of course, be of interest.
- c) **Data access with respect to social acceptability and legal frameworks:** social acceptability is key to gaining access to privately-held data. This means that NSOs need to be transparent and able to demonstrate and explain the value proposition to society (public good) and address society’s concerns about trust, confidentiality and privacy. At the same time, legal frameworks need to be developed to ensure that NSOs can use all

these new data sources to their maximum extent and make sure that society can benefit from the added value NSOs can potentially provide.

- d) **Data access with respect to technology and methodology:** The keywords for future data access are collect, connect and link. Technology to obtain secure data access, in conjunction with the appropriate methodology and algorithms to guarantee privacy and confidentiality, is one of the main technological development areas for the near future. Multi-party computation, privacy-preserving data sharing (PPDS) and privacy-preserving record linkage (PPRL) are potentially promising technological advancements that need to be further developed into a robust set of methods.

Links to guidelines, best practices and examples:

- [Big data in official statistics](#), CBS (2020);
- [Bucharest Memorandum on Official Statistics in a Datafied Society](#), 104th DGINS Conference, Bucharest (2018);
- [Recommendations for access to data from private organizations for official statistics](#), Global Working Group on Big Data for Official Statistics (2016);
- [Scheveningen memorandum on the use of Big Data in official statistics](#), Eurostat (2013);
- [UN Global Working Group on Big Data](#).

Chapter 9. Analysis and Analytical Frameworks

9.1 Introduction

9.1.1 What is analysis?

In general terms, *data analysis* is the process of developing answers to questions through the examination of data. The basic steps in analysis consist of identifying issues, determining the availability of suitable data, deciding which methods are appropriate for answering the questions of interest, applying the methods and evaluating, summarizing and communicating the results.

This chapter refers to the data analysis conducted by a national statistical office (NSO) immediately prior to, and/or possibly following, the dissemination of statistical outputs based on the data. It is distinct from *policy analysis* conducted by users. Where the context is clear, it is referred to as simply *analysis*, as in the Generic Statistical Business Process Model ([GSBPM](#)).

More specifically, according to the GSBPM (see Chapter 5.3.1.3 - *Reorganizing the production process – the GSBPM* and Chapter 14.4.3 - *Generic Statistical Business Process Model (GSBPM)*) the *analysis phase* of a statistical process includes preparing statistical content (including commentary, technical notes, etc.), and ensuring outputs are ‘fit for purpose’ prior to dissemination to users. The preparation of maps, GIS outputs and geostatistical services may be included to maximise the value of the statistical information and capacity to analyse it. This phase also includes the sub-processes and activities that enable statistical analysts to understand the data and the statistics produced.

9.1.2 Why a national statistical office performs analysis

The primary function of an NSO is to disseminate statistical information (comprising data and explanatory notes) for the benefit of users. In the process of using this information, users, especially the more sophisticated users, may do a great deal of analysis. However, although, in these broad terms, the NSO produces and disseminates data, and the users analyse data, *the NSO itself should undertake a significant amount of analysis* in order to better understand the quality of the data and the data production processes. More specifically, the reasons for data analysis are as follows:

- a) By analysing the data, the NSO puts itself in the position of a user. It becomes a surrogate user. It comes to understand more about how users may view the data. It finds the ‘stories’ in the data, and it may find errors that have previously escaped notice.
- b) The NSO gets a better feel for the coverage and content of the data, and the limitations of the data in these respects.
- c) The NSO gets a better understanding of the accuracy and reliability of the data and the limitations of the data in these respects.

- d) The NSO learns more about the internal coherence (consistency) of the data, and the coherence of the data with respect to other datasets, i.e., the ease with which they can be jointly understood and analysed.
- e) The NSO is better positioned to identify the limitations of the process by which the data are generated and how the process could be improved.
- f) The NSO must assure itself that confidentiality is preserved when the data are disseminated (as discussed in Chapter 11.8.5 - *Confidentiality and disclosure control*).
- g) The NSO may identify seasonal components of sub-annual data and disseminate seasonally adjusted data when appropriate as discussed in Chapter 11.8.4 - *Seasonal adjustment and time series analysis*.
- h) Finally, the NSO is in a better position to write the commentary and/or explanatory notes that may accompany data when they are disseminated.

In summary, there are considerable benefits to an NSO in analysing data before their dissemination.

9.1.3 What is an analytical framework?

Some users may be interested in a single dataset, for example, a dataset containing the consumer price index. However, many are interested in several datasets relevant to a particular topic or domain, say health inputs and outcomes. Typically, different datasets are produced by different statistical processes. For them to be coherent, i.e., easily analysed jointly, they need to have been produced using common standards for scope, definitions, classifications and units.

In some domains, for example, health, the relevant standards are brought together within a single *analytical framework*, for example, the System of Health Accounts (described in Chapter 9.9 - *Health accounts*). In some cases, for example, the System of National Accounts, the framework may span multiple domains.

An analytical framework, which may also be referred to as an *integrated framework* or *integrating framework*, may be summarised along the following lines.

- a) It is a model relevant to a particular statistical domain that defines the scope, definitions, classifications, units, and relationships between them, for that domain.
- b) It aims to guide and facilitate understanding and to help logical thinking systematically.
- c) It ensures that the data are structured in such a way that analysis has tangible outcomes, for example, to answer questions such as ‘what are key priority needs?’
- d) Defining an analytical framework requires selection amongst the possible options. It means deciding what data items are most important and informative, therefore limiting the analysed information.
- e) Analysis conducted using a framework is systematic, transparent, and with known coverage. It reduces the possible impacts of selection and procedural biases in the sense that multiple analysts are obliged to use the same concepts, definitions and classifications.

- f) It provides a basis for review of data outputs. For example, supply-use tables may be used to check consistency and completeness of data being provided to the national accounts.

In the specific context of an NSO, an analytical framework is a model relating all the units, concepts, data items and classifications pertinent to a particular topic or domain. It enables data originating from different sources (surveys, censuses, administrative records, etc.) to be combined and analysed consistently.

Use of an analytical framework, wherever available, is highly recommended.

9.2 Supplementing data with analysis

9.2.1 Introduction

A *fact* is something consistent with objective reality, or that can be proven with evidence. Dictionaries define a fact as *something that can be shown to be true, exist, or have happened*. Therefore, the usual test for a statement of fact is verifiability, whether it can be demonstrated to correspond to experience. Given that official statistics are the products of processes that incorporate objective, scientific methods, they can be used as a basis for fact verification.

Even though official statistics bring awareness to particular issues and are a basis for fact verification, it must be noted that facts, for the most part, are still subject to interpretation. A user of statistical data analyses them and interprets their meaning within his/her own particular context. It is generally agreed that an NSO should comment on its most important statistical outputs and use its detailed knowledge based on access to the microdata to comment on impressions created by them, particularly if those impressions are liable to be wrong. However, analyses provided by an NSO should avoid policy and political interferences and comments. In General, an NSO would restrict itself to comment on statistical correlations between data sets and not interfere with non-statistical causality analyses. Analysis performed by the NSO should be an integral part of the production process, along with quality management. However, in the end, only a fraction of this analysis will supplement the dissemination of the results of official statistics. Disseminated analysis results should refer to ways of looking at and talking about data without imposing definitive conclusions about what the data mean. This includes providing interesting breakdowns, contextual information, explanatory notes and commentaries to accompany disseminated data, thereby giving additional value to users.

Links to guidelines, best practices and examples:

- Walter J. Rademacher – [The future role of official statistics](#).

9.2.2 Analytical functions and outputs

Analytical results underscore the usefulness of statistical outputs by shedding light on relevant issues. Statistical outputs often depend on analytical output as a major component because, for confidentiality reasons, it is not possible to release the underlying microdata to the public. Data analysis also plays a key role in data quality assessment by pointing to data quality problems. Analysis can thus be a trigger for future improvements in the statistical production process.

Data analysis involves summarising the data and ensuring that it provides clear answers to the questions that initiated the statistical process. Often, it consists of analysing tables and calculating summary measures, such as frequency distributions, percentages, means and ranges. For sample surveys, it includes a description of the observed units, a selection of statistical outputs (tables, charts, measures of spread, models, etc.), and/or a description of the population and tests of hypotheses about it, in which case the sample design must be properly accounted for.

In addition to analysing the statistical data from a user perspective, NSOs should also continuously monitor and analyse the underlying statistical processes to ensure their stability and enable continuous improvement of their quality, as was discussed in Chapter 6.2 - *Measuring and analysing user satisfaction and needs*. Analysis may be undertaken at various stages in the statistical process, and by various organizational units, depending upon the overall organizational structure of the NSO, as further discussed in the following sections.

9.2.2.1 Analysis by responsible subject matter area

The subject matter specialist may perform analysis during the processing of statistical data and prepare the statistics for dissemination. The analysis may begin with exploratory data analysis and macro-editing methods described in Chapter 8.2.6.5 - *Macro-editing*. This form of analysis, which may be termed *preliminary analysis*, involves summarising the raw data and investigating any data discrepancies. All preliminary outputs should be analysed in this way, to determine data consistency and to direct further analysis.

The preliminary analysis includes macro editing, drill-downs to unit data, tabulation, exception reporting and assessment of results against results from previous periods and related data sources. During this phase, subject matter experts also perform the additional analysis required to complete the quality reports. This type of analysis provides a better understanding of the properties of a dataset and the underlying phenomena. It also helps identify potential errors in the processing, helps improve weights for sample surveys and identifies areas for further improvement, for example, parts of a questionnaire that may benefit from wording improvements.

The key elements of analysis are performed just before dissemination, while the data are being tabulated and prepared for release. The analysis may include preparing a summary of key findings of the release, preparing the explanatory notes that provide detailed information about properties of the dataset, and preparation of charts to accompany the release. The analysis should try to mimic the users of data, and, by replicating the procedures that they may use, try to further check the consistency of released figures. Commonly, comparisons are made with the results with previously released statistics and with other data sources. Every effort should be made to reflect users' interests and perform additional checks of data that may be of particular interest to them.

Even though these types of analysis are usually done by the subject matter specialist, there are NSOs where tabulation is done by the IT department and charts and commentaries are produced by the dissemination department. For sample surveys, some analyses such as a non-response analysis (see Chapter 8.2.7.4 - *Minimizing non-response and follow-up procedures* for more details) may be performed either by the subject matter area or the organizational unit responsible for processing, or other specialised units, such as methodology. Subject matter experts may also perform time series analysis and analysis for confidentiality and disclosure

control (as described later in this chapter). These types of analysis may also be performed by methodology experts or jointly with them.

9.2.2.2 Analysis by a dedicated analysis unit or other organizational units

This section describes options for organizing the expert knowledge (such as sampling techniques, analysis methods, IT and dissemination options) required for statistical analysis within an NSO. As this knowledge is needed across the full range of statistical processes, staff with such knowledge are usually located in a dedicated analysis unit, particularly in larger and well developed NSOs. In many smaller NSOs, this may not be possible.

Depending on the type of the statistical process, additional analyses may also be performed by other experts in specialised units. For example, an expert in the statistical business register unit may analyse the classifications assigned to reporting units and perform coverage tests in order to determine the representativeness of responses within subgroups of the population as discussed in Chapter 11.4 - *Frames for informal sector surveys*. A sample design expert may analyse weights to perform nonresponse adjustments and improve estimates for sample surveys, as discussed in Chapter 8.2 - *Surveys and censuses*. Experts in an analysis unit may perform time series analysis and seasonal adjustment. An IT or data management expert may apply disclosure control measures discussed in Chapter 11.8.5 - *Confidentiality and disclosure control*. Some larger offices may also have a dedicated experimental statistics unit that may deal with innovative sources and Big Data issues. This unit often requires different skillsets, combining statistical knowledge with extensive technological skills, as discussed in Chapter 8.2.9 - *Survey staff training and expertise*.

Regardless of the statistical process, further analysis of the coherence and consistency of the statistical output is performed by the unit that specialises in the corresponding analytical framework (if there is one). The most notable example is the national accounts unit, where data from a wide range of sources are brought together and analysed side by side as further discussed in Chapter 9.4 - *National Accounts*).

Links to guidelines, best practices and examples:

- Eurostat, [Handbook on improving quality by analysis of process variables](#).

9.2.2.3 Review of outputs and practices

In their quest for continuous improvement, an NSO should be open to a broad review of its outputs and evaluate its practices. An internal review of a publication before release is a common practice. It engages the senior officials of the organization and fosters cross-subject review and criticism/critiquing. For example, a release of statistics on employment and unemployment may be effectively reviewed by those responsible for industry and trade statistics or by national accountants. This type of review is usually performed regularly. It is particularly important if statistics being released tend to attract a significant number of questions (or frequently repeating questions) after the release.

A more formal process should be reserved for larger analysis efforts, such as analyses associated with a new survey of family incomes and expenditure, a new economic census, or a new population census. In addition to engaging multiple experts and units internally, it is beneficial to persuade members of the academic community to take part in a review process. The goal of the review is to judge whether the statements made are fully supported by evidence;

whether the most important inferences based on the new data available have been taken into account; and whether the methods used stand up to close scrutiny in the face of current knowledge. Additionally, publications are also scrutinized as part of periodic external reviews that may result in recommendations that can vastly improve the quality of future statistical outputs. In all cases, such reviews are likely to involve significant analysis of statistical output and metadata. Such reviews may be performed as national, regional and/or international exercises. They may focus on the entire NSS, or a particular subject matter area. Regional or international reviews usually check the application of international standards, such as the [Global review of the implementation of the Fundamental principles of official statistics](#). The scope of a national review may vary according to the structure of the NSS. In a centralised system, a review may check the quality of outputs, while in a decentralised system, it may check both the quality of outputs and the application of principles. (More details are provided in Chapter 7 - *Quality Management*).

9.2.2.4 Review of data output – mirror statistics

Mirror statistics refer to the situation where flow statistics between two countries are compared. For example, the exports of country A to country B (measured by country A) are compared with the imports of country B from country A (measured by country B). The aim is to detect causes of bilateral asymmetries. Apart from detecting asymmetries, the mirror statistics methodology may be used to derive estimates or impute a missing variable of flow statistics for a country using data from the partner country. Mirror statistics are commonly used for foreign trade statistics, and migration statistics, where the mirror data flows from partner countries can be used to assess the quality of the data and eventually compile estimates for the country.

Even though mirror statistics are useful in filling data gaps, their prime use should be for review purposes. The most common process of mirror statistics review is performed when NSOs of two or more countries agree to compare the results and the underlying microdata to improve the quality, for example through subsequent improvements in registration and classification procedures.

Links to guidelines, best practices and examples:

- [UNECE - Statistics on International Migration: A Practical Guide for Countries of Eastern Europe and Central Asia](#);
- [UNESCAP - Asymmetries in International Merchandise Trade Statistics: A case study of selected countries in Asia-Pacific](#).

9.2.2.5 Review of analytical output

Review of analytical output is usually performed by external reviewers or through a peer-review process. It consists of checking the processes and procedures that accompany the statistical releases. GSBPM provides a framework that can be used to systematically review the stages of production. Statistical areas are usually reviewed using an audit-like approach, as each step should be well documented to enable the replication of results. There are also examples where reviews on statistical processes and products are conducted by function such as dissemination, sampling or the use of statistical registers, and not by statistical domain.

Further, systematic reviews of whole statistical systems are occasionally commissioned to assess the effectiveness of the statistical system and its governance models.

Links to guidelines, best practices and examples:

- [Eurostat - Review of national supply, use and input-output tables compilation](#);
- [Professor Sir Charles Bean: Independent Review of UK Economic Statistics](#);
- [ONS - Review of international best practice in the production of productivity statistics](#).

9.3 Methods and systems of analysis

9.3.1 Methods of analysis

9.3.1.1 Regression and correlation

The most commonly used techniques for investigating the relationship between two quantitative variables are correlation and linear regression. Correlation quantifies the strength of the linear relationship between a pair of variables, whereas regression expresses the relationship in the form of an equation. Both methods are used in sampling and estimation procedures for sample surveys. They are also used in analysis, particularly to determine the relevance of a research hypothesis. In statistical analysis, correlation can be used to confirm the relation between variables - for example, the turnover of retail trade and the collected value-added tax in the same period are expected to positively correlate.

To determine a regression equation, the first step is to determine the general pattern that the data fits. This includes making a scatter plot and then trying out various equations to find the best fit. It is not always straightforward to select the appropriate regression equation. Experience helps.

9.3.1.2 Seasonal adjustment and time series

Seasonal adjustment is a method of removing short-time periodic changes based on a basic time series decomposition. It is widely used in official statistics for removing the seasonal component of a sub-annual (usually monthly or quarterly) time series. In essence, a series is split into four components:

- a) Seasonal component;
- b) Calendar component;
- c) Irregular component; and
- d) Smoothed, seasonally adjusted trend component.

Such decomposition creates a seasonally and calendar adjusted series by the exclusion of the seasonal and calendar components from the original series.

The objective of seasonal adjustment is to facilitate time series analysis, i.e., period to period comparisons in a time series, and detection of the underlying trend, which may otherwise be obscured by seasonal and calendar effects. It involves the removal of seasonal and calendar variations in the original series.

Seasonal adjustment is invariably preceded by pre-treatment, including detection and correction of outliers. The next step is the calendar adjustment, i.e., the removal of trading day variations and moving holiday effects. Then, in some cases, the original series may be differenced, to obtain *stationarity*, which is a property of a time series required by seasonal adjustment algorithms for them to work properly. The various choices made in setting up a seasonal adjustment (including pre-treatment and calendar adjustment) plan for a particular series are collectively referred to as *model selection*.

The use of seasonally adjusted time series is becoming the norm in official statistics as users expect the data (particularly short-term data) to be available in a form that is not influenced by seasonal and calendar components. Given that pre-treatment and seasonal adjustment algorithms are complex and computationally intensive, they are invariably implemented using a seasonal adjustment system. There are multiple seasonal adjustment systems available, of which the most commonly used are listed below and further described in Chapter 14.7 - *Specialist statistical processing/analytical software*:

- a) [X-12 ARIMA](#), US Census Bureau.
- b) [TRAMO-SEATS](#), Department of Statistics, National Bank of Spain.
- c) [X-13 ARIMA-SEATS system](#) combines X-12 ARIMA and TRAMO-SEATS, developed and supported by the US Census Bureau.
- d) [Jdemetra+](#), also combines X-12 ARIMA and TRAMO-SEATS, developed by the Department of Statistics of the National Bank of Belgium for the ESS Seasonal Adjustment Group.

It is recommended that the seasonal adjustment method, and at least a general procedure for determining the adjustment parameters, are adopted and used consistently within the NSO, and ideally across the entire NSS. Having different seasonal adjustment methods may lead to different seasonally adjusted series of similar initial data sets.

Links to guidelines, best practices and examples:

- [Eurostat - Handbook on Seasonal Adjustment, 2018 edition](#);
- [Eurostat - ESS guidelines on temporal disaggregation, benchmarking and reconciliation, 2018 edition](#);
- [ABS - Time Series Analysis: Seasonal Adjustment Methods](#).

9.3.1.3 Confidentiality rules and disclosure control

Confidentiality is a fundamental principle of statistics discussed in detail in Chapter 3.2.6 - *Principle 6*. Producers of official statistics must guarantee that individual data collected for statistical compilation, whether they refer to natural or legal persons, are to be strictly confidential and used exclusively for statistical purposes. This section discusses the confidentiality rules that are implemented to ensure the observance of this principle and methods of disclosure control.

The modern approaches to statistical confidentiality distinguishes *direct* and *indirect identification*. Direct identification means identification of the respondent from one or a combination of their identifiers (name, address, identification number...). Indirect identification means inferring a respondent's identity by combining variables or characteristics

such as location combined with age, gender and education. These variables may be found in one data source or in different sources and eventually combined. According to the principle of confidentiality, both direct and indirect identification of a respondent should be avoided. However, access to microdata without identifier but that in some cases could allow indirect identification may be granted for scientific purposes under specific terms and conditions, as further discussed in Chapter 4.5.5 – *User access to confidential data for their own statistical purpose* and in Chapter 10.6.3 – *Microdata*.

a) **Confidentiality rules for tabular data**

Confidentiality rules can be divided into two approaches: *active* and *passive*. Passive confidentialising (or confidentialisation) is traditionally limited to international trade in goods statistics, where it is applied only if the dominant enterprise in a tabulation cell (i.e., the enterprise with the largest value) specifically asks for it. Active confidentialising per defined confidentiality rules, is applied in almost all other statistical areas.

NSOs throughout the world most commonly apply the following three confidentiality rules for protecting tabular data:

- **Number criterion**, i.e., applying a minimum requirement of, e.g., three observations in a table cell, for the relevant data in the cell to be published.
- **Dominance criterion** for economic variables (e.g., sales or value-added) is applied. This means that if the largest or two largest businesses together account for a dominant share (e.g., 85%) of the value of a given table cell, confidentialising is applied.
- **Secondary confidentialising** (or **residual disclosure**); after sensitive cells have been identified and their values suppressed there is still the possibility that the suppressed values can be identified from the values in cells that have not been suppressed. This is referred to as residual disclosure. The simplest example is a one-dimensional table of counts or qualities in which the value of one cell has been suppressed, but the total of all cells is published. In this case, the suppressed cell's value can readily be deduced by subtracting the values of all other cells from the total. All output tables have to be checked for residual disclosure and other cells suppressed to ensure that it does not occur. The overall number of cells suppressed should be minimised to ensure that as many data as possible are published.

b) **Statistical disclosure control**

Statistical disclosure control methods are processes and procedures used to reduce the risk that statistical units are identified when the statistical data are being published. These include:

- **Tabular data protection** for aggregate information on respondents presented in tables (using suppression, rounding and interval publication);
- **Microdata protection** for information on statistical units (using local suppression, sampling, global recoding, top and bottom coding, rounding, rank swapping and micro aggregation).

If the value of a sensitive cell is published, disclosure is said to have occurred, violating the requirement that no confidential data be revealed. Thus, ensuring that there are no sensitive

cells in output tables is one requirement for preserving confidentiality. Typically, the value of a sensitive cell is suppressed in the output table, meaning that, instead of being published, it is replaced by an asterisk or other special symbol with a note indicating the reason, i.e., preservation of confidentiality. Automated systems for disclosure control can be integrated into the tabulation solutions, thus providing *confidentiality on the fly* for any query that the users may request.

Software solutions that automate statistical disclosure control are available on the market, as discussed in Chapter 11.8.5 - *Confidentiality and disclosure control*.

Links to guidelines, best practices and examples:

- [Statistics Denmark's data confidentiality policy](#);
- [UNECE: Managing Statistical Confidentiality & Microdata Access Principles and Guidelines of Good Practice](#).

9.3.2 Systems for analysis

9.3.2.1 Commercial and free open-source systems for data analysis

It is safe to assume that almost every producer of official statistics uses one or more commercial or open-source software packages in the production of statistical data, including for data analysis. While NSOs have used some packages (such as SAS) since the early mainframe days, others such as open-source R have gained popularity more recently.

The purpose of this section is not to recommend the use of a particular software system for analysis, but rather to list possible options and to provide guidance on possible criteria for selection. Below are links to each of the most commonly used statistical software packages. More options are provided in Chapter 14.7 - *Specialist statistical processing/analytical software*.

- a) [SAS](#) is a software suite that can discover, alter, manage and retrieve data from various sources and perform statistical analysis on them. See Chapter 14.7 - *sub-section on SAS*.
- b) [SPSS Statistics](#) is a statistical software platform from IBM by means of which a user can analyse and better understand its data and solve complex business and research problems. See Chapter 14.6 *sub-section on SPSS*.
- c) [Stata](#) is statistical software that enables users to analyse, manage, and produce graphical visualizations of data. See Chapter 14.6 *sub-section on Stata*.
- d) [R \(Project for Statistical Computing\)](#) is a language and environment for statistical computing and graphics. See Chapter 14.6- *sub-section on R*.
- e) [Minitab](#) is a general-purpose statistical software package used as a primary tool for analysing research data. See Chapter 14.6 – *sub-section on Minitab*.

Selection of the appropriate system for data analysis is often *path-dependent*. If a particular system is already being used somewhere else in the NSO, it may be difficult and time-consuming to use another system as processes, procedures and customisation are already in place.

Licensing costs are often a limiting factor. Implementing an advanced enterprise-grade statistical system may be too expensive. Availability of local knowledge and training may also nudge an NSO towards a specific solution. Statistical procedures are prewritten in some systems, and recently NSOs have started promoting the sharing of procedures and code, mostly based on open-source platforms (discussed in detail in chapter 14.2.9 - *Open-source software*).

9.3.2.2 Systems for seasonal adjustment

There are multiple seasonal adjustment packages available of which the most commonly used are listed below and further described in Chapter 14.7 - *Specialist statistical processing/analytical software*.

- a) [X-12 ARIMA](#), US Census Bureau.
- b) [TRAMO-SEATS](#), Department of Statistics, National Bank of Spain.
- c) [X-13 ARIMA-SEATS system](#), which combines X-12 ARIMA and TRAMO-SEATS, developed and supported by the US Census Bureau.
- d) [Jdemetra+](#), also combines X-12 ARIMA and TRAMO-SEATS, developed by the Department of Statistics, in the National Bank of Belgium for the ESS Seasonal Adjustment Group.

9.3.2.3 Systems for confidentiality and disclosure control

As output tables are typically voluminous and may be inter-related, identifying and preventing disclosure is not a process that can readily be done manually. Thus, an NSO should either acquire a confidentiality checking and disclosure control tool or develop a tool of its own. The acquisition is recommended to save development costs. However, as confidentiality checking, and disclosure control tools are not readily available commercially (there being very little demand for them outside the realm of official statistics) acquisition is likely to be from another NSO. Two well-known examples are as follows and further described in Chapter 11.8.5.2 - *Confidentiality checking and disclosure control tools*:

- a) **ARGUS, Statistics Netherlands**: as described in [ARGUS Users' Manual Version 3.3](#), the purpose of Γ -ARGUS is to protect tables against the risk of disclosure. This is achieved by modifying the tables so that they contain less detailed information. A twin application, μ -ARGUS protects microdata files. Both applications have been rewritten in [open source](#).
- b) **G-Confid, Statistics Canada**: as described in [G-Confid: Turning the tables on disclosure risk, 2013](#), *G-Confid* is a generalized system that can deal with potentially voluminous multi-dimensional tables and that can incorporate new approaches.

9.4 National accounts

9.4.1 System of National Accounts (SNA)

The [System of National Accounts \(SNA\)](#) is the internationally agreed standard set of recommendations on how to compile measures of economic activity. The central role of national accounts (NA) based on the SNA is critical. There is no other such widely accepted

and powerful integrating tool for social and demographic statistics. Its use in identifying weaknesses and gaps in basic statistics is clear. Moreover, its role extends beyond the production of data on the condition of the economy at regular intervals. Part and parcel of estimating the broad macroeconomic aggregates is the related task of taking an inventory of, and influencing, the corresponding incoming economic data.

The SNA describes a coherent, consistent and integrated set of macroeconomic accounts in the context of a set of internationally agreed concepts, definitions, classifications and accounting rules. In addition, it provides an overview of economic processes, recording how production is distributed among consumers, businesses, government and foreign nations. It shows how income originating in production, modified by taxes and transfers, flows to these groups and how they allocate these flows to consumption, saving and investment. Consequently, the national accounts are one of the building blocks of macroeconomic statistics, forming a basis for economic analysis and policy formulation.

As a conceptual framework, the SNA provides an overarching framework for standards in other economic statistics domains, facilitating the integration of these statistical systems to achieve consistency with the national accounts. It does this by defining the basic elements of economic statistics such as definition of units; valuation principles; accounting rules; the production boundary; and the assets boundary etc. This approach means that data from many collections can be, and indeed are, utilized to populate the National Accounts in countries. Indeed, as the SNA is a conceptual standard (as opposed to a collections standard) data from numerous sources, including non-survey data sources, can be integrated into the accounts. As such, the National Accounts are well placed to take advantage of administrative data and other (including big) data sources.

The SNA is intended for use by all countries, having been designed to accommodate the needs of countries at different stages of economic development. Another strength is that the articulation of the SNA is sufficiently robust that a great deal of flexibility can be applied in its implementation while still retaining integrated, economically complete and internally consistent accounts.

The SNA exhibits another form of flexibility by incorporating the concept of satellite accounts that are intended for special purposes without altering the SNA's globally accepted framework. Many NSOs use satellite accounts to provide alternative views of economic activity that their national users require. Examples are the Tourism Satellite Accounts (further discussed in Chapter 9.8.1.2' *Tourism Satellite Accounts* ') and the Non-Profit Institution Satellite Accounts.

The international community is also taking advantage of this flexibility to build standards that link the traditional economic focus of the SNA to other related areas of policy need. An important example is the development of the System of Economic-Environmental Accounts (further discussed in Chapter 9.6 '*System of Environmental-Economic Accounting*'), an accounting framework that integrates economic and environmental data using concepts, definitions and classifications consistent with the SNA. Another example is the development of Labour Accounts that link the National Accounts to labour market outcomes (further discussed in Chapter 9.8.1.1 - *Glossary of Tourism Terms*).

9.4.1.1 System of National Accounts 2008

The most recent version of the SNA is the [System of National Accounts 2008 \(2008 SNA\)](#). It is the fifth version of the SNA, the first of which was published in 1953. The 2008 SNA does not include any fundamental or comprehensive changes that would impede a smooth transition from the use of the previous version, namely the 1993 SNA (discussed in the next subsection). Furthermore, consistency with related manuals, such as those on the balance of payments, government finance statistics and monetary and financial statistics, was an important consideration in the update.

The 2008 SNA starts with an introduction and an overview and then presents the accounting rules, the accounts and tables, and their integration. These subjects are the topics of chapters 1-17. Chapters 18 to 29 elaborate on various aspects of the accounts provide details about their presentation and describe some possible extensions to improve the usefulness of the accounts for a wide range of purposes.

The European Union, has published the [European system of national and regional accounts \(ESA\) 2010](#), which is a version of the 2008 SNA tailored to the EU's specific needs.

Countries sometimes publish the concepts, sources and methods they use in compiling their national accounts. These are invariably based on, but may not implement precisely, the SNA 2008 or earlier versions. An extract from such a publication is presented below. It contains a nice summary of what a user needs to know about the national accounts.

As detailed in the [Australian System of National Accounts Concepts, Sources and Methods 2015](#), the Australian System of National Accounts (ASNA) is based on the international standard 2008 SNA and the BPM6. It provides a systematic statistical framework for summarising and analysing economic events, the wealth of an economy, and its components.

The principal economic events recorded in the national accounts are production, consumption, and accumulation of wealth. The national accounts also record the income generated by production, the distribution of income among the factors of production and the use of the income, either for consumption or acquisition of assets. Additionally, they record the value of the economy's stock of assets and liabilities, and the events, unrelated to production and consumption that bring about changes in the value of the wealth stock. Such events can include revaluations, write-offs, growth and depletion of natural assets, catastrophes, and transfers of natural assets to economic activity.

The national accounting framework comprises a set of accounts that are: balanced using the principles of double-entry accounting and fully integrated in that there is a balance between the value of assets and liabilities at the beginning of an accounting period, the transactions and other economic events that occur during the accounting period, and the closing values of assets and liabilities.

Accounts for the economy as a whole are supported by accounts for the various sectors of the economy, such as those relating to the government, households and corporate entities. The framework also embraces other, more detailed, accounts such as financial accounts and input and output (I-O) tables. It also provides for additional analyses through social accounting matrices and satellite accounts designed to reflect specific aspects of economic activity such as tourism, health and the environment. By applying suitable price measures, the national

accounts can be presented in volume terms as well as in current prices. The national accounts' time series can also be adjusted to remove seasonal distortions and to disclose trends.

In general terms, the main purpose of the national accounts is to provide information that is useful in economic analysis and formulation of macroeconomic policy. The economic performance and behaviour of an economy as a whole can be monitored using information recorded in the national accounts. National accounts data can be used to identify causal relationships between macroeconomic variables and can be incorporated in economic models used to test hypotheses and make forecasts about future economic conditions. Using national accounts data, analysts can gauge the impact of government policies on sectors of the economy, and the impact of external factors such as changes in the international economy. Economic targets can be formulated in terms of major national accounting variables, which can also be used as benchmarks for other economic performance measures, such as tax revenue as a proportion of gross domestic product or government contribution to national saving. Provided that the national accounts are compiled according to international standards, they can be used to compare the performance of the economies of different nations.

In addition, the full range of information available from a comprehensive national accounting system can serve purposes well beyond immediate concerns of macroeconomic analysts. For example, national accounts information can be used to analyse income and wealth distribution, financial and other markets, resource allocation, the incidence of taxes and welfare payments, environmental issues, productivity, industry performance, etc.

Surveys and other statistical systems that employ the concepts in the national accounting framework produce information that is consistent with the national accounts and with other statistics that are based on the national accounts framework.

9.4.1.2 System of National Accounts 1993

The [System of National Accounts 1993 \(1993 SNA\)](#) was the fourth version of the SNA, a significant update of the 1968 version. Many countries are still using the 1993 SNA.

9.4.2 Other related manuals and guidelines

The SNA is accompanied by numerous manuals and guidelines dealing with various aspects of its implementation and extension. The most important of these are presented below.

9.4.2.1 Quarterly National Accounts Manual, 2017 IMF

The [IMF Quarterly National Accounts Manual](#) provides conceptual and practical guidance for compiling quarterly national accounts (QNA) statistics. It offers a comprehensive review of data sources, statistical methods, and compilation techniques to derive official estimates of quarterly GDP. The 2017 edition, which upgrades the [first edition](#) published in 2001, improves and expands the previous content based on recent methodological advances, best country practices, and suggestions from QNA compilers and experts.

The Manual provides an internationally accepted framework for producing QNA data. It is fully consistent with the 2008 SNA. Countries should consider the Manual a companion guide to the 2008 SNA regarding specific aspects of quarterly GDP compilation. The methodology and concepts described in the Manual are also consistent with those of other statistical manuals produced by the IMF Statistics Department, including the BPM6 (discussed below), the

[Government Finance Statistics Manual 2014](#), and the [Monetary and Financial Statistics Manual and Compilation Guide](#). The [2001 version of the Manual](#) is still available for countries using the 1993 SNA.

9.4.2.2 Essential SNA: Building the Basics, 2014, Eurostat

The [Eurostat Essential SNA Handbook](#) supports the successful implementation of the 2008 SNA, providing instruments to support analysis of basic data when preparing national accounts statistics for the first time or improving the existing situation. The 2014 handbook develops the work undertaken over the previous four years. It includes the most recent developments of the Inter-secretariat Working Group on National Accounts (ISWGNA) and its work on monitoring 2008 SNA implementation.

9.4.2.3 Handbook on Supply, Use and Input-Output Tables with Extensions and Application, 2018, UNSD

The [UNSD Handbook on Supply, Use and Input-Output Tables](#) was updated to refer to the latest versions of the international standards, in particular, the 2008 SNA and the BPM6. It is one of a series of handbooks on national accounting (presented below in this subsection) that supports the 2008 SNA. Its objective is to provide step-by-step guidance for the compilation of supply and use tables (SUTs) and input-output tables (IOTs) and an overview of the possible extensions of SUTs and IOTs that increase their analytical usefulness. The [1999 Handbook of Input-Output Table Compilation and Analysis](#) is still available for countries using 1993 SNA.

9.4.2.4 Handbook of National Accounting: Financial Production, Flows and Stocks in the System of National Accounts, 2014, UNSD

The [UNSD Handbook of National Accounting: Financial Production, Flows and Stocks in the System of National Accounts](#) provides practical guidance on the calculation and allocation of the production of various types of financial services and issues related to the compilation of the financial account and balance sheets by institutional sector in the context of from-whom-to-whom relationships.

9.4.2.5 Satellite Account on Non-profit and Related Institutions and Volunteer Work, 2018, UNSD

The [UNSD Handbook on Satellite Account on Non-profit and Related Institutions and Volunteer Work](#) is an update of the [Handbook on Non-Profit Institutions \(NPIs\) in the System of National Accounts \(United Nations, 2003\)](#). It reflects the most recent revisions of the underlying international economic accounting standards (notably the 2008 SNA) and classifications (notably ISIC Rev. 4), and experiences and country practices in implementing the guidelines for NPI satellite accounts. The Handbook brings various efforts together to offer comprehensive methodological guidance for creating, in a manner that is compatible with the 2008 SNA, a coherent satellite account on what is called the ‘third sector’, or ‘social economy sector’ (abbreviated ‘TSE sector’) that embraces three components:

- a) NPIs that are not controlled by the government;
- b) certain related institutions that are not controlled by the government, including in-scope cooperatives, mutual societies, and social enterprises; and

c) volunteer work.

9.4.2.6 Guidelines on Integrated Economic Statistics, 2013, UNSD

The [UNSD Guidelines on Integrated Economic Statistics](#) provide practical guidance on advancing consistency, coherence and reconciliation of statistical information by applying the methodology of integrated economic statistics using the System of National Accounts 2008 as the overarching conceptual framework. The Guidelines also provide case studies and other practical material to share experiences in implementing an integrated statistical production approach in national statistical systems.

9.4.2.7 Handbook of National Accounting: Household Accounting Experience in Concepts and Compilation, Vol.1: Household Sector Accounts, 2000, UNSD

Volume 1 of the [UNSD Handbook of National Accounting: Household Accounting Experience in Concepts and Compilation](#) focuses on household sector accounts and their possible extensions described in the 1993 SNA. (It is also useful for countries using 2008 SNA.) It describes the experiences of countries with regard to conceptual and compilation issues of the household sector and satellite accounting. It focuses on the concept of the informal sector, presents country and case studies on the compilation of household sector accounts, and describes the links of the household sector with other selected sectors.

9.4.2.8 Handbook of National Accounting: Household Accounting Experience in Concepts and Compilation, Vol.2: Household Satellite Extensions, 2000, UNSD

Volume 2 of the [UNSD Handbook of National Accounting: Household Accounting Experience in Concepts and Compilation](#) focuses on household sector accounts and their possible extensions described in the 1993 SNA. (As for Volume 1, it is also useful for countries using 2008 SNA.) It describes the experiences of countries with regard to conceptual and compilation issues of the household sector and satellite accounting. It is primarily devoted to various types of household satellite accounting, including labour accounting and socio-economic accounting. It also describes various social indicators, problems in measuring them and potential data sources.

9.4.2.9 Handbook of National Accounting: Links between Business Accounting and National Accounting, 2000, UNSD

The [UNSD Handbook of National Accounting: Links between Business Accounting and National Accounting](#) refers to SNA 1993 but is still applicable for countries using the 2008 SNA. It covers the conceptual and practical aspects of linking business accounts to national accounts through countries' experiences. It describes how to read corporations' financial statements, the similarities and differences between concepts in business accounts and economics, and the necessary adjustments to be made to business accounts to obtain national accounts for economic analysis. Its main target audience is staff responsible for the compilation of national accounts and survey specialists.

9.4.2.10 Handbook of National Accounting: Use of Macro Accounts in Policy Analysis, 2002, UNSD

The [UNSD Handbook of National Accounting: Use of Macro Accounts in Policy Analysis](#) is about the interaction between the scope of macro accounting, the compilation of macro accounts, and analysis. Traditionally policy analysts use statistics to monitor developments and make decisions. This handbook emphasizes the role of macro accounting as an instrument rather than a dataset. The term 'macro accounts' refers to the feature of macro accounts to reconcile separate statistics into a coherent data set and offers macro accounts as an instrument to policy analysts.

9.4.2.11 Manual on regional accounts methods, 2013, Eurostat

Regional accounts are a regional specification of the national accounts. They play an important role in the formulation, implementation and evaluation of regional policies. In particular regional indicators resulting from the regional accounts are used for assessing regional disparities.

While Chapter 13 of ESA 2010 contains basic rules for regional accounts, this [Eurostat Manual on regional accounts methods](#), provides detailed recommendations for their practical implementation in the Member States.

9.4.2.12 Measuring the Non-observed Economy – a Handbook, OECD, IMF, ILO and CIS Statistics

Complete coverage of economic production is a vital aspect of the quality of the national accounts. This *exhaustiveness* is hard to achieve because of the difficulties in accounting for certain types of productive activities. Activities that are missing from the basic data used to compile the national accounts because they are underground, illegal, informal, household production for own final use, or due to deficiencies in the basic data collection system are referred to as *non-observed*. They are said to comprise the non-observed economy (NOE), and including them in the national accounts is referred to as a measurement of the NOE.

Given the wide range of possible approaches to NOE measurement, there is a need to identify and promote international best practice. This is the aim of the [Handbook on Measuring the Non-observed Economy – a Handbook, OECD, IMF, ILO and CIS Statistics](#). It presents a systematic strategy for achieving exhaustive estimates of gross domestic product consistent with international standards and, in particular, with the 1993 SNA.

9.4.3 Organizational arrangements

9.4.3.1 Location of national accountants

Given that compilation and management of the NA require very specialized skills and good liaison with key users, the location and training of the national accountants (i.e., those responsible for the national accounts) and their communications with staff in the relevant subject matter areas are vital factors.

In most countries, the unit responsible for the compilation of the national accounts (NA Unit) is contained within the NSO. This is the preferred arrangement as it makes it relatively easy for the NSO to ensure appropriate staff are recruited and trained, that they have easy access to

the sources of data input to the NA and that they communicate effectively with the subject matter experts responsible for collecting these data (as further discussed in the next subsection).

In some countries, the NA Unit is in another producer of statistics within the NSS, often the Central/Reserve Bank, sometimes a research unit within the Ministry of Finance. Whilst this may have the merit of placing the NA Unit close to a major user, it is not a recommended practice. More specifically, in conformity with UN Statistical Commission decision 51/108c, to comply with the Fundamental Principles of Official Statistics, national accountants should be independent of the users of these statistics such as the monetary authorities.

If the NA Unit is not within the NSO then, in its role as NSS coordinator, the NSO should have a memorandum of understanding (MOU), or equivalent, with the NA Unit. The MOU should cover:

- a) the data required by the NA Unit from the NSO;
- b) the training (if any) required by the NA Unit to be delivered by the NSO;
- c) the national accounting outputs to be produced and disseminated by the NA Unit;
- d) the schedule and draft agenda for regular and frequent meetings at working level to review the production and transfer of data as agreed and to discuss any forthcoming events or changes in circumstances that might require changes to procedures or lead to improvements in procedures;
- e) the schedule and draft agenda for regular six-monthly meetings at top management level to ensure that everything is taking place as planned, consider changes proposed at the working level that require top management authorisation, and respond to any concerns raised by top management.

9.4.3.2 Relationships with subject matter experts

As noted above, and for the following reasons, it is vital that the NA Unit and relevant subject matter experts have highly effective communications.

- a) First, the subject matter staff determine what data actually become available to the NA Unit for compiling the NA. In this sense, the NA Unit is a particularly important user, perhaps the most important user, for some subject matter areas. In some countries, the NA Unit itself is responsible for some direct data collection. This was more common in the past. It is not recommended because staff in subject matter and service areas are chosen for their skills in conducting surveys, whereas NA staff are not.
- b) Second, in compiling the accounts, the NA Unit staff have the opportunity to thoroughly assess the various incoming datasets, and their limitations, in terms of coverage, content, accuracy, timeliness, and coherence, and to feedback their observations and recommendations for improvements to the subject matter experts.

Relationships should be built on good communications between subject matter area and NA unit staff, and on common strategies and objectives at the senior management level. Communications can take the form of regular and frequent meetings at working level and regular, but less frequent, meetings at the senior management level. NSO top management should set priorities and stay informed through regular meetings of the chief statistician and

immediate deputies with the NA Unit head. This is especially important where the NA Unit and subject matter areas are in different agencies or report to different deputies, as is further discussed in Chapter 5.4.3 - *Internal communication and coordination*.

9.4.4 Further examples of national practices

9.4.4.1 Statistics Finland National Accounts

As detailed in [ESA 2010 GNI Inventory, Finland](#), Statistics Finland compiles the gross domestic product (GDP) and the gross national income (GNI) in Finland in accordance with the European System of Accounts (ESA 2010). The inventory includes only a report for calculating figures at current prices. Constant price (volume, amount) methods are not discussed. It includes the general description of the compilation of National Accounts, calculation methods according to various approaches (output, income, expenditure), account balancing methods, ensuring exhaustiveness of data, and describes the main data sources.

The main data are published on Statistics Finland's website. Statistical databases contain more detailed data. A press conference is arranged to discuss the first preliminary data. All published data are also available in the Astika time-series database. In addition, statistical data are reported to Eurostat and thus become published in both Eurostat's and the OECD's databases.

9.4.4.2 National Accounts Benchmarking at Statistics South Africa

The outcome of the five-yearly benchmarking and rebasing of South Africa's national accounts statistics, a project jointly undertaken by Statistics South Africa (Stats SA) and the South African Reserve Bank (SARB), is disseminated in detail in [South Africa's national accounts 1946–2014, An overview of sources and methods Supplement to the South African Reserve Bank, Quarterly Bulletin March 2015](#).

Comprehensive revisions to South Africa's national accounts statistics are typically undertaken every five years in order to incorporate new or additional information that became available, to reclassify transactions where necessary and to rebase estimates at constant prices. Market developments and the concomitant emergence of new products and services furthermore continually necessitate changes to compilation practices.

In addition to the comprehensive longer-term revision of national accounts aggregates and time-series data, the revision also reflects conceptual, methodological and classification changes following the partial implementation of the latest edition of the System of National Accounts (2008 SNA).

The five-yearly comprehensive revisions differ from the regular annual national accounts' revisions due to the scope of the changes and the length of the period to which the revisions apply. The most recent set of revisions drew on information from relevant censuses released by Stats SA during the period 2009 to 2014, a number of sectoral surveys and technical reports, and more detailed producer and consumer price information. Most notable were the 2010/11 Income and Expenditure Survey of Households; the results of the Population Census of 2011; the 2010 General Household Survey; various issues of the Annual Financial Statistics (AFS) survey; various issues of the Quarterly Financial Statistics (QFS) survey; the South African National Survey of Research and Experimental Development compiled by the Centre for Science, Technology and Innovation Indicators on behalf of the Department of Science and

Technology (DST); technical reports from the Department of Agriculture, Forestry and Fishing; the Abstract of Agricultural Statistics for various years; and information sourced from the Department of Human Settlements.

9.4.5 Further development

The 2008 SNA is continuously reviewed to ensure its relevance for measuring new developments in the economy, as well as new socioeconomic phenomena and dimensions introduced in national and international policy frameworks. This review is undertaken, under the auspices of the UNSC, by the Inter-Secretariat Working Group on National Accounts (ISWGNA) with the support of the Advisory Expert Group (AEG), as further described below.

9.4.5.1 Inter-Secretariat Working Group on National Accounts (ISWGNA)

The [Inter-Secretariat Working Group on National Accounts](#) (ISWGNA) is one of the oldest working groups of the UNSC and comprises five organizations, namely Eurostat, IMF, OECD, UNSD and the UN regional commissions; and the World Bank. The ISWGNA mandate, provided by the UNSC, is to:

- a) provide strategic vision, direction and coordination for the methodological development and implementation of the SNA in national, regional and international statistical systems;
- b) revise and update the SNA and develop supporting normative international statistical standards and other methodological documents on national accounts and supporting statistics;
- c) promote the development of databases at international, regional and national level on national accounts statistics;
- d) promote the implementation of the SNA and supporting statistics; and
- e) promote the use of national accounts and supporting statistics in policy formulation.

9.4.5.2 Advisory Expert Group (AEG)

The aim of the [Advisory Expert Group \(AEG\)](#) is to assist the ISWGNA in resolving issues on the research agenda of the SNA and emerging research issues and to assist the ISWGNA in the review of the SNA implementation programme. The composition of the AEG reflects the global community representing all regions in the world. It comprises 18 members, not including the five representatives of the ISWGNA organizations. The period for which a member is invited to serve in the AEG depends on the particular issue that the ISWGNA needs to consider but is at least three years.

The AEG was initially formed in 2002 to assist the ISWGNA with the update of the 1993 SNA. At its 41st session in 2010, the UNSC re-established the AEG to support the ISWGNA in its work.

9.5 Balance of Payments

9.5.1 Balance of Payments and International Investment Position Manual, Sixth Edition

9.5.1.1 Conceptual Framework

The balance of payments (BoP) measures economic transactions between economic entities resident in a country and the rest of the world. It also draws a series of balances between inward and outward transactions, provides a net flow of transactions between the country's residents and the rest of the world, and reports how that flow is funded. BoP statistics are typically compiled at the same time as the national accounts. The BoP is an alternative presentation of the rest of the world sector in the national accounts, which provides more detail on international transactions and uses many common data sources.

More precisely, the relationship between the [BoP](#) and the SNA is as follows. The international accounts include the balance of payments, the international investment position (IIP), and the other changes in financial assets and liabilities accounts. The balance of payments statement is equivalent to the rest of the world accounts of the SNA, and the IIP statement may be considered a component of the sectoral balance sheet accounts of the SNA.

Published by the IMF, and most recently revised in 2013, the sixth edition of the [Balance of Payments and International Investment Position Manual \(BPM6\)](#) updates the fifth edition (BPM5) that was released in 1993. The update was undertaken in close collaboration with the IMF Committee on Balance of Payments Statistics and involved extensive consultations with national compilers, and regional and international agencies over many years. It was drafted in parallel with the 2008 SNA to retain consistency between the two systems.

Like earlier editions, the BPM6 provides guidance on the recording of cross-border transactions and positions according to a set of internationally agreed guidelines. In addition:

- a) it provides greater clarity and details on an expanded range of international activities that affect countries than BPM5;
- b) it takes into account globalization (for example, currency unions, cross-border production processes, complex international company structures, and issues associated with labour mobility, such as remittances) and builds on the growing interest in examining vulnerability using balance sheet data (for example, greater elaboration of balance sheet components);
- c) it contains guidance on new financial instruments and financial activities linked to innovation (for example, on the treatment of short positions, goods under financial leases, and financial intermediation services indirectly measured); and
- d) it makes the international investment position (IIP) more central to the framework than does BPM5.

9.5.1.2 Example of national practice

An example of a national application of BPM6 and a good description of the BoP concepts and procedures is provided by the UK Office for National Statistics in a document entitled the [Balance of payments QMI](#).

The UK BoP measures economic transactions between economic entities resident in the UK and the rest of the world. It also draws a series of balances between inward and outward transactions, provides a net flow of transactions between UK residents and the rest of the world, and reports how that flow is funded.

The UK's BoP statistics are compiled at the same time as the national accounts. The BoP is an alternative presentation of the rest of the world sector, which is a component of the sector and financial accounts (SFA) and uses many common data sources. A BoP [statistical bulletin](#) and [time series dataset](#) is published quarterly on the ONS website, 90 days after the end of the period to which the data relate.

Eurostat has established an [annual BoP quality reporting](#) process for all European Union (EU) member states. This is one of the provisions in the [EU Regulation of BoP Statistics](#). The reports are based on quantitative measures of quality developed by Eurostat, which align with those assessed within this framework.

The conceptual framework of the UK BoP corresponds to that of the BPM6. This provides objective and coherent international standards to make data for the UK and other countries comparable, reflecting the needs of international and domestic users. The UK economic territory excludes the Channel Islands and the Isle of Man, which have their own fiscal and monetary authorities.

The UK BoP forms part of the broader system of UK National Accounts. The national accounts are a closed system in which both sides of every transaction involving a resident economic entity are recorded. A set of accounts, the 'rest of the world account', capture transactions that involve economic relationships with non-resident entities. The rest of the world accounts are presented from the perspective of non-residents; the reverse is true for the BoP presentation where the accounts are represented from the perspective of residents.

There are a number of different data sources used in the production of SFA and BoP statistics, some of which are ONS surveys and some of which are provided by partners such as the Bank of England (BoE) and HM Revenue and Customs (HMRC).

BoP estimates are used by the Bank of England and HM Treasury to inform decisions on monetary and fiscal policy. The Department for International Trade also uses BoP estimates to identify international trade partners. International users include Eurostat and the IMF; Eurostat uses UK figures to compile aggregate EU accounts, and the IMF collate data as a means of ensuring financial stability and sustainability.

BoP estimates are also used for feeding data into their own regular analyses of the macroeconomy, and also into more ad-hoc and in-depth analyses. For example, the importance of trade with particular countries or groups of countries, the importance of trade in different commodities or services, identifying comparative advantage, changes in import and export prices, economic contribution from trade and income, and looking at inward and outward investment. These analyses and briefings are aimed to inform ministers or decision-makers of the current or historical situation and provide evidence for the policy debate.

BoP data are also of interest to a wider range of user groups including the media, researchers and other regional, national and international policymakers. Some users focus primarily on the developments in the current account and their financing, including the sustainability of the current account imbalances in the longer-term and the need for policy adjustments. Others

focus on an analytic presentation, classifying the standard components of BoP and their relationship to other components (for example, trade and direct investment, and foreign direct investment and productivity). The BoP allows a sector breakdown of the financial account and their relationship to domestic sources of finance.

9.5.2 Other related guidelines and manuals

9.5.2.1 Balance of Payments and International Investment Position Compilation Guide (BPM6 CG), 2014, IMF

The [BPM6 CG](#) is a companion document to the BPM6. It updates the guide that was released in 1995 to accompany the BPM5. Its purpose is to show how the conceptual framework described in the BPM6 may be implemented in practice. It is not intended as a stand-alone manual. In other words, users of the Guide should be familiar with the BPM6. Appendix 6 of the Guide explains the relationship between the BPM6, and the 2008 SNA as outlined in Chapter 9.5.1.1- *Conceptual Framework*. In describing how the international accounts statements may be compiled, the Guide thus illustrates how the rest of the world account of the SNA may be compiled.

The Guide covers:

- a) extraction of data from collections (e.g., international merchandise trade statistics, migration statistics, and other official sources) over which the compiler may have some influence but not full control;
- b) extraction of data from collections (such as reporting systems for foreign exchange and other international transactions and surveys of businesses) managed, either solely or jointly with other statistical compilers, by the balance of payments compiler;
- c) compilation of the international accounts, including the balance of payments, supplementary balance of payments series, and the IIP statement;
- d) international accounts data management, publication, dissemination, and communication with users;
- e) evaluation and development of data sources and compilation methods as necessary; and
- f) assessment of data quality.

9.5.2.2 Balance of Payments Coding System, 2012, International Monetary Fund

The IMF BoP Coding System was developed by the International Monetary Fund in cooperation with Eurostat, the OECD, and the ECB. It is designed to facilitate the exchange of data on the balance of payments, international investment position, international trade in services, and foreign currency liquidity among these organizations, their member states, and other interested organizations or entities. The system also appears as Appendix 9 Balance of Payments Coding System within the BPM6.

9.5.2.3 Extended Balance of Payments Services Classification 2010 (EBOPS 2010)

The [EBOPS 2010 classification](#) appears as Annex I in the [Manual on Statistics of International Trade in Services 2010](#). It provides a breakdown of the Balance of Payments Trade in Services item (debit and credit) as defined in BPM6, by types of services. The classification thereby

meets a number of user requirements, including the provision of more detailed information on Trade in services as required in connection with the General Agreement on Trade in Services (GATS).

9.5.3 Further development

The [IMF Committee on Balance of Payments Statistics](#) was established in 1992 to:

- a) oversee the implementation of the recommendations contained in the reports of two IMF Working Parties that investigated the principal sources of discrepancy in the global balance of payments statistics;
- b) advise the IMF on methodological and compilation issues in the context of the balance of payments and international investment position statistics; and
- c) foster greater coordination of data collection among countries.

The [Committee terms of reference](#) provide more details.

9.6 Environmental accounts

9.6.1 System of Environmental Economic Accounting

Policy and decision makers require consistent, comparable and comprehensive statistics and indicators that consider interlinkages and dependencies across different domains. Integrated policies depend upon integrated information. Unfortunately, in many cases, the production and dissemination of the various statistics relevant to sustainable development have remained relatively disparate, following the traditional *data silo* approach, rather than an integrated systems approach. Moreover, given that data collection often involves many different agencies with different scopes of responsibility, there is usually limited collaboration in the collection, management and sharing of data across institutions. This is particularly true for environmental information and policies.

To address these problems, the [System of Environmental-Economic Accounting \(SEEA\)](#) is the international statistical standard for measuring the environment and its relationship with the economy. It follows an integrated systems approach. In particular, it applies an accounting approach to measuring the environment. As such, the concepts, definitions and classifications are broadly consistent with the SNA, thus facilitating the integration of environmental and economic statistics.

The SEEA has two parts: the [SEEA-Central Framework \(SEEA-CF\)](#), the [SEEA-Experimental Ecosystem Accounting \(SEEA-EEA\)](#). In addition, the [SEEA Applications and Extensions](#) illustrate to compilers and users of the SEEA-CF how the information can be used in decision making, policy review and formulation, analysis and research.

The SEEA-CF looks at individual environmental assets, such as water, energy, forests and fisheries resources and how these assets are extracted from the environment, used within the economy and returned back to the environment in the form of air emissions into the air and the water as well as waste. It was adopted by the UNSC as the first international standard for environmental-economic accounting in 2012.

The SEEA-EEA complements the SEEA-CF and represents international efforts towards a coherent accounting approach to the measurement of ecosystems. Ecosystem accounts enable the presentation of data and indicators of the level and value of ecosystem extent, ecosystem condition and ecosystem services in both physical and monetary terms in a spatially explicit way. The SEEA-EEA is currently [being revised](#) with the intention of reaching agreement on as many aspects of ecosystem accounting as possible by the end of 2020.

Both, the SEEA-CF and SEEA-EEA provide the framework for measuring natural capital and make explicit the relationship between the environment and well-being, which is not depicted through traditional measures of economic activity, such as GDP and national income.

Because of its integrated nature and its reliance on scientific knowledge, the SEEA is a catalyst in bringing together users and producers of information on the environment and the economy. It is also an important tool in enhancing the new role of the NSO as data steward, taking the role of coordinating the production of data, including Big Data, to respond to new policy demands that take the environment into account.

Of course, effective use of the SEEA depends upon good environment statistics being available.

9.6.2 Monitoring sustainable development

A critical aspect of the [2030 Agenda for Sustainable Development](#) is the need for integrated policies that speak to the three pillars of sustainability—economy, society and environment—and how they work together. More specifically, the interlinked nature of the SDGs requires an integrated approach to policy decisions, based on a better understanding of the interactions and trade-offs between the different pillars of sustainability. Thus, the integrated approach of the SEEA is well-suited to the SDGs. By eliminating data silos and highlighting interactions and trade-offs, the SEEA provides a means of monitoring progress towards the SDGs, the post-2020 global biodiversity framework, and the Paris Agreement.

Because the SEEA includes information on both individual environmental assets, such as timber and water, and on ecosystems and how they relate to the economy, it can be used to measure several SDG indicators directly. Overall, it supports direct measurement or supplemental information for 40 indicators within nine SDGs. In addition, SEEA implementation itself forms the basis of Indicator 15.9.1 on progress towards [Aichi Target 2](#). In addition to the SDGs, the SEEA provides a useful framework for informing climate change and biodiversity policies as well as progress towards a circular economy.

While the SEEA is well suited to help countries monitor progress towards the SDGs, it does not propose or recommend any single indicator or basket of indicators for use in developing and accessing policy. In fact, one of its major strengths is that it integrates statistics for multiple purposes and multiple scales of analysis. At the same time, there are several key aggregates and indicators that can be directly derived from the SEEA accounting tables and are of interest to policy analysis and target-setting in various domains. Importantly, because the SEEA takes a systems approach and is an international statistical standard, all aggregates and indicators derived from the SEEA are consistent and comparable.

9.6.3 Other guidelines and manuals

In addition to the SEEA-CF, SEEA-EEA there are guidelines and manuals, which can be found online at the SEEA [knowledge base](#), and which are summarised below.

9.6.3.1 Technical Recommendations in support of the SEEA-EEA

The [Technical Recommendations](#) serve as an intermediate step in the transition from the 2012 SEEA-EEA to its revision, which is scheduled for completion in 2021. The aims to support ecosystem accounting-related testing and research while elaborating the concepts presented in the SEEA EEA.

9.6.3.2 SEEA for Agriculture Forestry and Fisheries

The [SEEA for Agriculture, Forestry and Fisheries \(SEEA AFF\)](#) is a statistical system for organizing data to enable the description and analysis of the relationship between the environment and the economic activities related to agriculture, forestry and fisheries. It is fully consistent with the SEEA-CF. It applies and expands the SEEA-CF concepts and methods related to agriculture, forestry and fisheries.

9.6.3.3 SEEA-for Energy

The [SEEA for Energy \(SEEA-Energy\)](#) is a multi-purpose statistical framework for organizing energy-related statistics. It describes the energy mix used by the economy, the stocks and changes in stocks of energy and mineral resources including depletion, the inventories of energy held within the economy as well as current and capital expenditures to extract, exploit and distribute energy resources. It also elaborates the compilation of energy accounts, building on energy statistics and balances. The SEEA Energy supports analysis of the role of energy within the economy, the state of energy inputs and various energy-related transactions of environmental interest. It is fully consistent with the SEEA-CF. Energy information is typically presented in physical terms, but the SEEA-Energy also applies monetary valuations to various stocks and flows, based on the SEEA accounting approach.

9.6.3.4 SEEA for Water

The [SEEA for Water \(SEEA-Water\)](#) is an integrated approach to water monitoring, bringing together a wide range of water-related statistics across sectors into one coherent information system. The SEEA-Water is the conceptual framework and set of accounts which presents hydrological information alongside economic information in a consistent way. It is fully consistent with the SEEA-CF.

9.6.3.5 Enhance Natural Capital Accounting Policy Uptake and Relevance

Four papers on the policy applications of the SEEA have been developed under the BMZ-funded project *Enhance Natural Capital Accounting Policy Uptake and Relevance (EnhaNCA)*. They include three separate papers on issues in biodiversity, climate change, and macroeconomic applications of the SEEA, respectively, and a paper on the overall policy applications of the SEEA.

9.6.3.6 Framework for the Development of Environment Statistics (FDES 2013)

In its 44th session, the UNSC endorsed the revised [Framework for Development of Environmental statistics \(FDES\), 2013](#) as the framework for strengthening country environment statistics programmes and recognized it as a useful tool in the context of the SDGs and the Post-2015 Development Agenda.

The Commission also endorsed:

- a) the [Blueprint for Action](#) which documents a way forward for making the FDES 2013 operational in countries that need guidance in starting or further developing their environment statistics programmes; and
- b) the establishment of the Expert Group on Environment Statistics (further described below) to collaborate with UNSD in developing methodological tools, hands-on guidance, and training material that contribute to the implementation of the FDES.

9.6.4 Examples of national practices

The examples below are from just a handful of the many countries that that UNSD has supported in compiling the SEEA.

9.6.4.1 Brazil

The Brazilian Institute of Geography and Statistics (IBGE) has been one of the pioneers in the compilation of the SEEA in South America. It has made important advances in land cover and compiles land cover and use accounts every two years. Work is also ongoing in developing energy and forest accounts. In addition, under the EU-funded project, [Natural Capital Accounting and Valuation of Ecosystem Services \(NCAVES\)](#), IBGE is piloting SEEA-EEA accounts in the Matopiba region. The project will analyse a number of ecosystem services, such as water flow regulation and soil retention.

9.6.4.2 Mexico

Mexico's National Institute of Statistics and Geography (INEGI) was the first Latin American NSO to compile SEEA accounts. It is also currently participating in the [NCAVES](#) project, in which context it is developing land and ecosystem extent accounts, condition accounts and ecosystem service supply accounts (including carbon storage and sequestration, provision of crops, water supply and coastal protection).

INEGI also compiles water accounts, forest accounts (physical and monetary balance sheets), fisheries accounts and material flow accounts. The accounts are also used to derive the headline indicator *Ecologically-Adjusted Net Domestic Product*, which estimates the costs of natural resources depletion and environmental degradation.

9.6.4.3 India

Work on environmental-economic accounting began in 2011 when a high-level Expert Group was initiated by the Ministry of Statistics and Programme Implementation (MOSPI) with the mandate of developing a framework for green national accounts of India and preparing a roadmap to implement the framework. In 2018, the Central Statistics Office released India's first official environmental-economic accounts containing asset accounts in physical terms for

forests, land, minerals and water. MOSPI is also participating in the [NCAVES](#) project to pilot SEEA EEA accounts in both physical and monetary terms.

9.6.4.4 Indonesia

Badan Pusat Statistik (BPS) compiles both SEEA-CF and SEEA-EEA accounts. Under a [UN Development Account project](#), Indonesia began the compilation of both energy and air emission flow accounts. In addition, BPS compiles asset accounts for land, energy and mineral resources and timber resources. In terms of the SEEA-EEA, Indonesia has developed several accounts with the support of the World Bank Global Program on Sustainability, including ecosystem extent accounts and SEEA EEA accounts for peatlands.

9.6.4.5 Malaysia

The Department of Statistics, Malaysia also participated in the [UN Development Account project](#), compiling energy, air emission and water accounts. Under this project, the Department also developed a [national plan for SEEA implementation](#), outlining priorities and opportunities for inter-institutional collaboration.

9.6.4.6 The Philippines

The Philippines Statistical Authority (PSA) published a Technical Report on Physical Asset Accounts: Asset Accounts for Land Cover (2010-2015). It focuses on the tree-covered areas and presents a short background on the status of forest and how the SEEA CF is operationalized. The PSA also published a report describing its experience in adopting the FDES.

9.6.4.7 Netherlands

Statistics Netherlands compiles both SEEA-CF and SEEA-EEA accounts and has been at the forefront of the implementation of the SEEA EEA. In collaboration with Wageningen University, Statistics Netherlands has developed all the core SEEA EEA accounts in both physical and monetary terms, as well as carbon and biodiversity accounts. It has also developed SEEA accounts for the Dutch North Sea.

9.6.4.8 Kenya

The Kenya Bureau of Statistics (KBS) recently began compiling SEEA accounts under the [UN Development Account project](#). It undertook a pilot compilation of physical energy flow accounts, and now regularly compiles physical energy flow accounts in the economic survey.

9.6.4.9 South Africa

Statistics South Africa (SSA) has been compiling SEEA accounts since 2000, starting with SEEA-Water accounts. It also compiles other SEEA-CF accounts, including energy, minerals and fisheries.

South Africa is also a project country under the [NCAVES](#) project, where it is leading implementation of ecosystem accounting. SSA has piloted accounts for river ecosystems and is now focusing on national ecosystem extent, urban, protected area, marine ecosystems and species accounts.

9.6.4.10 Uganda

The Uganda Bureau of Statistics (UBOS) recently developed a [national plan](#) for SEEA implementation and began compiling SEEA-Water accounts under the [UN Development Account project](#). UBOS has also compiled SEEA-EEA accounts for ecosystem extent and species.

9.6.4.11 United Kingdom

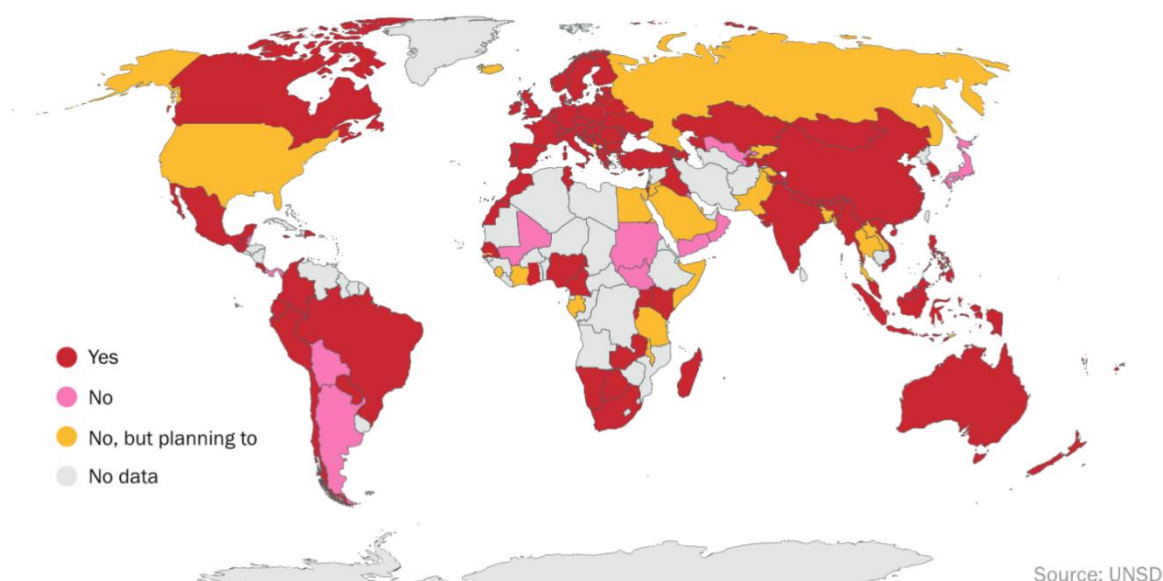
The UK Office of National Statistics (ONS) compiles both SEEA-CF and SEEA-EEA accounts. It provides regularly updated SEEA-EEA accounts in partnership with the UK Department of Environment, Food and Rural Affairs. The UK ecosystem accounts have been developed by integrating bottom-up, spatially disaggregated modelling approaches with data at a national (top-down, aggregate) level. This has enabled a time series of high-level accounts for various broad habitats to be compiled, in both physical and monetary terms.

9.6.5 Further development

9.6.5.1 United Nations Committee of Experts on Environmental-Economic Accounting

The [United Nations Committee of Experts on Environmental-Economic Accounting \(UNCEEAA\)](#) was established by the UNSC 2005 as an intergovernmental body to provide overall vision, coordination, prioritization and direction in the field of environmental-economic accounting and supporting statistics. Its work programme is organized along with the following areas of work: (a) coordination; (b) methodological advances; (c) data collection and development; (d) capacity building; and (e) communication and response to emerging issues. Each of this area is led by a representative from a national statistical office or international agency.

The UNCEEAA has established targets for SEEA implementation. By the end of 2020, the aim is to have at least 100 countries implementing the SEEA-CF and at least 50 countries implementing the SEEA-EEA. This aim is on track to being achieved. As the SEEA often does not require new data collection but rather reorganization of existing data, countries in all regions and at all stages of development are compiling the SEEA, as indicated in Figure 8. In summary, as of the beginning of 2020, over 90 countries have compiled SEEA-CF accounts and over 40 countries have implemented or are currently implementing SEEA-EEA.

Figure 8: Countries implementing the SEEA in 2021

To help advance the SEEA-EEA and its implementation, the UNCEEA is currently undertaking a revision of the SEEA-EEA, with the intention to reach agreement on as many aspects of ecosystem accounting as possible by 2020. The revision has been a collaborative effort between statisticians, national accountants, ecologists, environmental economists, geospatial experts and academia, and the UNCEEA aims to elevate the SEEA-EEA to the level of a standard at the UNSC in 2021. A Forum of Experts bringing together experts from different communities is organized every year to discuss advances in implementation and share experience in implementation and methodological development.

The UNCEEA is also examining the possible integration of the SEEA-CF and SEEA-EEA. Given that they are complementary frameworks, exploring the synergies between the two and creating a unified SEEA framework could bring substantial benefits.

9.6.5.2 London Group on Environmental Accounting

The [London Group on Environmental Accounting](#) held its first meeting in 1993 and since meets more or less annually. The purposes of the Group are:

- a) to play a leadership role in defining international best practices in the theory and practice of environmental accounting within the framework of the SEEA);
- b) to provide a forum for the sharing of national and international expertise in this field;
- c) to assist the United Nations Committee of Experts on Environmental Accounting (UNCEEA) with advancing methodologies and developing statistical standards for environmental accounting;
- d) to encourage the adoption of statistical standards and best practices in the field by promoting the results of the Group's efforts via website, concepts and methods manuals, operational manuals and other means.

The topics covered by the Group to date include:

- a) physical flow accounts (materials, water and energy);
- b) asset accounts for natural resources and land;
- c) environmental activity accounts and related flows;
- d) ecosystem accounts;
- e) applications and extensions of environmental accounts; and
- f) training and implementation material.

9.6.5.3 Expert Group on Environment Statistics (EGES)

The [Expert Group on Environment Statistics \(EGES\)](#) was convened in 2014 and comprises experts on environment statistics and related areas from all geographical regions representing United Nations member States, as well as international and regional organizations. The EGES meets annually to review the progress made in the implementation of the FDES 2013 in countries. It also assesses the progress made in the development of methodological and data collection guidance in environment statistics needed for the compilation of environmentally related SDG indicators and environmental-economic accounts, as well as for the reporting to Multilateral Environmental Agreements. Complementarily, during each calendar year, the EGES organizes its work remotely through smaller teams tasked with specific areas of work.

The main objectives of the EGES are to support the work on environment statistics led by UNSD in the following areas.

- a) Standardization of methods, classifications and definitions in environment statistics.
- b) Data collection, processing and dissemination of environment statistics, in particular in the areas of water and waste statistics, as well as support the work of the environmentally-related SDG indicators.
- c) Technical cooperation, training and capacity development in environment statistics.
- d) Coordination and harmonization of environment statistics and indicator programmes and activities.

9.7 Labour statistics and labour accounts

9.7.1 Conceptual framework

The labour statistics domain covers a wide range of labour-related topics. There is no single overarching internationally accepted framework for labour statistics or accounts like the SNA. However, there is a suite of internationally adopted statistical standards, guidelines and related indicator frameworks that can be referenced by those seeking to develop a comprehensive system of labour statistics. For those interested in compiling a labour account, there are national examples.

The International Labour Organization (ILO) is the UN international agency with the mandate to develop statistical standards in the domain of labour. It has fulfilled this purpose since its foundation in 1919 through the [International Conference of Labour Statisticians \(ICLS\)](#). The ICLS is a forum where countries discuss and adopt common definitions and agree on [guidelines](#)

[and standards](#) that subsequently act as a reference point for national and international labour statistics.

Reflecting the wide scope of labour statistics, many topics have been covered by resolutions and guidelines over time. Some of the main ones are:

- a) employed persons and jobs;
- b) unemployment and labour underutilization;
- c) hours of work;
- d) income from employment and labour costs;
- e) organization of the labour market (i.e., statistics on collective labour agreements, industrial disputes and trade-union memberships);
- f) health and safety at work;
- g) informal employment and the informal sector;
- h) child labour;
- i) labour migration; and
- j) key classifications including those relating to occupation and status in employment.

The ICLS has also endorsed the [Decent Work Indicator Framework](#) as an overarching set of indicators covering ten substantive elements corresponding to the four strategic pillars of the ILO's Decent Work Agenda (full and productive employment, rights at work, social protection and the promotion of social dialogue). Along with the range of resolutions and guidelines adopted by the ICLS, this indicator framework gives a sense of the wide scope of the labour statistics domain. Among other things, it enables a range of analytical approaches that can best be referred to as *labour accounting*, given that different countries use the term *labour accounts* to refer to different types of analysis.

9.7.2 Key resolutions and standards of the ICLS

Among the many resolutions and standards which have been adopted through the ICLS, a number of resolutions are particularly key in setting a framework for labour statistics and relevant to labour accounts.

9.7.2.1 19th ICLS Resolution I: Resolution concerning statistics on work, employment and labour underutilization

At the 19th ICLS in 2013, a landmark set of [standards concerning statistics on work, employment and labour underutilization was agreed](#). They are the basis for all statistics building on the concept of employment (which is the focus of labour accounting) although they extend beyond employment. The main features are:

- a) The first statistical definition of the concept of *work* and a *forms of work framework* which identifies multiple forms of paid and unpaid work, distinguished by the beneficiary of the production, the receipt of payment (or not) and the purpose of the work (to gain workplace experience, to produce goods for household consumption etc.). Importantly, the framework recognises that people may engage in different working activities in the

same period of time, enabling statistics to be produced on participation and time spent in different forms of work, as well as highlighting total work burden.

- b) An updated definition of *employment* as *work done in exchange for pay or profit*. This is narrower than the widely applied definition adopted at the 13th ICLS that referenced all activities done to produce goods or services within the SNA production boundary. The 13th ICLS conceptually included some forms of unpaid work, such as subsistence farming within the scope of employment. The new framework identifies different forms of work for separate measurement and reporting, more closely aligning with policy needs and creating a more comprehensive framework.
- c) Definitions of different components of *labour underutilization* to complement unemployment, namely time-related underemployment and the potential labour force (comprising people without employment that fulfil some but not all of the criteria of unemployment). Definitions are also provided for four different labour underutilization indicators, of which the *unemployment rate* is one.

The definitions from the 19th ICLS should be used as the reference point for analysis centred on employment or labour underutilization, such as labour accounting, as described below.

9.7.2.2 18th ICLS Resolution i: Resolution concerning the measurement of working time

These [standards concerning the measurement of working time](#) define several different concepts of *working time* which can be used for different analytical purposes, such as the estimation of total hours worked or full-time equivalents (FTEs), which can be important in a labour accounting context. The working time concepts defined are:

- a) Hours actually worked;
- b) Hours paid for;
- c) Normal hours of work;
- d) Contractual hours of work;
- e) Hours usually worked;
- f) Overtime hours of work.

Among these concepts, *hours actually worked*, and *hours usually worked* are the ones most extensively used in measurement, and hours actually worked is the typical reference point for calculations of total hours worked or FTEs.

9.7.2.3 16th ICLS Resolution II: Resolution concerning the measurement of employment-related income

The most recent statistical [standards covering employment-related income](#) were adopted at the 16th ICLS in 1998. The standards include a definition of employment-related income and different components of it. The standards distinguish between income related to *paid employment* and *income related to self-employment* recognising that the type of income earned can differ substantially between these two groups.

9.7.3 Other standards and guidelines

A variety of other standards may be relevant to labour accounts depending on the analytical approach chosen. For example, a labour account may be aggregated using different classifications such as the international classification of status in employment (ICSE-93 or ICSE-18) or international standard classification of occupation ([ISCO-08](#)).

The latest international classification of status in employment ([ICSE-18](#)) was adopted at the 20th ICLS in 2018, replacing [ICSE-93](#). The new classification is more detailed than ICSE-93 and provides improved analytical potential, building from 10 mutually exclusive categories at the lowest level of the hierarchy up to higher-level groupings. Another new feature of ICSE-18 is that it contains two sub-classifications built on the same ten detailed groups.

- a) **ICSE-18-R** has a hierarchy that is aggregated based on the level of exposure to the economic risk of the worker in relation to their job/business, and at the top level distinguishes between *workers in employment for pay* and *workers in employment for profit*.
- b) **ICSE-18-A**, by contrast, is aggregated based on the level of authority of the worker, distinguishing at the top level between *independent workers* and *dependent workers*.

In implementation, careful attention needs to be paid to the concepts, classifications and practices used to ensure the appropriate use of the data for labour accounts or any other analytical purpose. This is particularly important where, as is generally the case, multiple sources of data are used. Sources may differ in various ways, either conceptually or in measurement approach. For example, the reference point (employment concept) for a measure of working time used should align with the employment concept used in a measure of employment or any other measures used in the accounting framework. Likewise, attention should be paid to the classifications; for example, one source may use ICSE-93, while another uses ICSE-18, necessitating some adjustments during analysis. All such issues should be carefully considered in planning and undertaking the analysis.

9.7.4 Labour accounts

The objective of labour accounts is to provide an integrated conceptual framework for producing a coherent and consistent set of aggregate labour market statistics. A labour account is designed to complement the existing suite of labour statistics to provide a logical framework for obtaining internally consistent estimates of key labour market variables. These key variables can assist users in making sense of seemingly inconsistent labour-related data, which are often based on different reference periods, populations, concepts, definitions and methodologies drawn from a variety of business and household surveys and other administrative sources.

A labour account provides a framework to bring together labour market data from multiple statistical sources into a coherent and consistent set of labour statistics. It is a complement to the existing suite of labour statistics. Users should continue to use the Labour Force Survey (LFS) for headline estimates of employment, unemployment and persons not in the labour force.

While there are currently no international standards for the production of a labour account, the ILO has documented two compilation approaches and a four-step process, which has been

followed, to varying degrees, by the NSOs in Australia, Denmark, the Netherlands and Switzerland in compiling their own labour accounts.

[A Step Forward to a Coherent and Timely Description of the Labour Market](#) describes the four-step process and the two compilation approaches, which are:

- a) a **cross-sectional** approach involving confrontation and reconciliation of key labour market measures; and
- b) a **longitudinal** approach, which incorporates changes to population and labour force via births, deaths, and net migration, and includes measures such as duration of employment.

A labour account provides a logical framework within which to bring together labour market data from a variety of business and household surveys and other administrative sources. The inputs from these sources and the derived statistics need to be harmonized, adjusted and integrated. Decisions that are taken in the production of a labour account within the national context need to be explicitly documented and published. The integration process can be viewed as a four-step procedure.

In the first step, the model and the identity equations are defined. The identity equations can be derived from the model. These identities may be seen as the most important part of the labour accounts, not only from the point of view of users of statistics, who will be presented with consistent data but even more from the producer's point of view. These identities enable quality checks of sources. For example, in the context of the working time accounts covering registered paid employment, the document cites three main relational equations for employees:

- a) $\text{jobs} = \text{employed persons} - \text{employed persons on leave} + \text{secondary jobs}$;
- b) $\text{total hours worked} = \text{number of jobs} * \text{actual hours per job}$;
- c) $\text{total compensation} = \text{number of jobs} * \text{compensation per job}$.

The second step involves the harmonization of definitions and classifications in source statistics and achievement of full coverage. The latter requires decisions to be made regarding which source is to be the primary source for each variable. Data are cut to size or expanded according to newly defined populations and definitions. After harmonization and achievement of full coverage, the aggregate values may still disagree in practice, but the findings from source statistics are aligned on shared parameters.

The third step is the minimization of measurement errors. It is highly likely that the harmonized data from the second step do not satisfy the definitional equations. By confrontation within identity relations, errors, irregularities and improbabilities are traced and corrected.

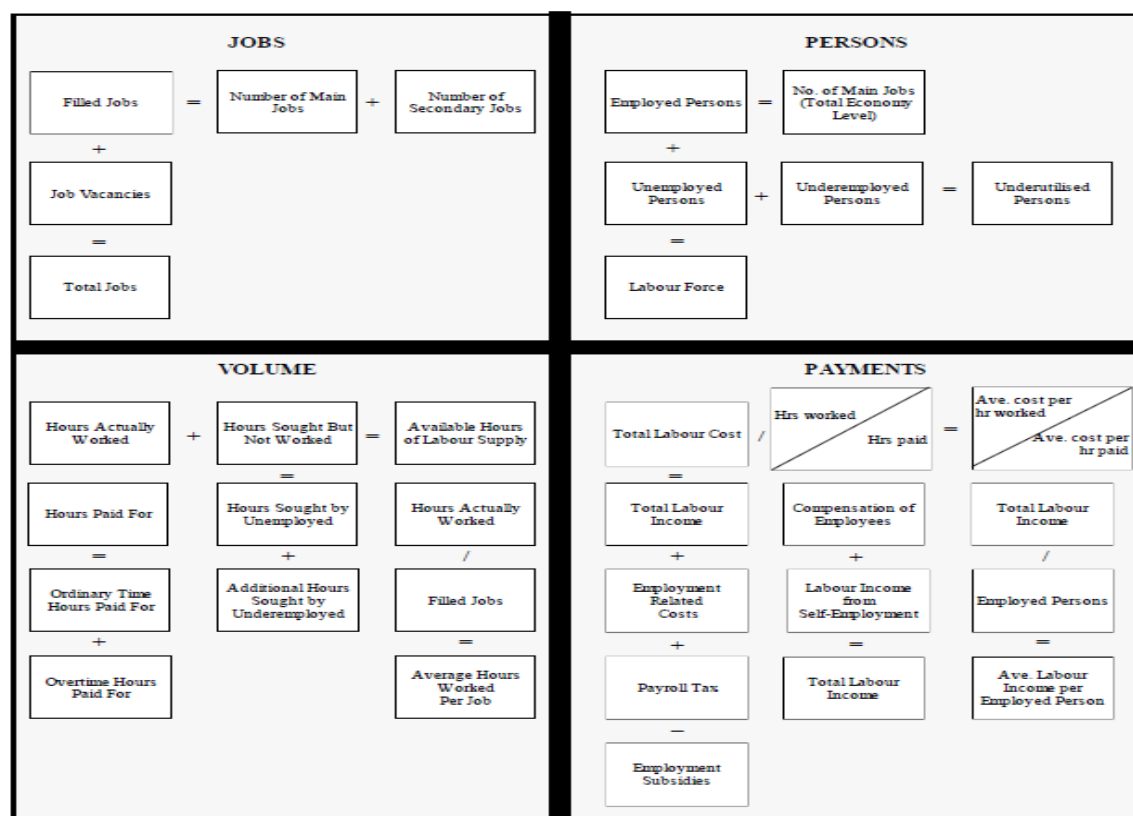
The fourth step involves balancing. Very small differences are neglected in the third step. These are smoothed out in the fourth and final step of the integration process. Here a mathematical procedure can be used by which the adjustments are minimized under the condition that the values attached meet the identity equations.

9.7.5 Australian Labour Account: Concepts, Sources and Methods, Oct 2019

The [Australian Labour Account](#) focuses on the cross-sectional approach and provides time-series data spanning 25 years. It has been designed to align with the 2008 SNA, as applied in the Australian System of National Accounts (ASNA), in particular, with the ASNA production

and residency boundaries. This ensures direct compatibility with national accounts and productivity estimates, as well as providing a mechanism for bringing together conceptually related aggregate data from business, household and administrative sources. It is also consistent with the guidelines and standards established by the ILO.

Figure 9: Australian Labour Account identity relationships – Jobs, Persons, Volume and Payments



The scope of the Australian Labour Account is consistent with that of the national economy, as defined in the ASNA, which follows the 2008 SNA international standard. The framework incorporates four distinct quadrants: Jobs, Persons, Labour Volume and Labour Payments and covers all types of employment, including employees, self-employed and contributing family workers. The four quadrants are linked by a set of identity relationships, which the aggregate statistics must satisfy. These identities are shown in Figure 9. Some relationships are direct, such as the number of employed persons in the total economy is equal to the number of main jobs, while other relationships are considered indirect or derived, such that the relationship is based on an average or ratio measures such as average hours worked per job, or average labour income per employed person.

The Jobs Quadrant provides data on numbers of filled jobs derived separately from business and household sources, plus data on vacant jobs to provide a total number of jobs in the economy.

The Persons Quadrant includes data on numbers of employed persons, together with data on numbers of unemployed and underemployed persons (derived from household survey sources).

The Labour Volume Quadrant provides data on hours paid for (derived from business survey sources) and hours worked (from household survey sources), plus data on additional hours of work sought by unemployed and underemployed persons (from household survey sources).

The Labour Payments Quadrant provides data on labour income and employment costs (from business survey sources).

The Australian Labour Account combines data from the persons, jobs, labour volume and labour payments tables to calculate average hours worked, average remuneration (per person and per job), and average labour cost per hour worked. The data tables are compiled using interpolation, extrapolation, backcasting or benchmarking methods. The methods chosen are based on two main factors: the context in which the data were originally collected, and ability to fill data gaps between collection points or periods.

Various data sources (published and unpublished) are used in compiling the four quadrants. In general, the same data sources are used to compile both quarterly and annual labour account estimates. Quarterly survey estimates are benchmarked to annual survey estimates where possible. The method used to annualise data varies for each quadrant, depending on whether data are stock or flow estimates. The Australian Labour Account data at an industry level is derived where possible from data classified by industry reported in both business and household surveys. Where data at an industry level is not reported in surveys, the industry detail has been modelled using alternative sources.

Outputs from the Australian Labour Account consist of a number of spreadsheets and data sets, produced for both quarterly and annual data. Data are also produced for both balanced and unbalanced estimates. Quarterly data are produced at the industry division level, and the annual data are available at the industry subdivision level. Data are presented quarterly for the four quadrants for the balanced data for original (unadjusted), seasonally adjusted and trend estimates. For the unbalanced data outputs, data are presented quarterly for the four quadrants in original terms only.

The Australian Labour Account data provides an overarching picture of the Australian labour market over the past 25 years. This rich data source can be used for industry analysis of labour growth and performance in terms of people, jobs, hours, labour costs and income to better understand how the Australian labour market has evolved over time. In its [Statement of Monetary Policy, February 2019](#) the Reserve Bank of Australia made the following remarks regarding the Australian Labour Account:

- a) “While the LFS will remain the best and most timely indicator of overall labour market developments (including employment growth and the unemployment rate), the ABS suggests that the Labour Account is likely to become the primary source of industry employment information.”
- b) “The Labour Account's industry employment numbers have a number of potential advantages over those in the LFS. The industry classification in the Labour Account aligns better with the measurement of industry value-added in the national accounts, and so the Labour Account should contribute to better estimates of industry productivity growth.”

- c) “The Labour Account also takes a more comprehensive approach to estimate the amount of labour employed in each industry, for instance, by including the employment of non-resident visa holders.”

9.7.6 Further development

There are no immediate plans to develop international standards which could be adopted at the ICLS and no standing international working group addressing the topic in a dedicated manner. This may change at some future date depending on the evolution of country demands.

9.8 Tourism accounts

9.8.1 Concept, frameworks and guidelines

9.8.1.1 Glossary of Tourism Terms

[UNWTO Glossary of Tourism Terms](#), developed by the UN World Tourism Organization (UNWTO) brings together definitions of some 140 terms that are relevant in developing and implementing a *tourism satellite account (TSA)* and *tourism statistics*. In addition to defining *tourism* and terms specific to tourism, the Glossary includes terms that are used in other branches of statistics and are drawn from the corresponding international standards, guidelines and manuals, such as the 2008 SNA.

Tourism is defined in the Glossary as a social, cultural and economic phenomenon which entails the movement of people to countries or places outside their usual environment for personal or business/professional purposes. In the context of tourism, the people involved are referred to as visitors (and may be tourists or excursionists; residents or non-residents) and tourism has to do with their activities, some of which involve tourism expenditure.

9.8.1.2 Tourism Satellite Account: Recommended Methodological Framework.

As tourism cuts across different sectors, it cannot be measured in the same way as sectors of the economy, such as manufacturing or retail trade. Thus, the UNWTO, the OECD, Eurostat and the UNSD developed the [Tourism Satellite Account: Recommended Methodological Framework \(TSA RMF\) 2008](#). It provides a common conceptual framework for constructing a TSA and is the main tool for the economic measurement of tourism. It adopts the basic system of concepts, classifications, definitions, tables and aggregates of the 2008 SNA. Thus, it allows the harmonization and reconciliation of tourism statistics from an economic (SNA) perspective. This enables the generation of tourism economic data (such as *tourism direct GDP*) that are comparable with other economic statistics.

A TSA uses the SNA logic of contrasting data from the demand-side of the economy (the acquisition of goods and services by visitors while on a tourism trip) with data from the supply-side (the value of goods and services produced by industries in response to visitor expenditure).

A TSA can be viewed as a set of up to 10 summary tables, each with their underlying data.

- a) Inbound tourism expenditure.
- b) Domestic tourism expenditure.

- c) Outbound tourism expenditure.
- d) Internal tourism consumption.
- e) Production accounts of tourism industries.
- f) Total domestic supply and internal tourism consumption.
- g) Employment in tourism industries.
- h) Gross fixed capital formation of tourism industries.
- i) Tourism collective consumption.
- j) Non-monetary indicators.

To be considered a TSA, at least Tables 1-6 should be compiled. Given the importance of tourism as an employment generating sector, it is recommended that the TSA also includes Table 7 as well as the non-monetary indicators in Table 10, which can provide different insights from an analysis viewpoint.

Compilation of Tables 8 and 9 often require data to be collected from complex sources, so they should be considered at a more advanced stage of TSA development.

9.8.1.3 International Recommendations for Tourism Statistics, 2008

[The International Recommendations for Tourism Statistics \(IRTS\) 2008](#) provide a comprehensive methodological framework for collection and compilation of tourism statistics in all countries irrespective of the level of development of their statistical systems. They are primarily addressed to staff in NSOs and national tourism administrations involved in the compilation of tourism statistics. The document also contains a wealth of information that might be of interest to data users who would like to understand better the nature of tourism data. In addition, general guidance is provided with respect to data sources and data compilation methods, which are detailed in the accompanying compilation guide (discussed below).

The international recommendations were drafted by the UNWTO in close cooperation with the UNSD, the ILO and other members of the Inter-Agency Coordination Group on Tourism Statistics (further described below). A draft version of the recommendations was reviewed and endorsed by the United Nations Expert Group on Tourism Statistics in June 2007 and was adopted by the Statistical Commission at its thirty-ninth session ([E/CN.3/2008/34](#)).

9.8.1.4 International Recommendations for Tourism Statistics 2008 Compilation Guide⁴

The [IRTS Compilation Guide, 2014](#) is a companion document to the IRTS 2008. It provides further clarifications and practical guidance on using sources and methods to compile statistics on tourism. It is designed to support the production of a high-quality set of basic data and indicators in each country and to strengthen the international comparability of tourism statistics.

The Compilation Guide discusses new data sources and the application of statistical methods to changing circumstances. Given that statistical methods evolve over time, it does not present a prescriptive or definitive approach to compiling tourism statistics. It includes:

- a) comments and explanations concerning the different concepts introduced and used in IRTS 2008;
- b) orientation on the issues behind these recommendations;
- c) guidance on how to compile the recommended variables and aggregates; and
- d) examples of how some countries have solved specific problems.

Some of the solutions can be considered as best practice. Others are geared to particular national circumstances but, nevertheless, are interesting as illustrations of how countries can overcome obstacles encountered in the compilation process.

9.8.1.5 Practical Guide for the Compilation of a TSA: Directory of Good Practices

The [Practical Guide for the Compilation of a TSA: Directory of Good Practices](#) draws on EU Member States' experiences on how to compile the TSA. It is a practical TSA implementation guide, based on the evaluation of country-specific TSA stocktaking reports.

The technical assistance missions carried out as part of a Eurostat funded project on fostering TSA implementation in the Member States provided an additional stimulus for the identification of further specific implementation practices. As a result, the Guide refers mainly to the TSA-RMF 2000 (the earlier version of RMF 2008 described in Chapter 8.8.1.2) and to the corresponding European Implementation Manual (TSA-EIM) which was published by Eurostat in 2001. Nonetheless, it includes comments on significant methodological changes introduced in the TSA-RMF 2008. Above all, it caters to compilers who are less experienced in national TSA compilation and professionals seeking practically orientated recommendations.

9.8.2 *Linking the TSA and the SEEA*

The [TSA-SEEA Technical Note](#) was prepared by UNWTO, in collaboration with UNSD, under the auspices of the United Nations Committee of Experts on Environmental-Economic Accounting (UNCEEA) and the UNWTO Committee on Statistics. It was welcomed by the UNSC at its March 2019 session. The Note describes approaches to linking information from the TSA and System of Environmental-Economic Accounting (SEEA) frameworks. It provides practical guidance for the measurement of environmental flows (water, energy, greenhouse gas emissions and solid waste) in the tourism industries. This work is part of the current Measuring the Sustainability of Tourism (MST) initiative of UNWTO supported by UNSD (discussed below).

The United Nations Committee of Experts on Environmental-Economic Accounting (UNCEEA) (see Chapter 9.6.5.1) has overseen the development of a number of technical notes relating to various components of the SEEA Central Framework, such as accounting for water, energy, air emissions, material flows, environmental protection expenditure and the environmental goods and services sector. The TSA-SEEA Technical Note follows the same general structure including the description of core accounts, discussion of indicators and provision of general compilation guidance.

9.8.3 Examples of national practice

The economic value of tourism to Australia's economy is estimated using the TSA. The resulting [Australian Tourism Satellite Account \(ATSA\)](#) is published annually and provides measures of tourism gross value added, tourism gross domestic product, tourism employment and tourism trade. It enables the government and industry to compare the value of tourism with other industries in the economy.

The Australian Bureau of Statistics produces the estimates at a national level (using inputs from the International Visitor Survey and National Visitor Survey) and Tourism Research Australia produces the state and regional estimates. The ATSA is funded by the Australian Trade and Investment Commission.

9.8.4 Further development

9.8.4.1 Measuring the Sustainability of Tourism

In 2015, the UNWTO, with the support of UNSD, initiated the programme of work entitled [Measuring the Sustainability of Tourism \(MST\)](#). The aim is to develop an international *Statistical Framework for Measuring the Sustainability of Tourism (SF-MST)*, including economic, environmental and social dimensions. By integrating tourism within economic, social and environmental measurement standards, the framework aims to provide a common language and to organize structure for exploiting the richness of data already available and for more effective data production, management and integration.

Such a standards-based framework supports the credibility, comparability and outreach of various measurement and monitoring programmes pertaining to sustainable tourism, including the derivation of SDG indicators. A number of countries have already participated in pilot studies and shared their experiences in the implementation of some aspects of the SF-MST.

It is expected that the SF MST will be presented to the UNSC for its endorsement.

9.8.4.2 6th UNWTO International Conference on Tourism Statistics: Measuring Sustainable Tourism

On the occasion of the [International Year of Sustainable Tourism for Development 2017](#), the Government of the Philippines and the UNWTO organized the [6th International Conference on Tourism Statistics](#) in Manila with the primary objective of addressing the issue of the Measurement of Sustainable Tourism.

One thousand five hundred participants from 88 countries, including ministers, chief statisticians, private sector representatives, and key decision-makers from international organizations discussed how to advance a rigorous, statistical approach to the measurement of sustainable tourism. The [Manila Call for Action](#) was a culmination of this conference in which governments and administrations, international organizations, academia, the private sector and civil society, called for the *development and implementation of a Statistical Framework for Measuring Sustainable Tourism* that includes economic, environmental and social dimensions across relevant spatial levels (global, national and sub-national)'.

9.8.4.3 The UNWTO Committee on Statistics

The UNWTO Committee on Statistics is a subsidiary advisory body of the UNWTO Executive Council and, as such, contributes to the fulfilment of Article 13 (3) of the agreement whereby UNWTO became a specialized United Nations agency. That agreement states: “The United Nations recognizes UNWTO as the appropriate organization to collect, to analyse, to publish, to standardize and to improve the statistics of tourism and to promote the integration of these statistics within the sphere of the United Nations system.” The Committee is involved in the following:

- a) Proposing initiatives relating to the design and implementation of international standards on tourism statistics.
- b) Promoting the international comparability of tourism statistics by proposing initiatives relative to the collection, homogeneity, processing and dissemination of data.
- c) Helping member countries in their initiatives to improve their respective national systems of tourism statistics and in the development of TSAs, including the further development and clarification of methodological issues relating to tourism statistics and exploring future extensions of TSAs.
- d) Liaising with other international bodies with delegated responsibilities for leadership regarding and coordination of related international statistics and their standards within the sphere of the United Nations system.

9.8.4.4 Working Group of Experts on Measuring the Sustainability of Tourism

The Working Group of Experts on MST was established by the UNWTO’s Committee on Statistics in collaboration with UNSD and works in coordination with the UNCEEA. The primary task of the Working Group is to develop the SF-MST and support its implementation in countries.

9.8.4.5 Expert Group on Tourism Satellite Account Compilation Guide

UNWTO, with the support of UNSD, set up an Expert Group on Tourism Satellite Account to lead the development of the Compilation Guide. It is the mandate of the Expert Group to draft the compilation guide, consult all stakeholders in this process and submit the guide to the UN Statistical Commission in the near future.

9.9 Health accounts

9.9.1 System of Health Accounts

Health care systems in all countries continue to evolve in response to changing demographics and disease patterns, rapid technological advances and more and more complex financing and delivery mechanisms. Common goals are equity, efficiency and effectiveness of care. A health account (HA) facilitates their achievement by reporting health expenditures using the current global standard, the [System of Health Accounts \(SHA 2011\)](#), which ensures a systematic description of the financial flows related to health care goods and services. The aim of SHA 2011 is to describe the health care system from an expenditure perspective both for international and national purposes. The standard was prepared by the International Health

Accounts Team (IHAT), comprising the health accounts experts from three organizations: OECD, WHO and Eurostat. It is jointly maintained by these organizations.

SHA 2011 provides a systematic description of the financial flows related to the consumption of health care goods and services. It sets out the boundaries, definitions and concepts of comparative health accounting. It enables tracking of all health spending including expenditures on health promotion, prevention, treatment, rehabilitation, palliative care and related ancillary, administration and governance services as well as provision of medical goods for residents of a given country over a defined period of time regardless of the entity or institution that financed and managed that spending.

SHA 2011 can be used as a monitoring and evaluation tool to track changes in policy priorities and to determine whether the introduction of reforms and new programs has resulted in changes in health resources allocation and expenditure.

The core tables in SHA 2011 address the following three basic aspects (and corresponding questions):

- a) the types of goods that are purchased and the kinds of services that are performed (what kinds of health care goods and services are consumed?);
- b) the sources of funding, the financing scheme(s) that pay(s) for these goods and services (where does the money come from?); and
- c) the providers that deliver health care goods and services (where does the money go?).

The ultimate goal of data compilation of the core accounts is to answer these three questions with respect to each transaction that incurs health care expenditure. Thus, the SHA 2011 is organized around a triaxial system for the health expenditure recording. It incorporates the *International Classification for Health Accounts (ICHA)*, which defines:

- a) consumption: health care by function (ICHA-HC), and related classifications;
- b) financing: financing schemes of health care (ICHA-HF), and related classifications; and
- c) provision: health care service provider industries (ICHA-HP), and related classifications.

The entire mapping of health care system and its complex funding is a multi-dimensional process. Therefore, these three core classifications are complemented by additional classifications generally used in producing a health account, such as

- a) Revenues of health care financing schemes (ICHA-FS);
- b) institutional units providing revenues of financing schemes (FS.RI);
- c) Financial Agents (ICHA-FA);
- d) Factors of health care provision (ICHA-FP);
- e) Diseases and conditions (DIS).

SHA 2011 distinguishes between the two indicators *current health expenditure* and *capital health expenditure (ICHA-HK)*. Principles and classification for capital expenditures are borrowed from international standard, the 2008 SNA.

Existing national and international classifications, such as the *International Standard Industrial Classification of All Economic Activities (ISIC)*, served as a starting point in defining

the ICHA. WHO led a discussion on the updated version of COICOP 2018 in order to facilitate linkage to SHA2011. Disease and condition classification have a strong linkage with the International Classification of Diseases (ICD).

9.9.2 General guidelines and tools

The World Health Organization (WHO) is the international organization with primary responsibility for the [Health accounts country platform](#). Through this platform (further described below), WHO provides countries with an accounting framework, guidelines, tools and technical support to institutionalize and set up a harmonized, integrated platform for timely collection of health expenditure data.

WHO has a mandate for health expenditure data at global level, as per the World Health Assembly (WHA) to establish and strengthen institutional capacity in order to generate country-level evidence and effective, evidence-based policy decision-making on the design of universal health coverage systems, including tracking the flows of health expenditures through the application of standard accounting frameworks.

9.9.2.1 Health in All Policies: Framework for Country Action

While the [Health in All Policies](#) (HIAP) Framework concerns health policy and not statistics per se, it provides the background within which health statistics are being developed and implemented.

The Framework provides countries with a practical means of achieving a coherent policy approach to health, particularly at the national level. It presents an approach to health-related rights and obligations. It improves the accountability of policymakers for health impacts at all levels of policymaking. It includes an emphasis on the consequences of public policies on health systems and determinants of health and well-being. It also contributes to sustainable development. It can also be adapted for supranational level decision-making as well as at the local level. This is important as decentralisation of government functions has empowered local authorities in many areas.

In terms of take-up, as of mid-2020, some countries have already adopted a HIAP based approach, even though this may not be obvious. In other countries, the framework has yet to be operationalized.

9.9.2.2 Health Accounts Production Tool (HAPT)

For reducing the need for technical assistance, increasing local capacity and efficiency for health account production, the [Health Accounts Production Tool \(HAPT\)](#) was developed with input from the WHO and the World Bank. The tool is maintained by WHO and distributed free of charge. It guides health accounts' teams through the entire production process. Its key features are:

- a) step-by-step directions to help guide country teams through the health accounts estimation process;
- b) platform to manage complex data sets, reducing issues with missing data;
- c) survey creator and import function to streamline data collection and analysis;

- d) built-in auditing feature to facilitate review and correction of double-counting of expenditures;
- e) automation of the mapping of data;
- f) interactive diagram to help analysts visualize the flow of funding through the health sector; and
- g) automatically-generated health accounts tables and reports.

HAPT is a data management tool that has been developed for low- and middle-income countries for the development of health accounts in the standardised format of SHA 2011. HAPT is used in more than 60 countries around the world.

9.9.2.3 Health Accounts Analysis Tool (HAAT)

The [Health Accounts Analysis Tool \(HAAT\)](#) was developed and is maintained by the WHO. It guides health accounts teams through the analysis of health expenditure data by automatically producing relevant graphs and charts using the data entered into the HAPT. In 2021, after complex development, HAPT and HAAT will be combined in one common tool under the HAPT name. In addition, SHA 2011 is accompanied by several supportive documents produced by OECD, WHO and Eurostat. Each document aims to promote consistency of approach across countries in implementing SHA 2011. The key documents are summarised below:

9.9.2.4 Pilot exercises of SHA 2011: Lessons learned, (OECD, 2014)

During the latter stages of the process of revising SHA 1.0 to create SHA 2011, pilot testing of a preliminary draft of the new manual was conducted in a Member State of each WHO region and in a selection of OECD countries. The aim was to provide feedback and information on the appropriateness of the revised classifications and the overall feasibility of the new system. Participating countries were asked to test the various draft classifications of the new manual in different stages of development. The pilot testing results were used to refine the revision process.

This report [Pilot exercises of SHA 2011: Lessons learned](#) provides a summary of the main lessons learned, consolidating the reports of the pilot countries together with exchanges with other countries. The inventory of problems found by the pilot teams, the solutions proposed, and the usefulness of the revised proposals for policy were discussed when clarification on selected subjects was required. The cross-classifications of the data provided were analysed for their internal and cross-classification consistency.

9.9.2.5 Indicator metadata registry (IMR), WHO

The [Indicator metadata registry \(IMR\)](#) is a central source of metadata of health-related indicators used by WHO and other organizations. It includes indicator definitions, data sources, methods of estimation and other information that allow users to get a better understanding of their indicators of interest. It facilitates complete and well-structured indicator metadata, harmonization and management of indicator definitions and code lists, internet access to indicator definitions, and consistency with other statistical domains. It promotes interoperability through the SDMX-HD indicator exchange format and allows the incorporation of appropriate international standards such as SDMX Metadata Common

Vocabulary (MCV), the ISO 11179 Metadata Registry, Data Documentation Initiative (DDI) and Dublin Core (DCMES).

9.9.3 Guidelines and tools dealing with specific issues

9.9.3.1 Accounting and mapping of long-term care expenditure under SHA 2011, (2012, OECD)

Accounting for long-term care (LTC) under the SHA framework is one of the major issues affecting the overall comparability and usefulness of international health expenditure data. In the past, comparability of long-term care and, therefore, total health care expenditure figures were limited since the previous version of the SHA (SHA 1.0) allowed for multiple interpretations of the LTC definition and boundary. Much variance was thus triggered by the different national notions of LTC, for example, which ministry had responsibility for LTC or how LTC was financed.

Annex 1 of the document, entitled *Additional guidance on LTC services* provides examples of services with recommended accounting practices complementing the corresponding LTC paragraphs in SHA 2011.

9.9.3.2 Guidelines to measure expenditure on over-the-counter (OTC) drugs, (2012, OECD)

Drawing on current practices, the [OECD Guidelines to measure expenditure on over-the-counter \(OTC\) drugs](#) aim to assist countries in starting to report OTC drug expenditures, as well as helping others to improve their current methodology. Moreover, the Guidelines seek to enhance the exchange of experiences between countries so that the comparability, accuracy, reliability and policy relevance of pharmaceutical expenditure data can be improved.

The Guidelines describe a general approach, consisting of four areas:

- a) National legislation;
- b) Data sources;
- c) Mapping into the SHA categories; and
- d) Adjustments to the data.

These are complemented with further clarifications on the new definitions of OTC drugs presented in SHA 2011 together with information on how to capture recent developments in the OTC drug market, such as the intensification of patient mobility across borders and the diffusion of on-line purchases.

9.9.3.3 Implementing the capital account in SHA 2011, (2012, OECD)

Reflecting the distinct treatment of current and capital spending and in an effort to avoid some of the previous ambiguities surrounding capital spending, the SHA 2011 introduced a new separate chapter on the accounting of capital formation in health systems. The aim of the chapter - [Implementing the capital account in SHA 2011](#) - is to provide a clearer definition of the aggregate capital formation in health care systems, while proposing a new for SHA breakdown of capital formation by the type of assets (i.e., infrastructure, machinery, etc.). Furthermore, a capital account has been developed in the chapter to allow the reporting not

only of total expenditure on capital formation but also what sources have been used to fund the purchase of new assets.

In an effort to test the understanding and the feasibility of reporting the various components of the new capital account table, the OECD invited its member countries to participate in a study. Nine countries provided feedback on the various methodologies, data sources they currently use, or could feasibly use, in order to report the various items of the proposed capital account, as well as identifying those parts that they envisage would be problematic in their reporting. In addition to the country responses, the OECD investigated various national and international data sources currently available that would allow for additional reporting, and it analysed some aspects of the financing mechanism of capital acquisition, in particular for France and Germany.

9.9.3.4 Guidelines for the implementation of the SHA 2011 Framework for accounting health care financing, (2013, OECD)

The accounting framework for health care financing is a key component of SHA 2011. It makes health accounts more adaptable to rapidly evolving health financing systems, further enhances cross-country comparability of health expenditures and financing data and leads to improvement of the information base for the analytical use of national health accounts.

The [Guidelines for the implementation of the SHA 2011 Framework for accounting health care financing](#), provide:

- a) a more detailed explanation of the various concepts, particularly concerning the role of the government in the health sector and foreign aid; practical approaches for preparing SHA data relevant to health care financing, together with possible methodologies that may be useful in the case of complex financing arrangements;
- b) a set of tools that health accountants can choose from, according to their specific needs.

9.9.3.5 Expenditure on prevention activities under SHA 2011: Supplementary guidance (2013, OECD)

A key criterion for inclusion under SHA 2011 is whether the primary purpose of the spending is health. Therefore, policies that address the wider determinants of health and have known impacts upon health, for example. Improving or increasing incomes, employment, housing, or active travel are considered outside the SHA boundary as they have another primary purpose. However, much of the public spending to improve occupational health and safety and environmental health, to prevent mortality and injuries in road and transport accidents, and to increase food safety, do fall within the boundary of prevention.

The document [Expenditure on prevention activities under SHA 2011: Supplementary guidance](#) strives to better define the prevention boundaries in three ways: in relation to other health spending, health-related spending, and non-health spending. Thus, the legislative and regulatory process to increase health and safety, or curtail the advertising and promotion of hazardous behaviour, are considered part of health governance rather than spending on prevention per se; while the enforcement of such regulations is classed as health-related spending.

The costs of compliance with regulations by individuals and companies may have the purpose of avoiding the penalties for contravention, so any expenditure in this domain is also outside the boundary of prevention and health. Likewise, voluntary measures by individuals and companies may have a primary purpose other than health, and so are outside the boundary too. When their purpose is prevention, public health programmes and personal preventive healthcare services are within the prevention boundary, including when requested by patients – these include many forms of information, education, counselling and mass communication, plus immunisation, screening and check-ups. Pharmaceutical spending, including prophylactic medication and contraceptives, is classed with medical goods rather than preventive spending under SHA 2011.

9.9.3.6 Links to additional guidelines

- a) [Guidelines to Improve Estimates of Expenditure on Health Administration and Health Insurance](#);
- b) [Guidelines for Improving the Comparability and Availability of Private Health Expenditures](#);
- c) [Feasibility and Challenges of Reporting Factors of Provision in SHA 2011](#);
- d) [Improving Estimates of Exports and Imports of Health Services and Goods](#);
- e) [DIS.0.0 Disease Manual Distribution ratios](#);
- f) [DIS.1.1 Disease Manual HIV Chapter](#);
- g) [DIS.1.2 Disease Manual TB Chapter](#);
- h) [DIS.1.3 Disease Manual Malaria Chapter](#);
- i) [HC.6.2 \(DIS.1.7\) Disease Manual Immunization Chapter](#).

9.9.4 Examples of national practice

The Philippine National Health Accounts (PNHA) is one of the satellite accounts being produced by the Philippine Statistics Authority (PSA). It presents data on the country's health spending, health financing and health management over a defined period of time. Early compilation of PNHA used local estimation methodologies approved by PSA Board in 2011. The country adopted SHA 2011 in 2016 and officially released PNHA-SHA estimates for 2014 to 2016 in 2017. From then on, PSA annually compiles PNHA-SHA.

The latest release of PNHA-SHA for 2016 to 2018 generated the following tables:

- a) Current Health Expenditures by Revenues of Health Financing Schemes;
- b) Current Health Expenditures by Institutional Units Providing Revenues to Financing Schemes;
- c) Current Health Expenditures by Financing Agent;
- d) Current Health Expenditures by Health Care Financing Scheme;
- e) Current Health Expenditures by Health Care Providers;
- f) Current Health Expenditures by Factors of Health Care Provision;

- g) Health Capital Formation Expenditures;
- h) Current Health Expenditures by Health Care Function;
- i) Current Health Expenditures by Income Quintile Group;
- j) Current Health Expenditures by Disease Group;
- k) Current Health Expenditures by Age and Sex Group;
- l) Current Health Expenditures by Region;
- m) Total Health Expenditures.

9.9.5 Further developments

The basic aim of the [WHO Health Accounts Country Platform](#) is to institutionalize a harmonized country platform for annual and timely collection of health expenditure data, with a particular focus on the distribution of expenditure by disease and health functions. It strengthens the capacity of country health account teams to report health expenditures using SHA 2011 and to analyse and produce policy-relevant reports.

Most EU Member States and OECD countries have implemented the SHA 2011 framework. Many WHO Member States are also implementing the SHA 2011 standard or initiating the process. OECD, Eurostat and WHO will continue to support the SHA 2011 implementation by providing training and technical assistance.

9.10 Gender Statistics

9.10.1 Context: the need for gender statistics

9.10.1.1 Beijing Declaration and Platform for Action, 1995, United Nations

The [Beijing Declaration and Platform for Action](#) was adopted at the Fourth World Conference on Women and held in Beijing in 1995. It recommended that *national, regional and international statistical services should ensure that statistics related to individuals are collected, compiled, analysed and presented by sex and age and reflect problems, issues and questions related to women and men in society*. Twenty-five years on, its stature and significance as a roadmap for the achievement of gender equality remain undiminished. This pivotal document continues to guide the global struggle against constraints and obstacles to the empowerment of women around the world. It underpins the formulation of a framework for gender statistics.

It identifies 12 domains:

- a) Women and poverty;
- b) Education and training of women;
- c) Women and health;
- d) Violence against women;
- e) Women and armed conflict;

- f) Women and the economy;
- g) Women in power and decision-making;
- h) Institutional mechanisms for the advancement of women;
- i) Human rights of women;
- j) Women and the media;
- k) Women and the environment;
- l) The girl-child.

9.10.1.2 The 2030 Agenda for Sustainable Development

Achievement of gender equality is also inextricably linked and contributes to all spheres of the [2030 Agenda for Sustainable Development](#). Goal 5 explicitly calls for gender equality and empowerment of women and girls, and around one-third of the 232 SDG indicators, covering 14 different goals, are identified as gender-relevant by the Inter-Agency and Expert Group on Gender Statistics. Thus, countries are asked to provide sex-disaggregated data wherever applicable when reporting on the progress made towards achieving the Sustainable Development Goals.

In addition to the Beijing Declaration and 2030 Agenda, national development strategies create new demands for gender statistics. Policymakers, researchers and advocates voice the need for more high-quality gender data and argue that the gender perspective should be a basic guiding assumption to plan, formulate and monitor inclusive and evidence-based policies and programmes at the national level. In 2010 the UNECE and the World Bank prepared [Developing Gender Statistics: A Practical Tool](#). This manual (which is further discussed in Chapter 9.10.4.1 - *Developing Gender Statistics: A Practical Tool, 2010*) guides statistical organizations in the production and public use of statistics.

9.10.2 Concepts and definitions

Gender statistics are defined as *statistics that adequately reflect the differences and (in)equalities in the situation of women and men, girls and boys*. They cover a broad diversity of topics and issues, reflecting the ever-changing roles of women and men in society and public life, in the economy, and in families and households. They help policymakers to formulate policies and plans, monitor changes, and inform the public.

More specifically, gender statistics should reflect gender issues, that is, questions, problems and concerns related to all aspects of women's and men's lives, including their specific needs, opportunities and contributions to society. In every society, there are differences between what is expected, allowed and valued in a woman and what is expected, allowed and valued in a man. These differences have a specific impact on women's and men's lives throughout all life stages and determine, for example, differences in health, education, work, family life or general well-being. Producing gender statistics entails disaggregating data by sex and other characteristics to reveal those differences or inequalities and collecting data on specific issues that affect one sex in particular or relate to gender relations between women and men.

As noted in [Integrating a Gender Perspective into Statistics, 2016, UN](#), concepts and definitions used in data collection must be developed in such a way as to ensure that the diversity of various

groups of women and men and their specific activities and challenges are captured. In addition, data collection methods that induce gender bias in data collection, such as underreporting of women's economic activity, underreporting of violence against women and undercounting of girls, their births and their deaths should be avoided.

In summary, gender statistics are defined by the sum of the following characteristics:

- a) Data are collected and presented by sex as a primary and overall classification;
- b) Data reflect gender issues;
- c) Data are based on concepts and definitions that adequately reflect the diversity of women and men and capture all aspects of their lives;
- d) Data collection methods take into account stereotypes and social and cultural factors that may induce gender bias in the data.

9.10.2.1 Difference between 'gender' and 'sex'

Confusion between 'sex' and 'gender' still persists among both producers and users of statistics. The difficulty of translating the term gender from English into other languages further contributes to the confusion. Sometimes categories of sex (male and female) and gender (masculine and feminine) are treated as if they were the same thing. However, the word 'sex' refers to biological differences that define persons as women and men. Biological differences are relatively fixed and tend not to vary across cultures or over time. 'Gender', meanwhile, refers to socially constructed differences in the attributes and opportunities associated with being female or male, and to social interactions and relationships between women and men. Gender determines what is expected, allowed and valued in a woman, or man and should be further measured in the broader context of gender identity³⁹.

When data on demographic, social or economic characteristics are collected in the field, it is the sex of a person that is recorded, e.g., as female (woman) or male (man), not the gender. However, when analysed, data disaggregated by sex can reveal differences and (in)equalities in women's and men's lives that are the result of gender roles and expectations.

9.10.2.2 Analytical framework

There is no single overarching analytical framework for gender statistics. However, there are international guidelines for their production and use (as elaborated in the next section) and there are commonly held strategic objectives to expand gender statistics to cover all the important issues and to integrate them into mainstream statistical production.

³⁹ In recent years, there has been a new call for data on sexual orientation and gender identity (SOGI), and a few countries have been testing initiatives for identifying, defining and measuring SOGI across populations, including the non-binary and transgender individuals. Research on expanded questions on sex and gender has been conducted quite intensively by national statistical offices in Australia, New Zealand, Canada, the United Kingdom and the United States (United Nations, 2019).

9.10.3 Indicator frameworks and guidelines for production and use of gender statistics

9.10.3.1 Global Minimum Set of Gender Indicators, 2013, UNSD

The [Global Minimum Set of Gender Indicators](#) was agreed by the UNSC in 2013 as a guide for national production and international compilation of gender statistics. It is a collection of 52 quantitative indicators and 11 qualitative indicators covering national norms and laws on gender equality. It includes indicators covering domains such as education, employment, health, the human rights of women and girls, and public life and decision-making.

The choice of indicators was guided by the primary criterion that indicators should address key policy concerns as identified in the Beijing Platform for Action and other more recent international commitments. The list of Minimum Set of Gender Indicators has been revised to be fully aligned with the SDG indicators.

9.10.3.2 Indicators of Gender Equality, 2015

This UNECE publication [Indicators of Gender Equality](#) is recommended for use in countries participating in the Conference of European Statisticians (CES). It was developed by a CES task force and endorsed by CES in October 2014. It presents a set of 115 gender equality indicators. The criteria for selection were that an indicator:

- a) clearly addresses a relevant policy issue related to gender equality and/or women's empowerment;
- b) is relevant to the CES member countries;
- c) is conceptually clear, easy to interpret, and has an agreed international definition;
- d) is sensitive to changes, and changes in the value of the indicator have a clear and unambiguous meaning;
- e) is feasible, robust and reliable;
- f) is comparable over time and enables international comparison.

The indicators are grouped into eight *thematic domains* inspired by the Beijing Platform for Action and categorized into 42 *headline indicators* and 73 *supporting indicators*.

- a) The *headline indicators* cover the essential aspects. Their purpose is to provide simple and clear information to decision-makers, and the public about progress towards internationally agreed gender-related policy objectives.
- b) The *supporting indicators* provide further information on more specific aspects of gender equality. They are valuable to achieve a deeper comprehension of the phenomenon.

The indicator set is fully aligned with the *Global Minimum Set of Gender Indicators*.

9.10.3.3 Gender Statistics, ESCAP

The core set of [gender indicators for Asia and the Pacific](#) developed by ESCAP adapts and extends the global minimum set of gender indicators to focus on the key issues for gender equality in the region. This core set is providing a basis for national policy development and for measuring and monitoring progress towards the achievement of gender equality and other global gender-related goals.

[ESCAP](#) also seeks - in the longer term - to assist the Member States through a [regional programme on gender statistics](#), to build their capacity to collect the gender-sensitive data required to provide the proper foundation for such indicators.

9.10.3.4 CARICOM GEI, CARICOM RSP and UN Women Multi-Country Office - Caribbean

The [CARICOM Regional Statistics Programme \(RSP\) and the UN Women Multi-Country Office](#) – Caribbean launched a collaborative endeavour in early 2015. The main goal of this initiative was to develop a set of CARICOM gender equality indicators (GEI) parallel to the global Minimum Set of Gender Indicators described in Chapter 9.10.3.1 - *Global Minimum Set of Gender Indicators, 2013, UNSD* to identify, assess, measure and track persistent gender equality concerns and disparities across the CARICOM region, in accordance with the newly adopted SDGs. The CARICOM GEI framework was validated, and the indicators agreed upon at the 40th meeting of the Standing Committee of Caribbean Statisticians (SCCS) in 2015. In 2017, the CARICOM GEI were piloted in Dominica, Grenada, Jamaica and Suriname.

9.10.4 Guidelines for the production and use of gender statistics

9.10.4.1 Developing Gender Statistics: A Practical Tool, 2010

The UNECE and World bank publication [Developing Gender Statistics: A Practical Tool](#) aims to guide statistical organizations in the production and use of gender statistics. It presents a consolidated reference for any organization or individual interested in producing information about gender differences, guides producers of gender statistics and assists in improving the availability of high-quality information on women and men.

9.10.4.2 United Nations Guidelines for Producing Statistics on Asset Ownership from a Gender Perspective, 2018.

The [UN Guidelines for Producing Statistics on Asset Ownership from a Gender Perspective](#), prepared by the UNSD and UN Women provides national statistical agencies and policymakers with guidance on collecting, processing, analysing and disseminating individual-level data on asset ownership to inform three broad sets of policy issues: fostering the empowerment of women; reducing poverty and vulnerability; and understanding livelihoods.

The Guidelines introduce concepts, definitions and data requirements for measuring asset ownership from a gender perspective in household surveys and provide guidance on planning, organizing and implementing a household survey, appending a module, or adding a minimum set of questions on asset ownership to a nationally representative household survey. National statistical offices may choose a particular modality for the implementation of the recommendations, depending on their own needs and capabilities, including the needs of data users and the availability of data from other sources, such as administrative records.

The associated [e-learning course](#) translates key concepts and recommendations from the Guidelines in an interactive manner. The course covers the conceptual framework, data sources, implementation guidance and data processing, analysis and dissemination.

9.10.4.3 United Nations Guide to Producing Statistics on Time Use: Measuring Paid and Unpaid Work, on-going, UNSD

Since 2018, the UNSD and the Expert Group on Innovative and Effective Ways to Collect Time-Use Statistics have been working towards the implementation of the International Classification of Activities for Time-Use Statistics (ICATUS 2016) and the modernization of time-use surveys, in the context of updating the Guide to Producing Statistics on Time Use: Measuring Paid and Unpaid Work and with the overall objective of further promoting this critical data collection across countries and over time.

The updated Guide aims to provide national statistical offices and policymakers with recommendations and best practices for collecting, processing, analysing and disseminating time-use statistics to inform research and the development of a broad range of policies, including on unpaid work and non-market production, well-being and gender equality. The guidelines will introduce key concepts and definitions related to time-use data and provide national statistical offices with advice on the different phases and processes to follow (data needs, design, build, collect, process, analyse, disseminate and evaluate) when implementing a household survey or appending a module on time-use to a nationally representative household survey. By exploring ways to modernise the collection of time-use data, including through the use of technology, the guidelines will ensure that national statistical offices have access to a sustainable model to institutionalize the systematic collection of those data. The updated Guide will build on the [Guidelines for Harmonizing Time-Use Surveys, published by the Economic Commission for Europe](#) in 2013.

9.10.5 Using gender statistics: examples of assessments of progress towards gender equality

9.10.5.1 Turning promises into action: gender equality in the 2030 Agenda for Sustainable Development, 2018

The flagship report on [Turning promises into action: gender equality in the 2030 Agenda for Sustainable Development](#), by UN Women, monitors global and regional trends in achieving the SDGs for women and girls based on available data, and it provides practical guidance for the implementation of gender-responsive policies and accountability processes. As a source of high-quality data and policy analysis, the report is a key reference and accountability tool for policymakers, women's organizations, the UN system, and other stakeholders. It lays the basis for robust, gender-responsive monitoring of the 2030 Agenda for Sustainable Development by:

- a) showing how gender equality is central to the achievement of all 17 SDGs and arguing for an integrated and rights-based approach to implementation;
- b) explaining gender data gaps and challenges for robust monitoring and establishing starting points and trends across a range of gender-related indicators based on available data;
- c) providing concrete guidance on policies to achieve two strategic targets under SDG 5 (violence and unpaid care) and outlining how these policies are synergistic with other goals and targets; and
- d) setting an agenda for strengthening accountability for gender equality commitments at global, regional, and national levels.

9.10.5.2 Women and the Sustainable Development Goals (SDGs), 2019, UN Women

[Women and the Sustainable Development Goals \(SDGs\)](#), by UN Women, showcases the above report (Turning promises into action.) It stresses that gender equality is a right and fulfilling this right is the best chance of meeting some of the most pressing current challenges, from the economic crisis and lack of health care, to climate change, violence against women and escalating conflicts. Women are not only more affected by these problems, but also possess ideas and leadership to solve them.

9.10.5.3 Progress of the World's Women 2019-2020 Families in a changing world, UN Women

The UN Women report on [Progress of the World's Women 2019-2020 Families in a changing world](#) assesses the reality of families in the context of sweeping economic, demographic, political, and social transformation. The report features global, regional, and national data. It also analyses key issues such as family laws, employment, unpaid care work, violence against women, and families and migration. It relies on a broad array of available data as of March 2019, gathered from national sources, and compiled and harmonized by international agencies.

9.10.5.4 The World's Women reports, UNSD

The [UNSD World's Women reports](#) are prepared at five-year intervals. The first was in 1990. The first three and 2010 edition analyse women's situation compared to men's worldwide in a broad range of fields. The 2005 edition reviews and analyses national capacity to collect and report sex-disaggregated data on socioeconomic topics relevant for addressing gender concerns. The most recent, 2015 edition comprises eight chapters covering critical areas of policy concern: population and families, health, education, work, power and decision-making, violence against women, environment, and poverty. In each area, a life-cycle approach is introduced to reveal the experiences of women and men during different periods of life-from childhood and the formative years, through the working and reproductive stages, to older ages.

9.10.5.5 Selected Statistics about Women and Men in Suriname, General Bureau of Statistics

The publication commenced in 2002 with 37 indicators under the name 'Selected Gender Statistics'. In 2017 (after piloting the CARICOM Gender Equality Indicators) the name was changed to '[Selected Statistics about Women and Men in Suriname](#)'. The statistics have been published in all the odd years since 2005 and included 142 indicators in 2019. The publication is one of the outputs of a UNSD/CARICOM Project (which became a CARICOM Program) on *Strengthening Capacity in the Compilation of Statistics and Indicators for Conference Follow-up*. Indicators are grouped under various headings, e.g., Education, Population, Health, Employment and Unemployment, Public Governance and Crime. Gender Statistics (odd years) and Environment Statistics (even years) are the responsibility of the Research and Planning Division of the General Bureau of Statistics of Suriname.

9.10.6 Examples of national practices

9.10.6.1 Standard Question Modules for Sex and Gender, Australian Bureau of Statistics

The Australian Bureau of [Statistics Standard Question Modules for Sex and Gender](#) specifies the mandatory elements and the allowable variations and optional inclusions in asking the questions 'What is your sex?' and 'What is your gender?'

9.10.6.2 Gender workplace statistics at a glance, Australia

The [Gender workplace statistics at a glance](#) publication by the Australian Workplace Gender Equality Agency brings together statistics from a variety of sources on women's workforce participation, economic security, educational attainment, paid parental leave and leadership roles.

9.10.6.3 Guidance for questions on sex, gender identity and sexual orientation for the 2019 Census Rehearsal for the 2021 UK Census

The UK Office for National Statistics has provided [guidance for questions on sex, gender identity and sexual orientation](#) for the 2019 Census Rehearsal, accompanied by a summary of the research that informed the drafting of the guidance.

9.10.6.4 Gender-based Analysis plus (GBA+), Statistics Canada

GBA+ is an analytical process used in Canada to assess the differential effects of policies, programs, and legislation on diverse groups of women, men, and people of all sexual orientations, gender identities and expressions. In 2015, the Government of Canada strengthened the application of GBA+ across federal governments to support the development of evidence-based policies and programs that benefit everyone in the country. GBA+ also provides the foundation for gender-based budgeting, to ensure the effects of budget proposals on different groups of people are understood and addressed through more effective and inclusive priority setting and decision making. Statistics Canada is supporting GBA+ and gender-based budgeting by providing data disaggregated by sex, gender and other intersecting characteristics and quantitative analyses on a broad range of social, economic and environmental subject matter areas. To fill these roles, Statistics Canada created [the Centre for Gender, Diversity and Inclusion Statistics](#) in 2018.

9.10.6.5 The Gender Equality Barometers, Statistics Finland

Coordinated by the Centre for Gender Equality Information, a national information service that provides information related to gender equality and gender studies, and conducted by Statistics Finland, the Gender Equality Barometers provide information on opinions, attitudes and experiences related to gender equality in various areas of life in Finland. They enable monitoring the development of gender equality in different sectors of Finnish society.

9.10.6.6 Gender Statistics Program, Uganda Bureau of Statistics

The Uganda Bureau of Statistics (UBS) has developed a comprehensive [gender statistics program](#). One of the starting points was the [National Governance Peace and Security Survey 2017](#), which was a baseline survey of perceptions on violence against women, women's economic empowerment and women's political participation and leadership.

9.10.7 Further Development

There are several international programmes aimed at further development of gender statistics and their integration within the regular statistics produced by NSOs. In this subsection, programmes that primarily focus on further development guidelines and indicators are described. The following section (Chapter 9.10.8 - *Mainstreaming a gender perspective into*

official statistics) discusses programmes specifically promoting integration of gender statistics into regular statistical programmes.

9.10.7.1 UN Global Gender Statistics Programme (GGSP)

The [Global Gender Statistics Programme](#) is mandated by the United Nations Statistical Commission (UNSC), implemented by the United Nations Statistics Division (UNSD) and partners, and coordinated by the Inter-Agency and Expert Group on Gender Statistics (IAEG-GS). The Programme encompasses:

- a) improving coherence among existing initiatives on gender statistics through international coordination;
- b) developing and promoting methodological guidelines in existing domains as well as in emerging areas of gender concern;
- c) strengthening national statistical and technical capacity for the production, dissemination and use of gender-relevant data; and
- d) facilitating access to gender-relevant data and metadata through the minimum set of gender indicators for national production and international compilation (adopted in 2013 by the UNSC).

9.10.7.2 Inter-Agency and Expert Group on Gender Statistics (IAEG-GS)

The [Inter-Agency and Expert Group on Gender statistics \(IAEG-GS\)](#) brings together representatives of international agencies within and outside United Nations system, statisticians from national statistical systems, and development partners, to review progress and provide guidance on future activities geared at advancing gender statistics. The United Nations Statistics Division (UNSD) is the secretariat of the group. The IAEG-GS is mandated by the UNSC to:

- a) serve as the coordination mechanism for the Global Gender Statistics Programme;
- b) provide guidance for the development of manuals and methodological guidelines for the production and use of gender statistics; and

The IAEG-GS was first convened in 2006, meets annually and functions through advisory groups. The Group reviews methodological developments to measure and monitor gender indicators, shares best national practices in measuring and monitoring gender equality and takes stock of on-going and planned activities on gender statistics to improve coherence among existing and planned global and regional initiatives on gender statistics.

UNSD organizes *Global Fora on Gender Statistics* biannually under the Global Gender Statistics Programme and the guidance of the IAEG-GS. The Fora bring together producers and users of gender statistics from national and international statistical offices, other government agencies, international organizations, academia, civil society and the donor community to discuss and exchange best practices and innovations implemented across the globe to improve gender data and evidence for gender policies.

9.10.7.3 UNECE Steering Group on Gender Statistics

The objective of the [UNECE Steering Group on Gender Statistics](#) is to provide direction to the Conference of European Statisticians (CES) work on gender statistics, to advance methodological work, capacity development, and collaboration between users and producers of gender statistics, and to follow up the implementation of CES guidance. The Steering Group:

- a) coordinates the CES work on gender statistics;
- b) launches and steers the development of guidelines and surveys of best practice;
- c) oversees the work of CES task forces in the area of gender statistics;
- d) follows up the implementation of CES methodological guidance related to gender statistics in UNECE countries;
- e) acts as an organizing committee for UNECE Work Sessions on Gender Statistics;
- f) advises the UNECE Secretariat on the formulation and planning of capacity-development activities to support the integration of a gender perspective into statistical systems in countries of Eastern Europe, Caucasus and Central Asia;
- g) promotes the use of UNECE training materials in gender statistics; and
- h) advances collaboration between users and producers of gender statistics.

9.10.8 Mainstreaming a gender perspective into official statistics

9.10.8.1 Integrating a Gender Perspective into Statistics, 2016

While many countries are attempted to establish or have succeeded in establishing sound gender statistics programmes, additional guidance is needed to improve the availability of data and to ensure a proper mainstreaming of gender issues in all areas of official statistics. This UNSD manual [Integrating a Gender Perspective into Statistics](#), which is targeted primarily at statisticians working in less developed NSSs, provides information needed to accomplish three main goals

- a) to achieve comprehensive coverage of gender issues in data production activities;
- b) to incorporate a gender perspective into the design of surveys or censuses, by taking into account gender issues and avoiding gender biases in measurement; and
- c) to improve data analysis and data presentation and to deliver gender statistics in a format that is easy to use by policymakers and planners.

Mainstreaming a gender perspective in statistics means that gender issues and gender-based biases are systematically taken into account in the production of all official statistics and at all stages of data production. Gender statistics produced as an ‘add-on’ are often marginalized and may not reach the full range of potential users, including policymakers in domains other than gender equality, analysts and researchers. Moreover, their production may be more dependent on irregular funding. Mainstreaming may also lead to more efficient coverage of gender issues and better coordination among data collection programmes in producing gender statistics.

- a) **Leadership:** mainstreaming a gender perspective requires political will at all levels, throughout the NSS. Sensitizing and raising the awareness of both users and producers

of data is critical in linking gender statistics to policies. NSO heads should be fully involved in the required capacity-building and leadership.

- b) **Legal framework:** of crucial importance to improving the availability of gender statistics is the specification of formal requirements for sex-disaggregation and the incorporation of a gender perspective within the national statistical legislation that regulates the production and dissemination of official statistics. Requirements need to be established not only for statistics officially collected by the NSO but also for other NSOs and even organizations in the private sectors.
- c) **Cooperation between users and producers of statistics:** efforts should be made to promote dialogue and understanding between statisticians and the various users of statistics -policymakers, representatives of non-governmental organizations, activists and researchers. This enables data users to understand, gain access to and use gender statistics more effectively and help to increase the capacity of statisticians to identify and understand gender issues and to produce and communicate data that better address user needs.
- d) **Collaboration in developing and improving concepts and methods:** NSO need to work with international and regional organizations and agencies and academic and research institutions to mainstream gender in the development and revision of concepts, definitions and methods of collecting data. This collaboration extends to all methodological issues, including the design of survey questionnaires or modules within questionnaires, the revision of international classifications and standards and the development of analytical methods and appropriate indicators, among others.
- e) **Training:** statisticians should be trained in how to incorporate a gender perspective into their regular work, from the design of data collection tools and fieldwork to data analysis and presentation. In particular, producers of statistics need to be trained to become more proactive in making the value of gender statistics visible to Governments, the public and other stakeholders.
- f) **Refocusing the activities and position of gender units and gender focal points:** while many countries have embarked on gender statistics programmes, the activities, and the roles of gender units and focal points have often been narrowly focused on the compilation and dissemination of sex-disaggregated data. NSOs should ensure that gender units are more involved in assessing the relevance for policymaking and quality of the statistics produced, and that they are under the direct supervision of a staff member at the director level.

9.10.8.2 Making Every Girl and Woman Count, UN Women

The programme implemented by UN Women and partners [Making Every Girl and Woman Count](#) aims to bring about a radical shift in how gender statistics are created, promoted and used. It addresses the urgent need to increase the availability of accurate information on gender equality and women's rights in order to inform policy and decision-making. Through this ground-breaking public-private initiative, UN Women and its partners support countries to improve the production, accessibility and use of gender statistics.

9.10.8.3 Evidence Data for Gender Equality (EDGE), UNSD and UN Women

The [Evidence Data for Gender Equality \(EDGE\)](#) project was a joint initiative of the UNSD and UN Women that sought to improve the integration of gender issues into the regular production of official statistics for better, evidence-based policies. The Project accelerated existing efforts to generate internationally comparable gender indicators on health, education, employment, entrepreneurship and asset ownership in four key ways:

- a) developing an online interactive platform to disseminate gender-relevant data and metadata on education, employment, health and other dimensions in the Minimum Set of Gender Indicators;
- b) developing methodological guidelines on measuring asset ownership from a gender perspective that was presented to the UNSC in 2017;
- c) developing a conceptual framework and related indicators for measuring entrepreneurship from a gender perspective; and
- d) providing technical support to countries to implement the EDGE methodological guidelines – an [e-learning course is available](#).

To achieve these goals, the Project worked with NSOs, regional commissions, and international agencies, including the Asian Development Bank (ADB), the African Development Bank (AfDB), the Food and Agriculture Organization of the United Nations (FAO), the International Labour Organization (ILO), the Organization for Economic Co-operation and Development (OECD) and the World Bank.

The Project was guided by a Steering Committee composed of members of the IAEG-GS.

9.10.8.4 Supporting Gender Statistics, 2019, Paris21 and UN Women

The SDGs, especially SDG5, call on all countries to achieve gender equality and the empowerment of all women and girls by 2030. This will be possible only if the depth and scope of the issues are understood, and the impact of interventions can be measured. Current gaps in gender statistics make it difficult to obtain the full picture of the different roles that men and women play in society.

One of the main reasons for gender data gaps is the limited national capacity to produce and effectively communicate gender statistics. In fact, only 13% of countries have budgets dedicated to gender statistics. Further, donor commitments to statistics do not sufficiently address gender issues. According to the 2019 PARIS21 Press report, only 13% of multilateral donor-funded statistical development projects include activities in gender statistics, and these activities represent only 8% of the total budgets of all projects reported.

Against this backdrop and in the framework of the Making Every Woman and Girl Count Programme, PARIS21 and UN Women are collaborating to increase the [production and wider use of gender statistics](#) in line with national priorities and the 2030 Agenda on Sustainable Development. The collaboration focuses on four main activities.

- a) Improving coordination and planning for gender statistics through the development of an assessment framework and tools to identify reasons for gender statistics gaps relating to the capacity of national statistical systems.

- b) Improving data dissemination and communication of gender statistics through media engagement and data visualisation trainings and brokering user-producer partnerships through dialogues.
- c) Reporting the use of gender-specific data: currently, PARIS21 is building a methodological base for conducting text analysis methodology in the use of gender-specific data in newspapers, national development plans (NDPs) and select policy documents to measure citizen's use and actual policy uses.
- d) Reporting of financial resources for gender statistics through the [Paris 21 Partner Report on Support to Statistics \(PRESS\)](#). The report presents data on technical and financial support to statistical development worldwide and thus is a valuable tool for collaboration between donors and recipient countries. The PRESS report has included a section dedicated to support to gender statistics since its 2018 edition.

9.10.8.5 CARICOM gender equality indicators

Gender mainstreaming is one of the strategic drivers of the CARICOM Regional Strategy for the Development of Statistics (RSDS) 2019–2030, which was approved by CARICOM heads of government in July 2018. The [CARICOM Gender Equality Indicators \(GEI\)](#) were adopted as a tool within the RSDS. The RSDS includes the following directions:

- a) Mainstream gender issues and concerns in the development and implementation of the RSDS, ensuring that the production and dissemination of gender statistics are both integrated into different sections of the strategy, and is a key objective in itself.
- b) Advance the incorporation and systematising of a programme on gender statistics, including data production and dissemination mechanisms to monitor progress using CARICOM Gender Equality Indicators.
- c) Ensure consistent sex disaggregation of SDG related data wherever possible and embed sex-disaggregated estimates into regular reporting cycles of the regional and international statistical systems.
- d) Develop and implement specialised surveys, as needed, to capture issues of gender equality and women's empowerment across the region, including the conduct of gender-based violence surveys for the monitoring and evaluation of the achievement of gender equality commitments.
- e) Facilitate training of statisticians and experts in gender analysis and the interpretation and use of gender statistics.
- f) Enable collaboration and networking of gender experts and statisticians to promote and sustain a focus on gender in the production, analysis, dissemination, and use of statistics.
- g) Promote dialogue between gender data users and producers to ensure gender statistics meet users' expectations and are widely used for policymaking and advocacy.

Chapter 10. Dissemination of Official Statistics

10.1 Introduction

Dissemination is the phase in statistical processing in which data collected and compiled by statistical agencies are released to the public. It is defined in the [Guidance on modernising statistical legislation](#), UNECE (2018) as: ‘. *the activity of making official statistics, statistical analyses, statistical services and metadata accessible to users*’. The dissemination and use of its statistics that contribute to understanding and better decision-making should be considered the main objective of a national statistical system.

‘Only statistics that are used are useful statistics’, [Petteri Baer](#)

As stated in the first UN Fundamental Principles of Official Statistics (UNFPOS), ‘official statistics... are to be compiled and made available on an impartial basis by official statistical agencies to honour citizens' entitlement to public information’. These principles underline that official statistics are a public good, that access to statistical data should be provided simultaneously to all users, and that the means of access to and dissemination of statistical data take into account the convenience of users and their needs.

Official statistics should be sufficiently comprehensive and presented in such a way with appropriate metadata so that data can be understood without having specialised statistical knowledge. According to UNFPOS 3, “*To facilitate a correct interpretation of the data, the statistical agencies are to present information according to scientific standards on the sources, methods and procedures of the statistics*”.

In recent years, the environment in which official statistics operate has changed significantly. There has been an explosion, not only in the volume of data available but also in the demand for it. This has increased the pressure on NSOs to produce more and better data and to improve its accessibility. To ensure that data users get what they need and to provide benchmark data and forecasts on achieving SDG targets and other reporting requirements, NSOs need new and diversified ways of disseminating statistical information.

How users consume statistical products has changed. In order to stay relevant, NSOs have reacted to this by adapting their dissemination and reaching out to users directly, often by using social media as a part of their dissemination strategy. In today's world, it is not enough to make statistical information available; it is also necessary to give it an edge in a highly competitive data environment. At the same time, NSOs have to make data accessible to better meet demand, while employing innovative technological solutions through various channels to make this process more efficient.

The topics concerning dissemination and communication discussed in this chapter are relevant and applicable to other producers of official statistics throughout the national statistical system (NSS). The NSO can play a leading role in promoting dissemination standards and coordinating efforts for an integrated and interoperable data dissemination platform for the whole national statistical system. This should be based around an exchange standard such as the Statistical Data and Metadata Exchange (SDMX) format (see Chapter 14.4.5 - *Statistical Data and*

Metadata Exchange), facilitating a more efficient and timely flow of data from line ministries to the NSO.

10.2 Release schedule

Many (or most) NSO are committed to making statistical data available to the public according to a pre-defined release schedule (calendar). This is a significant commitment as the release calendar entails that key indicators and datasets have to be released on a given date. Advance release calendars (this term is more usual than schedule) are important for the prevention of manipulation of release dates for political purposes. In addition, reporting by NSOs to international monitoring agencies often follows specific reporting requirements and formats to satisfy national, regional and international reporting. A release calendar is thus a fundamental component and vital for the credibility of an NSO and should be a central part of an NSOs statistical website.

As part of a release schedule an NSO should ensure the following (from the [Code of Practice for statistics](#)):

Organizations should commit to releasing their statistics openly and transparently which promotes public confidence.

- a) The release of both regular and ad hoc official statistics should be pre-announced through a 12-month release schedule, giving a specific release date at least four weeks in advance where practicable.
- b) Changes to pre-announced release dates or times should be agreed upon by the chief statistician/Head of Profession for Statistics. Any changes should be announced promptly, explaining the reasons for the change.
- c) Access to statistics before their public release should be limited to those involved in the production of the statistics and the preparation of the release, and for quality assurance and operational purposes. Accurate records of those who have access before they are finalised should be maintained.
- d) If the NSO grants access to their statistics ahead of their publication, such pre-release access should be restricted to few participants in line with international recommendations on pre-release access in line with the pre-release access rules and principles. The details of that granted access should be recorded, together with clear justifications for the access. No indication of the results should be made public, and the statistics should not be given to any other party without prior permission for access. The list of recipients should be reviewed regularly and kept to a minimum.
- e) Statistics and data should be released on a timely basis and at intervals that meet users' needs as far as practicable. The statistics should be released as soon as they are considered ready, under the guidance of the chief statistician/Head of Profession for Statistics.
- f) Statistics should be released to all users according to a pre-announced schedule.
- g) The name and contact information of the lead statistician or analyst responsible for production should be included in the published statistics.

- h) Policy, press, or ministerial statements referring to official statistics should be issued separately from, and contain a prominent link to, the source statistics. The statements should meet basic professional standards of statistical presentation, including accuracy, clarity and impartiality. The lead statistician or analyst should advise on the appropriate use of the statistics within these statements.
- i) Scheduled revisions or unscheduled corrections to the statistics and data should be released as soon as practicable. The changes should be handled transparently in line with a published policy.

Links to guidelines, best practices and examples:

- Statistics Norway - [making a greater impact with an earlier release time](#).
- Ireland Central Statistics Office – [the timeliness monitor](#).

10.3 Data accessibility

Providing easy access to official statistical data is a core responsibility of an NSO, as well as the commitment that the service meets user needs. The NSO website should strive to meet national and international requirements and guidelines related to accessibility by citizens with special needs as quoted below from the W3C [Web Content Accessibility Guidelines \(WCAG\) 2.0](#):

a) **Perceivable**

- Provide text alternatives for any non-text content to be changed into other forms people need, such as large print, braille, speech, symbols or simpler language.
- Provide alternatives for time-based media.
- Create content that can be presented in different ways (for example, simpler layout) without losing information or structure.
- Make it easier for users to see and hear content, including separating foreground from background.

b) **Operable**

- Make all functionality available from a keyboard.
- Provide users with enough time to read and use the content.
- Do not design content in a way that is known to cause seizures.
- Provide ways to help users navigate, find content, and determine where they are.

c) **Understandable**

- Make text content readable and understandable.
- Make Web pages appear and operate in predictable ways.
- Help users avoid mistakes.

d) **Robust**

- Maximize compatibility with current and future user agents, including assistive technologies.

10.4 Metadata - providing information on the properties of statistical data

Statistical metadata is commonly defined as data about data and is critical to ensuring the quality, interpretability and usefulness of datasets. The first and most fundamental purpose of metadata is to help users of statistical data to interpret, understand, and analyse statistical data.

It is vital that an NSO provides sufficient metadata to ensure quality and add value to statistics. Metadata provides information about the background, purpose, content, collection, processing, quality, and related information of a statistical dataset that a user needs to find, understand and manipulate statistical data. Simply put, the metadata for a statistical dataset increases the number of people who can successfully use a data source once it is released.

10.4.1 Types of metadata

The two main categories of metadata are reference metadata and structural metadata. These are described in the [Eurostat 'statistics explained' glossary](#) in the text below.

a) **Structural metadata**

Structural metadata is used to identify, formally describe or retrieve statistical data, such as dimension names, variable names, dictionaries, dataset technical descriptions, dataset locations, keywords for finding data, etc. For example, structural metadata refer to the titles of the variables and dimensions of statistical datasets, as well as the units employed, code lists (e.g., for territorial coding), data formats, potential value ranges, time dimensions, value ranges of flags, classifications used, etc.

b) **Reference metadata**

Reference metadata (sometimes called explanatory metadata) describes the contents and the statistical data quality from a semantic point of view. They include explanatory texts on the context of the statistical data, methodologies for data collection and data aggregation as well as quality and dissemination characteristics.

Metadata may appear alongside the data in the form of graph labels and footnotes or may be compiled as explanatory notes that contain information such as a definition and description of the population, the source of the data, and the methodology used. Metadata can include documentation of definitions, relationships among variables, specifications, procedures, classification schemes, and instructions. It can be used to assist search and navigation on a website and assist post-processing such as downloading data and statistical tools for analysis. In a dissemination system, metadata can be present at all data collections levels, from footnotes at the individual record level, information at dimension level, and the dataset level.

Standards and guidelines for statistical metadata have been developed and are already applied in practice by national and international statistical organizations. These include:

- [Data Documentation Initiative](#) (DDI).
- Dublin core – [metadata definitions](#).

- Eurostat [Terminology on Statistical Metadata](#).
- Eurostat [metadata guidelines, methodologies and definitions](#).
- Metadata: basic concepts and definitions and [the role of the Statistical Data and Metadata Exchange](#).
- OECD [Data and Metadata Reporting and Presentation Handbook](#).
- Statistical Data and Metadata Exchange ([SDMX](#)) [Glossary](#).
- Statistics Botswana - [the importance of sound metadata management](#).
- Statistics Canada - [Metadata: An Integral Part of Data Quality Framework](#).
- UNECE Guidelines for [statistical data on the internet](#).
- UNSD Statistical Metadata in a Corporate Context: [A guide for managers](#).

10.5 Types of statistics disseminated

This section covers the various types of data disseminated by an NSO. An NSO primarily disseminates macrodata although dissemination of geospatial data is becoming increasingly common. Microdata can also be disseminated, but this tends to be the exception.

10.5.1 Macrodata

Macrodata is a term used to describe data generated by aggregating microdata according to statistical methodology. Examples of such aggregated data include unemployment statistics, demographics and GDP. There are few specific technical or legal issues relating to disseminating macrodata as they do not, in general, have confidentiality or data volume concerns.

10.5.2 Geospatial data

An increasing number of NSOs are disseminating integrated geospatial information and statistics, including a geographic component. This means that the records in a geospatial dataset have implicit locational information such as Global Positioning System (GPS) (or geographic) coordinates. A geographic information system (GIS) is a system designed to capture, store, manipulate, analyse, manage, and present geospatial data (See. Chapter 8.4 - *Geospatial data*).

The challenges of disseminating integrated geospatial and statistical data mentioned in the GLOS guidance include:

“Official statistics typically disseminate statistical data free of charge according to open data principles. This may not always be the case for geospatial data provided by the national mapping agency or regional authorities. Therefore, access to geocoded data is not self-evident or could be costly for statistical authorities.

Statistical offices disseminate statistics in formats, such as tables, maps, graphs, infographics, news releases, public-use files, etc. The geospatial community uses traditional vector data and prepares large grids to disseminate their earth observations data. Publishing statistics on smaller areas and in an increasing number of formats makes the risk of disclosure higher. Very detailed

aggregations pose risks to the privacy of individual data. Furthermore, the data protection methods used by mapping agencies and statistical offices differ, which can make the comparison of data difficult.”

10.5.3 Microdata

Microdata generally contains information on individual persons, households or business entities collected through a survey or interview. In these datasets, each row typically represents an individual and each column an attribute such as age, gender or address. Microdata can also be made up of data on individuals collected from governmental administrative systems and registers. Microdata is used in official statistics for the production of aggregate information.

Microdata provides the underlying data for addressing critical development challenges such as poverty, gender inequality, and food insecurity. They can be aggregated into macrodata or, more commonly, statistical indicators, providing counts and averages at the level of a group, a country, or region. Because it contains disaggregated information about small population groups or areas lost in the process of compiling statistics indicators, microdata can provide a more nuanced, multidimensional view of the needs of vulnerable population groups that is essential for validating previous analyses, testing new hypotheses, and designing programs.

Some NSOs provide microdata for research and analysis purposes. It generally requires significant effort to produce high-quality microdata and the associated creation and documenting of microdata files, creating access tools and safeguards, and supporting and authorising inquiries made by the research community.

Dissemination of microdata in official statistics needs to be done carefully because it may lead to indirect or direct identification of the reporting unit, and measures must be taken to ensure anonymity. The privacy of data collected is core in protecting respondents, particularly for sensitive data set on health, gender violence or victimisation, thus ensuring the quality of and the trust in official statistics. Direct and indirect identification of individuals should be impossible with microdata publication while for research purposes, indirect identification could be possible and therefore, such accesses strictly regulated (see Chapter 14.2.17 - *Data security*).

NSOs often charge researchers for such access to offset the extra costs of making the microdata available. There are also costs associated with the checking of outputs to ensure confidentiality.

For more information, see also Annex 5 - *Why share microdata – a view from Open Data Watch* (ODW).

Links to guidelines, best practices and examples:

- Eurostat [microdata reference guide](#).
- OECD expert group for [collaboration on microdata access](#).
- FAO [microdata catalogue](#) (FAM).
- Guidelines and good practices for [managing statistical confidentiality and microdata](#).
- INSEE France [Statistical confidentiality and data protection](#).
- UN Principles and Guidelines for [Managing Statistical Confidentiality](#) and [Microdata Access](#).

10.6 Dissemination strategy

A dissemination strategy should include agreed principles and guidelines for disseminating and communicating statistics and procedures for handling errors and revisions. It can also promote the development of a common platform of official statistics that includes data from all producers of official statistics. This can help an NSO to harmonize statistical releases, tables, graphs and analysis, and terminology applied across statistical domains. It can help avoid confusion and misinterpretation and can facilitate the comparison of statistics.

A dissemination strategy should take into account the following principles taken from [EU statistics code of practice](#):

a) **Principle 6 - Impartiality and Objectivity**

- Statistical authorities develop, produce and disseminate statistics respecting scientific independence in an objective, professional and transparent manner in which all users are treated equitably.
- Statistics are compiled on an objective basis determined by statistical considerations.
- Choices of data sources and statistical methods, as well as decisions about the dissemination of statistics, are based on statistical considerations.
- Errors discovered in published statistics are corrected at the earliest possible date and publicised.
- Information on data sources, methods and procedures used is publicly available.
- Statistical release dates and times are pre-announced.
- Advance notice is given on major revisions or changes in methodologies.
- Statistical authorities independently decide on the time and content of statistical releases, while considering the goal of providing complete and timely statistical information. All users have equal access to statistical releases at the same time. Any privileged pre-release access to any outside user is limited, well-justified, controlled and publicised. In case of breach, pre-release arrangements are reviewed to ensure impartiality.
- Statistical releases and statements made in press conferences are objective and non-partisan.

b) **Principle 15 - Accessibility and Clarity**

- Statistics are presented in a clear and understandable form, released in a suitable and convenient manner, available and accessible on an impartial basis with supporting metadata and guidance.
- Statistics and the corresponding metadata are presented, and archived, in a form that facilitates proper interpretation and meaningful comparisons.
- Dissemination services use modern information and communication technology, methods, platforms and open data standards.
- Custom-designed analyses are provided when feasible, and the public is informed.

- Access to microdata is allowed for research purposes and is subject to specific rules or protocols.
- Metadata related to outputs are managed and disseminated by the statistical authority according to the European standards.
- Users are kept informed about the methodology of statistical processes, including the use and integration of administrative and other data.
- Users are kept informed about the quality of statistical outputs with respect to the quality criteria for statistics.

A dissemination and communication strategy will need to be in line with other policies, particularly confidentiality requirements. According to the Generic Law of Official Statistics ([GLOS 2016](#)), the strategy may include the following elements:

- a) the general dissemination principles and guidelines, in line with the statistical law;
- b) the use of different dissemination platforms and the pricing policy;
- c) procedures for handling errors;
- d) procedures for handling revisions;
- e) ways to facilitate users' access to all official statistics from different producers;
- f) the main contents and practices for releasing metadata;
- g) best practices for producing tables, graphs and written explanations;
- h) practices for archiving statistical releases for future use.

Links to guidelines, best practices and examples:

- [India Ministry of Statistics data dissemination policy](#);
- [National Statistics Institute \(INE-Chile\) data dissemination policy](#);
- [Open data standards directory](#);
- Open Data Watch “[Measuring Data Use](#)”;
- PARIS21 NSDS [guidelines on data dissemination](#);
- Statistics Botswana [data dissemination policy](#);
- [Statistics Estonia data dissemination policy](#);
- [Palestinian Central Bureau of Statistics \(PCBS\) data dissemination policy](#);
- UNSD Principles for the [dissemination policy of official statistics](#).

10.7 Dissemination methods

10.7.1 Dissemination by websites and data portals

NSOs have provided access to data via their websites for many years. Data has been made available in pdf format, as downloadable datasets, and as interactive links to databases. The most important tool used by an NSO to disseminate statistical data and metadata is the data

portal, a web-based, interactive data and metadata platform with databases modelled for specific data types and domains such as microdata, macrodata or geospatial data.

Today many developing countries lack fully functional platforms for data dissemination and reporting and rely on less sophisticated dissemination methods on their websites. Solutions have come and gone, but none in the recent past have emerged that were sustainable over the long term for many countries. For example, [DevInfo](#), was the data dissemination platform developed for the Millennium Development Goals (MDGs) and used in 120 countries but is now no longer supported. This issue was highlighted by the [PARIS21 study on national data portals](#) published in 2016 which concluded that while there have been many well-intentioned efforts to make data portals available to countries, the outcomes have been mixed, particularly in the most aid-dependent countries. The report also notes that the increased adoption of data portals in NSOs of all capacity levels has had a particular impact on developing countries where data portals were often implemented by international agencies for monitoring purposes as well as to help NSOs to improve the dissemination of data to a broader public. In many cases, NSOs found themselves having to maintain multiple, non-integrated data portals focussed on specific domains. This confuses users who consult the various portals with often conflicting results, and such multiple portals have the consequence of overall high costs for low usage.

Data portals can help promote standards that can enable interoperability – this can be within an NSO, within an NSS, or at the international level. They can promote the exchange of data by leveraging standards such as SDMX to establish a coherent framework for transmitting data and metadata. Data portals can play a major role in reducing reporting burdens and improving the quality of reporting data and provide a single interface for accessing statistical data using standards of content and presentation.

10.7.1.1 Selecting the appropriate data portal for a national statistical office

It is important that an NSO seek impartial expert advice and can access the information needed to make an informed decision on selecting the appropriate data portal to meet their needs. An NSO should be aware of the advantages and shortcomings of each system, its use of international standards or proprietary formats, its sustainability, and the real costs of maintenance. Regional bodies and centres of expertise can play an important role in providing such guidance based on the latest available information in the international statistics community.

The UNSD report on [Principles of SDG Indicator Reporting and Dissemination Platforms and guidelines for their application](#) provides a set of principles for selecting a national data reporting platform. These are summarised below:

A national reporting and dissemination platform can be understood as a means to report and disseminate national statistics including SDG indicators and descriptive metadata, and refers to a web site, database(s), and associated IT infrastructure, workflows and processes used to collect, store, secure, and ultimately disseminate data and related metadata and documentation in an easily accessible way to reach all target users.

- a) **Clear institutional arrangements and management:** The responsibility for the development, implementation and maintenance of a national reporting and dissemination platform, including the required coordination and cooperation within the national statistical system, as well as accountability and oversight, should be clearly established

through adequate laws and/or regulations, mandates and standard operating procedures. The NSO, commonly tasked with coordinating the national statistical system, is typically assigned this responsibility. Information flows, and the role of each actor within the national statistical system should be clearly established.

- b) **Fitness for purpose:** National reporting and dissemination platforms should comply with the Fundamental Principles of Official Statistics and should address the priority needs and requirements of sub-national, national, regional and global monitoring and reporting, as well as reduce the reporting burden.
- c) **Sustainability:** The decision on the purpose, scope, features, development and implementation of the national reporting and dissemination platform needs to consider the availability of internal and external resources and capacities over the medium and long term.
- d) **Interoperability and statistical standards:** The components of national reporting and dissemination platforms should follow international and national statistical standards and best practices, to facilitate the integration, customization and further development of components and different solutions. In particular, standards should be supported to facilitate data harmonization and exchange across different stages of the statistical production and institutions including common data structure definitions and code lists, and the integration of data flows and processes within the national statistical system.

The report also lists the following guidelines for the implementation of an SDG Indicator Monitoring and Reporting Platform:

- a) **National Ownership:** NSOs should have the ability to maintain, adapt, transform and customize their national reporting and dissemination platform to address their own and their users' needs, such as the management of sub-national administrative boundaries, country-specific ethnic and language groups, and additional indicator definitions related to national development priorities.
- b) **Collaboration:** National reporting and dissemination platforms should be designed, developed, improved and maintained based on a collaborative approach that leverages learning between various stakeholders of the national statistical system as well as technology developers, donors, policymakers, subject-matter experts, business partners, advocacy groups and both institutional and grassroots users.
- c) **Multilingualism and accessibility.** To leave no-one behind, to ensure national ownership, and to promote the use and impact of data for policy and decision making at the local level, national reporting and dissemination platforms should support national languages and implement national and international best practices in terms of accessibility to persons with disabilities, as well as full access across the range of browsers and devices, including mobile devices.
- d) **User-centric Design:** National reporting and dissemination platforms should be designed for and with users (including both operational and end-users, such as data consumers or NSO officers), and project owners should engage them in all phases of development.
- e) **Data Communication:** National reporting and dissemination platforms should implement innovative strategies to improve the presentation, communication and use of sustainable development data.

- f) **Data disaggregation:** National reporting and dissemination platforms should support improved access to, and use of, disaggregated data to focus on all population segments, including the most vulnerable. In particular, data platforms should allow the management and dissemination of data disaggregated by sub-national geographic areas, sex, age group, residence, wealth and income group, disability, ethnicity, migrant status, and other important characteristics relevant to the national context.
- g) **Modularity and extensibility:** National reporting and dissemination platforms should be modular, composed of modules (sub-systems) and components that interoperate to service the different phases of the data life cycle. The data that these modules and components consume as inputs and produce as outputs should as much as possible be based on open standards and protocols such as Statistical Data and Metadata Exchange (SDMX) and Common Statistical Production Architecture (CSPA). The system should support extensibility through the addition of modules or components, upstream or downstream.
- h) **Standardized interfaces:** National reporting and dissemination platforms should provide standardized Application Programming Interfaces (APIs) in accordance with the industry best practices such as the OpenAPI Specification. This facilitates creating and sharing data across global, regional, national and sub-national data communities.
- i) **Scalability:** A National reporting and dissemination platform should have an architecture that enables an NSO to start with a limited scale implementation and iteratively progress towards a full-scale system.
- j) **Metadata:** National reporting and dissemination platforms should support statistical metadata at the appropriate level of granularity. This includes structural metadata such as codes and their descriptions; reference metadata such as methodology and quality aspects of published indicators; and other relevant information such as the date of last update.
- k) **Open Data:** National reporting and dissemination platforms should be consistent with Open Data best practices, summarized as ‘Open data and content can be freely used, modified, and shared by anyone for any purpose’. National reporting and dissemination platforms should include and follow a data license consistent with the Open Data principles, such as Creative Commons Attribution (4.0) or the Open Database License. Published datasets should be clearly attributed to the originating organization.

Links to guidelines, best practices and examples:

- [List of open data portals;](#)
- [Africa open data portal;](#)
- [CKAN data portals;](#)
- [Eurostat data portal;](#)
- [OECD data portal;](#)
- [UN data portal;](#)
- Search for [data portals;](#)

- [World Bank data portal](#).

Examples of NSO-specific data portals:

- [Canada data portal](#);
- [China data portal](#);
- [India data portal](#);
- [Ireland data portal](#);
- [Mongolian data portal](#);
- [Philippines data portal](#);
- [Rwanda data portal](#);
- [South Africa data portal](#);
- [Turkey data portal](#).

10.7.1.2 National statistical system data portals

As well as the need for an NSO to have a data portal, there is also a wider requirement for a common integrated data portal that can be used across an entire national statistical system. This is especially important in the SDG context where a coordinated approach is necessary to provide indicators from multiple sources. National SDG reporting platforms are usually separate from web portals intended for the dissemination of official statistics.

These data should feed in from the various ministries and other agencies that make up the national statistical system, coordinated by the NSO, in a standard format such as SDMX. The African Information Highway is an example of such an NSS-wide system that uses SDMX as the common exchange and dissemination format (see Chapter 14.4.5 - *Statistical Data and Metadata Exchange*)

10.7.1.3 Generic data portals

There are several generic data portals that aim to meet the common dissemination needs of NSOs of all capacity levels. This reiterates the need for commonly shared systems or interoperable home-grown solutions. A challenge is to adapt a generic portal to accommodate every data type that an NSO produces - and generic solutions may eventually need to be customized for specific NSO requirements.

Examples of generic data portals:

- a) [Fusion Registry 9](#) Enterprise Edition is an integrated management system for aggregated statistical data and metadata. It uses SDMX, the international standard for describing and exchanging official statistics.
- b) [National Data Archive \(NADA\)](#) dispenses survey documentation – questionnaires, technical documents and reports describing the surveys etc.; survey description – sampling frames and data collection information etc.; and data description – variables and counts etc. and anonymized microdata of surveys.

- c) [.Stat Suite](#) is a component-based, open-source set of tools for managing the full data life-cycle. The Data Explorer allows for searching, visualising and sharing of data through a fully open-source front-end set of components that can be adapted to specific needs and context.
- d) [IMF Dissemination Standards Bulletin Board](#).
- e) [African Information Highway](#).

10.7.2 The use of social media in dissemination

Social media are websites and applications that enable users to create and share content or to participate in social networking. In the last edition of the Handbook in 2003 social media barely existed – this indicates the rate of change in technology and human behaviour that has taken place during the intervening period that NSOs have to adapt to.

The use of social media by NSOs has been increasing rapidly in recent years, and this will most certainly continue in years to come given its pervasiveness. Social media has been used in various forms to disseminate and raise the profile of official statistics. Social media are mainly used to distribute information, announce new releases, promote the use of statistics, and increase statistical literacy. They can also be used to reach new audiences and improve user support and receive user feedback and for marketing purposes. Using social media can also promote the image of the NSO as a modern and dynamic organization. Social media can be a useful tool in disseminating and discussing official statistics, as it offers tailor-made solutions to reaching individuals interested in official data.

The main types of social media are listed below:

- a) **Collaborative projects** serve as an online database, allowing users to pool knowledge and information on particular topics to be viewed by other interested parties. Example: Wikipedia.
- b) **Blogs, microblogs and vlogs** are a type of website or part of a website maintained by an individual with regular entries of commentary, graphics or video. Many blogs provide commentary or news on a particular subject; others function as more personal online diaries. Example: WordPress or Twitter.
- c) **Content communities** allow users to upload, share, and view multimedia content such as videos, pictures, music or presentations. Example: YouTube, Flickr, Soundcloud.
- d) **Social networking sites**, e.g., are online services, platforms or sites that focus on building and reflecting social networks or social relations among people who share interests or activities. Example: Facebook, LinkedIn.
- e) **Virtual communities** take the form of a computer-based simulated environment through which users can interact with each other through avatars and can explore, meet others, socialise, participate in individual and group activities, and create and trade virtual property and services with one another, or travel throughout the ‘world’. Example: Second Life.

Social media can be of use to an NSO in the following ways:

- a) reaching and more people and people who normally do not look for statistics;
- b) providing a new way for users to find facts quickly;

- c) challenging the traditional ways of searching and accessing information;
- d) allowing quick and spontaneous reaction to issues raised;
- e) fostering reputation and strengthen the brand of NSOs;
- f) increasing information availability; and
- g) increasing the use and reputation of statistics in a positive way.

Links to guidelines, best practices and examples:

- Eurostat [microdata reference guide](#);
- Eurostat - [Social Media in Statistical Agencies](#);
- UK GSSr - [Improving user engagement for official statistics](#);
- [United Nations on social media](#);
- UNECE [framework for communication on official statistics](#);
- [Statistics Canada use of YouTube](#).

10.7.3 Machine-to-machine dissemination

Machine-to-machine access (commonly abbreviated as M2M) refers to computers exchanging data via application programming interfaces (APIs) as a means of opening up data to a wider variety of uses. It can also refer to communication within a system of networks that transmit data to personal appliances. The expansion of networks around the world and increased computing power has made M2M communication quicker and easier to implement.

M2M data transmission methods can reduce reporting lags and lower the reporting burden. Using a standard such as SDMX data structures and common IT building blocks, international information systems can communicate M2M as industrial production processes. Using SDMX makes it possible to interconnect remote dissemination databases to cut transmission delays, save resources, and improve the data quality in making global data more comparable.

Links to guidelines, best practices and examples:

- Statistics Poland – [API portal](#).

10.7.4 Hard-copy dissemination

The use of printed publications varies from NSO to NSO, but the overall trend is that producing large numbers of printed publications that are essentially a series of tables is declining and being replaced by online access to data or PDF files that can be printed on demand. There is still a need for paper publications in countries with scant access to digital systems and tools and undeveloped digital literacy.

Printed publications are also used for display purposes in conferences and events, or as gifts, but this is fairly small-scale production of well-designed infographics presented in small booklets. Ready-made-tables can provide a service to those who need material ready-made and simple to download. Many NSOs do this in PDF only, but machine-readable files in standard formats such as CSV or XLSX can be useful to many users.

Links to examples and guidelines:

- Albania National Statistics Institute – [dissemination policy and guidelines](#).

10.7.5 Multimedia dissemination

Other dissemination formats include CD-ROMs, DVDs and USB keys. These are mostly used where there is little internet access and are generally being phased out in most NSOs. They and have been replaced by online access to data.

10.7.6 Mobile apps

As a result of the continuing technological advances in smartphones, users now expect access to digital information anytime, anywhere, and on any device. Use of mobile devices by NSOs to provide data access has risen significantly in recent years, with more users accessing data on mobile devices. One concern is that such apps can quickly become obsolete if they are not maintained. It is important that existing web-based applications, in particular, data portals, should be adapted to be usable on multiple platforms of mobile devices.

10.7.7 GIS Portals

Geographic Information System (GIS) portals are specialised platforms for the dissemination and visualisation of geospatial data. Data is combined with maps from publicly available sources such as Google Maps.

- Central Statistical Bureau of Latvia [thematic maps](#);
- The Environmental Systems Research Institute (Esri) ArcGIS platform for [geospatial data processing and dissemination for NSOs](#);
- Eurostat – [GISCO \(Geographic Information System of the Commission\)](#);
- National Institute of Statistics of Rwanda [Geodata Portal](#);
- [Statistics Korea - GIS, Maps and Statistics](#);
- Tool for [visualisation and dissemination of geospatial statistics](#) in Slovenia;
- World Resource Institute (WRI) portal of [maps, charts, datasets, infographics, and other visual resources](#);

10.7.8 Statistical yearbook

The statistical yearbook is a compendium of statistical information dealing with a wide range of development pertinent topics. Printed yearbooks have the limitations of other paper publications in that people now read less and want clickable tools accessing live databases - however, many NSOs at all capacity levels are still producing them. Merits of producing a yearbook include the following:

- a) The yearbook can be distributed to/is useful for users who do not have access to digital equipment and in regions with little or no digital network;
- b) It provides an occasion for a review of the relevant information that describes a country;
- c) It clarifies the need for integration in the statistics that will be selected for the yearbook;

- d) It reveals gaps in the available information, thereby suggesting the new initiatives that should be taken to complete the description of the country's social and economic fabric;
- e) In the case of decentralized systems, it is yet another means of promoting coordination among statistical units in different government departments;
- f) It is an ideal pedagogical device to introduce children to the physical, political and human geography of their country;
- g) It also acts as a timestamp for the data published on a specific date.

Links to guidelines, best practices and examples:

- [Albania statistical yearbook](#);
- [China statistical yearbook](#);
- [India statistical yearbook](#);
- [Jordan statistical yearbook](#);
- [Maldives statistical yearbook](#);
- [Mongolia statistical yearbook](#);
- [Rwanda statistical yearbook](#).

10.7.9 Dynamic visualisations

Dynamic visualisation refers to those representations that go beyond static forms, such as printed media. The defining characteristics of dynamic visualisation are animation, interaction and real-time data access. Visualisation tools play a key role in making complex data understandable and accessible to a wide audience (see Chapter 14.2.6 - *Data visualisation software*). It can support and underscore messages to influence policy and evidence-based decision making. Visualisations can reveal compelling stories from complex underlying data and have become an important element of communication strategy. Until fairly recently data visualisations used by NSOs were mainly static images and simple graphics, but advances in technology have led to a wide range of visualisation methods and sophisticated graphics that border on artistic design that can be reused, linked to datasets and embedded in websites and via apps in social media.

10.8 Recovering dissemination costs

10.8.1 Free versus paid access

There has been much debate over the years on whether NSOs should provide all their statistical data free of charge. The trend today is to provide access to data for free with some exceptions. As previously noted, official statistics are considered to be a public good, which in itself seems a reason for an NSO to provide free access to its data. One should also note that if collecting a fee requires more resources than the fee brings in, it is economically inefficient. Operating complex paywalls may be beyond the capacity of many NSOs. If charges for data are made, they should be based on data extraction costs or the costs of expert work in compiling additional

aggregations and linking of data for new statistics requested. It should cover costs, IT, and infrastructure required for the tailored service, not for profit.

There are still several paying models which include (extracted from ‘[why people pay for data](#)’)

- a) **Metered consumption:** In this model, a certain amount of data is free, and when you need more, you must pay for it. Within this model, there are a couple of options: one where rates are measured on a per dataset basis, and one where rates are measured site-wide, regardless of the dataset(s) being accessed.
- b) **Consumer classification:** Charging different rates for various types of customers is a well-known business model. For government data, business consumers are most likely to be charged since they are probably using the data for revenue-generating purposes. Sometimes referred to as ‘freemium’, this model works by offering simple and basic services for free for basic users while more advanced or additional features are at a premium. The business consumers are paying customers that effectively subsidize free services for non-business customers.
- c) **Access methods:** Purely from a technology perspective (computer memory, processing, and connectivity), downloading an entire set of data is generally less costly than asking for small specific pieces of it. Bulk data could be made available for free while application programming interfaces (APIs) could be fee-based. Charging to push data to a subscriber as it becomes available (rather than pulling it using bulk downloads or APIs) is another option.
- d) **Premium datasets:** Similar to consumer classification, except instead of charging based upon who is accessing the data, costs are determined by what data they access.
- e) **Real-time or delayed access:** This scenario is useful for transactional data where extremely recent data has greater value, but value decreases over time until it’s free. An example from the finance sector is stock market data, where companies pay a premium for real-time information (and invest millions of dollars to gain a millisecond lead over the competition), but within 15–20 minutes, the data is free and publicly available.

10.8.2 Role of data resellers

The NSO is a provider of high-quality data that others can profit from by adding value. As more and more NSOs adopt open data policies (see Chapter 14.2.8 - *Open data initiatives*), data resellers can simply pull the data from NSO websites, re-package and re-sell it without having to engage in any specific relationship with the NSO.

In many countries, the private sector is already engaged in the dissemination of statistical data and information. In some cases, these are basic statistical information, and in others, the vendor provides a value-added service such as conducting further analysis of the data or integrating the data with other sources of information. While an NSO may not disseminate all statistical data, it does have an obligation to ensure that essential statistical information is provided to all society segments on an equal basis. Depending on national practices, an NSO may provide the information itself or assist the vendor in doing so.

The involvement of data resellers can assist in the dissemination of statistical information in several ways. Their marketing skills relieve statisticians of the task of interacting with the end-users of information, and by subjecting the data to thorough analysis, data resellers can provide

additional constructive criticism of quality and presentation. They can also help NSOs assess demand for various types of data.

Value-added features of data resellers include the following:

- a) High-frequency data delivery;
- b) Multiple data delivery methods and formats;
- c) Integrating multiple data sources into a single format;
- d) High availability of data;
- e) Adding on related data.

However, potential problems also exist in that resellers may misinterpret data without giving statisticians a chance to set the record straight.

10.8.3 Copyright and royalties

Copyright is an intellectual property right assigned automatically to the creator of an original work that aims to prevent unauthorised copying and publishing of the work and *gives the copyright holder legal recourse*. Copyright applies to statistical data and plays a role when creating, sharing and reusing data. Data itself cannot be copyrighted, but an NSO may own copyright of the compilation of the data.

A Creative Commons (CC) license is one of several public copyright licenses that enable the free distribution of an otherwise copyrighted work. A CC license is used when giving others the right to share, use, and build upon a work that the author has created. This lessens the restrictions on using that data considerably by changing the copyright from 'all rights reserved' to 'some rights reserved'.

For example, the Australian Bureau of Statistics (ABS) supplies the bulk of its free and customised data with Creative Commons Attribution (CC BY) licensing. In this way, the ABS only requests that it be acknowledged as the source of the data.

Links to examples and guidelines:

- [Australian Bureau of Statistics - Creative Commons licensing](#).
- [Creative Commons](#).
- [WIPO principles of copyright](#).

10.9 Open data movement

Open data is defined by the [Open Data Foundation](#) as “*Open data is data that can be freely used, shared and built on by anyone, anywhere, for any purpose*”. If an NSO wants to comply with recommended standards for open data, then certain steps should be taken to make its data freely available in this way (see Chapter 14.2.8 - *Open data initiatives*). Openness is a concept common to open source, open government and open data. It responds to various political and economic issues. Democratic gains are expected from data openness (better transparency of public action, citizen participation, response to the crisis of confidence towards politicians and

institutions), and economic value creation through the development of new activities based on open data.

The benefits of open data can serve many groups, including the government. Open data creates value for the government; it can improve measurement of policies, increase government efficiency, provide deeper analytical insights, stimulate greater citizen participation, and boost local companies by way of products and services that use government data. In recent years, many national governments have implemented open data initiatives. Data quality, in turn, improves when data are well documented and open to public review.

A benefit for an NSO is that open data initiatives can provide incentives for improvement, including modernisation of statistical systems, upgraded IT infrastructure, and more responsive user services. By better responding to demand and improving the efficiency of the supply side, NSOs can reach a larger audience and raise their profile and influence, which can, in turn, help with resource mobilization to improve statistical systems. But moving to an open data model may remove a revenue stream that previously supported data production or dissemination.

The adoption rate of open data principles varies from NSO to NSO according to each country's culture and political climate. Reluctance to open public data sources can be due to concerns about data quality, costs, privacy and information technology capacity.

Links to examples and guidelines:

- PARIS21 [NSDS guidelines on open data](#).
- World Bank [open data toolkit](#).

10.10 Moving to a modernised distributed digital system

The development of a modern distributed digital statistical information system and data dissemination platform as a basis for digital outputs is a major transformation project for an NSO. A project of this scale would need to be implemented in gradual phases and not be carried out in isolation. An NSO should not act alone but engage with other NSOs to reuse existing software solutions as far as possible. The project should follow the principles of the Common Statistical Production Architecture (CSPA) framework (see Chapter 14.2.12 -*The Common Statistical Production Architecture*).

Links to examples and guidelines:

- [Strategy for information and dissemination](#) developments in the statistical office of the Republic of Serbia.

10.11 Statistical literacy

Statistical literacy is the ability to understand and reason with statistical data. It applies to all age groups and categories of society to better understand data presented to them in its various forms in daily life and, consequently, allow them to make better evidence-based and informed decisions. An NSO can play a major role in improving statistical literacy for the public benefit and ensuring that the value of statistical outputs is maximised.

NSOs use different strategies to improve statistical literacy in different target groups. Strategies such as improving the accessibility to statistics via easy-to-use, well-designed and understandable websites. Strategic questions that are relevant to the chief statistician include:

- a) What is the role of NSOs in developing numeracy and statistical literacy in society?
- b) Why is it important/crucial for the existence of official statistics?
- c) How much resources should be put on promoting statistical literacy?
- d) What innovative methods can be used to improve statistical literacy?

The [UNECE ‘Making data meaningful handbook Part 4’](#) lists the following target groups for improving statistical literacy:

- a) **Opinion leaders** (the media, politicians, NGOs, academia): web-based tools tailored for specific key users; targeted training courses.
- b) **Decision-makers** (elected officials, government policymakers): web-based tools tailored for specific key users; targeted training courses; newsletters; social media; educational presentations.
- c) **The education community**: influencing the curriculum; provide educational material for teachers; web-based educational resources for children.
- d) **Respondents, businesses and the general public**: easily findable, accessible and clear data; animated stories, data displays and visualisations; educational website sections to explain statistics; social media.
- e) **Within statistical organizations**: structured development programmes for staff; training courses; educational leave; training by retirees.

Links to guidelines, best practices and examples:

- The [International Statistical Literacy Project](#) (ISLP).

10.12 Skills needed by an NSO for dissemination and communication

Developing comprehensive communication strategies is a new approach for many NSOs and it is a challenge to build expertise in this area. This may require training staff across NSOs and the development of a network of professional communication experts.

A typical communication team would combine skills in dissemination, infographics and graphic design. Other skills include developing and maintaining communication tools such as videos, social media, blogs, data visualisations, and infographics/motion graphics. The communication team should be able to correspond on high-level issues, organize events and product launches, run NSO social media accounts, manage the web site and other digital spaces, and finally assess the impact of NSO’s communication initiatives. With the huge increase in social media use and its importance as a communication tool, it is becoming common practice for NSOs to recruit communication staff who specialise in the use of social media.

Chapter 11. Common Statistical Infrastructure

11.1 Introduction

11.1.1 Definition of common statistical infrastructure

The *common statistical infrastructure* is defined as the *statistical tools and systems* that support the activities constituting a generic statistical production process, but that is not part of any specific statistical process, together with the *statistical activities* required for development or acquisition, maintenance and promotion of these tools and systems. The common statistical infrastructure is part of the so-called intangible assets of a national statistical office (NSO) or any other producer of official statistics within the country.

Examples best illustrate the distinction between activities associated with a generic statistical process and with the common statistical infrastructure:

- a) As the first example, consider the subprocesses of designing and creating the frame for a survey as described in the Generic Statistical Business Process Model ([GSBPM](#)) subprocesses 2.4 and 4.1. In the case of a business survey, the frame is typically sourced from a statistical business register (SBR), which is not part of the survey, rather it is developed and maintained for the benefit of all business surveys. Thus, the SBR is an element of the *common statistical infrastructure* and associated with the statistical activities required to design, develop and maintain it and promote its use. Likewise, an address register is an element of the *common statistical infrastructure* providing survey frames for household surveys.
- b) As the second example, consider the subprocesses of designing and building a survey questionnaire (GSBPM subprocesses 2.3 and 3.1). They are typically supported by a questionnaire design and construction tool/system independent of the survey. This tool/system is another element of the *common statistical infrastructure* and is developed or purchased, maintained and promoted, for the benefit of many surveys.
- c) As the third example, consider the subprocess of checking output tables for confidentiality preservation (GSBPM subprocess 6.4). This is typically supported by a confidentiality checking tool, which is also independent of the survey, and which is developed or purchased, maintained and promoted for the benefit of many surveys. This tool is another element of the *common statistical infrastructure*.
- d) As the fourth example, consider the development, maintenance, and promotion of a statistical standard that defines all the ways a country can be acceptably divided by geographical area to collect and disseminate statistical data. Such a standard is used in the design and dissemination phases of a generic statistical process but is independent of the process. It is another element of the *common statistical infrastructure*.

11.1.2 Benefits of common statistical infrastructure

A common statistical infrastructure has two key benefits. First, each element of the infrastructure, once developed, supports all statistical processes, or, at least, all statistical processes of a given type, say business surveys. Thus, a new statistical process can be

developed more quickly and at less cost than if there were no common statistical infrastructure, and it can be conducted more efficiently and with greater coherence with other processes. Second, the common statistical infrastructure promotes harmonisation across statistical processes through the use of common methods and standards.

Evidently, the NSO and other large producers of official statistics are likely to have considerably more common statistical infrastructure than smaller producers and, as such, they are likely to derive more benefits. However, smaller producers may also benefit if, as members of the national statistical system (NSS), they can take advantage of common statistical infrastructure developed by the larger members. In fact, the benefits of a common statistical infrastructure apply not only to producers in the NSS, but also to producers in different countries. This is the major aim of UNECE's [Common Statistical Production Architecture \(CSPA\)](#), which is defined as:

“a set of principles for increased interoperability within and between statistical organizations through the sharing of processes and components, to facilitate real collaboration opportunities, international decisions and investments and sharing of designs, knowledge and practices.”

CSPA is further described in Chapter 14.2.12 - *The Common Statistical Production Architecture*.

11.1.3 Content and structure of the chapter

Chapter 6 - *Users and Their Needs*, Chapter 8 - *Data Sources, Collection and Processing*, Chapter 9 - *Analysis and Analytical Frameworks*, Chapter 10 - *Dissemination of Official Statistics* and Chapter 7 - *Quality Management* describe and provide guidance for the statistical activities associated with a generic statistical production process as described by the GSBPM. The current chapter is complementary to these chapters in the sense that it focuses on the statistical tools and systems that support the activities directly associated with a generic statistical production process while being separate from them. However, it does not cover statistical training, statistical information, data, and metadata management, which are dealt with in Chapters 12 - *Human Resources Management and Development* and 14 - *Data, Information and Knowledge management*.

A statistical production process starts with a conceptual target population, which is defined in terms of the type of unit that is the subject of the process (for example, enterprise, person, household, farm, etc.) and the envisaged coverage of these units (for example, all enterprises registered for VAT, all persons that are permanent residents of a country or region, etc.).

As discussed in Chapter 8 - *Data Sources, Collection and Processing*, for a statistical production process that is a survey, the target population is realised in the form of a set of sampling units in a survey frame (abbreviated frame where the context is clear). In principle, the survey frame should provide complete unduplicated coverage of all units included in the target population. In practice, it is the closest approximation to the target population that can be reasonably obtained. The population covered is termed the survey population. The survey frame is not simply a list of sampling units; it includes all the data about those units required for stratification, sampling, and contact.

Survey frames should be coordinated across the surveys that are in any way related so that the data resulting from the surveys are coherent, i.e., can be readily combined without anomalies.

For example, the frames for two business surveys intended to cover different industrial sectors should have mutually exclusive coverage.

How a survey frame is constructed depends upon the type of sampling unit involved. In this context, surveys may be divided into four basic types: business surveys, informal sector surveys, agricultural surveys and household surveys.

For most business surveys, the frame is most efficiently and effectively constructed by using a statistical business register (SBR). This describes the construction and maintenance of an SBR and its primary function - that of providing frames for business surveys - and its other uses, particularly as a source of publishable business demographics.

To the extent it depends upon administrative data for construction and maintenance, an SBR cannot provide coverage for informal sector surveys. Frames for such surveys can be obtained from an economic census based on area enumeration, as a by-product of a population and housing census, or using a household-based survey in which a sample of individual households is asked about the businesses.

Although business, informal sector, agricultural and household surveys are treated separately, the three groups are becoming increasingly interrelated. For example, household surveys may be used to collect data about businesses in the informal sector or identify agricultural producers for own consumption. The SBR may be used as the frame for agricultural surveys of incorporated businesses that are in agriculture. Close cooperation between a population census and agricultural census in a country is strongly advocated in the relevant international guidelines.

11.2 Register-based statistics

11.2.1 Description of Register-based statistics

‘Register-based statistics’ mean statistics that are fully based on administrative registers or partly based on them with complemented data from other administrative sources and direct surveys. This definition is rather wide and may include almost all statistics production. The focus in this section is on those statistics which have links to a register-based production model.

The term ‘register-based statistical system’ is used in this section even though it is by nature indicative rather than an accurate description of any statistical system. As a pragmatic approach the handbook [*Using Administrative and Secondary Sources for Official Statistics: A Handbook of Principles and Practices*](#) published by the UNECE (2011) defines register-based statistical system as a system based primarily on administrative data that have been organized into linked statistical registers. This definition considers that in practice, all NSOs, independently of their data collection policies and production models, need to conduct regular statistical surveys to produce a full range of statistics. However, in a register-based statistical system, the basic data infrastructure is organized around linked statistical registers based on administrative sources. With such an infrastructure, administrative data is considered as a main source of information for the compilation of official statistics. Administrative data has been used in modern statistics production for decades and a remarkable milestone in producing register-based statistics was the Danish population and housing census of 1981 and its underlying register-based production model. The production model was based on the linking of several administrative registers and

other administrative data sources. Since then, several NSOs have applied this approach to the production of register-based statistics.

The above mentioned UNECE Handbook summarises several countries' experiences in collecting and using administrative data at that time. A common understanding among statisticians about the possibilities and constraints of using administrative data has grown remarkably during the recent decade. At the same time, statistical methods to improve possibilities and overcome problems have developed. It has become a good international practice to add a specific section to the use of administrative sources to domain-specific guidelines, such as guidelines for population census or integrated business statistics, to remind the NSOs about the possibilities of administrative data as a source for compiling statistics.

Administrative sources, access and acquisition of administrative data are dealt with in Chapter 8.3 - *Administrative sources*. This section deals with utilising administrative registers and other administrative data effectively in the statistical production. The focus is on building an administrative and statistical register infrastructure to be used in the production of official statistics - including technical and organizational structures and facilities - which can facilitate the use of register data.

The utilisation of administrative sources varies greatly from country to country. The extent of the development of the basic infrastructure in the direction of intensive utilisation of administrative sources depends on the existence of suitable administrative sources, ease of access to them, general facilitators like common identifiers and, in the end, on government policy and the acceptance of the general public. The development phase is long, and a step-by-step approach is needed.

11.2.2 Registers

11.2.2.1 Administrative registers

A register can be simply a basic list of all units in the target population and nothing more. In practice, most registers include additional attributes for each unit. In a population register, these attributes are related to natural persons: name, identification code, address, domicile code, sex, and family relations. In a business register, a registered entity may have attributes like name, address, identification code, type of company and activity class.

An administrative register's function is typically to identify the registered units, keep stock of the population (like natural persons in a population register and businesses in a business register) and keep track of any information changes related to coverage (new units to be added and exiting units removed) and to events (changes in the attributes of the units). Management of these changes is built into the updating system of the register.

All countries have administrative registers. Administrative registers are seen increasingly often as a resource and facilitator in the effective and proper functioning of a society. Governments are giving ever-growing attention to the development and management of the administrative registers and the information management of public administration in full including information systems, information security, operating processes and technical interfaces. As part of the public sector information systems, administrative registers are needed to serve not only government administration in its daily operations but also to help people, businesses, and

other organizations understand their lawful rights, access benefits, and meet their obligations in the society.

Among the most important administrative registers widely used for statistical purposes are population registers or civil registration and birth and death registration systems, business registers, registers of social security and health care systems, taxation and customs registers and registers from building and property registration systems.

The way the registers and other governmental information systems are organized and developed varies from country to country and depends on the culture, policies and structure of the governmental sector as well as on the legislative framework of a society. The degree of centralisation of administrative registers, the identification systems and the extent to which the registers and the identification systems are regulated by law vary remarkably across the countries.

Identifiers play a vital role in maintaining administrative registers and their use for statistics production, which usually means linking data from various sources. Identification codes (ID codes) should ideally not be changed during the period a unit exists. This is the method usually applied in the countries with a common identification system. The codes are used in administrative data across the whole administration.

Registers and identification codes are usually regulated by national laws in the countries with centralised management of public sector's information systems. Laws regulate the responsible authorities and their rights and obligations as well as the content, access to and use of these registers. The creation and the use of the personal ID code and the business ID code are also regulated by law. The national legislation on protecting private life and other basic rights, which safeguards an individual right to privacy, governs society. For these reasons, the number of authorities with access to the population register and the right to handle any information with personal ID codes is very limited. Within this legislative framework, the NSO has the right to get access to and use record-level administrative data are guaranteed, and provisions to safeguard statistical confidentiality are included. By contrast to the population registers and other administrative registers with private information, in some countries, the business register's information about ID code, like address, place of residence and main activity are public by law and available on the web.

The legislation and organization of the registers, the updating systems, and the identification systems used in them, create the framework in which the national statistical system operates. Indeed, a centralised register-based administrative system with unique identification codes facilitates the acquisition of administrative data for the production of official statistics. When the administrative registers are more decentralised between government and administration entities, and especially if a common identification system used across the administration does not exist, an NSO has to make more effort to acquire data and process them. NSOs have made efforts for matching data from various administrative sources without a common identification system, but these efforts are very laborious, and the results may be quite weak in the context of regular statistical production.

Chapter 8.3 - *Administrative sources* discusses administrative sources and related quality issues in general. Due to the diversity of administrative register practice, data quality assessment frameworks for administrative data are bespoke. The use of administrative registers in statistical production requires that the NSO assess each administrative register's relevance,

suitability, and quality as a data source. The coverage, data content and updating system of the administrative register should fit the statistical purposes and meet the overall data quality requirements. The updating system for an administrative register has a significant impact on its coverage and data content at a certain point in time. Therefore, it is vital for statistical usability that the register contains reliable time references for registrations and updates. Administrative registers and systems to manage them have to be stable over time to meet the continuity requirements for statistics. The data should be available in the form agreed between the producer of data and the NSO.

11.2.2.2 Statistical registers and register-based approach to production

The NSOs keep statistical registers exclusively for statistical purposes. They are needed to organize the NSO's data collection activities by providing suitable frames for target populations and sampling. Statistical registers are usually created by processing data from several administrative sources, with or without combining them with survey data. Administrative registers are very seldom directly suitable as statistical registers, but they form an excellent source. A statistical register typically plays the role of a data coordination tool integrating data from several administrative and statistical sources. The data sources are integrated primarily by linking record-level data with common identifiers, occasionally by using matching techniques.

The generic model for register-based statistics is discussed in 'Using Administrative and Secondary Sources for Official Statistics: [A Handbook of Principles and Practices](#) published by UNECE. Chapter 9.3 - *Methods and systems of analysis* of this Handbook illustrates the links between administrative sources, statistical registers and statistical output.

The importance of statistical registers became obvious from the time when countries started to develop register-based censuses. Based on the available selection of administrative registers, the first step in the development process is to define a priority order in which the administrative registers play a role in the production system and which registers offer the possibility of identifying the units and links between the registers. This leads to selecting the most important ones to be used as a basis for statistical registers needed in the census system. Created statistical base registers, originally for census purposes, allow for implementing a meaningful system of internal links between these registers and the links to other registers and administrative data.

A statistical population register, a statistical register for buildings and dwellings or addresses and a statistical business register are usually defined as statistical base registers. Depending on the country's administrative registers and identification system, the statistical base registers may also include other statistical registers. The statistical base registers serve as a basis for the register-based system to statistical production. This is the main feature in the 'register-based production model'. The updating systems of the underlying administrative registers make it possible to choose the optimal updating dates for statistical base registers regularly updated at least annually. Suppose administrative records or other administrative registers than the main administrative source register are used in the statistical production; in that case, these additional data sets are linked to the corresponding statistical base registers. This 'centralized' register-based approach offers a basis for coordinating and integrating the production systems of population and social statistics based on administrative data, survey data or a combination of both.

The statistical business register cannot be based totally on administrative registers because it also contains information on establishments and enterprise groups, usually not available in administrative registers. The statistical business registers are dealt with more in detail in Chapter 11.3 - *Statistical Business Register*. Once the statistical business register with an updating system has been created, it serves as one statistical base register in statistical production and is an essential element in integrating business and economic statistics. The register-based approach to production may decrease the number of direct statistical surveys, but it does not diminish their importance. Many data items and variables are not found in any administrative register or data source. These data items include, for example, details of the activities of people and businesses, and their opinions, expectations and behaviours. In all countries, there is always a great need for regular statistical surveys to produce a full range of official statistics.

Traditionally the statistical registers were created to serve as a target population for sampling frames. With the increased content and regular updating mechanisms, statistical registers are increasingly being sources of statistical data in their own right, particularly regarding population and business demography, and data for small areas or small populations sub-groups. The role of statistical registers has increased especially since NSOs have become aware of, and started to develop, their common data architecture and data warehouses.

11.2.3 Production of register-based statistics

11.2.3.1 Main features of register-based statistics

The term ‘register-based statistics’ was first used in the 1980s in the context of register-based population census. At the same time, it was recognised that the same register-based approach used with established register-based production systems is also useful in producing many other statistics. The basic principle of the register-based production model is that all source data, from administrative sources and direct surveys, use the same identification system and link to the statistical base registers. The most common way to produce statistics using the register-based system is to combine data from different administrative sources or combine data from administrative sources and direct surveys.

The register approach allows the production of some register-based statistics without any complementary data from direct surveys. These statistics may include population and business demographic statistics, education statistics, crime statistics and housing statistics. For instance, in the register-based production model, demographic variables are produced in the statistical population register and are used in all kinds of population and social statistics.

11.2.3.2 Register-based population census

The “[UN Principles and Recommendations for Population and Housing Censuses](#)” published in 2017 offers useful information on census methodology summarising in its Chapter 4 the methodological questions related to the three data collection methods: full-field enumeration, register-based census, and combined methodologies, and concluding with the advantages and disadvantages in them.

A register-based population census requires a complex data system mainly based on the linking of various administrative registers. The combination of administrative registers and data used varies across countries as do the methods used and the production models applied.

Development of a register-based census has usually taken many years, or even decades, depending on the development of suitable administrative registers and infrastructure needed in the system. The missing administrative data have usually been complemented with new or existing data from direct surveys during the development phase.

Typically, a register-based population census requires record-level data from several registers with unified identification codes and an appropriate way to organize them into a register-based census system. Population registers, registers for buildings and dwellings or addresses and business registers are usually the cornerstones in this system. These contain the links to other registers and provide links to other administrative sources. Depending on the national registration systems, other typical administrative registers used in register-based censuses are registers for taxation, employment, pensions, social welfare, job seekers and students. The register-based census system in four Nordic countries (Denmark, Finland, Norway and Sweden) is thoroughly explained in the publication [“Register-based Statistics in the Nordic Countries – Review of Best Practices with Focus on Population and Social Statistics”](#). The Dutch paper [“The usability of administrative data for register-based censuses”](#) gives an illustrated description of the development process towards a fully register-based census in the Netherlands. It explains the country’s registration system and offers a good description of the solutions and methods developed to overcome some of the most important issues.

Administrative registers do not usually cover all required data or provide enough details to allow the production of all statistical variables for the census. To complement the information that is not available from registers, countries use various methods that best suit their respective national circumstances. The methods used in ten different register-based population censuses are described in the document [Efficiency in Population Censuses – the situation of the European register-based 2011 Censuses](#).

Once the register-based census system has been created, the infrastructure often allows annual production of the main statistical data contained therein. The register-based population census system usually offers a good basis to produce geospatial data in the countries with interlinked registers. One way to organize the production is via the register of buildings in which buildings and dwellings are geolocalised with map coordinates. Using the register-based inter-operability features, the exact location of each statistical unit can be derived. Thus, most variables of the population and housing census can be geo-localised.

The register-based census system also offers a good basis for developing special services for researchers. These services have currently developed rapidly, containing a large amount of anonymised and interlinked micro-data on persons, households, and businesses. These may be offered to researchers as online services. However, in giving access to census data on a more detailed level (microdata), it is crucial to secure confidentiality and privacy as discussed in Chapter 9.3.1.3 - *Confidentiality rules and disclosure control*.

11.2.3.3 Register based approach in the production of other statistics

Vast amounts of statistics in many countries are based on a combination of data from administrative sources and data from direct surveys. These may typically include annual and short term economic and business statistics, income statistics and statistics on social conditions of households as well as a growing amount of energy and environment statistics. These statistics are linked in the register-based production model to statistical base registers so that the domain-specific statistical systems can use administrative data more easily and combine

administrative data with survey data. The aim is to increase coherence and consistency in statistics production. The infrastructure developed for register-based statistics offers possibilities in fostering data warehouses and data integration in official statistics production. “[A Guide to Data Integration for Official Statistics](#)“, published by the UNECE, describes data integration in detail regarding different source data, methods and tools for data linking and matching.

Detailed administrative records can be an excellent source of information to compile more complex statistical frameworks, such as the national accounts or environmental-economic accounts. A register-based system with a vast amount of administrative and survey data stored and structured in a meaningful way in statistical registers and warehouses may allow for the production of complex statistics without launching new surveys. Further, this system increases the flexibility and agility to respond to new and emerging needs for statistics and indicators which is of growing importance in view of the monitoring the progress towards the SDGs. As for statistical surveys, statistical base registers function as sample frames.

A register-based statistical system also contributes to increasing sample surveys' quality, making them more consistent with other statistics at the macro-level and serving as additional information in analysing the results. The statistical base registers contain important demographic data for units that can be used to define populations and select samples. Using statistical base registers, samples may also be drawn for desired sub-groups, such as employed persons or students. In the analysis phase, survey results may be compared to data of the desired reference group available in the statistical base registers and other sources linked to them.

Statistical registers are also used to mitigate the impact of non-response in sample surveys when register data is used for the imputation of missing or invalid values.

11.2.4 Infrastructure for production of register-based statistics

11.2.4.1 Coordination and working with data providers

Production of register-based statistics usually requires a formal organization that supports the extensive co-operation between register authorities and an NSO. Ideally, the authority and coordination function of the NSO is recognized beyond the national statistical system, such as with administrative data holders, users, and other stakeholders. The organization model of coordination varies from country to country. A good practice has been that the NSO names a senior statistical expert to function as a coordinator for each of the most important producers of administrative registers and other data. Cooperation and coordination, as well as the follow-up, are often managed by a functional coordination unit at the NSO, which is also acting as an information hub between the different producers. The conclusion of formal written agreements (or Memoranda of Understanding/ToRs) between the NSO and administrative data holders belongs to such a functional coordination unit's essential task in a register-based statistical system. These contracts help all parties to understand their obligations. Some authorities with many administrative data systems, like tax authority, may prefer centralized coordination mechanisms which are helpful also to the NSO. The designated coordinator at the NSO and his/her counterpart or contact person in the administration prepare the ToR for the data delivery or access with detailed technical attachments for each separate data set to be signed at the top management level. Attachments which contain specific detailed information of each data set including technical details and delivery timetables need to be updated regularly. The expert(s)

role in the coordination unit is to manage and update the overall contract system and liaise between the subject matter specialists in the NSO and the holders of administrative data.

NSOs operating in a register-based statistical system also need to actively participate in the development of public sector information systems to safeguard the basis and continuity of the data sources for the production of statistics and eventually find new possibilities for further development. Therefore, it is a good practice to consult and invite the NSO to participate in any governmental initiatives that may have an impact on the accessibility, inter-operability, scope, content, periodicity, and timeliness of administrative data.

11.2.4.2 Other aspects of common infrastructure

Within a register-based statistical system, the general infrastructure of an NSO needs to be adapted to the growing flows of incoming administrative data complemented by survey results. There is often a need to re-engineer and integrate the processes and metadata systems, develop methods and quality frameworks, streamline the internal organization and policies, and develop staff capabilities. Complementing or substituting survey data with administrative data for the production of official statistics without adapting the statistical production process rarely works. At a general level, the statistical process does not change, but the use of administrative data in a register-based system impacts every phase of the process.

Wide methodological expertise is needed to utilise administrative data in statistics production, such as data matching and other methods used to integrate administrative sources into the production process. Increasing amounts of administrative data used and linked in the statistical process increase the need for proper disclosure methods and rules. It is also important that the quality frameworks, rules and practices are adapted to this production system. The staff working with register-based statistics may need additional competences and training. Those experts working with administrative registers and other administrative data in the production of domain-specific statistics need to know how to handle both, survey data and the administrative data they use. The register-based production system should be reflected in human resource policies and programs. A special function for administrative data, often as part of the data collection unit, may be useful. Its task would be to make the first validation and quality checks for incoming administrative data, review the production processes and acquire or develop software applications. This unit, as mentioned above, would also be responsible for managing the ToRs.

As discussed in Chapter 13 - *Data, information and knowledge management*, production of statistics needs well-functioning, uniform and standardised metadata systems. In register-based systems, it is important that administrative registers and other administrative data used in production be documented in the metadata systems. Careful documentation of administrative source data, record descriptions, and electronic access to questionnaires, including instructions should be stored in the metadata system. Also, all changes should be documented and stored. Processing rules and a possibility of tracing data to the source are an essential part of this documentation. The NSOs have developed over the years common databases for metadata used in the whole production process. These may include metadata for statistical units, for classifications with various levels, concepts, variables and characteristics with definitions as well as metadata for technical standards. This kind of standardised metadata repositories improves the consistency of statistics and streamline the production process. These metadata repositories should be planned and adapted to the multi-source production process.

Links to guidelines, best practices and examples:

- [Efficiency in Population Censuses – the situation of the European register-based 2011 Censuses](#);
- [A Guide to Data Integration for Official Statistics UNECE](#);
- [Using Administrative and Secondary Sources for Official Statistics. A Handbook of Principles and Practices. UNECE 2011](#);
- [Principles and Recommendations for Population and Housing Censuses. Revision 3, UN 2017](#);
- [The usability of administrative data for register-based censuses](#);
- [Register-based statistics in the Nordic countries. Review of best practices with focus on population and social statistics. UNECE 2007](#).

11.3 Statistical Business Register

11.3.1 What is an SBR?

Narrowly defined, a *statistical business register (SBR)* is a set of businesses, including all the characteristics of those businesses required to provide frames for business surveys. More broadly interpreted, an SBR is these data together with the procedures, systems and human resources that support their use. In operational terms, it is a regularly updated, structured database that contains organizational, administrative and statistical units describing businesses in a country or region, that is maintained by a dedicated staff, supported by a purpose-built software system and that is used by an NSO to create frames for business surveys and sometimes as a direct source of counts of businesses by type, size, geography, economic activity, etc.

Chapter 11.2.1 - *Description of Register-based statistics* provides an overview of the key elements of a well-designed SBR, detailed in the subsequent subsections. Indications of how current SBRs may fall short of this standard are also provided.

11.3.1.1 Primary role and benefits of an SBR

The primary role of an SBR is as the source of frames for business surveys. In this context, to be of good quality, the SBR should contain all the businesses relevant to the surveys that use it together with accurate and up to date information about these businesses required for them to be stratified, sampled and contacted.

The reasons why having an SBR as the common source of business survey frames is better than for each individual survey to create and maintain its own frame are that:

- a) an SBR facilitates the application of common standards and classifications, for example the International Standard Industrial Classification of All Economic Activities Revision 4 ([ISIC Rev 4](#)) across all business surveys;
- b) an SBR harmonises the surveys to which it provides frames in terms of coverage and units, thus facilitates the integration of the resulting business statistics;

- c) an SBR is effective; it provides well defined and better coverage than individually constructed survey frames, are likely to do; and
- d) an SBR is efficient; it ensures that data on key characteristics (such as main economic activity, location, turnover, and number of employees) are collected once only and shared across surveys; this saves resources and allows survey staff to focus on collection and analysis rather than frame preparation.

Sometimes the SBR is used simply as an input for frame development by a survey that maintains and augments its own local copy of the SBR for its own purposes. This is certainly not ideal practice but is done where the facilities for updating the (central) SBR are poor or difficult to control.

11.3.1.2 Creation and maintenance of an SBR

An NSO can construct the sets of units within an SBR in essentially two different ways: first, by field enumeration, typically during the course of an economic census; and second by using registers created for administrative purposes by other government departments and agencies. Maintenance of these units is by use of data from administrative sources and data from statistical sources.

11.3.1.3 Economic census as the basis of an SBR

Use of an economic census as the basis for an SBR was once a common practice in all NSOs, and even now it is used in a number of countries. For example, according to the [AfDB's SBR Guidelines](#), Botswana, Mozambique, Uganda, and Zambia have all developed an SBR from an economic census within the last decade. However, the approach is no longer used by countries with well-developed SBRs for the following reasons.

- a) First, an economic census is very expensive even if its scope is restricted to businesses with identifiable premises. The numbers of businesses and costs are even further increased if businesses operating from households without visibility are also covered. Thus, an economic census can be conducted at best every five or ten years. Thus, well-developed NSOs consider a suite of annual surveys based on a register-based list to be much more cost-effective.
- b) Second, an economic census produces a point in time list of businesses. The small businesses located during area enumeration are volatile in the sense that they may go rapidly in and out of production, or ownership, or change their activities or addresses. Thus, to be really effective as a source of survey frames over the years until the next census, the list has to be constantly updated.
- c) Third, the only means of updating the list is by a full-scale ongoing enumeration operation. NSOs cannot afford to do this, so the list becomes steadily more out of date, resulting in survey samples containing inactive or untraceable units.

Nevertheless, in some countries, there is a case for conducting a periodic economic census and/or area enumeration in order to conduct surveys of the informal sector.

11.3.1.4 Administrative input data

Administrative data are data collected by an *administrative source* (meaning a government department or other agency) *primarily for administrative (not research or statistical) purposes*, such as taxes, annual permits, etc. Administrative data should provide most of the data about the small businesses contained in the SBR and a starting point for obtaining and maintaining data about large businesses. The reason for using administrative data is that they provide comprehensive coverage of registered businesses, they are constantly updated, and they are essentially free to an NSO. In a country with good access to administrative data, collectively, these data determine the coverage of the SBR and hence of the survey frames it provides. In countries where access to administrative data is limited, statistical data may have to be used to provide adequate coverage.

The quality of administrative data is an important consideration. Close coordination between an NSO and the administrative source is imperative to ensure the administrative data are well understood and that there are no surprise changes in the data flow or content. Legislation, a memorandum of understanding, a service level agreement, or similar arrangement, and the use of a common identification coding system, facilitate data flow and data sharing.

11.3.1.5 Statistical input data

Statistical input data refer to *data collected by statistical processes undertaken by an NSO*. They are used to complement the administrative input data about businesses in an SBR by providing extra information about:

- a) the organizational structure, and appropriate reporting arrangements, for very large complex businesses, which are obtained by *profiling*, i.e., research and discussion with those businesses; and
- b) characteristics of businesses that are not available from the administrative data or are not current; these characteristics may include economic activity code, turnover, employment or other size code, current operation status (active, inactive, out of business), and contact details.

11.3.1.6 Informal sector

Businesses that are not registered with any of the sources used to create the SBR are typically small. In the national accounts, they are referred to as *household unincorporated enterprises*. Those that produce market output may be defined to constitute the *informal sector*. Information about them cannot be obtained from surveys based on the SBR. This is an important limitation in the scope of the SBR, and of the surveys based on it, especially in developing countries where the informal sector's contribution is relatively large.

Data for the informal sector can be obtained by economic census based on area enumeration, or as a by-product of a population and housing census, or using a household-based survey in which a sample of individual households is asked about the businesses that (i) they conduct and (ii) they have not registered with any of the administrative sources used to construct the SBR. This is further discussed in Chapter 11.4 '*Frames for informal sector surveys*'.

11.3.1.7 SBR Outputs

The primary output of the SBR is a periodic (typically quarterly) *common frame* which is a snapshot of the active units in the SBR as of a given date, from which individual survey frames are extracted and business statistics generated.

In addition to providing survey frames, the SBR has other purposes. First, it is a potential source of business demographic statistics; second, it facilitates measurement of the response burden imposed on businesses by surveys; and third, it provides a framework within which unit-level data from different surveys and administrative sources can be brought together. Furthermore, the SBR system can readily be extended to include *sample selection* (from the survey frame) and *generation of the corresponding sample control file* used in subsequent conduct of a survey. Such an extension ensures a smooth interface between these functions.

11.3.1.8 SBR Processes

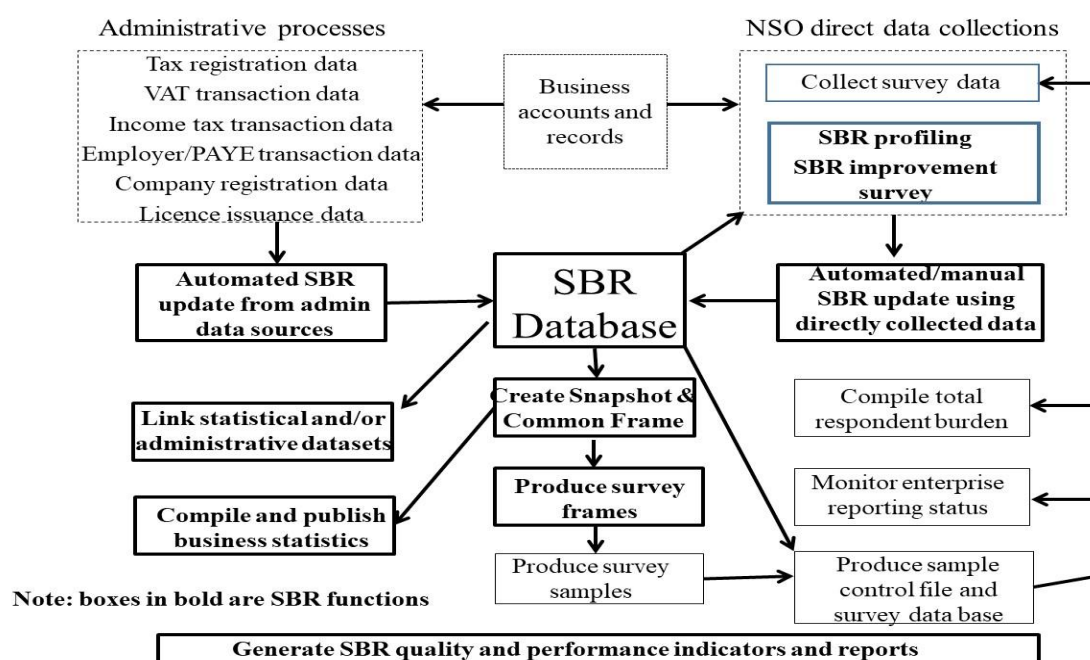
Figure 10 summarises the SBR inputs, processes and outputs, and their interactions in a fully developed SBR. The central block labelled *SBR Database* is often referred to as the *live register*. The data it contains is continually being updated based on data from administrative and statistical sources.

Administrative data sources may include tax registration data, VAT transaction data, income tax data, employer pay-as-you-earn data, company registration data and license data. To avoid the risk of duplication, it is best to use only sources having a common identification scheme or known to have mutually exclusive coverage. Updating should be fully automated, with only small numbers of incoming data records flagged for manual verification to ensure that SBR staff are not overwhelmed.

Statistical data are obtained as feedback from sample surveys and censuses that have derived their frames from the SBR and from SBR operations, including profiling of large businesses, SBR quality improvement surveys of smaller business and ad hoc investigations. Again, to the extent possible, such input is automated.

Periodically (typically quarterly) a *snapshot*, is taken of the SBR database. It provides a stable basis for analysis as the live register continues to evolve. It is sometimes referred to as a *frozen frame*. Numbers of units by industry, size code region, and numbers or units for which characteristics are missing, are derived and used in planning future SBR operations.

Periodically (typically quarterly or annually) a *common frame*, is derived from a snapshot, including only those units that are marked as being active and that include sufficient information to be stratified for sample selection and contacted if selected. The common frame provides the basis from which survey frames are extracted. It may also provide the basis for the publication of business statistics.

Figure 10: Typical SBR inputs, functions and outputs

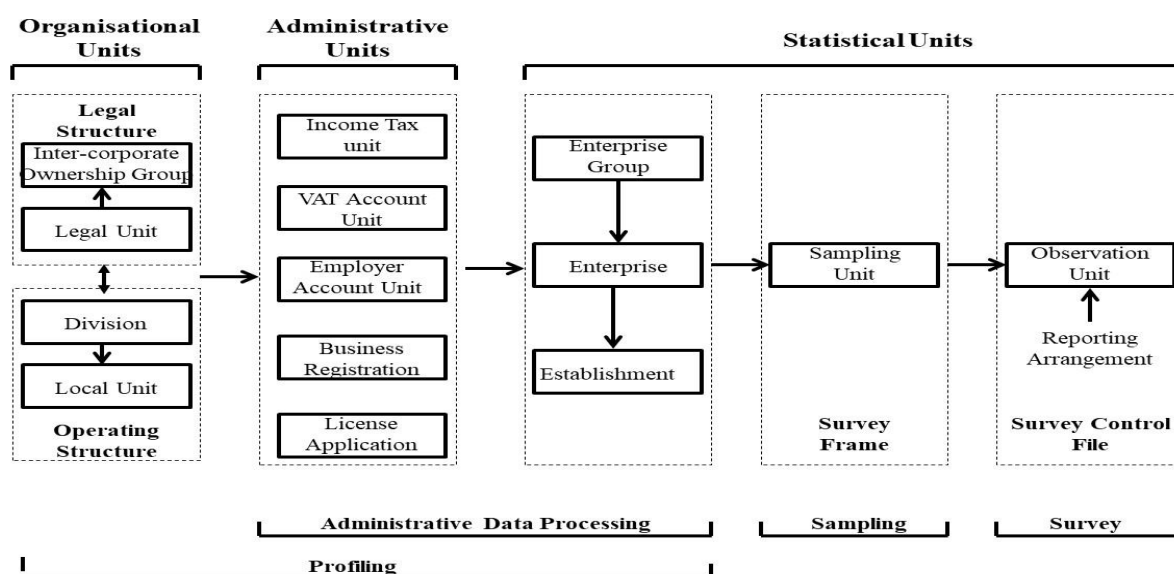
A sample is selected from each survey frame, a sample control file and embryonic survey database are created, and the survey conducted with data being feedback to the SBR, as noted above. Based on the survey control files, response burden can be monitored.

The SBR Database may also be used as a means of linking other administrative and statistical datasets.

11.3.1.9 SBR Units Model

Figure 11 indicates a typical SBR *units model*, i.e., a view of the types of units used in describing the SBR, its inputs and its outputs. The units are in three groups

- organizational units** – comprising legal units that are businesses (companies, partnerships or sole proprietors), groups of legal units defined by ownership and control arrangements, and operational units into which (large) businesses organize themselves, such as divisions, branches, plants, and outlets;
- administrative units** – such as income tax unit, value-added tax (VAT) unit and employer/pay-as-you-earn (PAYE) unit; these are the units that businesses use in responding to the various administrative requirements; usually (but not always) there is one unit, or no unit, of each type associated with a business; and
- standard statistical units** –comprising (in this particular model) a three-tier hierarchy (enterprise group, enterprise and establishment) that the NSO uses to represent businesses in a standardised way for sample selection and data collection purposes. Some NSOs may use a different and possibly more complex model.

Figure 11: Typical SBR Units Model

11.3.2 Conceptual framework for SBR

As described in Chapter 9.4.1.2, - *System of National Accounts 2008 (2008 SNA)* is the core element of the conceptual framework and most important harmonizing and integrating mechanism for economic statistics. It defines the notion of *economic production activities* in which *institutional units* in their role as *enterprises* engage. The definition of an enterprise is very broad. It includes *commercial enterprises*, (comprising corporations and unincorporated household businesses) and it includes non-commercial enterprises (comprising non-profit institutions and government units). It includes enterprises in the informal sector, and even households producing goods for their own consumption (which are not included in the informal sector).

The 2008 SNA and the *International Standard Industrial Classification of All Economic Activities, Revision 4 (ISIC Rev 4)* note that an enterprise, particularly a large enterprise, may be engaged in a range of different activities at a set of different locations. In such a case, the classification of a large enterprise to a single activity at a single location will result in a blurring of detail. This will constrain subsequent analysis of any datasets that include data collected from the enterprise. Thus, it is recommended that large enterprises are divided into smaller, more homogeneous producing units that can be more precisely classified and that collectively represent the enterprise as a whole. Dividing an enterprise into its various economic activities at its various locations (in a process referred to as *profiling* and further described below) results in a set of *establishments*, each of which refers to a particular activity at a particular location. An enterprise may alternatively, or as well, be divided simply by its economic activities into *kind of activity units (KAUs)* or by its geographic locations into *local units*.

The 2008 SNA also refers to *conglomerates* of enterprises – enterprises that belong to an *intercorporate ownership group*. The behaviour of an enterprise may depend on its role in a group and this needs to be taken into account in defining the survey reporting arrangements. (For example, though part of the ownership structure, an enterprise may be a “shell company” with no production activities and hence out of scope for a production survey.) Thus, where

appropriate, enterprises are associated with an *enterprise group*. The process of dividing enterprises into establishments and/or grouping them into enterprise groups is commonly referred to (though not in the SNA) as *profiling*.

In summary, the SNA provides the basis for defining the set of standard statistical units by which all businesses large or small can be modelled. Figure 11 indicates a particular three-tier hierarchical model (enterprise group, enterprise and establishment) that is in accordance with the 2008 SNA and is often used in practice. A common alternative is a three-tier model containing enterprise group, enterprise, and kind of activity unit. More complex models can be defined based on the 2008 SNA, for example, including *kind of activity unit*, *local unit* and *establishment*, but are rarely used in practice.

11.3.3 Administrative data inputs for SBR construction and coverage

As previously outlined and indicated in Figure 10, a well-developed SBR is created and updated based on administrative data and statistical data.

The first step in constructing an SBR is to select the *primary administrative data source*. This should be the source that most nearly provides the target SBR coverage and content. Figure 11 indicates the typical options, for example, business income tax data, VAT data, and business registration data.

As no single source is likely to provide all the coverage and content provided, data from the primary source are typically supplemented by data from secondary administrative sources. However, although there are a wide variety of possible administrative sources, combining them can be difficult. There is a serious risk of duplication unless the sources share a common identification numbering system, or they are known to be mutually exclusive. Thus, the introduction of a common identification numbering system should be promoted. In its absence use of record linkage techniques based on name, address and other characteristics to identify potential duplicates has been tried but rarely proved satisfactory. Thus, an SBR is typically based on a small number of carefully selected administrative sources that can be used in combination without risk of duplication. Jointly these sources determine the coverage of the SBR.

It is convenient and perfectly in accordance with the framework for the definition of the informal sector in [Resolution II of the Fifteenth International Conference of Labor Statisticians 1993 \(ICLS93\)](#) to *define* the resulting coverage of the SBR to be the *formal* sector and all other enterprises producing goods or services for sale or barter to be the *informal sector*.

Assuming that administrative sources provide adequate coverage, field observation by NSO staff should *not* be used to further expand coverage, first, because it is an inefficient use of resources, but mainly because the additional enterprises found by this method are likely to be transient and mobile and hence not worth trying to maintain in the SBR. Furthermore, the extra coverage that is obtained is difficult to quantify, i.e., it is difficult to explain precisely what coverage is still missing.

While the use of administrative data may be impractical in countries where the NSO is unable to access such data or where they are of very poor quality, the aim should always be to maximise use of administrative data as they are constantly updated, and they are essentially free to the NSO.

11.3.4 Statistical sources to supplement SBR content

Although administrative sources provide the enterprises that define SBR coverage, they are not sufficient to maintain an SBR. They are typically deficient in one or both of two basic ways:

- a) they do not provide the information required to divide large complex enterprises into establishments;
- b) they do not provide current values of all the enterprise characteristics and contact information that are required to produce up to date survey frames. Characteristics required include activity status (active, inactive, defunct, etc.), economic activity code, and size measures (turnover, employment, assets, etc.). Contact data include name, physical address and geocodes, postal address, e-mail address, contact person(s), etc. Whilst administrative sources may provide current values of many characteristics; they may not provide values for all, or the values provided may not be current.

11.3.4.1 Profiling

As previously noted, to collect data from large enterprises efficiently and at an appropriate level of detail, large enterprises need to be divided into establishments and/or grouped into enterprise groups through a process commonly known as *profiling*. The first step in profiling is a desk study to identify, as precisely as possible, all the legal units belonging to an intercorporate ownership group and their inter-relationships. This is the basis for developing a first draft of the organizational structure and how it might be best represented in terms of the SBR units model (typically enterprise group, enterprise and establishment) for the purpose of collecting data. The second step is face-to-face contact with senior staff (typically the chief accountant or secretary) in the leading enterprise in the group to review and update the draft organizational structure and reporting arrangements. The final step is to create the corresponding statistical units in the SBR.

Evidently, profiling requires very high-level contact with the enterprises involved and is resource-intensive. Therefore, it is only worth doing for *very large complex enterprises* for which the identification of appropriate reporting arrangements is absolutely vital. Thus, only a very small number of enterprise groups are defined, and only a small number of enterprises are divided into multiple establishments.

11.3.4.2 Feedback from business surveys

To supplement and update what is received from administrative sources, current economic activity code, size measures and contact information are obtained as feedback from the units responding to business surveys that have drawn their frames from the SBR. Typically, the first page of a business survey questionnaire asks for verification or updating of contact information, and other parts of the questionnaire provide updated size measures and perhaps indications of changes in economic activity.

11.3.4.3 SBR Quality Improvement Survey

Survey feedback alone is insufficient to fully maintain the SBR as not all SBR units are included in surveys. Indeed, some are excluded precisely because there is insufficient information about them to determine if they are in scope for a survey, to sample them if they are, or to contact them if they are selected in the sample. To obtain this information, through

its field staff, the NSO typically conducts ongoing special-purpose SBR surveys, referred to as *nature of business surveys* or *SBR quality improvement surveys*.

11.3.5 SBR snapshots and common frames

11.3.5.1 Live register and snapshots

As previously noted, the central block in Figure 10, labelled *SBR Database*, is often referred to as the *live register*, as the data it contains are continually being updated based on data from the various administrative and statistical input sources. It is possible to extract survey frames directly from this. However, as the database is constantly changing, many NSOs prefer to take a regular point in time *snapshots* of the SBR and use these as the basis for developing survey frames. Snapshots may also be used for SBR backup purposes, for analysis of SBR counts and content quality, and for direct production of statistics, as elaborated in the following paragraphs.

A snapshot of the entire SBR (live register) is the starting point for deriving SBR counts such as:

- a) numbers of enterprises by activity status (active, temporarily inactive permanently inactive, defunct, etc.); and
- b) numbers of enterprises, by region and by economic activity;
- c) data quality measures such as:
- d) number of enterprises with no activity code;
- e) number of enterprises with no turnover size code; and
- f) number of enterprises with insufficient contact data to be able to locate the business.

11.3.5.2 Common frame

A *common frame*, also referred to as a *frozen frame*, is a subset of a full SBR snapshot obtained by selecting only those enterprises:

- a) that are *active* during, or at the end of, a specified reference period; and
- b) that contain sufficient information for the enterprise to be identified for inclusion/exclusion in the frame for any business survey being conducted for the given reference period.

A common frame is the starting point for extracting the frame for each survey conducted for the specified reference period. Use of this single dataset as the basis for defining the coverage of all surveys ensures consistency of the corresponding survey frames.

11.3.6 Generation of survey frames and samples

11.3.6.1 Survey frames

The frame for an economic survey should be a subset of the common frame, comprising the set of statistical units that match the specification of the survey target population and are active during the survey reference period, together with the characteristics that will be needed for the

survey. For example, the frame specification for a sub-annual manufacturing production survey may require all establishments that are active, have a manufacturing ISIC code, and have five or more employees.

11.3.6.2 Sample Selection and Sample Overlap Control

Given that the SBR is the source of survey frames, it is vital that the SBR frame extraction software interfaces nicely with the sample stratification and selection programs and initializes the sample control files and the input databases in which the survey data will be stored. Incorporating these functions within the SBR environment ensures they are well harmonised.

From the survey frame, a sample can be selected in accordance with the sample specification. For example, the sample specification for the above sub-annual manufacturing production survey may require that the sample includes all establishments with one hundred or more employees and a five per cent sample of all remaining establishments in each ISIC group. (Sampling is further discussed in Chapter 8.2.4 – *Survey design*).

The sample selection mechanism may include a requirement for the sample (to the extent possible) to avoid an overlap with the sample for another business survey or to have a specified overlap with that survey or with the previous cycle of the survey itself. This is best handled within the SBR environment.

11.3.7 Producing statistics directly from the SBR

The SBR is a source of business demographic statistics, i.e., counts of enterprises and of their births, deaths and changes by industry, size institutional sector, region, etc. Subject to quality considerations, these can be published.

Usually, the counts are based on the common frame so that they refer to a specific point in time and they do not include businesses that are not known to be active or for which key characteristics are missing. The aspects of quality that need to be considered are:

- a) the numbers of enterprise not included in the counts because due to missing data items in the SBR (for example ISIC code) that are not included in the common frame; and
- b) period to period changes in counts due simply to changes in SBR operations (for example cleaning up a backlog of enterprise with no activity code) and not to changes in the economy.

11.3.8 Other functions of the SBR

11.3.8.1 Data linkage across administrative and statistical data sources

The SBR is ideally placed to facilitate linkage of data at individual unit level across administrative and statistical data sources (subject to confidentiality provisions). For example, if business income tax is a data source for the SBR, then it is easy to link data from income tax returns (and the accompanying financial statements) to the data for the same business obtained via a production or employment survey.

11.3.8.2 Respondent Burden Monitoring

It is useful to be able to list all the surveys to which any given enterprise has to report within any given year and the status of those reports. It is also informative to measure the respondent burden imposed on enterprises by individual surveys and by all surveys in total. These functions are most efficiently handled through the SBR.

11.3.9 Sources of further information

11.3.9.1 Guidelines on Statistical Business Registers, 2020 UNSD

The [UNSD Guidelines on Statistical Business Registers](#) were originally published by the UNECE in 2015 and subsequently revised by the United Nations Committee of Experts on Business and Trade Statistics in collaboration with the United Nations Statistics Division. As of June 2020, a white cover version prior to official editing is available.

The main objectives of the Guidelines are to:

- a) provide practical guidance on core issues of establishing and maintaining an SBR;
- b) clarify typology, concepts and definitions, including for statistical units;
- c) provide guidance on the use of administrative and other sources for the establishment and updating of an SBR;
- d) provide guidance on how to use an SBR in its own right for the production of statistics and how information from the SBR can be combined with information from other statistical registers, administrative sources or surveys to produce new statistics; and
- e) provide guidance on the role of an SBR in the modernisation of statistical production and services.

The Guidelines are consistent with the 2008 SNA and its European version. They are targeted at SBR management and staff members, business survey staff, and staff dealing with the administrative authorities that deliver data to the SBR. They provide guidance in the form of a broad range of concepts and explanations that need to be interpreted within each particular national context.

11.3.9.2 Guidelines for Building Statistical Registers in Africa, 2014, AfDB

The design, development, and introduction or enhancement of an SBR is so important that it typically constitutes a core goal in the five-year national strategy of most if not all African NSOs. Thus, in response to requests from NSOs, the African Development Bank (AfDB) prepared the [Guidelines for Building Statistical Registers in Africa](#). They detail all the essential elements of an SBR. Although produced with African countries in mind, the Guidelines are equally applicable to developing countries on other continents. They are consistent with the UNECE SBR Guidelines as they were input to the drafting of the latter.

The general objectives of the Guidelines are to provide:

- a) a general background to the need for an SBR and the concepts on which it is based;
- b) a description of the functions of an SBR;
- c) detailed information on SBR development and implementation; and

- d) a starting point for harmonization of SBRs across African NSOs.

The Guidelines are directed, first and foremost, at economic and labour statistics practitioners in NSOs and policy analysts in development, economic, and labour ministries and central banks. In addition, they may be useful to a wide spectrum of other users, including:

- a) SBR managers and staff – by detailing SBR concepts and creation and maintenance procedures, and SBR quality and performance measures;
- b) business survey managers and staff – by providing the basic concepts on which an SBR is based and describing the production of survey frames from the SBR;
- c) business statistics dissemination staff – by providing the basic concepts, including what data are included in the SBR and how these data may be published;
- d) staff responsible for communications with other organizations in the national statistical system and with international organizations – by providing the basic concepts;
- e) staff responsible for respondent relations – by defining and enabling calculation of the individual and cumulative respondent burden associated with business surveys; and
- f) NSO senior managers – by providing the basic concepts, quality and performance measures, and suggestions for quality improvement.

11.3.9.3 Business Registers Recommendations Manual, 2010, Eurostat

In Regulation (EC) No 177/2008 of the European Parliament and of the Council of 20 February 2008 *establishing a common framework for business registers for statistical purposes*, Article 7 states that “the Commission shall publish a business registers recommendations manual and the manual shall be updated in close cooperation with the Member States.”

The purpose of the [Eurostat Business Registers Recommendations Manual](#) is to answer this requirement by providing guidelines explaining the Regulation and guiding the further development of SBRs in the ESS.

While the BR Regulation sets out a common framework for the harmonisation of national registers, the practical implications are not always clear, partly because the Regulation is the outcome of complex negotiations. The Manual aims to explain the reasoning behind the provisions of the Regulation. It aims to provide the extra information required for the correct and consistent interpretation of the Regulation in all countries.

The Manual extends beyond the provisions of the BR Regulation for the following reasons:

- a) One of the main constraints in drawing up the Regulation was what was feasible within a certain timeframe for all Member States. Consequently, the Regulation reflects a compromise rather than the ideal situation. The Manual can, therefore, be used as a tool to push on towards ideal solutions by identifying and recommending best practices.
- b) Implementing the provisions of the Regulation guarantees a certain level of harmonisation between the SBRs in the various Member States, but this is not sufficient to make them fully operational. Member States must incorporate other elements to take account of national peculiarities, such as the administrative sources used and the requirements of various SBR users. The freedom for a country to determine how to compile and maintain an SBR is consistent with the principle of subsidiarity but makes

it all the more important for there to be documented guidelines and information on the experiences of various countries.

11.3.9.4 Statistics Canada Business Register

The [Statistics Canada Business Register](#) (BR) is Statistics Canada's continuously maintained central repository of baseline information on businesses and institutions operating in Canada. As a statistical register, it provides listings of units and related attributes required for survey sampling frames, data integration, stratification and business demographic statistics.

The BR provides the statistical sampling frames for the 200+ business survey programs administered by the organization. It also serves as a central hub for data integration in the compilation of cross-cutting statistics obtained through record linkage. Finally, it is used to compile business demographic indicators, including the detailed counts of enterprises within industries) and provinces that comprise the *Canadian Business Counts* product (further described below), which is released semi-annually.

a) **Statistics Canada Business Register - Population**

The BR maintains a complete, up-to-date and unduplicated list of all businesses in Canada that have a corporate income tax account, an employer payroll deduction remittance account, a Goods and Services Tax account, a partnership account, or a registered charities account. Persons reporting any of the various types of business income on personal tax forms are also included.

The *complex portion* of the BR represents approximately 1% of the total active businesses on the database and accounts for approximately 52% of the total economic activity in Canada. The *simple portion* represents approximately 99% of the total active businesses on the database and accounts for approximately 48% of the total economic activity in Canada. The focus of manual intervention is on the complex portion, while automatic updates from administrative sources are made on the simple portion.

b) **Statistics Canada Business Register - Data sources**

The BR is updated by:

- data from Canada Revenue Agency (CRA);
- profiling of large and medium sized businesses (in the complex portion);
- survey feedback - changes and corrections to BR frame data are transmitted regularly by survey collection areas during the collection of economic survey data; and
- research tools such as the internet, provincial gazettes, trade and business publications and newspaper clippings.

c) **Statistics Canada Business Register - Error detection**

Editing of BR records is an on-going process that is performed daily by staff in various divisions with different roles across Statistics Canada. The Administrative Data Division takes in the CRA data and performs consistency checks and pre-processing activities. The Statistical Registers and Geography Division (SRGD), as the main manager and maintainer of the BR, then uses the data to build the register. Enterprise profilers and

statistical officers on-staff in SRGD perform on-going verifications and updating of data. Industrial and other subject-matter economists working in the many survey program divisions also contribute to the maintenance of the frame. Given the significant number of editors, editing of BR data is controlled through an internal interactive system that ensures coherence and proper routing of editing tasks.

d) **Statistics Canada Business Register - Disclosure control**

Statistics Canada is prohibited by law from releasing any data including data based on the BR that would divulge information obtained under the Statistics Act that relates to any identifiable person, business or organization without the prior knowledge or the consent in writing of that person, business or organization. Some confidential data can be released for statistical or research purposes with the authorization of the chief statistician. Only government bodies can receive authorization from the chief statistician, permitting them to receive confidential data that identifies individual units (company names, addresses, etc.). Private companies are not permitted to receive this kind of data.

e) **Statistics Canada Business Register - Demographic data**

[Canadian Business Counts](#) provides counts compiled from the BR of active business locations according to variables, such as geography, business activity and employment size. It is not advised to use this product for time-series analysis involving comparisons across reference periods because of data accuracy considerations.

- **Coverage error.** The BR is largely based on the Business Number (BN) that is collected and assigned by Canada Revenue Agency. Therefore, the quality of the data is dependent upon the quality of the information submitted by Canadian businesses when applying for their BNs.
- **Under-coverage.** The BR is subject to a fluctuating number of unclassified BN records, and outstanding work and unassigned workloads within Statistics Canada.

11.3.9.5 Australian Bureau of Statistics Business Register

The Australian Bureau of Statistics (ABS) [Business Register](#) (BR) is a list of organizations that undertake economic activity in Australia. The data on the ABS BR is primarily sourced from the [Australian Business Register \(ABR\)](#), maintained by the [Australian Tax Office \(ATO\)](#), and via ABS *profiling* of large and/or complex businesses.

The scope of the ABS BR is all organizations with an active Australian Business Number (ABN) on the ABR, undertaking productive activity in [Australia's economic territory](#). The relatively insignificant economic activity of organizations that fall below the threshold for needing to register for an ABN (i.e., annual turnover of less than \$75,000 or \$150,000 for non-profit organizations) and that have chosen not to apply for an ABN, remain outside the conceptual scope of the ABS BR.

The characteristics and structural relationships of organizations on the ABS BR are described using the ABS Economic Units Model. The model defines organizations by enterprise group, type of activity, location and legal unit. It enables organizations to provide data to the ABS at suitable levels of detail according to their size and complexity.

The ABS BR provides a frame for most ABS economic surveys, thus enabling a consistent, coherent, point-in-time picture of the Australian economy. Data are extracted from the ABS BR on a quarterly basis, producing the *Common Frame*. Subsequently, *survey frames* are extracted from the Common Frame. The unit record information on the ABS BR is not available for release outside of ABS.

a) **How the ABS BR is maintained**

The ABS BR is a dynamic database that is updated daily via profiling activity and updated monthly using ABR and other ATO data.

The ABS profiles large, complex and economically significant organizations and structures them in accordance with the model. These groups are collectively referred to as the *Profiled population*. The remainder of ABN registrants is assumed to have a simple structure comprising a single legal entity represented by a single enterprise group. These units are collectively known as the *Non-profiled population*. The two populations are mutually exclusive and cover all organizations in Australia that have registered for an ABN.

b) **ABS BR - main outputs**

The main outputs derived from the ABS BR are:

- survey frames for use in ABS economic data collection;
- information to support ABS economic survey processes including data editing;
- a dataset that is the main input to the annual publication [Counts of Australian Businesses, including Entries and Exits](#) (cat. no. 8165.0). This publication provides data relevant to users interested in understanding businesses that actively trade in goods or services.
- aggregate business structure reports for internal analysis and research and to meet client requests by Australian and state government agencies and industry associations at the aggregate level; and
- infrastructure to support the use of administrative-economic data.

11.3.9.6 Philippine Statistics Authority Statistical Business Register

The Philippine Statistical Authority (PSA) maintains a [List of Establishments](#) (LE), where the *establishment* is defined:

as an economic unit which engages, under single ownership or control, that is, under a single entity in one or predominantly one kind of economic activity at a single fixed physical location.

A *Frozen LE* is usually generated over the January to February period. From it survey frames are extracted, each according to its particular scope and coverage. Frames are provided to Annual Survey of Philippine Business and Industry, the Quarterly Survey of Philippine Business and Industry, the Labor Turnover Survey, the Occupational Wages Survey, the Integrated Survey on Labor and Employment, the Survey on Information and Communication Technology, and other establishment-based surveys.

An *Annual LE* is generated every June 30 and is the basis for the tables of establishment data disseminated to users.

The PSA updates its LE through the conduct of its *Updating of the List of Establishments (ULE)* operation. The ULE is a continuing activity undertaken primarily to provide an updated and reliable frame for the establishment- and enterprise-based surveys and census.

The updating activity involves:

- a) capturing "new" establishments and determination of their characteristics for inclusion in the LE;
- b) updating the characteristics of those establishments already listed in the LE; and
- c) tagging establishment records with the proper code reflecting their operational (activity) status as of the time of updating.

A comprehensive ULE is a nationwide undertaking which involves door-to-door canvassing and conduct of inquiry on the basic characteristics of establishments in the country. It is undertaken during the census reference year, that is, a year prior to the conduct of the Census of Philippine Business and Industry. A tablet-based inquiry form was utilized for the first time in [2018 Comprehensive ULE](#).

During intercensal years ULE operations cover only selected or growth areas, group of units with common characteristics, or group of industries with special concerns. The coverage depends mainly on the availability of resources and what is needed. Updating is usually supplemented by information from establishment's reports to surveys undertaken by the PSA, including the Census of Agriculture and Fisheries, which the SBR supports.

The LE is also updated from administrative data derived from the Central Bank, the Bureau of Internal Revenue, the Bureau of Customs, the Philippine Economic Zone Authority, and Securities and Exchange Commission. This is not all done on a regular basis; it depends upon what has been provided to PSA or can be found and downloaded by staff.

Profiling is undertaken to distinguish enterprises and establishments, and group of enterprises as well as to trace duplicate establishments. It is an effective method of identifying the units within an enterprise that are not yet captured in the LE. Ideally, profiling should involve input from the enterprise being profiled. Unfortunately, this does not happen. Instead, profilers use the information that they can gather from the enterprises' websites and other trusted sources.

11.3.9.7 Business Register of the Statistical Institute of Jamaica (STATIN)

a) **STATIN BR - Overview**

The [Business Register \(BR\) of the Statistical Institute of Jamaica \(STATIN\)](#) is a structured list of establishments operating in Jamaica. It currently has approximately 12,300 establishments, organized by industry and assigned an activity code based on the 2005 Jamaica Industrial Classification (JIC). It is designed to:

- serve as a sampling frame for establishment surveys;
- consistently classify statistical reporting units, i.e., establishments;
- serve as a data source for compiling demographic information about businesses.

As of 2020 STATIN is working with Statistics Canada on the [Project for the Regional Advancement of Statistics in the Caribbean \(PRASC\)](#) to improve the BR through review and redesign.

b) STATIN BR - Coverage and Scope

The BR covers privately operated businesses employing one or more persons. Establishments engaged in agriculture and entities in Central Government are not in scope. The BR covers both formal and informal businesses and contains the following variables:

- name of the establishment; year of commencement; type of organization;
- legal form of this establishment; type of ownership;
- business contact information; contact person information;
- economic activity; total number of employees.

c) STATIN BR - Maintenance

The BR is maintained through a programme of continual updating of business records. The process includes the following:

- Identification of business prospects (potential establishments for inclusion on the BR) from the internet, newspaper, telephone directory, etc;
- Administration of the Central Registry of Economic Units (CREU) questionnaire via a survey that is designed to provide updated information on businesses on the BR as well as initialize business prospects;
- Updating of records on the BR based on survey feedback (including CREU and other routine establishment surveys) and administrative records.

11.3.9.8 Business Register (Tanzania Mainland) in the Tanzania National Bureau of Statistics**a) TNBS BR - Overview**

The Business Register (BR) of the [Tanzania National Bureau of Statistics](#) (TNBS) formerly known as the Central Register of Establishments (CRE) is a list of establishments operating in a single location with fixed premises. The variables included in the BR are:

- name of the establishment; physical location (region, district, ward, street);
- postal address including telephone; email and fax numbers; main industrial activity;
- size group, ownership of establishment; registration status; number of people engaged by sex;
- nationality of the owner of the establishment; turnover; and source of initial capital investment.

b) TNBS BR - Purpose

The BR provides a comprehensive inventory of establishments in Mainland Tanzania. It is used as a basis for generating or obtaining sampling frames for establishment-based surveys in the country.

c) TNBS BR - Population and Coverage

The BR covers all sectors of the economy and economic activities as stipulated in ISIC Rev 4. It includes all legal establishments, regional headquarters and rural and urban parts of some districts with a large number of businesses in all regions of Tanzania Mainland.

d) TNBS BR - Data Sources Used to Update the BR

BR updating is a continuous exercise done mainly by the regional statistical offices under the direct supervision of the Department of Field Operations. Data are obtained from the physical visits to new establishments and from administrative records from tax, license, pension fund and other registration authorities, including the Tanzania Revenue Authorities, Business Registrations and Licensing Agency, the Ministry of Health, Community Development, Gender, Elderly and Children, and the Ministry of Education and Vocational Training.

The BR is also updated using data collected from economic surveys, including the Employment and Earnings Survey, Annual Survey of Industrial Production, and Tourism Statistics Survey.

11.4 Frames for informal sector surveys

11.4.1 Definition of the informal sector

The informal sector represents a very important part of the economy in many countries. SNA 2008 recommends the use of [Resolution II of the Fifteenth International Conference of Labor Statisticians \(ICLS\) 1993](#) in defining the informal sector. The Resolution requires the informal sector to be defined as a subset of household unincorporated enterprises, comprising those enterprises that:

- a) produce at least some output for the market; and
- b) are less than a specified size in terms of the number of persons engaged, or of employees or of employees employed on a continuous basis; and/or
- c) are not registered under specific forms of national legislation, such as factories or commercial acts, tax or social security laws, professional groups' regulatory acts, or similar acts, laws or regulations established by national legislative bodies.

Enterprises that are involved in agricultural production may, optionally, be included or excluded; conceptually, they should be included.

The registration (third) criterion is becoming the most commonly used in practice.

It is important to recognize that these criteria were a practical compromise that provide a *framework* for a definition of the informal sector, rather than a single, unambiguous definition. They reflect variations across countries in how the informal sector is actually defined. For example, the Philippine Statistics Authority defines the informal sector as comprising business that are a single proprietorship in terms of legal organization, a single establishment in terms of economic organization and have a total employment of less than ten persons.

On the other hand, the [Guidelines for Building Statistical Business Registers in Africa](#) suggest defining the informal sector as the set of non-agricultural household enterprises that have market production but that are not registered with the administrative source(s) on which the

coverage of the SBR is based. This definition is in accordance with the Resolution and has the virtue of making the formal/informal boundary very visible and easy to implement. It means that:

- a) the suite of business surveys based on the SBR and administrative data measure the formal sector;
- b) non-agricultural household market enterprises not included in the SBR constitute the informal sector; and
- c) agricultural household market enterprises not included in the SBR constitute the informal agricultural sector.

At the 2018 International Conference of Labour Statistician (ICLS), the ILO received a strong mandate to initiate a revision of the 15th ICLS resolution concerning statistics of employment in the informal sector and the 17th ICLS guidelines concerning a statistical definition of informal employment. A working group has been established, and a new set of standards based on current definitions and country practices will be prepared for the next ICLS, presently scheduled for October 2023.

11.4.2 Relationship between the informal sector and SBR

As noted in the Chapter 11.3 - *Statistical Business Register*, a modern SBR is based on administrative data and provides coverage only of the businesses registered with the administrative sources, thereby excluding most or all (depending upon the definition) of the informal sector. *The temptation to try and expand the coverage of the SBR to include the entire informal sector should be resisted as there is no sustainable way of doing so.*

Thus, frames for surveys of the informal sector, or for an economic census that includes the informal sector, must be otherwise derived. This is addressed in the subsections below. Three situations are discussed: (i) frame for a survey of informal businesses with visible premises, based on area enumeration; (ii) frame for a survey of informal businesses conducted by households, based on a household frame, and (iii) frame for an economic census with an informal component.

The following subsections also indirectly address some of the problems in providing survey frames that are faced by countries that do not have a modern SBR either because there are no suitable administrative sources, or because the NSO cannot access them.

11.4.3 Measurement of the informal sector

The ILO publication [Measuring informality: A statistical manual on the informal sector and informal employment](#) is a technical guide for NSOs. It focuses on technical issues that are specific to the production of statistics on informal employment and the informal sector. It presents the current international standards on employment in the informal sector that were adopted by the ICLS in 1993 and the guidelines on informal employment adopted by the 17th ICLS in 2003. It provides practical guidance on implementing the standards and presents three basic approaches regarding the type of survey that can be used to collect the informal sector data, together with the strengths and limitations of each. They are:

- a) household-based surveys with a labour force component, notably labour force surveys;

- b) establishment-based surveys and censuses of production, and
- c) mixed surveys, where the first phase is a household survey, and the second phase is an establishment survey of the businesses obtained in the first phase; the first phase can be a standalone survey or the module of an existing household survey.

Although it describes these approaches in detail, the Manual should not be regarded as a comprehensive guide to labour force or other household surveys, or to enterprise surveys for which there are dedicated manuals. Also, it should be noted that a population census or household survey may collect data relevant to the informal sector (such as occupation, industry, class of worker, and place of work of household members) without specifically having an informal sector module.

The following paragraphs describe the provision of frames for three types of surveys involving the informal sector and the mixed survey approach.

11.4.3.1 Frame for survey of informal businesses with visible premises

As noted in the Manual, a comprehensive survey frame for informal businesses can be created only by area enumeration. It may benefit from information obtained by an earlier enumeration, for example from an economic census that has been conducted not too long previously. In any case, the country is divided into enumeration areas and a list of all businesses with visible premises within a sample of these areas is obtained and used as the basis for the survey frame. The set of businesses thus identified will not define the informal sector in accordance with the ICLS93 framework as businesses without visible premises are excluded.

As such a list is likely to fall rapidly out of date, unless the survey is to be repeated annually there is little or no point retaining the list for the next cycle. There is certainly no point in attempting to use it to create or update an SBR.

11.4.3.2 Frame for survey of informal businesses conducted by households

Such a frame can be created by area enumeration of households, or, more probably, by use of a household frame that has already been created for some other purpose, for example the conduct of a labour force survey or a population census. Each household in the household frame is asked if they conduct a business and those that do form the frame for the informal sector survey of the businesses. During the course of the survey, those businesses that are found to be in the SBR are eliminated from the survey if the SBR is considered to define the formal sector.

Such a frame gives broader coverage of the informal sector than a survey based on area enumeration of visible premises as it includes businesses conducted by households from their own homes without visible premises.

11.4.3.3 Frame for an economic census with informal sector component

The appropriate method for constructing a frame for an economic census depends upon the target coverage of the census. If the target coverage of the census is all businesses in the formal sector, then the SBR can provide the frame, and the results can be used to update the SBR. There is no coverage of the informal sector.

If the target coverage of the economic census is all business with visible premises, then area enumeration as described above is required to cover the informal businesses with visible

premises. In a *dual-frame* approach, the resulting frame is used in combination with a frame from the SBR that covers businesses in the formal sector. To avoid duplication, businesses that are in the SBR frame and in the area-based frame, are identified, marked as duplicates and included only in the SBR frame.

Feedback from the census concerning businesses in the SBR is used to update the SBR. As the area-based frame cannot be maintained and is likely to fall rapidly out of date, there is no point in attempting to maintain it or use it to expand the coverage of the SBR.

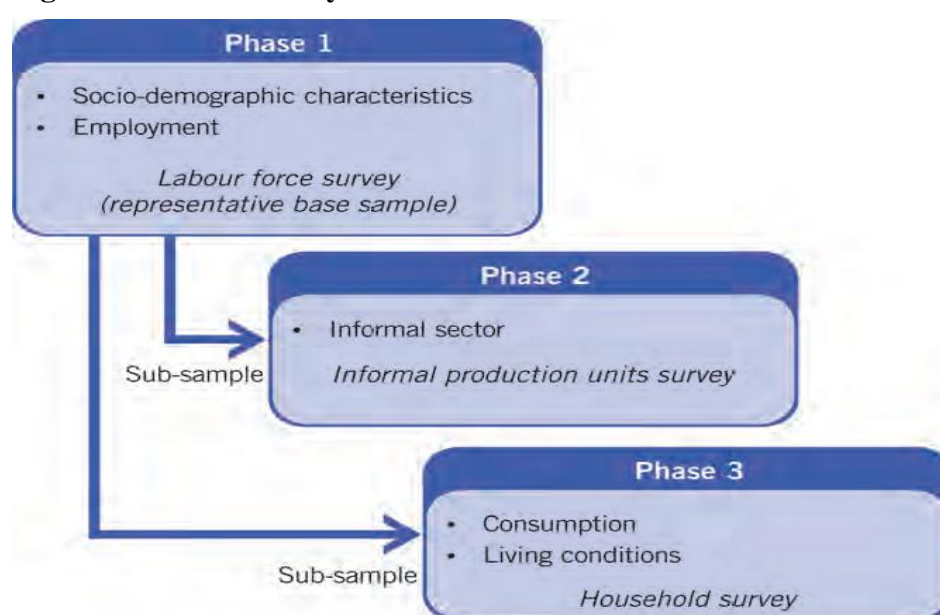
If the target coverage of the economic census is all incorporated businesses and all household businesses, then a household-based frame as described above is required to cover the household businesses. It is used in combination with the SBR in a dual frame approach (as also described above). Again, feedback from the census concerning businesses in the SBR is used to update the SBR, but data about the informal sector business should not be used to expand the coverage of the SBR.

11.4.3.4 Mixed surveys including the 1-2-3 Survey Approach

The 1-2-3 survey is a type of mixed modular survey. It is an arrangement of three interlocking surveys, as shown in Figure 12. Sometimes only the first two phases are applied, referred to as a 1-2 survey.

The first phase is the creation of the frame by a household survey such as a labour force survey. Persons that are identified as owners and operators of informal household market enterprises form the frame for Phase 2. In Phase 2, more detailed information is collected regarding the business activities. Phase 2 can be carried out at the same time as Phase 1 or later (but not too much later). If later, a sub-sample can be used. Phase 3, if conducted, involves collecting data on consumption and living conditions. Phase 3, if conducted, involves collecting data on consumption and living conditions.

Figure 12: 1-2-3 Survey



The 1-2-3 survey approach was first used in Mexico at the end of the 1980s. Initially designed to study the informal sector, the approach was gradually extended to measure and monitor

poverty and governance. Over the last few years, the approach has spread to many countries in Africa, Asia and Latin America. The first two phases of a 1-2-3 survey are a labour force survey and an informal sector survey. The third phase is an income and expenditure survey, administered to a subsample of households identified in the first phase, and designed to estimate the weights of the formal and informal sectors in household consumption, by product and type of household. Ad hoc surveys can be added to any of the three phases to obtain additional information on, for example, access to micro-credit, social insurance and taxes.

11.4.4 Examples of national practices

11.4.4.1 Afghanistan – Integrated business enterprise survey, 2009

The integrated business enterprise survey carried out in Afghanistan was the first survey of its type in the country. It covered all non-agricultural economic units in all urban and most rural areas and accounted for about 81 per cent of the total rural population. As it lacked a complete up-to-date sample frame for all units in the country, it used a dual sample frame. A list-based frame was used for large establishments (generally with 20 or more workers) and an area frame for villages in rural areas and ‘controller’ (or enumeration) areas in urban areas. The area frame was constructed using the 2004 population census list of villages and ‘controller’ areas. The population censuses did not provide information on the concentration of establishments or their industries, so this information could not be used to create strata. Areas in urban and rural areas were therefore stratified only by province; in urban areas ‘controller’ areas were also stratified according to the concentration of establishments, with areas with markets or a high concentration of enterprises forming one stratum separate from other areas.

All large enterprises in the list-based frame were included in the sample.

The sample-based on the area frame was selected in two stages. In the first stage, 150 villages in rural areas were selected using systematic sampling with probabilities proportional to population. In urban areas, 150 *controller areas* were also selected with systematic sampling but with equal probability. Each controller area was divided into around five smaller segments, from which two were selected, one with the highest concentration of units and another at random.

In the second phase, all economic units within the selected villages and segments were listed. The listing included all units operating in fixed premises, with the exclusion of those already in the list-based frame, as well as all household-based and itinerant activities. This was achieved by inquiring in each dwelling, whether some economic activity was being carried out there or was based there. Activities carried out within the dwelling were included in the list, as well as activities of household members that were carried out in no fixed premises. Activities carried out by household members in fixed premises outside the dwelling were not included in the area frame, as they were listed at the village or controller area in which the activity was carried out.

11.4.4.2 Ethiopia – Census of economic establishments, 2004

The first census of economic establishments in Ethiopia was carried out by the Central Statistical Agency (CSA) in February-March of 2004. The census covered all urban establishments that were set up with the aim of making profits and covered both public and private establishments. The census included units that sold or produced in open markets or in

a fixed location and mobile businesses in all sectors, with no limitation as to the number of persons engaged and the amount of income. It excluded civil service institutions and defence and other non-profit-making government and non-governmental organizations.

The fieldwork for the census was carried out without many problems. However, the reporting quality of some data items, particularly those on capital and revenue, was considered to be unreliable and the NSO was not capable of setting up a reliable SBR based on the data collected. Thus, the CSA's subsequent thrust is to establish a reliable SBR by conducting well-designed censuses of economic establishments and enterprises, and to use administrative data for supplementing and maintaining it.

11.4.4.3 National survey of micro-enterprises (ENAMIN), Mexico

Over the period 1992 to 2012 INEGI, Mexico conducted its [National survey of micro-enterprises \(ENAMIN\)](#) on a regular basis. The survey encompassed all non-farm activities without prejudging if they were formal or informal. For trade, transport, construction and services, it included units with six or fewer workers (including the owner or manager); for manufacturing, it included units with 16 or fewer (including the owner or manager). Mexico adopted only the two first stages of the 1-2-3 survey because an income and expenditure survey was already well established.

The first phase of the survey was the labour force survey, which has a questionnaire that already included the necessary elements for identifying entrepreneurs in the informal sector, as well as employees and contributing family members. In the second phase, the survey was directed to heads of non-farm micro-economic units (including professionals) operating either with or without premises, whether the business in question is the main or a secondary activity.

11.5 Statistical farm register and other frame sources for agricultural censuses and surveys

In the past, an economic statistic programme typically included a periodic economic census that was based on area enumeration of all establishments and that provided benchmark data and frames for production and other economic surveys conducted between censuses. As noted in Chapter 11.3.1 - *What is an SBR?*, this situation has evolved so that fewer countries now conduct an economic census. Instead, data are obtained from administrative sources and from an expanded suite of economic surveys, and the frames for these surveys are derived from an SBR, which itself is based on and updated from administrative data.

It could have been expected that agricultural censuses and surveys would evolve in much the same way, in other words that fewer countries would conduct an agricultural census, that data would be obtained from administrative sources and from an expanded suite of agricultural surveys, and that the frames for these surveys would be derived from a *statistical farm register (SFR)* based on and updated from administrative data sources. However, whilst there may have been some movements in this direction, it has been inhibited by (at least) two significant constraints.

- a) First, there is a continued ongoing demand for data that can only be obtained from an agricultural census, or at least, a very large sample;

- b) Second, an SFR containing a comprehensive list of farms (or agricultural holdings, as the basic unit for agricultural census and production surveys is more precisely termed) cannot be constructed from administrative sources in the way that an SBR can. The administrative sources that exist are not sufficient. Therefore, inevitably, some agricultural frames have to be constructed, at least part, by area enumeration.

Although there are no international guidelines for SFRs, there are international guidelines for conducting an agricultural census that include how to construct the census frame, as further discussed in the Chapter 11.5.2 - *Frames for agricultural censuses*. There is also a global strategy to improve agricultural and rural statistics, which also has information about constructing the frames for agricultural surveys, as further discussed in Chapter 11.5.3 - *Generation of agricultural survey frames*. Chapter 11.5.4 - *Examples of National Practices* provides examples of national practices.

11.5.1 Sources of frames

The frames for agricultural censuses and surveys can be obtained by the following methods:

- a) full enumeration of all agricultural holdings in the country specifically for, and part of, an agricultural census;
- b) enumeration of agricultural holdings in a representative sample of areas specifically for an agricultural survey;
- c) full enumeration of agricultural holdings and own account agricultural activities during the course of a population and housing census;
- d) enumeration of agricultural holdings and own account agricultural activities in a representative sample of areas during the course of a household survey;

or from the following sources:

- a) cadastral or other land records that identify land parcels;
- b) an SFR that is created from data collected during an agricultural census and subsequently maintained by the NSO using any combination of the above enumeration methods and/or administrative sources and/or feedback from agricultural surveys;
- c) an agricultural master sampling frame (MSF), comprising a representative list of units, created from an agricultural census and/or a population and housing census, maintained by the NSO, and used as a general-purpose sampling frame for selection of samples for agricultural surveys;
- d) an SBR that is maintained by the NSO and that can provide a frame of businesses (in the formal sector) that are agricultural businesses.

In a situation where no single frame provides adequate coverage a *dual frame* approach may be used. Samples are selected from two frames, typically one being list based and the other area (enumeration) based. Taking care to avoid double counting of units that are in both frames, the results are combined to provide better overall coverage than could be obtained from either frame alone. The approach can be extended to three (or more) frames.

In summary, although some countries do maintain an SFR, SFRs do not play the same major role in agricultural survey programmes as do SBRs in economic statistics programmes. Indeed,

as further elaborated below, many developed NSOs, such as the Australian Bureau of Statistics and Statistics Canada, no longer maintain a separate SFR. Instead, they may rely on a frame of agricultural businesses provided by the SBR coupled with an MSF of agricultural holdings obtained by enumeration in a representative sample of areas. This explains why there are no current internationally acknowledged guidelines, principles and recommendations for SFRs and why this section is entitled *Statistical farm register and other frame sources for agricultural censuses and surveys* rather than simply *Statistical farm register*.

11.5.2 Frames for agricultural censuses

11.5.2.1 Scope of and approach to agricultural censuses

As noted in the [World Programme for the Census of Agriculture \(WCA\) 2020, FAO](#), the scope of an agricultural census varies depending on the resources available within a country, the importance of agriculture, the traditions in census organization, and national priorities. Thus, the census should be conceived as part of an *integrated system of agricultural statistics*. Typically, the main aim of an agricultural census is to provide basic data on the structure of the agricultural sector, such as size of holdings, land use, land tenure, etc. These are data that do not change quickly over time.

Many countries do not have sufficient resources to conduct a full agricultural census, or a suite of agricultural surveys to replace it. Thus, they collect the data from a very large sample, still referred to as an agricultural census, or they collect only a subset of data items from all holdings and collect the remaining data from a sample.

The WCA 2020 recommends a modular approach to agricultural census and survey planning, with a core module based on a complete enumeration collecting a limited set of key items, coupled with sample-based complementary, thematic surveys. This approach is in line with the [Global Strategy to Improve Agricultural and Rural Statistics](#) (further described in Chapter 11.3.3 - *Administrative data inputs for SBR construction and coverage*) and the [UN Guidelines on Population and Housing Censuses](#). To facilitate implementation, the WCA 2020 provides guidance on agricultural censuses carried out by countries in the period between 2016 and 2025. It highlights the technical and operational benefits of coordinating the population census and the agricultural census. The [WCA Volume 1: Programme, concepts and definitions guidelines](#), as further discussed below, are in two volumes in each of which there is practical information how to create frames.

11.5.2.2 Statistical units of agricultural censuses

The statistical unit for an agricultural census is an *agricultural holding* and is defined as an economic unit of agricultural production under single management comprising all livestock kept and all land used wholly or partly for agricultural production purposes, without regard to title, legal form or size. Single management may be exercised by an individual or household, jointly by two or more individuals or households, by a clan or tribe, or by a juridical person such as a corporation, cooperative or government agency. The holding's land may consist of one or more parcels, located in one or more separate areas or in one or more territorial or administrative divisions, providing the parcels share the same production means, such as labour, farm buildings, machinery or draught animals.

There are two types of agricultural holdings:

- a) holdings in the household sector, that is, those operated by household members; and
- b) holdings in the non-household sector, such as corporations and government institutions.

For the non-household sector an agricultural holding often, but not always, coincides with an establishment (as defined for an SBR and business statistics), depending upon the exact definitions used for each.

In most developing countries, the majority of agricultural production is in the household sector. The concept of *agricultural holding* is therefore closely related to the concept of *household*. Standards for defining a household are laid down by the UN in its guidelines for population and housing censuses as follows:

“The concept of household is based on the arrangements made by persons, individually or in groups, for providing themselves with food or other essentials for living. A household may be either (a) a one-person household, that is to say, a person who makes provision for his or her own food or other essentials for living without combining with any other person to form part of a multi-person household, or (b) a multi-person household, that is to say, a group of two or more persons living together who make common provision for food or other essentials for living. The persons in the group may pool their resources and may have a common budget; they may be related or unrelated persons or constitute a combination of persons both related and unrelated”.

For the household sector, there is usually a one-to-one correspondence between an agricultural holding and a *household with own-account agricultural production* activities (either for sale or for own use); in other words, all of the own-account agricultural production activities by members of a given household are usually undertaken under single management. There are two special cases where the concepts of agricultural holding and household with own account agricultural production may diverge.

- a) If there are two or more units making up a household, such as where a married couple lives in the same dwelling as their parents, the two units may operate land independently but, as members of the same household, they make common arrangements for food, and they pool incomes.
- b) In addition to an individual household’s agricultural production activities, a household may operate land or keep livestock jointly with another household or group of households. In this case, there are two agricultural holding units associated with the household and two sets of activities: (i) the agricultural production activities of the individual household itself; and (ii) the joint agricultural operations with the other household(s).

Thus, some countries may prefer to define an agricultural holding in the household sector to coincide with a household with own-account agricultural production. The benefits of doing this are:

- a) identification of the holding in the agricultural census is simplified; it is no longer necessary to find out about multiple holdings within the same household;
- b) it is in line with the practice already used in previous agricultural censuses in many countries;

- c) the use of a common statistical unit – the household – enables the agricultural census to be more easily linked to the population census;
- d) it facilitates the analysis of household characteristics;
- e) if the scope of the agricultural census is expanded to include other households not engaged in own-account agricultural production, there is a common unit between agricultural production units and other households.

In defining the statistical unit for the non-household sector (corporations and government institutions), Volume 1 states that the concept of establishment (as an economic unit engaged in one main productive activity, operating in a single location) should be used.

11.5.2.3 Agricultural Census Frame Construction

a) **Main types of agricultural census frames**

There are two main types of frames for collecting agricultural statistics, a list frame and an area frame. A list frame comprises a list of agricultural holdings whereas the area frame comprises segments of land. In some cases, a multiple frame approach is used, in which part of the population (e.g., incorporated and government holdings) is covered by a list frame and the remainder (household holdings) by an area frame. For the census of agriculture, the list frame is the most common frame, and this is described below.

An ideal frame is a list of all agricultural holdings, based on the operational definition of the agricultural holding adopted by the country, identifying each unit without omission or duplication and without including any units other than agricultural holdings. Such a list could be obtained through a population and housing census for the household sector, an SFR, a listing exercise or other sources. The frame for the non-household sector can also come from an SFR, an SBR, administrative records or other data sources.

Whatever method is used, special care must be taken to ensure that all agricultural holdings are included in the frame. If holdings are missing, they cannot be enumerated in the agricultural census, and the validity of the census results is compromised. This is especially significant in an integrated agricultural statistical system, as any weaknesses in the agricultural census frame are also reflected in all the surveys that follow.

b) **Agricultural census frame from SFR**

Where an SFR exists, it is a good frame for an agricultural census, provided:

- it includes all agricultural holdings according to the definition established; and
- it is regularly updated, to remove units that cease to operate as holdings and to add new holdings.

Along with the usual identification criteria, an SFR usually contains some basic information about each unit, such as land area, types of livestock kept, types of crops grown. This information is updated periodically. It is used for stratification when sampling techniques are used.

An SFR can be created in various ways. It may be initially created at the time of an agricultural census and regularly updated thereafter, using information from various sources. In other cases, it may be established by law as part of an administrative process

and updated annually. The problem with this type of register is that the information is required for administrative purposes and may not coincide with statistical needs. The unit in the register may not correspond with the definition of the agricultural holding. For example, the register may be based on cadastral or other land records in which each parcel of land is identified rather than the holding unit. A register-based on land ownership is not entirely suitable for an agricultural census because several people in a household may manage land separately. Thus, ownership and management are not always synonymous. Furthermore, the landowner is not the land operator if the land is rented out. Frames based on business registration or licensing procedures are not always suitable as they represent what the unit is licensed to do, not necessarily what it actually does.

For the non-household sector, the SFR may be based on records from government regulatory agencies. Most countries have business registration and licensing systems. Membership information from industry associations may also be useful.

c) **Agricultural census frame from population and housing census**

Another type of frame covering the *household sector* of an agricultural census is one created from the population and housing census as a one-time exercise, but which is not kept up to date or maintained as an SFR afterwards. This is possible if the population and housing census include questions on agriculture that identify households involved in *own-account agriculture*. Although these are not the same as agricultural holdings, they provide a starting point. Based on the list an NSO can:

- contact each household in the agricultural census;
- ask each household about the household's own-account agricultural production activities and the management of agricultural activities in the household, to identify each agricultural holding; and
- enumerate all agricultural holdings.

The definition of the agricultural holding must be kept in mind. Where this is based on minimum size criteria such as land area, numbers of livestock, numbers of fruit trees, etc., these minimum size criteria need to be identified at some stage.

For such a frame to be useful, the agricultural census needs to be undertaken as soon as possible after the population and housing census to ensure that the list of households involved in own-account agriculture is current.

d) **Construction of an agricultural census frame from scratch**

If it is necessary to build a frame, the country is divided into suitable geographical units, referred to as enumeration areas (EAs), covering the whole in-scope national territory. Then each EA is visited, and interviews are conducted with local authorities or visits are made to households to identify all agricultural holdings in the EA. Population and housing censuses are usually conducted using EAs as the basic building block, and it is often possible for the agricultural census to piggyback on the population and housing census field system by using the same EAs and making use of maps and other field materials.

e) **Multiple frame approach**

Typically, a combination of frames is used for the agricultural census. Often, the household sector is enumerated based on the EA frame of the population and housing census, whereas a frame of agricultural holdings in the non-household sector is obtained from administrative sources. [WCA 2020 Volume 2: Operational Guidelines](#), which elaborates the operational aspects of conducting an agricultural census, *Chapter 13 Preparation of Frames* provides detailed information on frame construction.

11.5.3 Generation of agricultural survey frames

11.5.3.1 Global strategy to improve agricultural and rural statistics, 2010, FAO and World Bank

The third pillar of the Global strategy for improving agricultural and rural statistics ([GSARS](#)) is integration of agriculture into national statistical systems. Integration is needed for several reasons. A common shortcoming in both industrialized and developing countries is that data are collected by sector, using different survey frames. In addition to the NSO, there may be several other NSOs involved in the collection and analysis of agricultural, fishery and forestry data, and there is insufficient coordination. Surveys may be conducted on an ad-hoc basis with no links to a common frame or the use of georeferenced units. Thus, it may be difficult to combine data from different surveys, for example, crop and livestock production, for in-depth analysis. Integration of statistical systems can help solve many of these problems.

A very important aspect of integration is the development of an agricultural master sampling frame (MSF) and its use in a coordinated data collection program, thereby ensuring good coverage and coherent statistics. An MSF provides the basis for the selection of probability-based samples of farms and households and enables the characteristics of farms to be connected with those of households, and with land cover and land use dimensions. The challenge in developing an MSF is that it must satisfy the needs of three statistical units: agricultural holding, household, and land parcel. In addition, these three units must be linked so that, for example, household income, health, and other factors may be compared to the farm's economic situation, and all of these to their general environmental impact. Where there is a one-to-one relationship between the three types of unit, economic, social, and environmental information can be collected from a single unit. The main difficulty in the development of MSFs occurs where there is not a one-to-one link between the agricultural holding and the household.

11.5.3.2 Regulation (EU) 2018/1091, 2018 on integrated farm statistics

The [EU regulation \(EU\) on integrated farm statistics](#), which builds on the GSARS, provides direction and guidance to EU countries and is a source of guidance for others. It notes that, in order to avoid placing an unnecessary burden on agricultural holdings and national administrations, coverage thresholds should be established and that, for proper analysis of the structure of *European* agriculture, 98 % of the utilised agricultural area and 98% of the livestock units on farms should be covered. For some Member States, these thresholds are too high for national purposes. However, the agricultural holdings below those thresholds are so small that a sample survey once per decade is sufficient to allow the estimation of their structure and the impact on production. The approach results in a reduction of cost and burden while still enabling the design of effective policy action to support and maintain small farming structures.

11.5.3.3 Handbook on Master Sampling Frames for Agricultural Statistics

In accordance with the second pillar of the GSARS, the [Handbook on Master Sampling Frames for Agricultural Statistics](#) provides detailed guidelines and country examples for the development and construction of an MSF. The Handbook is intended as a reference document providing technical and operational guidance on various aspects of the development and use of an MSF in various country conditions, with an emphasis on developing countries. The Handbook recognizes the diversity of country situations and resources and consequently proposes various options.

11.5.3.4 Content and construction of an MSF

The population for an agricultural survey should be defined in terms of one of the three standard statistical units – agricultural holding, household or land parcel. A comprehensive MSF is a listing of sampling units that, when associated with reporting units, provides complete coverage of the population of interest, as well as linking agricultural holdings to households and land dimensions.

An MSF may comprise:

- a) a list of the names of farm operators obtained through an agricultural census,
- b) a list of households derived from a population and housing census,
- c) a list of commercial agricultural enterprises that are not associated with a household, or
- d) a list of area units that are defined geographically; or
- e) combinations of these.

If the list is of farm operators, the reporting unit is the holding associated with the name, and the items of interest are the land that it operates and the crops and livestock on that land, the households associated with that land, and the geo-referenced land. The list may also include commercial agricultural enterprises that are not associated with households and/or households with livestock but no land. Households that provide agricultural labour but do not operate a farm are excluded, as are households with small plots for which production falls short of a given threshold. This sort of list provides the linkage between an agricultural holding and the household associated with it. However, it is not a complete MSF because it excludes rural households.

If the list is of households, the reporting unit is the agricultural holding, and the items of interest include the land to which it is associated, the crops and livestock on that land, and the geo-referenced land. If the list has been derived from a population census, it will include all rural households, as well as those that are not linked to land but that have livestock contribute to the agricultural labour force or are simply rural non-farm households. It will not provide statistical efficiency at the first stage of sampling if the number of households used as an indicator of size when selecting PSUs is not well correlated to the items of interest such as crop areas or livestock inventories. It can become a more useful MSF if a listing of commercial agricultural enterprises is included. Alternatively, the agricultural enterprises may be used as a separate sampling frame in the multiple frame sampling context.

If the list is of segments or parcels of land, the reporting unit can be the holding associated with the land or the household(s) associated with the land having items of interest (crops and

livestock on the land). Rural non-farm households within the land parcel are also reporting units. Commercial agricultural enterprises are also reporting units. This list is an area sampling frame, as well as an MSF.

11.5.4 Examples of National Practices

11.5.4.1 EU Farm structure survey

The basic [EU Farm structure survey](#) (FSS) is carried out by all EU Member States using a common methodology every 3 or 4 years and once in ten years as a census. The basic unit is the agricultural holding. The coverage is all agricultural holdings which meet the minimum requirements set in the applicable legislation. The information collected covers land use, livestock numbers, rural development, management and farm labour input (including the age, gender and relationship to the holder of the agricultural holding).

The FSS provides comparable and representative statistics across countries and time. The data can be aggregated by different geographic levels (countries, regions, and for basic surveys also district level). They can also be arranged by size class, area status, the legal status of the holding, objective zone and farm type.

11.5.4.2 Farm Management Survey, Statistics Canada, 2017

The following description of the [Farm Management Survey, Statistics Canada, 2017](#) (FMS) indicates that Statistics Canada does not maintain a separate SFR. For surveys such as the FMS, Statistics Canada draws the survey frame from the SBR. For other agricultural surveys, such as the Farm Produce Prices Survey (FPPS) (described in the following paragraphs) it draws the frame from the most recent Census of Agriculture.

The FMS is conducted every five years. It contributes to Agriculture and Agri-Food Canada's work on measuring management practices on Canadian farms. The information generated from this survey helps measure management practices in the Canadian agriculture industry, address federal and provincial policy needs and support the development of effective agricultural programs. This mandatory survey focuses on both livestock and crop operations, specifically the production of dairy, beef, poultry, pig, field crops, forage crops and vegetable, fruit, berry and nut crops.

The conceptual universe for the 2017 FMS was all active farms on Statistics Canada's Business Register. The following groups were excluded.

- a) Active farms with agricultural sales in 2016 of less than \$10,000.
- b) Institutional farms (prisons, research stations, colleges).
- c) Farms located on Indian reserves.
- d) Farms for which more than 50% of the gross income in 2016 came from sales of greenhouse, sod and nursery products.
- e) Farms included on the 2017 Greenhouse, Sod and Nursery Survey frame.
- f) Farms without livestock inventory or crop area at the time of the 2016 Census of Agriculture.
- g) Farms located in the Yukon, the Northwest Territories and Nunavut.

11.5.4.3 Statistics Canada Farm Produce Prices Survey

The [Statistics Canada Farm Produce Prices Survey \(FPPS\)](#) is a monthly survey that produces provincial data on average prices received by farmers for agricultural products produced and sold. The primary purpose is to provide the pricing component of the Farm Cash Receipts series, which values the agriculture sectors' contribution to the Canadian economy. The prices are also used to calculate the Farm Product Price Index series. Agriculture and Agri-Food Canada and other federal departments use the data to develop, administer and evaluate agricultural policies and programs. Provincial departments and agencies use the prices for production and price analysis to support provincial stabilization programs.

The target population includes all Canadian agriculture operations as defined by the Census of Agriculture, as well as all marketing boards, agencies, commissions and federal and provincial government departments that collect data on producer prices or data from which prices can be calculated.

11.6 Household address register

11.6.1 Roles and benefits of address register

A statistical household address register contains organized contact information for every household. It can be generated from census or administrative information, but it is most commonly generated by combining census with administrative address information.

Administrative address information, with official names of streets, is usually in the jurisdiction of the local government and only in rare cases is subject to central government intervention. Even though street/block names and numbers are administrative information, the degree to which they are standardised and encoded varies greatly between countries. Some countries do not have a database of street names, while other spatial units (including dwellings) are codified to the greatest detail and regularly updated.

Codifying spatial units generally depends on national practices and administrative traditions. Recent attempts for international standardisation have been made through the [UN-GGIM](#) by developing the [Integrated Geospatial Information Framework \(IGIF\)](#), aiming to bring a spatial component into every data layer of the government. The importance of spatial information and GIS systems for official statistics is emphasised and further elaborated in Chapter 8.4 - *Geospatial data*.

NSOs, particularly those in charge of census taking, have a direct interest in the quality of address information. Thus, they have (with different results) managed to influence administrative bodies to improve (and standardise) the address information systems. Key to maintaining a high-quality statistical address register is having access to administrative data that is regularly updated. Unfortunately, building registration is often a complicated administrative process that involves multiple institutions and involves different procedures (safety, administrative, cadastral, taxation, etc.) and may therefore be difficult to influence. Census preparation may provide an excellent opportunity to start the standardisation process between different institutions. Each standardisation usually requires many discussions, but the key to success is agreeing to use a common identification number. Presentation [Building and dwelling register as a base for the production of geostatistical data](#) by Swiss Federal Statistics

Office provides an illustrative overview of the path that has to be taken by an NSO that wishes to promote a standardised approach through government administration.

In most advanced countries an address register is geocoded, each entry has a unique ID and is a member of multiple spatial hierarchies (street & house number, census area, school district, court district, hospital jurisdiction, etc.). Further, in some countries, an address register contains information about every building and every dwelling (apartment) inside every building. In some countries (i.e., Ireland) unique postal codes are assigned to each dwelling. This is commonly referred to as *buildings and dwellings register*. Dwellings registers often contain other properties such as surface area, floor, number of rooms, utility access, number of occupants and others.

Having a reliable address register improves survey data quality and reduces the data collection costs, as it eliminates the need for area enumeration/household listing (which is usually performed before Census or other major surveys).

Countries that do not have access to high-quality administrative information on dwellings and their occupancy have sought to supplement address information with additional sources. This approach is often referred to as *multi-source household address register* where administrative information on addresses (that may or may not include dwelling (apartment) numbers) is supplemented with information from utility companies, tax returns or other sources of information. Household address registers provide a tabular list frame that can be used for household surveys and population censuses, it reduces the costs of the Census as it eliminates the need for address canvassing and increases quality of the data through increased coverage, particularly if Census is conducted via the mail-in method.

In preparation for the 2020 Census round, some countries have started using Big Data approaches to gather information needed to update the household address register. Through agreements with post offices, they have started processing postal address information to update their address registers. Further, most offices perform in-office address canvassing using satellite imagery, thus significantly reducing the number of addresses that have to be canvassed in-field before the Census. An overview of the approach used by the Australian Bureau of Statistics to maintain and update Address Register, including issues relating to the preservation of privacy can be found [here](#).

Furthermore, one of the major recommendations of the 2020 World Population and Housing Census Programme, launched in 2015, refers to the advantages of geo-referencing individual housing units, resulting in a housing unit register that can be later reconciled with address register. Albeit in some developing countries, the completeness of the address register does not usually extend beyond major urban areas. The housing unit register would then be used as a major sampling frame for subsequent surveys and other statistical data collection exercises.

11.6.2 Conceptual framework

Even though neither a coherent conceptual framework nor an international standard for address registers exists, related concepts can be found in various places. [Handbook on geospatial infrastructure in support of Census activities](#) provides guidance on organizing address information for census purposes, while the [Integrated Geospatial Information Framework \(IGIF\)](#) and its much more detailed European equivalent [INSPIRE \(Infrastructure for Spatial Information in Europe\) Directive](#), and various national versions provide broader frameworks.

11.6.3 Sources and maintenance procedures

Countries that have developed administrative dwellings registers define their setup and maintenance procedures through legislative measures. A setup procedure is usually based on updated cadastral information through a specified administrative process or field recording of dwellings. The update procedure is also defined by law and includes adding and deactivating identifiers with addition/removal of every dwelling from the registry. Countries that do not have administrative dwellings and/or population registers usually construct household address registers before the census by supplementing the administrative and postal list of addresses with contact information from other sources, but there are examples where this process is performed continuously.

Usual sources for updating the information are utility and phone companies' information, tax forms, emergency services, tv licences and similar structured databases. The process usually involves multiple phases, where data from multiple sources is connected, cleaned and geocoded by using algorithmic tools and then controlled and corrected on the field, either by local authorities, statistical offices or external contractors. A modern approach to the process is creating a web-based address interface that enables address control and correction.

The quality of the household address register depends not only on the quality of the administrative address information but also on the quality of supplementing information. Quality of data depends on the registration process's quality but is often influenced by legal traditions, compliance and trust in institutions.

11.6.4 Generation of household survey frames

Household address registers can be used as directly survey frames or used to generate frames for specific surveys. A household address register is basically a list frame that lists all units in the survey population. It also contains information from an area frame, meaning information on the hierarchy of geographical areas as units. This feature of a household address register allows for two-stage sample selection, in which units are first selected from the area frame and then from the list frame only for previously selected areas.

Household address registers can be used as frames for population censuses because they contain identifying information for all census units. Further, household address register can be an excellent aid in census preparation, as they allow efficient fieldwork planning.

Unfortunately, ordinary household address registers generally do not contain information about their occupants and can therefore rarely be used for sample stratification. Population registers, on the other hand, can also serve this purpose. They can support:

- a) Specification of survey population;
- b) Derivation of survey frames;
- c) Selection of survey samples.

Links to guidelines, best practices and examples:

- [Fritz Scheuren - Administrative records and census taking, Survey methodology vol 25, DEC 1999g;](#)

- [The creation of a Residential Address Register for Coverage Improvement in the 1991 Canadian Census;](#)
- [ONS - compiling the address register for 2011 Census;](#)
- [ONS – local authority partnership programme guide;](#)
- [Building an address index for census and beyond - Alistair Calder, ONS;](#)
- [Building the address register for the 2011 Census – England and Wales Guidelines on the use of registers and administrative data for population and housing censuses – UNECE;](#)
- [HANDBOOK ON GEOSPATIAL INFRASTRUCTURE IN SUPPORT OF CENSUS ACTIVITIES - UNSD.](#)

11.7 Household master sample, civil registration and vital statistics and population registers

Having a reliable survey frame is essential to any survey. Even though NSOs benefit from using census information to construct household survey frames, updating the survey frame is often costly and complex. Depending on available resources and administrative environments, three general approaches to household survey frames construction can be identified:

- a) **Use of household master sample** – commonly used by NSOs that has a sufficient number of independent surveys or periodic rounds of the same survey to sustain their use;
- b) **Use of population census** – used by NSOs that have sampling experts but do not have the resources or administrative sources for regular and complete updating of the survey frame;
- c) **Use of population registers** – used by NSOs that regularly update the complete survey frame via defined procedures from administrative sources.

Apart from the approaches mentioned above, this section will discuss the civil registration and vital statistics system, both as a source of official statistics and its usage to update the sample frame.

11.7.1 Household master sample

A *master sample frame* is used for sample selection in a household survey, covers the entire target population and is used for multiple surveys or multiple rounds of the same survey. NSOs usually create a master sample frame after they finish the census processing by eliminating the information that is not needed for sampling purposes and making it available to sampling experts. Depending on security and data access policies, different approaches to the technical flow of individual and contact information are followed, but the general recommendation is that access to information should be closely guarded and limited.

The main advantage of a master sample design is that it allows one or more stages to be combined or shared among different household surveys. This approach reduces the costs of developing and maintaining sampling frames as more household surveys share the same master

sample frame and frame design. It also simplifies the technical process of drawing individual samples and facilitates operational linkages between different surveys. Being a master sample frame, the sampling frame does not vary either from one survey to the other or from one round to another of the same survey. Instead – and this is its distinctive characteristic – the master sample frame is designed and constructed to be a stable, established basis for selecting the sub-samples needed for the particular surveys or rounds of the same survey over an extended period of time.

Many countries face budgetary constraints and rely on technical assistance from international development agencies. To promote the sustainability of statistical data collection activities, different strategies have been proposed to economize on the technical and financial resources needed for conducting household surveys. One of these strategies is the development of a *master sample design*.

Using a *master sample design* to select samples for multiple household surveys provides an opportunity to minimize the resources needed to collect household survey data regularly. In particular, using the same sampling design and frame to select samples either for multiple surveys of different content or for different rounds of the same survey can produce significant cost-savings compared to developing an independent sampling design each time a household survey is carried out. Even though this strategy does not reduce the overall burden for respondents, respondents who live in a geographical area selected during the first stage may feel disproportionate response burden, particularly as surveys will not be collected in other areas.

A master sample is a sample drawn from a frame covering a target population for use on a number of future occasions, so as to avoid ad hoc sampling on each occasion. Sometimes the master sample is large, and subsequent inquiries are based on a sub-sample taken from it. The main advantage of using a master sample is that it lowers the cost of sampling as it provides a well-defined set of statistical units, which can be suitable, for instance, for panel surveys. On the other hand, a master sample is a preselected set of units, which might cause bias when used as the source for a sample survey. Countries with good registers are increasingly moving to samples of individuals and use telephone or web interviewing in combination. The benefits of a master sample are not obvious in that case if the sources are regularly updated, and the sampling expertise is available in-house.

The terms 'master sample frame' and 'master sample' can be confused, especially if a multi-stage sampling design is involved. The defining characteristic of a master sample frame is that it serves as a sampling frame for several samples; for different surveys or different survey rounds. The defining characteristic of a master sample is that it is a sample, and different sub-samples (for different surveys or different survey rounds) are drawn from it. It is important to keep in mind that not every sample drawn from a master sample frame is a master sample.

In general, a master sample consists of an initial selection of primary sampling units (PSUs) that remain fixed for each subsample. Note that the latter stages are usually variable. For example, in the final stage of selection, the particular households chosen for interviews are usually different for independent surveys, while they may be the same or partially overlapping in repetitive surveys.

Overviews of the conceptual framework can be found in:

- [National household survey capability programme - Sampling Frames and Sample Designs for Integrated Household Survey Programmes](#); and
- [Hans Pettersson - Design of master sampling frames and master samples for household surveys in developing countries](#).

11.7.1.1 Sources, creation and maintenance procedures

As noted in Chapter 8.2.4 – *Survey design*, in Chapters 11.3 – *Statistical Business Register* and in Chapter 11.4 – *Frames for informal sector surveys*, a business survey frame is derived from an SBR or in the absence of that, an economic census and the same applies to master sample frames for household surveys. A consistent survey frame is recommended for surveys with the same target population or a subset of the target population.

From a master sample frame, it is possible to select the samples for different surveys entirely independently. However, in many cases, substantial benefits result from selecting one large sample, a master sample, and then selecting sub-samples of this master sample to service different (but related) surveys. Several NSOs have decided to develop a master sample to serve the needs of their household surveys.

Over the time period during which a master sample frame is in use, changes will occur that affect both the number and the definition of the frame units. A master sampling frame is basically a list of area units that cover the whole country. For each unit there may be information on urban/rural classification, identification of higher-level units (administrative subdivisions – i.e., district and province to which the unit belongs), population counts and other characteristics. For each area unit, there must also be information on the boundaries of the unit. The amount of work required to maintain a master sampling frame depends primarily on the stability of these frame units. There are two kinds of changes that may occur in the frame units: changes in frame unit boundaries and changes in frame unit characteristics. Changes affecting the boundaries of frame units must be recorded in the master sample frame, and a system for collecting information about administrative changes needs to be established to keep track of these changes. Changes in frame unit characteristics include simple changes such as name changes and more substantial changes like changes in the measure of size (population or number of households/dwelling units) or changes in urban/rural classification. These changes do not necessarily have to be reflected in the master sample frame. However, as has been said above, outdated information on measures of size results in a loss of efficiency in the samples selected from the frame. Updating measures of size for the whole frame would be very costly and generally not cost-efficient; but for especially fast-growing peri-urban areas, it is a good idea to update the measures of size regularly.

There are examples where a master sample frame is periodically or continuously partially updated from CRVS systems (if the master sample contains individual information) and other administrative sources (such as local government registers, lists of voters, lists of immigrants and emigrants...) to reflect deaths, births and migrations. Also, there are examples where the update of the master sample is performed through updating address information from administrative information or via area canvassing. This is rather expensive and therefore rarely used. Examples where canvassing are focused on newly constructed buildings identified from geospatial (or other) information. Even though that periodic updates are beneficial, a full update

of the master sample frame should be performed as soon as census microdata becomes available.

11.7.1.2 Generation of survey frames and samples

As noted earlier, a master sample is a large sample from which different sub-samples are drawn for different surveys. The subsampling can be carried out in many different ways. Subsampling on the primary level (of primary sampling units) would give a unique subsample of the master sample primary sampling units for each survey, as each survey would have a different sample of enumeration areas. Subsampling on the secondary level would give a subsample of housing units from each master sample primary sampling units, as each survey would have the same sample of enumeration areas but different samples of housing units within the enumeration areas.

The subsampling could be carried out independently, or some kind of controlled selection process could be employed to ensure that the overlap between samples is at a desired level. Another way of selecting samples from the master sample is to select independent replicates from the sample. One or several of the replicates could be selected as a subsample for each survey. Such a set-up would require that the master sample be built up from the start from a set of fully independent replicates.

Links to guidelines, best practices and examples:

- [ST/ESA/STAT/SER.F/98 - Designing Household Survey Samples: Practical Guidelines](#);
- [Maligalig, D. S., & Martinez, A. Jr \(2013\). Developing a Master Sample Design for Households Surveys in Developing Countries: A Case Study in Bangladesh](#);
- [ESA/STAT/AC.93/3 - Sampling frames and master samples - Anthony G. Turner](#);
- [UNSD - Household Sample Surveys in Developing and Transition Countries](#);
- [ESSnet KOMUSO – Quality Guidelines for Frames in Social Statistics Version 1.51](#).

11.7.2 Civil registration and vital statistics systems

Ideally, Civil Registration and Vital Statistics (CRVS) is the continuous, permanent, compulsory and universal recording of the occurrence and characteristics of vital events of the population. The actors in a CRVS system typically include the civil registration authorities, Ministry of Interior or Home Affairs, Ministry of Justice, Ministry of Health and the national statistical office.

CRVS provides an important administrative function as it records documentary evidence of life events and family relations. Functioning CRVS systems record every birth, adoption, marriage, divorce and death, alongside additional information – such as the cause of death.

Recording every vital event is also an opportunity to produce the most accurate, complete and timely statistics on the population's health and demographics and maintain a national civil registry or a population database. While producing vital statistics through sample surveys serves a valuable function of highlighting and drawing attention to the possible scale of the situation, these can be costly, uncertain and may not cover the most vulnerable segments of the population, nor can they be localized. They are not a long-term substitute for vital statistics derived from a universal CRVS system. Even though CRVS systems are in place in most of

the world, a substantial part of the world population did not get registered at birth in a civil registration system. UN Statistics Division has initiated the formation of the [Global Civil Registration and Vital Statistics Group](#), a group of international and regional organizations to strengthen and support the establishment and modernisation of national CRVS systems. Similarly, Statistical division of United Nations ESCAP has launched a CRVS promotion campaign [Get into the picture](#) that is promoting the establishment of CRVS systems in Asia and the Pacific.

At the end of May of 2019, the United Nations Legal Identity Agenda was launched in Rome on the Conference in preparation for High-Level Political Forum: Peaceful, Just and Inclusive Societies – SDG 16 implementation and the path towards leaving no one behind. The United Nations Legal Identity Agenda refers to the holistic approach to civil registration of all vital events, production of vital statistics, the establishment and maintenance of population registers and identity management apparatus from birth to death, and there should be full interoperability⁴⁰ between these functions in a simultaneous manner, according to international standards and recommendations and in compliance with human rights of all people concerned, including the right to privacy. All Member States should adopt and implement this agenda as a systematic and perpetual mechanism for ensuring legal identity for all. The United Nations Statistical Commission adopted the UN LIA at its 51st Session in March 2020.

Apart from their use as a source of statistics on demographic events, CRVS systems (in combination with census and other sources) can be used to produce population estimates in inter-census periods and also population projections. Further, individual information from CRVS systems can be used to update the master sample frame information. Updating the master sample frame (as well as master sample) from CRVS systems is recommended, particularly for removing the deceased persons from the survey frame as this significantly reduces inconveniences for interviewers and consequently for NSOs.

Links to guidelines, best practices and examples:

- [Principles and Recommendations for a Vital Statistics System, United Nations, 2015;](#)
- [Handbook on Civil Registration and Vital Statistics Systems: Management, Operation and Maintenance Revision 1, United Nations, 2018;](#)
- [Guidelines on the Legislative Framework for Civil Registration, Vital Statistics and Identity Management, United Nations, 2019.](#)

11.7.3 Population registers

Having a fully reliable CRVS system and using its individual information to update the sample frame is not enough to get the complete sample frame in line with the total population. Even though information on life events is present, CRVS generally does not track information about the residence of individuals. Even if such information is present in CRVS or in a different administrative database, it is often not regularly updated or does not contain links between a

⁴⁰ Interoperability in this context refers primarily to ensuring that systems are using the same set of definitions, classifications and methodology, as well as technologically compatible platforms allowing for fully harmonization of interfaces and access protocols. Interoperability between functions does not infer allowing full access and manipulating records and content of any single system.

person and a dwelling, thus making it difficult to update the individual information on households from the sample frame.

In some (mainly northern European countries, also Slovenia and Austria) individuals are obliged by law to register themselves administratively to a specific dwelling, and that information along with items (such as educational attainment, and current economic activity) is stored in an administrative population register. Administrative population register is usually, connected with dwellings and buildings register (described in Chapter 11.6 - *Household address register*) on individual level, as each unique person (with unique personal ID) has to be connected with a unique dwelling (with unique dwelling ID).

Having a reliable administrative population register greatly reduces the total costs of official statistics as it eliminates the need for field collection of information that is available from reliable administrative sources. Countries with administrative population registers do not perform field collection of Census data but connect different administrative databases and may conduct a survey to collect information that enables imputation of missing data. Even though this approach is cost-effective and enables the annual production of otherwise available indicators every five or ten years, administrative data holders are generally concerned about the response burden, which generally leads to a limited number of available variables being collected. Further, the transition to administrative census opens the problem of comparability between previous censuses.

In the context of the United Nations Legal Identity Agenda (described above), the role of population registers extends well beyond both governmental and statistical functions and becomes a mechanism for ensuring the legal identity for all from birth to death by issuing legal credentials based on civil registration throughout the lifetime of an individual. The population register – accurate and updated regularly – represents a reliable source of information on population migration. In the context of generating small area census statistics, the establishment, maintenance and operations of a universal population register – combined with information synthesized from other functional registers – represents a significant and efficient alternative to costly canvassing of the whole country.

Consequently, it is of particular importance for NSO's to be closely involved in the legislative process, establishment, operations and protocols to access the information from population registers for statistical purposes from the onset of such a process in countries. While establishing the statistical exploitation of population registers at the later stage would not be impossible, it certainly would require more adjustments than if those relationships are elaborated at the very beginning.

11.8 Methodological services

This section contains information about the *methodological services* that are part of the common statistical infrastructure and that support questionnaire design, sample design and estimation, editing, coding, imputation, outlier determination, seasonal adjustment, time series analysis, and confidentiality and statistical disclosure control activities associated with a survey or other statistical process.

Methodological services involve the use of *specialised tools and systems*, and of *specialised staff* (typically *methodologists*) who are expert in the design, development or acquisition, and

use of such tools and systems. In this context, a *tool* implies a computer application supporting statistical activity, and a *system* is an integrated set of tools supporting a range of statistical activities.

International standards provide the foundation for developing methodological services and international statistical organizations provide support in their application.

11.8.1 Questionnaire design

11.8.1.1 Provision of questionnaire design support

Responsibility for the design and development of a survey questionnaire lies with the subject matter area staff for the survey. Questionnaire design specialists should provide support for questionnaire design and development, typically located in a methodology unit. Support may include:

- a) identification and acquisition of one or more questionnaire design and development tools;
- b) training of NSO staff in the questionnaire design principles, practices and use of the tools;
- c) assistance to subject matter staff in the design and testing of questionnaires;
- d) review of questionnaires from the perspective of understandability and question flow, and suggestions for improvements.

The principles on which the services are based are described in Chapter 8.2.5.4 - *Questionnaire design*.

11.8.1.2 Questionnaire design guidelines, tools and systems

Many NSOs have developed questionnaire design guidelines to assist their staff. For example [Questionnaire Design](#) is a section within the [Basic Survey Design Manual](#) developed by the Australian Bureau of Statistics.

In addition to guidelines, there are many questionnaire design tools available from NSOs, international statistical organizations, and commercially. Most of these tools are part of larger systems that, in addition to questionnaire design, include data collection and capture, editing, imputation and tabulation.

Two of the best-known systems from NSOs are:

- a) [Blaise](#) developed by Statistics Netherlands, and which supports questionnaire design and all types of computer-assisted data collection; and
- b) [Census and Survey Processing System \(CSPro\)](#) developed by the US Bureau of the Census and which is a public domain software package used by hundreds of organizations for entering, editing, tabulating, and disseminating census and survey data.

Two of the best-known systems from international statistical organizations are. [Survey Solutions](#), free software developed in the Data Group of the World Bank, and [EUSurvey](#), an online survey management system for creating questionnaires.

Systems from the commercial world include:

- [Survey123 for ArcGIS, which](#) is a form-centric data gathering application that integrates the use of mapping technology and survey operations;

- [Google forms](#), which is free and supports an unlimited number of surveys each with an unlimited number of respondents;
- [SurveyMonkey](#) is similar to Google Forms in that it supports any kind of online survey. The free version supports only a very small number of respondents.

All these systems are further discussed in Chapter 14.8 - *Questionnaire design tools*.

11.8.2 Sample design and estimation

11.8.2.1 Provision of sample design and estimation support

The close relationship between the estimation scheme and the sample design is often designed together even though estimation actually takes place much later in the survey process than sample selection.

It is broadly acknowledged that sample design and estimation should be fully delegated to specialists in these subprocesses as they require more mathematical knowledge than other survey subprocesses. Typically, but not invariably, the specialists are located in a methodology unit. Sometimes they are embedded within the subject matter areas responsible for the surveys.

Responsibility for the design of, development/acquisition of, and support in use of sample design and estimation tools virtually always rests with specialists located in a methodology unit. For any given survey, the subject matter staff are responsible for specifying requirements and constraints in terms of sample size, planned output tables, acceptable sampling errors, data collection budget and costs, etc., and for checking that the resulting sampling and estimation methods satisfy these requirements and constraints. The support services typically include:

- a) identification of appropriate sampling and estimation procedures;
- b) identification and (if need be) acquisition of appropriate sampling and estimation tools;
- c) conduct of sampling terminating with verification of the final sample with subject matter area;
- d) support to subject matter area in conduct of estimation and interpretation of sampling errors.

The principles on which the services are based are described in Chapter 8.2.4.1 - *Questionnaire design* and Chapter 8.2.6.6 - *Estimation*.

11.8.2.2 Sample design and estimation guidelines

Many NSOs have developed sample design and estimation guidelines for their staff, both subject matter and methodology experts. An example is [Sample Design, Australian Bureau of Statistics \(ABS\)](#), which is a section within the [ABS's Basic Survey Design](#) documentation. It deals with:

- a) defining the population, frame and units;
- b) calculating the sample size;
- c) determining the sampling methodology; and
- d) determining the estimation method to be used.

The document includes a review of non-probability sampling methods, including quota sampling, convenience and haphazard sampling, and judgement (purposive) sampling, and the circumstances in which they might be used. It describes simple random sampling with and without replacement, systematic sampling, stratified sampling, sample allocation, cluster sampling and multi-stage sampling, post-stratification and the circumstances within which each of these might be appropriate.

In addition to guidelines developed by NSOs, there are many textbooks and research articles on design and estimation. A classic textbook is [Sampling Techniques, Cochran, Third Edition, 1977, Wiley](#); and a classic article is [Sampling and Estimation for Establishment Surveys, 1994, M A Hidioglou](#).

The journals published by the [International Statistical Institute \(ISI\)](#), specifically including [the Journal of Official Statistics](#), and the various national association such as the [American Statistical Association \(ASA\)](#), and the [Royal Statistical Society \(RSS\)](#) are rich sources of articles.

11.8.2.3 Sample design and estimation tools and systems

In the past, an NSO would develop tools for stratification, sample size determination, sample selection, and estimation itself, often separately for each survey. This is no longer common practice as tools for every aspect of sample design, and estimation are readily available commercially and from international organizations and other NSOs. Typically, these tools are combined with one another and with tools for data preparation, analysis and tabulation in a single system.

Three of the best-known commercially systems are listed below. Purchase of any of these systems must be accompanied by training. All have a broad range of features, some of which may be complex and not all of which may be relevant to an NSO.

- a) [SAS](#) is a software suite that can discover, alter, manage and retrieve data from various sources and perform statistical analysis on them. It provides a graphical point-and-click user interface for non-technical users and more advanced options through the SAS language.
- b) [SPSS](#) Statistics is a statistical software platform from IBM with essentially the same features as SAS.
- c) [Stata](#) is a statistical software platform with essentially the same features as SAS and SPSS.

There are many freely available systems covering a wide range of functions of which. [R \(Project for Statistical Computing\)](#) is the best known. Although the system is free, the NSO staff require training in its application, which has to be purchased.

Over one hundred systems are available through [GitHub](#).

The systems referenced above are described in Chapter 14.7 - *Specialist statistical processing/analytical software*.

11.8.3 Editing, coding, imputation and outlier determination

11.8.3.1 Provision of support for editing, coding, imputation and outlier determination

The ultimate responsibility for executing these activities for any particular statistical production process typically lies with the subject matter area manager. However, in most NSOs, primary editing and (sometimes) coding are actually carried out by the staff who undertake data collection, typically field staff working from regional offices. Secondary editing, imputation and outlier determination may be carried out by specialists in these activities located in a methodology unit or in the relevant subject matter area.

Responsibility for the design of, development/acquisition of, and support in the use of, generic editing, coding, imputation and outlier detection tools and systems typically rests with specialists located in a methodology and/or ICT units.

In summary, support for editing, coding, imputation and outlier determination may include:

- a) identification and/or development of appropriate procedures and tools;
- b) training of staff in the editing, coding, imputation and outlier detection procedures and tools;
- c) assistance to staff in the conduct of these activities.

The principles on which the services are based are described in chapters 8.2.6.1 to 8.2.6.4.

11.8.3.2 Editing, coding, imputation and outlier determination guidelines, tools and systems

Many NSOs have developed questionnaire design guidelines for these activities to assist their staff. For example, [Data Processing](#) is a section within the [Basic Survey Design Manual](#) developed by the Australian Bureau of Statistics. [Generic Statistical Data Editing Models](#) have been developed by a multinational task team under the [High-Level Group for the Modernisation of Official Statistics](#).

In many NSOs the editing, coding, imputation and outlier determination tools are built separately for each production process (survey or administrative data collection) and, in the case of annual or less frequent surveys/collections for each cycle. This is not recommended practice. To the extent possible, the best approach is to use generic tools that can be customised to a particular survey or collection. Tools may be developed in house or, preferably, acquired from another NSO or an international statistical organization. In some cases, tools performing more than one of the functions may be combined in a system.

Systems currently available include [CSPRO](#), [Survey Solutions](#), and [Blaise](#), as noted above and described in Chapter 14.7 - *Specialist statistical processing/analytical software*.

11.8.4 Seasonal adjustment and time series analysis

11.8.4.1 Provision of support for seasonal adjustment

As discussed in Chapter 9.3.1.2 - *Seasonal adjustment and time series*, seasonal adjustment is a method widely used in official statistics for removing the *seasonal component* of a sub-annual (usually monthly or quarterly) time series. It includes *pre-treatment*, which involves *detection and correction of outliers* and *calendar adjustment*, i.e., removing trading day variations and

moving holiday effects. In some cases, the original series may be *differenced*, i.e., a new series derived that comprises the differences between adjacent points in the original time series. The various choices made in setting up a seasonal adjustment (including pre-treatment) for a particular series are collectively referred to as *model selection*.

Responsibility for the seasonal adjustment rests with the subject matter area responsible for the series. The model selection and seasonal adjustment algorithms are complex and depend upon knowledge and use of a seasonal adjustment system. Therefore, the subject matter staff is typically helped by seasonal adjustment specialists, who are usually located within a methodology unit or an analysis unit, depending upon the organizational structure of the NSO. Their role is:

- a) to decide upon the seasonal adjustment system(s) to be used across the NSO as a whole;
- b) to acquire and install the seasonal adjustment system(s), to test it and to adjust it for each time series;
- c) to determine the appropriate approach and system (if more than one is available);
- d) to establish the initial seasonal adjustment model and parameter settings for the series;
- e) to check that the model and settings work appropriately on the series before handing over the system to the subject matter area; and
- f) periodically, to review the outputs, check the continuing applicability of the model and settings, and to make adjustments if need be.

Support may also be provided from outside the NSO. For example, Eurostat provides a [free seasonal adjustment remote helpdesk](#).

11.8.4.2 Seasonal adjustment guidelines, tools and systems

[ESS Guidelines on seasonal adjustment, 2015, Eurostat](#) provide a comprehensive description of all aspects of seasonal adjustment, including pre-treatment and model selection.

There are multiple seasonal adjustment systems available, of which the most commonly used are listed below and described in Chapter 14.7 - *Specialist statistical processing/analytical software*.

- a) [X-12 ARIMA](#), US Census Bureau.
- b) [TRAMO-SEATS](#), Department of Statistics, National Bank of Spain.
- c) [X-13 ARIMA-SEATS system](#), which combines X-12 ARIMA and TRAMO-SEATS, developed and supported by the US Bureau of the Census.
- d) [Jdemetra+](#), also combines X-12 ARIMA and TRAMO-SEATS, developed by the Department of Statistics, in the National Bank of Belgium for the ESS Seasonal Adjustment Group.

It is highly recommended that an NSO use the same seasonal adjustment system for all the series that are seasonally adjusted. This allows staff to become familiar with the system. In any case, a single system may allow more than one approach to seasonal adjustment. To the extent possible, the same approach should be used for all series. However, there may be a case for using different approaches in different domains.

11.8.5 Confidentiality and disclosure control

11.8.5.1 Provision of support for confidentiality and disclosure control

As discussed in Chapter 3.2.6 - *Principle 6 - Confidentiality*, Principle 6 of the [Fundamental Principles of Official Statistics](#) states:

“Individual data collected by statistical agencies for statistical compilation, whether they refer to natural or legal persons, are to be strictly confidential and used exclusively for statistical purposes.”

Confidentiality is ensured through measures such as:

- a) protecting questionnaires during data collection and when in transit – as discussed in Chapter 14.2.17 - *Data security*;
- b) requiring all employees to swear an oath not to disclose confidential information;
- c) restricting access to buildings and servers with confidential information – as discussed in Chapter 15.3 - *Building security*; and
- d) implementing confidentiality checking and disclosure control procedures – as discussed in Chapter 9.3.1.3 - *Confidentiality rules and disclosure control*.

The first three items above are security issues. This section focuses on the fourth item, support for confidentiality checking and disclosure control.

Ensuring that there is no disclosure of confidential data in the output tables is the responsibility of the subject matter staff responsible for the statistical production process. However, these staff may not have the specialized skills required for confidentiality checking and preservation and may well draw on specialist support in selecting and using the appropriate tools. The specialists are usually located in methodology unit or an analysis unit, depending upon the NSO's organizational structure. The support services typically include:

- a) specification of appropriate confidentiality checking and disclosure control procedures and identification and (if need be) acquisition of a corresponding confidentiality checking and disclosure control tool, for use throughout the NSO;
- b) and, for each set of output tables from a statistical production process:
- c) support to subject matter area in their conduct of confidentiality checking and disclosure control; and
- d) periodic verification of confidentiality preservation effectiveness.

11.8.5.2 Confidentiality checking and disclosure control tools

Identifying and preventing disclosure is not a process that can readily be done, or should be done, manually. First, the tables are typically too complicated and/or voluminous. Second, manual processing is inefficient when the job can be much more readily done by automated processing. Thus, an NSO should either acquire a confidentiality checking and prevention tool as an element of its common statistical infrastructure or develop its own tool. Acquisition is recommended wherever possible to save development costs and to be more certain that the tool does the job properly. However, as confidentiality checking, and preservation tools are not readily available commercially (there being very little demand for such tools outside realms of

official statistics) acquisition is likely to be from another NSO. Two well-known examples are as follows:

a) **ARGUS, Statistics Netherlands**

As described in [ARGUS Users' Manual Version 3.3](#), the purpose of Γ -ARGUS is to protect tables against the risk of disclosure. This is achieved by modifying the tables so that they contain less detailed information. Several modifications of a table are possible - a table can be redesigned, meaning that rows and columns can be combined and/or sensitive cells can be suppressed and together with any additional cells required to protect against residual disclosure. Cells to protect these can be found in some optimum way (secondary cell suppression). A twin application, μ -ARGUS protects microdata files. Both applications have been rewritten in [open source](#).

b) **G-Confid, Statistics Canada**

As described in [G-Confid: Turning the tables on disclosure risk, 2013](#), cell suppression is the technique used to protect tabular economic data in the disclosure control application *G-Confid*, developed at Statistics Canada. It is a generalized system that can deal with potentially voluminous multi-dimensional tables and incorporate new approaches. Its main objective is to provide the appropriate protection level for confidential cells while minimizing the loss of information resulting from the process.

G-Confid features a suite of three SAS components for use with tabular economic data at various aggregation levels. PROC SENSITIVITY identifies cells requiring primary suppression. The macro SUPPRESS protects the cells identified by PROC SENSITIVITY by selecting an optimal set of cells for complementary suppression using a linear programming algorithm. The macro AUDIT validates a suppression pattern not provided by the macro SUPPRESS or the G-Confid user altered after running the macro SUPPRESS. An additional macro, AGGREGATE, provides further information about sensitive unions of cells, and another auxiliary macro REPORTCELLS provides a visual snapshot of the suppression pattern to facilitate the creation of output tables of the economic data under study.

11.9 Statistical policies, standards and guidelines

The final aspect of the statistical infrastructure discussed in this chapter comprises statistical policies, standards and guidelines, defined as follows:

- a) **Policy** –strategic direction or course of action defined, adopted and promulgated by the NSO;
- b) **Standard** -: set of standard concepts or variables, standard classifications, or standard method that underpins harmonisation and/or integration and that typically supports the implementation of policies;
- c) **Guideline** – a recommendation and/or element of best practice that typically supports the implementation of a policy or standard; usually used in the plural, referring to a set of guidelines on a particular topic.

11.9.1 Statistical policies

Whilst a *principle* is a statement of commitment (possibly a rule) that is to be followed, a *policy* defines a course of action that can be used to implement the principle. Thus, an NSO may adopt the Fundamental Principles of Official Statistics, and put in place one or more policies, such as a dissemination policy, to ensure that they are followed. This section focuses on national statistical policies, which are most commonly used to elaborate and provide strategic directions for implementing the principles or rules defined in legal documents and international recommendations.

Policies should be like the foundation of a building - built to last, and resistant to change and erosion. Policies should be easily accessible and understood. Policies are usually developed to provide a sense of direction in a strategically important area. They should be created to be in force for a long period and at the same time periodically reviewed to assess their relevance.

Policies may be divided into three types: organization-wide; issue-specific; and system-specific.

Commonly NSOs have policies for dissemination, revision, data access, microdata access, archiving, privacy, pricing for tailored statistical services among many others.

Recommendations on how to organize the development, monitoring and enforcement of policies is provided in Chapter 5.4.2 - *Internal advisory and decision-making bodies*. One general recommendation is that policies should be created through a designated internal decision-making body (such as a committee or a working group), reviewed by senior experts and management, and endorsed by the chief statistician.

Senior management should give special attention to policy enforcement, continually reminding the staff of the importance of a policy and why it was adopted. Policy performance monitoring should be continuous activity as ad hoc performance monitoring can create unreliable results.

Enforcement of statistical policies may be organized globally, for example through the [Global Review of the Implementation of the Fundamental Principles of Official statistics](#), or regionally for example through the [Peer Review on the implementation of the European Statistics Code of Practice](#) in the EU and candidate countries.

Statistical policy governance should involve eight characteristics: the rule of law; transparency; responsiveness; consensus-oriented; equity and inclusiveness; effectiveness and efficiency; accountability; and participation.

An example of good practice for statistical policy creation can be found in the UK Government Statistical Service (GSS) document [Governance for statistical policies, standards and guidance statistical system](#), which summarises the process for creating, updating and agreeing on all GSS. Policies, standards, guidance and strategies. All GSS policies are made available on the GSS Policy and Guidance Hub, which has the following objectives:

- a) helping people to find what they are looking for;
- b) increasing awareness of existing policy;
- c) preventing use of out-of-date policy;
- d) avoiding unnecessary new policies / reinventing the wheel; and
- e) identifying gaps in policy areas.

In the Philippines Statistical Authority (PSA), interagency committees on statistics (IACs) are established to serve as fora for the exchange of views and expertise:

- a) to resolve technical issues and problems arising from the production, dissemination, and use of statistics, among others and;
- b) in the development, maintenance and compliance to statistical standards and classification systems.

Statistical issues that are unresolved at the IAC level are elevated to the PSA Board, the country's highest policymaking body on statistical matters, for decision. Policies issued by the PSA Board are then implemented by all concerned agencies.

Links to guidelines, best practices and examples:

- [CSO Ireland - Standards and Guidelines](#);
- [US Office of Management and Budget - Standards and Guidelines for Statistical Surveys](#);

11.9.2 Standard concepts, variables and classifications

Today's world requires comparable statistics. Political unions, customs unions, free trade areas, and the global character of foreign investment require that statistics (and particularly socio-economic statistics) are expressed in the same language. The objective of harmonising statistics is to make it possible to combine or compare data collected for different populations, for different periods and/or by different data collection methods for different statistical units. This is possible by using the same or mutually consistent and harmonized standards and classifications across different data sets.

A failure to use internationally comparable standards is a weakness in an NSO. For effective coordination of classifications, nomenclatures and concepts, a designated organizational unit must be in charge of ensuring that what is adopted nationally is comparable with that adopted by other countries.

International comparisons are possible largely due to international classifications and standard accounting systems such as the System of National Accounts (SNA) or System of Environmental Accounts (SEA). In efforts to increase comparability, the statistical community is also developing standards such as GSBPM, GSIM, and CSPA (described in Chapter 14.4 - Use of Standards and Generic Models in an NSO) aimed at standardising the statistical production and its documentation.

Classifications group and organize information meaningfully and systematically into a standard format that is useful for determining the similarity of ideas, events, objects, or persons. The preparation of a classification means creating an exhaustive and structured set of mutually exclusive and well-described categories, often presented as a hierarchy reflected by the numeric or alphabetical codes assigned to them.

International statistical classifications (ISCs) are products of international agreements among national authorities responsible for statistics in the respective areas. In accordance with the established practice for the division of responsibilities among international agencies in the area of statistics, the ISCs require approval by the United Nations Statistical Commission (UNSC) or another competent intergovernmental board, such as that of the World Customs Organization (WCO), the World Health Organization (WHO), the International Monetary Fund (IMF), or

the International Labour Organization (ILO), depending on the subject matter area. ISCs may serve as models for the development of corresponding national, multinational and regional statistical classifications, and should, as far as possible, reflect what is considered “best practice” in the areas they cover.

Even though international standardisation of variables was not until recently seen as a priority, standardisation of data and metadata has been promoted through international organizations such as the IMF and the World Bank, the OECD and the EU. All of them accept data in their databases through XML and require standardised variables and metadata. This simplifies the use of data and makes data integration easier.

Within the European Statistical System (ESS), an *ESS standard* is defined as a normative document, established by consensus among ESS members and approved by a recognised body for ESS standardisation, that provides common and repeated use by several actors in the ESS. It can comprise rules, guidelines or characteristics for the development, production and dissemination of European Statistics, aimed at achieving the optimum implementation of the mission and vision of the ESS.

Adapting the statistical classifications to local circumstances and conditions and promoting their use among public and government agencies is an important task for every NSO.

Links to guidelines, best practices and examples:

- [Catalogue of ESS Standards](#);
- [Standard Statistical Classifications: Basic Principles](#);
- [Definitions, data sources and methods – Statistics Canada](#);
- [Best Practice Guidelines for Developing International Statistical Classifications -, Expert Group on International Statistical Classifications](#).

11.9.3 Statistical guidelines

In the world of official statistics, guidelines are used to document the best current practices and processes and explore and promote the new developments. Even though guidelines are, by nature, open to interpretation and do not need to be followed to the letter, they are worth developing, promoting and considering.

Guidelines cover every statistical area and domain. They provide a basis for training and support. When a new employee is introduced to an NSO, he/she can be given a copy of pertinent guidelines as a starting point. He/she may be asked to follow the work of more senior colleagues and write down observations and questions with reference to the guidelines. Since the guidelines are usually written following the statistical production process from the start to the end, they can be used as supporting tools to troubleshoot errors in streamlining and improving existing processes.

Creating guidelines in an NSO is somewhat similar to creating an internal policy as referenced above. Guidelines should be created through a working group or committee of experts, then commented on by internal decision-making body (such as a Committee or a working group), then reviewed by senior experts and management and finally endorsed by the chief statistician. In the case of guidelines being developed by an international organization, the final approval is by a commission or another competent intergovernmental body.

As international guidelines are often not mandatory, compliance is in general, monitored and not audited. International organizations often monitor compliance with international guidelines, for example, for EU and OECD applicant countries during the accession process.

Links to guidelines, best practices and examples:

- [CSO Ireland - Standards and Guidelines](#);
- [US Office of Management and Budget - Standards and Guidelines for Statistical Surveys](#);
- [ISTAT - Guidelines for the quality of statistical processes that use administrative data](#).

Chapter 12. Human Resources Management and Development

12.1 Introduction

This chapter looks more closely at the strategic issues and provides information, including current practices, on HRMD policies and practices relevant to NSOs. Of course, many of these are also highly pertinent to other major producers of official statistics in a national statistical system.

For other major producers, a statistical unit within a ministry or government agency is typically responsible for collecting data and producing statistics. The way statistical functions are carried out varies. In some countries, the statistical unit in these agencies is fully staffed—for example, the central bank or, ministries of agriculture or labour/employment. Some health and education ministries have developed management information systems from which health and education statistics are produced. In others, the statistical functions are embedded in the planning and monitoring unit of the ministry or government agency. Customs, the data source for international trade statistics, may or may not produce the statistics itself but may prepare the data files further processed by the NSO.

As producers of statistics, the staff of these statistical units need the core skills and competencies discussed in this chapter, as well as knowledge of the concepts, standards and classifications pertaining to their sectors. The skills and competencies required at the technical level—the sectoral statistics, data collection and processing, analysis, etc. are quite relevant to these other data producers. Of particular importance is the capability for producing statistics from administrative records and registers.

In discussing human resources (HR) and development for organizations in general and national statistical offices (NSOs) in particular, the following key strategic questions need to be addressed:

- a) What skills are needed now and in the future?
- b) What can statistical offices offer for staff?
- c) How to attract staff with those skills?
- d) How to communicate about job opportunities in statistics?
- e) How to train staff to maintain and develop their skills?
- f) How to provide the best possible working environment?
- g) An earlier version of the Handbook makes some timeless observations that are still relevant today. A decisive factor in the internal capability of a national statistical office (NSO) is the calibre of its staff. An agency can only function well if good people are available to make it work. Organizational arrangements may enable people to do their best, but it is essential to give utmost attention to building up the right skills for a statistical organization.

- h) To acquire the kind of skills needed, an NSO needs a well-planned HRM and Development (HRMD) policy and active recruitment programme, career development, education and training.
- i) Capacity development is an ongoing process for current staff. For example, they may be assigned to handle new statistical methodologies, learn and apply new technologies or prepare implementation plans for new statistical frameworks. And, they are often progressively given increasing managerial responsibilities among many other possible progressions of career development.
- j) Capacity development is also an ongoing need for recruits who start at the “beginner level” and as opportunities for training and career development are important parts of the staff retention programme.
- k) Opportunities for higher education and short-term training (including on-the-job training) should be part of the staff learning and career development programme. The design of such a programme should be anchored to a capacity development framework or capability framework or a core skills framework.
- l) The statistical system may consider establishing a statistical training institute to provide core training and training in new areas. Some national statistical offices have a statistics degree-granting institution attached to it.
- m) The physical environment of the workplace—working space, computer-related facilities and spaces to facilitate communication between teams as well as cross-teams contributes not only to efficiency but also to the well-being and satisfaction of the staff. Moreover, the environment must be conducive to integrating statistics because, in a real sense, the "successful integration of statistical end-products is contingent upon the 'integration of the statisticians'".
- n) NSOs who have not yet done so may consider adopting policies on flexible working arrangements (FWAs). FWAs are adjustments to the normal working hours and locations, such as: telecommuting, remote working and condensed workweeks. FWAs are globally recognised and adopted by organizations; for example, see the FWAs adopted by the [UN Secretariat](#)) including a tool to increase productivity and to better balance the professional and personal lives of their staff.

12.2 Workforce (Staff composition) of an NSO

The statistical system’s human resources—the people who work for the component organizations and the skills and expertise are the most valuable and often the scarcest resource. The workforce of a modern NSO needs a wide range of skills and competencies to effectively carry out its functions. The requirements for human resources of an NSO are determined by its legislated and programmatic mandates and functions.

A strategic plan and a multi-annual work plan set out what the NSO needs to do. The determination of planned activities and expected outputs is guided by its vision, mission, and strategic goals identified and renewed over time.

12.2.1 NSO functions

The core functions of an NSO (refer to Chapter 4.3.4 - *National Statistical Office*) layout the core knowledge, skills and competencies that its workforce would need to have--

- a) Ensuring continuity of production and dissemination of all statistics under its responsibility.
- b) Providing an effective performance of the system-wide functions such as setting standards, planning, coordination of the national statistical system, and statistical registers, which includes the responsibility of the NSO to provide services for other producers (e.g., sampling).
- c) Ensuring quality and efficiency of the production and dissemination processes, based on using the best-suited methods and technology, carrying out research to enhance quality and effectiveness, applying standards-based modernisation and innovation models such as GSPBM, GAMSOC or and CSPA.
- d) Developing and maintaining networks with the various user groups to assess the relevance and respond to changing and emerging information needs.
- e) Ensuring trust of users, respondents and data providers in its institutional quality, and in the integrity of the whole national statistical system, through regular monitoring of adherence to the United Nations Fundamental Principles of Official Statistics ([UNFPOS](#)) or equivalent lists of principles across the whole national statistical system.
- f) Contributing substantively to discussions in international forums (expert groups, standards-setting, framework development, technical conferences, etc.) of official statistics.

The core, current and planned activities, targets and schemes of service determine the number of people, the workforce plans and how the work is to be organized. In this Chapter, the workforce composition is described, assuming that the NSO organizational structure is a vertically centralized one—with a central office and geographically dispersed sub-national offices. And the ability to meet new demands for NSO products and services may require the ability to change how it conducts its business.

12.2.2 Workforce Composition

The organizational charts for Bhutan, shown in Figure 13, suggest that workforce needs of a national statistical office-- whether large or small, developed or developing-- are largely functionally similar. The differences would be in the *number* of staff and their skills and competencies.

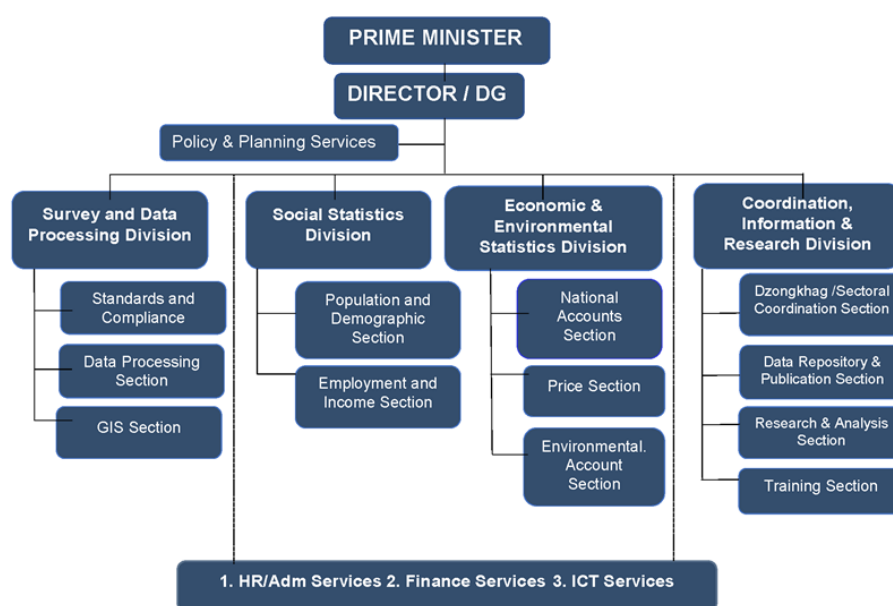
Using the UNECE [Classification of Statistical Activities](#), the functional composition of an NSO workforce as highlighted in the charts are:

- a) Strategic and managerial issues of official statistics: Statistical programmes; coordination within the statistical system; management and development of human resources; management and development of technological resources.
- b) Subject matter expertise: Demographic and social statistics; economic statistics; environment and multi-domain statistics.

- c) Methodology of data collection, processing, dissemination and analyses: Data sources (Census, registers and surveys); data processing; dissemination; data analysis.

It is to be noted that the illustrative organizational charts do not explicitly reflect the functions of coordination of international statistical work and technical cooperation. Typically, the function is carried out by a unit of the office of the chief statistician.

Figure 13: Illustrative NSO organization chart - National Statistics Bureau of Bhutan
(Source).



Owing to the evolving range of subjects covered by a modern NSO, the staff tends to possess various skills and varying backgrounds. Even agencies that conduct only moderately complex and specific statistical undertakings find themselves in need of a wide range of skills. Statistical operations require a mix of talent apart from statisticians and data scientists, including economists, sociologists, psychologists, demographers, econometricians, model builders, geographers, information technology experts, accountants, etc.

It is important to build and maintain a multi-talented staff with a broad range of academic, technical and managerial skills and work experience. Professional staff can often be divided into two categories:

- General personnel performing at various levels of sophistication in informatics; statistical design and analysis; national, public sector or enterprise accounting; and economic, social or demographic analysis.
- Specialized personnel capable of performing at a substantially high level in an area such as non-response analysis; applications of geospatial information; access and use of Big Data; data integration.

In addition to the technical know-how, staff also take on managerial responsibilities (heads of organizational units; e.g., as shown in the organizational charts).

12.3 Human resources (HR) policies

12.3.1 Defining human resources (HR) strategy and policy

HR policies are ‘a written source of guidance on how a wide range of issues should be handled within an employing organization, incorporating a description of principles, rights and responsibilities for managers and employees. They define the philosophies and values of an organization on how people should be treated; these are the foundations upon which managers are expected to act when dealing with HR matters. Therefore, HR policies serve as reference points when employment practices are being developed and when decisions are being made about people. They help to define ‘the way things are done around here’. Examples of HR policies are criteria for selection, performance, incentives and rewards, and learning and development.

HR policies should flow from HR strategies. An HR strategy is a “statement or framework determining how HR can support business or organizational objectives, focusing on longer-term people issues and macro-concerns about structure, values, commitment and matching resources to future need.” Examples of HR strategies are incentive and reward strategy and learning and development strategy.

An organization’s human resource management (HRM) framework ties up strategy and policy and supports its implementation.

12.3.2 The need for HR policies

HR policies play an important role in fostering and supporting cultures of trust, fairness and inclusion. They outline the responsibilities of both employer and employee in the employment relationship. They can impact employee motivation, organization reputation and the ability to attract and retain talent. These policies can support the attitudes and behaviours needed for sustainable performance, creating mutual benefits for employees and organizations.

HR policies provide frameworks within which consistent decisions are made—based on the organizations’ core values-- and promote equity in how people are treated. The policies ensure that employees understand their roles and how their work contributes to achieving the goals of the NSO. Because they provide guidance on what managers should do in particular circumstances, they facilitate empowerment, devolution and delegation.

12.3.3 The scope of HR policies included in this Handbook

Types of HR policies organized according to the employee life cycle would include:

a) Beginning employment

- Recruitment and criteria for selection;
- Induction/On-boarding;
- Beginning training.

b) During employment

- Compensation, benefits, performance and rewards;
- Health, safety and well-being;

- Employee relations and general HR issues (job rotation, secondment, communication);
- Retention;
- Learning and development (training, coaching and mentoring, talent development).

c) **Ending employment**

- Exit interview;
- End of employment (Retirement, resignation, separation, change jobs, etc.).

An example of a set of coherent objectives that HR policies are designed to help attain are:

- a) Workforce planning- Increase the proportions of professional staff by expanding the annual intake of young professional qualified staff.
- b) Ensure that once recruited, qualified people are assigned suitable jobs, and everyone is treated fairly.
- c) Devise a proper mixture of deterrents and incentives, to be made explicit to the staff.
- d) Learning and development-- Administer sufficient training to staff members at key points in their careers, to maximize versatility and motivation.
- e) Succession planning-- Ensure that key jobs are staffed and have a possible successor ready to step into an incumbent's shoes should the need arise.

In this handbook, discussion on HR policies covers recruitment, workforce planning, learning and development, retention, job rotation and exit interviews at the end of employment.

12.3.4 Competency Framework

A competency framework is a tool that guides the formulation and implementation of HR policies—from recruitment to building professional capability, staff well-being and to ensure that the organization stays on course in pursuing what the statistical office is expected to achieve.

Links to guidelines, best practices and examples:

- The Government Statistician Group (GSG) [Competency Framework \(UK\)](#);
- Australian Bureau of Statistics [Statistical Language](#);
- Australian Bureau of Statistics [Statistical Capability Framework](#).

Excerpts from the Government Statistician Group (GSG) Competency Framework (UK) shown in Box 4 highlight the purpose, uses and key contents of a competency framework. It shows how a competency framework is linked to the mission of the government statistical service and the strategy for UK statistics.

Box 4: UK Competency Framework

The Government Statistician Group (GSG) Competency Framework of the UK sets out what members of the statistical profession are expected to achieve in addition to the competencies set out in the Civil Service Competency Framework (CSCF).

This framework will support us in meeting these aims [referring to the mission of the Government Statistical Service (GSS)]. It will help us recruit and retain a strong cadre of Statisticians and Statistical Data Scientists and build the professional capability of all GSS members, keeping statistical evidence and advice at the heart of decision-making across society.

The framework draws on the Better Statistics, Better Decisions Strategy [the strategic plan for the GSS].

In alignment with the Civil Service Competency Framework (CSCF) and the [Better Statistics, Better Decisions Strategy](#), it places the values of honesty, integrity, impartiality and objectivity at the heart of everything that statisticians do.

The framework is structured into the five pillars, which describe how we will deliver our strategic objectives (e.g., we will be innovative in our approach to presenting and disseminating results that meet our customers' needs). Within each of the five pillars, competencies are grouped into four statistical strands (Acquiring data/Understanding customer needs, Data analysis, presenting and disseminating data effectively, working with credibility) that outline what we will do to deliver our strategic objectives (e.g., we will apply the latest data visualisation method to our statistical product to boost user engagement).

Through aligning with the five pillars (Helpful, Innovative, Capable, Efficient and Professional), it describes the way that we want statisticians and statistical data scientists to work with others to provide a professional and high-quality service, be innovative, deliver cost-effectively and ensure we continue to grow the capability of the statistical community.

Statisticians and statistical data scientists work in a huge range of roles across government, and this framework has been designed with that flexibility in mind. No individual will be expected to satisfy the full suite of competencies within a given pillar/level – the competencies that you are required to demonstrate will depend on your post, and these will have been initially established at the recruitment stage, or where they have changed, at the start of the performance year. However, you will be expected to be aware of the wider competencies/skills in play across both the GSG Competency Framework and the CSCF.

This framework will be used for recruitment, performance management and development discussions from April 2016.

12.3.5 Communication of HR Policies

Turning HR policy into practice requires working across the organization to ensure that leaders, line managers and employees fully understand the policies and expectations. How these are communicated depends on the organizational culture and nature of the policies.

Line managers are pivotal in bringing HR policies to life; thus, training is crucial to ensure that managers have a clear understanding of the policies and have the capability to implement policies sensitively and fairly.

Induction (the process where employees adjust or acclimatise to their jobs and working environment) plays a key role in making sure new employees are aware of all the policies and procedures within an organization.

Links to guidelines, best practices and examples:

- [Statistics New Zealand](#).

12.4 Recruitment

From: Chapter on [Managing staff vacancies, UNECE Guidelines for Managers](#)

Good recruitment and selection process are based on a clear definition of specific capabilities and classification requirements to meet business needs. Any vacancy management process must be executed in consideration of the efficient and effective use of available budget. It is considered prudent policy and good practice that managers should consider internal options, such as re-allocation of responsibilities, before proceeding to external recruitment. To obtain the best pool of capable applicants, external recruitment advertising must offer a reasonable opportunity for all eligible community members to apply.

The fundamental principle of merit (i.e., it assesses, through a competitive selection process, the relative suitability of applicant(s) to carry out the identified duties) must be applied in both internal and external recruitment and selection processes. Merit must be applied even if the need is filled by an employee at level (negating the necessity for a competitive selection process).

Since NSOs are part of the government administration, their respective HR policies, including recruitment, follow the government recruitment policies. For example, the UK's GSG Competency Framework speaks of it as set out "what members of the statistical profession are expected to achieve *in addition* to the competencies set out in the Civil Service Competency Framework". In some cases, the recruitment and selection procedure for NSO staff is limited to a roster of candidates resulting from a general competition for jobs in the administration.

Specific examples of recruitment practices in NSOs are provided hereunder:

a) **Mongolia.** [Global Assessment Report for Mongolia \(2014\)](#)

According to Mongolia's Law on Statistics, the Chairperson of NSOM is appointed by the Parliament on the basis of nomination by the Speaker of Parliament. The Chairperson, in turn, appoints the heads of statistics at aimag, district and municipality (Capital-City) levels. The Treasury Officer who comprises the statistics capacity at soum level is appointed by the sitting government, as are the Governors at bag and khoroo levels.

According to Mongolia's LS, Article 15, the Chairperson of NSOM has the right to appoint the Statistics Department heads and divisions of the Capital-City and districts, and the aimags. Furthermore (Article 15bis, paragraph 1), the General Manager of NSOM has the right to recruit, promote and dismiss staff.

However, in practice, recruitment in NSOM is managed according to Mongolia's Law on Civil Service, which stipulates that the Civil Service Central Authority manages the recruitment of all civil servants, thus including staff of NSOM.

Accordingly, candidates that meet the requirements of each job position at NSOM are sourced from a labour pool by the Civil Service Committee and recommended for the position. The pool comprises candidates who have passed a general civil service exam. Although vacancies can include requirements specific to the functions at NSOM, the Civil Service Committee decides whether any of the pooled candidates meet the requirements. If no qualified candidates are found, the post is advertised, and applicants must pass the standard civil servant exam to be considered for the post. The Civil Service Committee makes the final selection decision and the decision is sent to NSOM.

Recruitments at the territorial level are managed by a sub-committee of the Civil Service Committee. Like the Civil Service Committee itself, this sub-committee does not have a particular mandate related to statistics posts but oversees recruitments in all professions at the territorial offices.

b) Philippines

In the Philippines, civil service eligibility is a basic requirement in applying for government positions. Aside from the civil service eligibility, the applicant for a statistical position must also satisfy the minimum qualification standard for the position set by the Civil Service Commission (CSC), e.g., education, training and work experience. In the screening stage, the NSO evaluates the applicants based on the core competency skills, e.g., communication skills and data management, for entry positions. For higher positions below Division Chief level, Trade test is also given to applicants while Division Chief applicants have to undergo management/leadership skills test. In some instances, the CSC reviews the credentials of the newly hired employee before their appointment in the government takes effect, especially if the government organization/NSO is not yet accredited to approve the appointment of the newly recruited staff.

12.4.1 Recruitment-related issues and processes

From: Chapter on *Managing staff vacancies*, UNECE [Guidelines for Managers](#)

Guidance to managers on managing recruitment issues and processes:

a) Choosing the right person using the right selection process

- At the initial identification stage, it is valuable to re-assess role capability requirements, by referring to Work Level Standards, the work program, and updating the role description if required. From this point of view, continuous maintenance of a skills register (better if integrated into a database system) is required, considering both the evolution of professional profiles and emerging new skills.
- Then, critically assess work needs and the team structure, to manage through internal options such as work distribution and a selection process not required.
- Consider the available salary and consider flexible working arrangements such as part-time options to meet requirements.
- Upon identifying the need for a new employee, consider which staff engagement strategy is most reasonable to pursue.

- Finally, determine what level of support and coordination the Human Resources Division (or if applicable the Recruitment Unit) can provide to help you scope out what resources are needed to manage a recruitment and selection process.

b) External recruitment

- When exploring the external market, the process selected depends on capability needs, the number of vacancies, time frames and budget.
- Work with the Recruitment Unit from the beginning to establish what administrative assistance will be provided. They can help coordinate advertising and promotion, and for the time commitment from selection and placement panel members.
- Maybe it is possible to use an existing order of merit from a similar selection exercise that is no more than 12 months old, use a secondment, or transfer at level from another agency. Filling a vacancy at level (ongoing or non-ongoing) means it is unnecessary to conduct a competitive selection; however, it must still be based on merit.

c) Managing a selection process

- Ensure that administration and coordination roles are clarified at the beginning of a selection process within the Human Resources Division (HRD), including forming a selection panel that will define appropriate selection method and provide recommendations after the completion of the selection process.
- The choice of the selection method should meet the needs of the position that will select the most appropriate applicant(s). Examples include work samples, role plays, assessment, or based on application only.
- The selection panel will conduct a systematic process to assess the relative merit of applicant's, document decisions, report to the delegate and provide feedback to applicants.
- Contacting referees is not a mandatory selection process requirement, however, it is essential when obtaining a fair and accurate evaluation of an applicant relative suitability to the role, team environment and organizational culture.

d) Internal flexibility and inter-agency transfers

- It is good practice to look at the internal options and opportunities within the organization and the Public Service.
- For example, there may be a short term need to finish a project because a key project staff has left. Internal options may help fill the vacancy quickly and achieve project time frames. However, even if the vacancy is filled internally, it is still required to evaluate the work-related qualities of the person against what is required in the position.

Links to guidelines, best practices and examples:

- Chapter on *Managing staff vacancies*, [Guidelines for Managers](#), UNECE.

12.4.2 Managing integration of newly recruited staff (Induction/Onboarding)

Integration of newly recruited staff into the NSO involves a process (induction) where employees adjust or acclimatize to their jobs and working environment. The term ‘onboarding’ refers to the whole process from an individual’s contact with the organization before they formally join, through to understanding the ways of working and getting up to speed in their job.

From: Chapter on Managing staff vacancies, UNECE [Guidelines for Managers](#)

Newly recruited staff must be provided with all information and tools required to become fully operational in due time, including orientation training and seminars.

However, managers themselves must take care of the integration of newly recruited staff within their organization. They could appoint more experienced people within the organization – or even the one the newcomer is going to replace – as mentors for newcomers, using mentoring as an informal tool for the newcomer to learn what he/she will have to know in his/her new position.

Managers could also support newly recruited staff integration by organizing knowledge-sharing events within their structures, during which information and documentation about working activities are circulated and shared. Documentation for newcomers could also be made available on an electronic form and made accessible on the web, in the form of digital storytelling, where the retiring person tells about meaningful experiences of his/her working life and share his/her lessons learned.

The first day (or the first few days or the first week) of a new staff can have a pronounced effect on the recruit’s attachment, respect, and dedication to the organization. An effective NSO will ensure that the following take place on the first day:

- a) The recruit finds a suitable place in which to sit and something definable to do.
- b) An accessible person is identified who will address questions and resolve doubts for the recruit.
- c) The organization conveys its willingness to consider the individual’s career in addition to the immediate job.
- d) An explanation is given of what the individual’s activities will be in the immediate and the near future, how they fit in with the organization of the office and what specific objectives they are designed to serve.
- e) A training plan is presented.
- f) Orientation is provided. Some offices, usually larger ones, have developed a tradition of organizing, at regular intervals (e.g., every month or every second month) an orientation day that is meant to give recruits a quick overview of how the organization is structured and operates.

Beyond the first day or first few weeks, a decision has to be made to deploy recruits to undertake a specific function and to the corresponding organizational unit. A few NSOs (e.g., Statistics Netherlands) have a system in place whereby for the first two years new staff are rotated across the organizational units for 4-6 months before a final deployment is made. Box 5 illustrates the concept of coaching.

Box 5: Coaching at Statistics Finland

An example from Statistics Finland. The changing role of statistical institutes requires a new type of management - a coaching leadership style.

Developing a coaching leadership style is essential for the productivity of a modern statistical institute. Coaching leaders motivate and support their team to develop their skills and expertise and work together more successfully. This type of management involves giving experts room for independent problem solving and developing new solutions, for example, through experimenting. It is important to encourage people to grow and develop their capabilities. Continuous change calls for joint discussions on the direction of work and how to reach common goals; it is important to encourage interaction between various teams within the institute. To this end, managers with their teams prepare a development map to describe the current status and the desired future vision for the team. This will help the team to focus their activities and skills development.

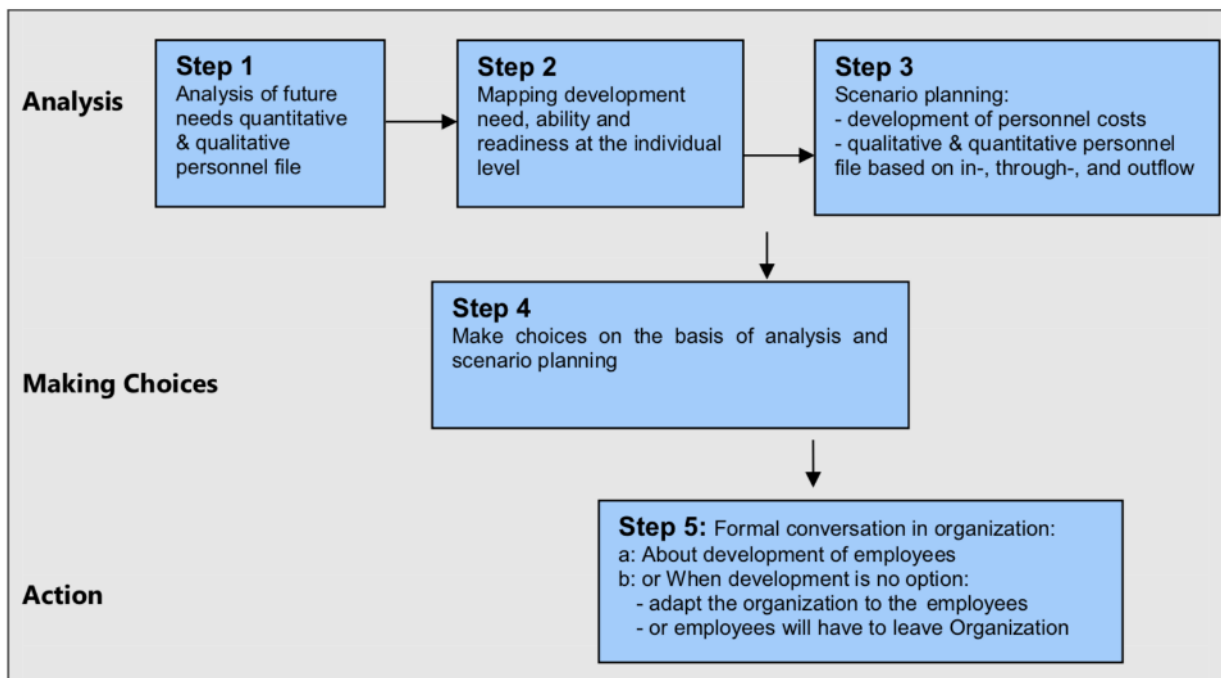
12.4.3 Workforce planning (or Strategic personnel planning)

Workforce planning is a process of analysing the current workforce, determining future workforce needs, identifying the gap between the present and the future, and implementing solutions so that an organization can accomplish its mission, goals, and strategic plan. It is about getting the right number of people with the right skills employed in the right place at the right time, at the right cost and on the right contract to deliver an organization's short and long-term objectives.

Workforce planning processes can: reduce labour costs in favour of workforce deployment and flexibility; identify and respond to changing customer needs; identify relevant strategies for focused people development; target inefficiencies; improve employee retention; improve productivity and quality outputs; improve employees' work-life balance; and, make recommendations to deliver strategic value through talent.

The outcomes of this process inform HR policies and practices, such as organizational design and development; succession planning; work-life balance initiatives such as flexible working arrangements and well-being; recruitment and selection; retention planning; talent management; job design; career planning; learning and development focus; and reward and recognition.

The main steps in the workforce planning process can be summarized by the diagram shown in Figure 14.

Figure 14: Diagram of workforce planning process**Figure 15: Five steps to conduct strategic personnel planning**

KPMG Business Advisory Services B.V.

An application of workforce planning, also referred to as strategic personnel planning, from Statistics Netherlands, is provided in Chapter 2 of the HRMT: Compilation of good practices in statistical offices, UNECE (2013). In this example, the aim of Strategic Personnel Planning is to gain insight in the number and type of personnel needed in the short and long term, taking into account developments in the labour market. Strategic Personnel Planning helps to translate policy developments into HR-policy issues concerning the in- through- and outflow of personnel.

Drafting a Strategic Personnel Planning requires comprehensive data about the workforce. To that end, a computerized personnel information system should be filled with up-to-date data.

Secondly, it requires a strategic vision of the organization, so the organization goals and ambitions can be translated into HRM and training policy (and HR-instruments).

A general approach in five steps to conduct a Strategic Personnel Planning (developed by KPMG consultancy) is illustrated in Figure 15.

Strategic personnel planning, as described above, is, unfortunately, not always possible for NSOs. Public sector hiring is often a tedious process involving multiple authorisations, which political considerations may influence. In Croatia, for example, each public body at the beginning of the year proposes its hiring plan. The plan has to be well-argued and documented. Typically, it takes at least six months until the government approves the plan—usually in reduced numbers. Thus, the strategy taken is to overstate to receive the needed number.

Links to guidelines, best practices and examples:

- [CIPD workforce planning factsheet](#);
- [Human Resources Management and Training: Compilation of good practices in statistical offices](#), UNECE (2013).

12.4.4 Other recruitment practices

To get the right number of people with the right skills, NSOs can look into:

- a) Investing in an internship programme to attract future statistical staff;
- b) Inbound/outbound staff mobility and staff exchanges;
- c) Part-time staff sharing between NSOs and other research organizations.

For example, in some United Nations organizations, interns (typically those who are yet to complete their post-graduate degrees) are recruited to provide targeted skills needed. The fields of social media and communication, data analytics and IT are areas that would be useful for NSOs and attractive to potential interns.

Examples include: NSO experts having a part-time academic position at university, NSO staff spending a medium-term research visit at a foreign research institute; a senior academic researcher spending a sabbatical with the NSO.

Considering the increasing difficulties that NSOs encounter in recruiting and retaining experts in highly demanded fields, all such alternative channels are likely to play an increasing role in building and maintaining qualified human capital within the organization.

Recruitment need not be limited to the market of new graduates or young professionals; NSOs should also be bringing in experienced professionals and/or scientists working in research organizations or the private sector. The challenge in attracting these high calibre experts is that NSO traditional posts are typically not attractive enough to them. NSOs should deploy more agile forms of engagement other than permanent full-time recruitment.

12.5 Learning and development (training)

Organizations should support learning, innovation, and high performance to build an organization that, through individual learning, drives itself to become a "learning organization" to meet the future challenges.

Organizations that invest in their employees' ongoing learning and development are rewarded with a more dedicated, professional and capable workforce. Organizations should encourage staff to take personal responsibility for their development, including career-enhancing opportunities across the organization. There is an expectation that managers will support and encourage employee development. The employer recognises that manager support is critical to engaging and retaining high performing staff and maintaining specialist knowledge to the advantage of the organization.

Learning and development is a mix of structured and informal activities designed to enhance knowledge acquisition and competency development in NSOs. In addition to the structured learning of online and classroom training, a range of resources and tools to support employees' learning and development informally should also be available.

Links to guidelines, best practices and examples:

- Chapter on *Capability and Development*, UNECE [Guidelines for Managers](#), UNECE

12.5.1 Learning and development strategy

Fundamental to helping people learn is an organizational culture that is supportive of learning. This requires an awareness of not only which methods are most effective, but also a robust understanding of the behavioural science of learning. The wider culture and environment of an organization impact learning, including permission to learn and support from managers and peers to implement learning.

A learning and development (L&D) strategy is an organizational strategy that articulates the workforce capabilities, skills or competencies required, and how these can be developed, to ensure a sustainable and successful organization.

A key element of an organization's learning strategy will target all employees' long-term development, but they may actually focus on those identified as exceptionally high-performing or high-potential individuals (sometimes defined as 'talent') who are critical to long-term business success. This typically includes techniques such as mentoring programmes with senior leaders, in-house development courses and project-based learning. Other organizations run a broader range of interventions to suit a broader strategy, adopting a more inclusive approach to employee development.

Links to guidelines, best practices and examples:

- [Learning and development strategy and policy](#), CIPD (2020).

12.5.1.1 Talent management

Talent management seeks to attract, identify, develop, engage, retain and deploy individuals who are considered particularly valuable to an organization. By managing talent strategically, organizations can build a high-performance workplace, encourage a learning organization, add value to their branding agenda, and contribute to diversity management.

Wide variations exist in how the term "talent" is defined across different sectors, and organizations may prefer to adopt their own interpretations rather than accepting universal or prescribed definitions. That said, it's helpful to start with a broad definition and, from our research, we've developed a working definition for both "talent" and "talent management":

- a) Talent consists of those individuals who can make a difference to organizational performance either through their immediate contribution or, in the longer-term, by demonstrating the highest levels of potential.
- b) Talent management is the systematic attraction, identification, development, engagement, retention and deployment of individuals of particular value to an organization, either in view of their “high potential” for the future or because they are fulfilling business/operation-critical roles.

These interpretations underpin the importance of recognizing that it’s not sufficient simply to focus on attracting talented individuals. Developing, managing and retaining them as part of a planned strategy for talent is equally important, as well as adopting systems to measure the return on this investment.

Many organizations have recently broadened the concept, looking at “talents” among all their staff and working on ways to develop their strengths (see “inclusive versus exclusive approaches” below). At its broadest, then, the term “talent” may be used to encompass the entire workforce of an organization.

Talent management programmes can include a range of activities such as formal and informal leadership coaching and or mentoring, secondment, networking events and board-level and client experience.

Links to guidelines, best practices and examples:

- [Talent management](#), CIPD (2020);
- [Developing Talent Management Plans](#), Statistics Canada.

12.5.1.2 Performance management and training

Learning and development opportunities aim to improve the performance of employees. Related to this, organizations engage in performance management -- the activity and set of processes that aim to maintain and improve employee performance in line with an organization's objectives. Broadly, performance management is an activity that⁴¹:

- a) establishes objectives through which individuals and teams can see their part in the organization’s mission and strategy;
- b) improves performance among employees, teams and, ultimately, organizations;
- c) holds people to account for their performance by linking it to reward, career progression, and contracts termination.

NSOs stand to gain from a well-integrated performance management system in its HR strategy and learning and development strategy. Some country examples are provided in Box 6.

⁴¹ For further information: <https://www.cipd.co.uk/knowledge/fundamentals/people/performance/factsheet#6292>

Box 6: Linking training to performance assessments - Statistics Mongolia

To encourage professional development among staff, an innovative evaluation system was introduced with assistance from the National University of Mongolia. All staff members regional and central took theoretical and practical knowledge tests in 2010. The results were kept confidential and not utilized for formal performance assessments. Again in 2011, a test was conducted, and this time the results were shared internally in NSOM. In 2012, NSOM used the following grades and points: A grade or 90-100 for high distinction; B grade or 80-89 points for distinction; C grade or 70-79 points for satisfactory; D grade or 60-69 points for poor; and F grade or 50-59 points for failure. Staff who scored less than 60, or F, did not receive bonuses in the particular year and were given time to improve their skills during working hours. In 2017, the NSOM provided opportunities to upgrade their educational level or gain a master's degree. With the accredited University of Economics, this training is being carried out, resulting in higher academic degrees, as well as increased academic performance with NSOs and other academic institutions and improving quality.

12.5.2 Capacity development frameworks as the basis for training

As mentioned in Chapter 12.3.4 - *Competency Framework*, a competency framework that is the basis for recruitment can guide career development and the requisite capacity development. This can be further elaborated into training skills frameworks that define the expected skills and competencies of staff in accordance with their responsibility levels and subject matter specialization. Apart from technical skills, soft skills, supervisory and management competencies also need to be addressed.

Links to guidelines, best practices and examples:

- [Core skills framework for Statisticians of NSOs in developing countries](#), SIAP (2010);
- [European Statistical Training Programme](#) (ESTP), Eurostat (2021);
- [Statistical Skills for Official Statisticians](#), Australian Bureau of Statistics (ABS).

In addition to individual-level capacity development, the concept of a more holistic capacity development framework that covers system, institutional and individual capacity development (termed [Capacity Development 4.0](#), PARIS21) is currently being explored and applied.

12.5.3 Training topics**12.5.3.1 General areas of training**

Based on the discussions in the various chapters of this handbook, ongoing skills development is encouraged in the following general areas:

- a) Core business of the NSO
 - Statistics and methodology, such as basic and advanced training on topics such as survey design and development, questionnaire design, sampling, data analysis, time series methods, non-response, imputation, quality assurance, longitudinal surveys, use of administrative records and registers and the interpretation and presentation of data.

- Subject matter, such as agriculture statistics, gender statistics, System of National Accounts (SNA), business surveys, household surveys, population and housing censuses, etc.
 - Data, information and knowledge management (Refer to Chapter 13 - *Data, information and knowledge management*).
- b) People management (managing and leading others);
 - c) Project management (See Chapter 5.7 - *Project management approaches*);
 - d) General management and leadership;
 - e) Effective communication, professional relationship development and client management;
 - f) Technical expertise including IT systems and infrastructure, programming (see Chapter 14.7 - *Specialist statistical processing/analytical software*);
 - g) Corporate management (strategic planning and programming, people, budget, legal, financial);
 - h) Second language training (e.g., English language training);
 - i) Client service (website and data dissemination, client interactions) (see Chapter 10 - *Dissemination of Official Statistics*).

12.5.3.2 Skills and competencies

This section discusses the core skills and competencies needed by NSOs.

a) **Required skills**

Thinking about NSOs and NSSs of the future, it is very hard to anticipate what specific skills will be required. However, three essential skills will always be required: numerical skills; statistical skills; and increasingly, technological skills.

- Mathematical and numerical skills. A statistician should be able to spot patterns, understand differences between stocks and flows and be comfortable reading and writing in scientific notation.
- Statistical skills. Being able to work with real, often messy or incomplete data. Understanding bias; both the likely sources and what remedial actions can be taken. Statisticians should understand the subtle but important differences between accuracy and precision. They should also develop a good understanding of concepts like uncertainty and risk. A competent statistician should be able to select and use appropriate statistical techniques and models. Future technological skills are the area hardest to predict.
- Technological skills. Technology is changing rapidly, with consequences not only for the applications to be used but also the types of data. It will be a challenge for statistical offices to say with any certainty what will be required. If current trends have anything useful to say, then it suggests greater use of ‘freeware’ and combining packages. It also suggests a commitment to lifelong learning will be essential.

In addition, statisticians must understand the underlying **logic of theory**, so that having acquired skills, they can apply them and put theory into practice in a variety of real-life situations (all invariably more complex and messier than the scenarios presented in textbooks). The ability to **communicate** well and to present statistics in its proper context is now recognized as an essential skill for statisticians. This includes skilled application of data visualization.

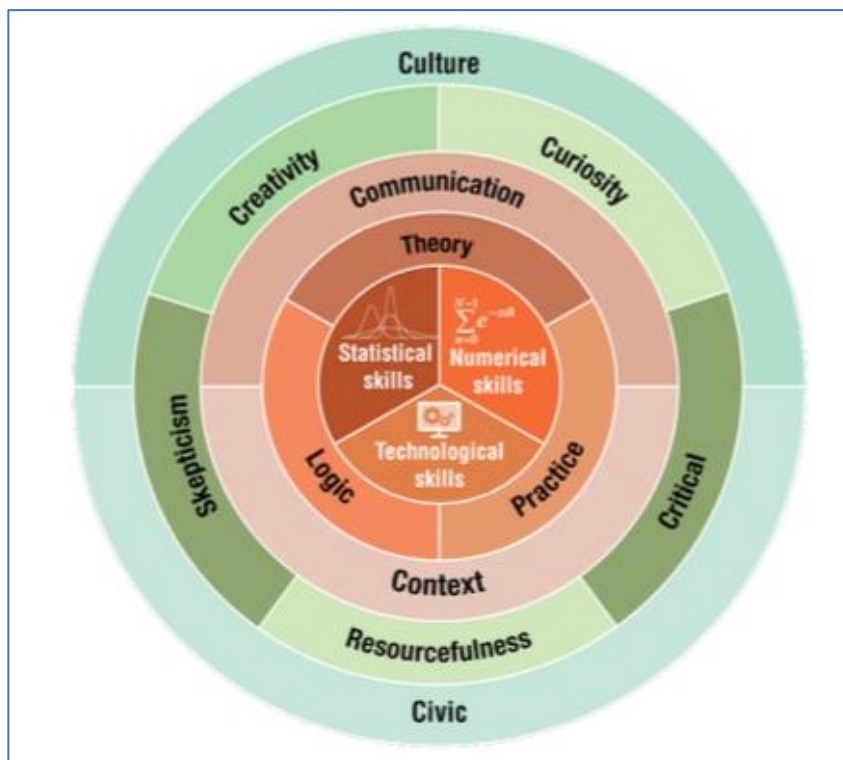
b) **Required competencies**

Statisticians will need to continually update their skills over the lifetime of their career. What is less likely to change over time are the basic characteristics or *competencies* necessary to be a good statistician. Specifically, a statistician must be creative, curious, critical, sceptical and resourceful.

A statistician should also be aware of the *cultural and civic or political environment* in which they operate. A statistician must understand not only the context in which previous indicators and statistics were compiled but also the environment in which they operate. For example, when contemplating the use of Big Data, NSOs may be forced to confront issues before the law is clear or cultural norms have been established. Given the importance of public trust for an NSO, statisticians must be sensitive to these issues and understand what is acceptable by the public they serve.

Figure 16 provides a visualization of a skills and competencies framework for statisticians.

Figure 16: Skills and competencies of a statistician, MacFeely. 2019



Links to guidelines, best practices and examples:

- [Preparation for a career as an official statistician](#), Steve MacFeely (2019).

12.5.3.3 “Traditional” skills and competencies: Survey data process

The survey data process requires staff with specific skills and competencies (see Chapter 8.2.9 - *Survey staff training and expertise*) as follows:

- a) Survey managers;
- b) Subject matter specialists;
- c) Methodologists;
- d) Data collection and follow-up specialists;
- e) Data capture, verification and editing process;
- f) Interviewers;
- g) Data entry and editing clerks.

12.5.3.4 “New” skills and competencies: Accessing and use of Big Data

Accessing and using Big Data is an area where NSOs have developed new skill sets and competencies in recent years. A discussion on what this entails in terms of training and development of NSO staff can be found in [New data sources for official statistics – access, use and new skills](#), UNECE (2019).

A multifaceted transformation of national statistical systems is needed to meet the new data innovation challenges and to reap benefits from using Big Data. Existing capacity building programmes should be broadened and possibly be focused on transforming the technology architecture and the workforce, exploiting more Big Data sources and redirecting products and services. The transformation of the technology architecture should facilitate the shift from physical information technology equipment on-site towards introducing a cloud-computing environment along with the adoption of common services and application architecture for data collection, registers, metadata and data management, analysis and dissemination.

This approach should be accompanied by capacity-building programmes that support the progressive diversification of the new skill sets of the national statistical systems' staff. These programmes should range from data scientists and data engineers using new multisource data and modern technology, through lawyers strengthening the legal environment, to managers leading the change in corporate culture with a continuously improving quality standard. Those new capabilities should allow for adopting a standardized corporate business architecture that is flexible and adaptable to emerging demands. They should also be process-based rather than product-based, with increasing use of administrative and Big Data sources for multiple statistical outputs. In addition, our dissemination and communication strategy should be upgraded and made adaptable to target different segments of users by applying a diverse set of data dissemination techniques, including mobile device applications and data visualization of key findings.

Links to guidelines, best practices and examples:

- Related: [Big data team level competency](#)., UNECE (2016).

12.5.4 Training modalities, including learning in the workplace

Training may be in the classroom or self-paced through online courses, allowing managers and staff to organize learning in line with work priorities and ensuring that all staff members have training opportunities.

There has been much discussion on the merits of utilising information technology for delivery of training through online or web-based e-learning courses. E-Learning courses are cost-efficient and can reach a larger number of participants. Webinars are useful for short seminars on specific topics. NSOs should develop a strategy for online learning activities that takes into account the IT infrastructure needs. Inadequate IT infrastructure is one of the main reasons the uptake of web-based learning activities is difficult for many NSOs. The statistical community could work together to make available online learning resources such as through wikis and common shared platforms for e-learning.

Managers can be effective coaches in the workplace to support training with:

- a) one-to-one guidance;
- b) sharing workplace experience;
- c) sharing technical expertise;
- d) effective performance feedback to sharpen staff skills and improve their performance.

Managers can also invest in having their most experienced employees take part in coaching and mentoring programs. It may also be useful to have a team of coaches and mentors who can support newly recruited and less experienced employees. Mentoring encourages sharing knowledge, providing guidance and advice about work and the workplace and discussing career development.

Box 7: Examples from Statistics Poland

Knowledge sharing. In Statistics Poland, there is a practice that after a foreign training (e.g., within the European Statistical Training Programme), participants are obliged to share their knowledge by conducting internal training. The course is held in Statistics Poland or in the Regional Statistical Office. The rest of Polish Official statistics units can participate in the training via videoconference.

Internal coach programme. The Internal Coach Programme aims to improve knowledge transfer between employees, which is a key element of the organization's development. It also allows incorporating in Statistics Poland and Regional Statistical Offices the concept of a learning organization adapted to rapidly changing conditions. Trainers from the same organization know the needs of training participants perfectly. Thanks to the Programme, it is possible to educate professional trainers inside the organization who effectively contribute to raising the staff's professional competence. Internal trainers conduct mainly specialist training, including statistical research and statistical analysis, as well as support the professional development of employees, e.g., a group of interviewers.

Managers can provide on-the-job training and development as part of the regular working environment. For example, holding information sessions when a person returns from training to share what they learned (“re-echoing”) can be beneficial. It is also useful to 'buddy up' team members to share knowledge and skills. This is also effective in maintaining work program continuity if an employee is absent from the workplace for a period of time, leaves the workgroup, or the organization. A “brown bag” seminar - an informal meeting that occurs in the workplace generally around lunchtime - is also informal a good way of sharing knowledge. Some examples from Statistics Poland are articulated in Box 7.

Links to guidelines, best practices and examples:

- [Developing Talent Management Plans](#), the example from Statistics Canada.

12.5.5 General purpose training cycle

While there are different ways to provide career-long training, one way that has proved to work in many countries is to consider general-purpose training as having three distinct cycles:

a) Introductory cycle

This is primarily designed for newly recruited staff. Its purpose is to ensure their speedy integration into the organization, which implies both becoming familiar with the traditions of the statistical organization and being able to contribute in any of the domains or functions within its scope. Virtually all agencies administer such training, even if they do so in the most informal manner.

b) Intermediate cycle

This training cycle is designed primarily for those who have worked in a statistical organization for a period of five to ten years and who have not had an opportunity to refresh their skills.

c) Administrative cycle

Throughout a staff member's career, its direction eventually becomes foreseeable. Those who can fill policy-making positions within their respective agencies should be trained in the subjects that will demand their energies once they reach management levels. These subjects include financial administration and control, large project management, marketing, the institutional set-up of the Government, and other external features to the statistical organization.

Moreover, one should make the corresponding cost part of the organization's regular budget and administer training to all targeted staff members as a matter of course. It would be especially critical to pay attention to staff development during times of budget cuts applied to the NSO, as often, maintenance of premises and training (whether in-country or overseas) are the first budget line items to suffer during times of reduced allocations to the NSO.

12.5.6 Specific situations

12.5.6.1 Training of employees with no university education

There are several NSOs where a large number of staff lack university education. In this situation, training programmes for them are particularly important to enable them to better carry out their tasks. In addition to the introductory courses for new employees, more extensive courses may be useful when they have acquired enough statistical work experience. The topics may focus on more advanced aspects of statistical production. Such systematic training in important day-to-day operations cannot be over-emphasized.

In addition, voluntary and more advanced courses may be arranged for employees who have demonstrated high learning capacity and are motivated to improve their qualifications. Courses may be given in basic theory on sampling, demography, economics, coupled with exercises designed to build bridges between theory and application. Experience has shown that after attending such courses, employees have been able to carry out work that previously would have been assigned to professionals with higher education. Thus, the latter personnel, who play a very significant role in a statistical agency and often are scarce-- particularly in developing countries-- can be released for jobs requiring higher qualifications.

12.5.6.2 Training on leadership and management

Leadership and management capabilities are integral to meeting NSO goals, encouraging innovation and high performance, and building a sustainable future. Individuals with leadership aspirations need to build this capability and be responsible for their own learning. In many cases, staff with primarily technical backgrounds are placed in positions of management and administration.

As part of succession planning, NSOs need to offer project management and leadership training to interested staff. Many future managers can be selected from trained staff members. This also supports career development. Leadership training should be a requirement for all supervisors (either before or during their assignment).

Links to guidelines, best practices and examples:

- [Leadership and Management Charter](#), ABS;
- Chapter 14, [HRMT: Compilation of Best Practices](#), UNECE (2013);
- Section XII-H-2, [Leadership Training Programme](#), PARIS21;
- [Statistical Leadership Training](#), SIAP;
- [Statistical Leadership Training Programme for Africa](#), UNECA (2019).

12.5.7 Beyond general-purpose training-- Where to obtain training

General-purpose or basic and introductory training for NSO staff is not sufficient. It needs to be complemented by more specialised defined courses to meet specific needs. Many offices are not in a position to provide courses at all or at any of these levels. Therefore, alternatives and special arrangements are so important.

12.5.7.1 In-house and national public administration training centres

Many NSOs will have at least general-purpose training for statistics as a function of its human resource department. Training on administration, management, and leadership is also available (and in some countries required for certain high-level positions) from a national public administration training centre. Some NSOs have an academic institute (e.g., Indonesia-STIS, India-ISI and France-ENSAE) that confer formal diploma or bachelors-level degrees in statistics. Increasingly, NSOs or NSSs are establishing a statistical (research) and training institute. The institute provides specialised training on statistics not just for the statistical agencies but also for other government agencies' needs. In some cases, the statistical training institute also offers courses to countries in the region (e.g., Statistics Korea, India Statistical Institute). In some cases, the Government may take over the NSO Training Institute and incorporate it into the formal educational system (e.g., Suriname).

12.5.7.2 Regional training institutes

Some regions have established intergovernmental regional training institutes that provide both general-purpose training and specialised training courses. The offerings use mixed modalities - regional face-to-face/online courses and country-focused courses. Some institutes offer “scholarships” to participants (e.g., the JICA-funded 4-month and 6 to 8-week courses at the Chiba premises of the Statistical Institute for Asia and the Pacific).

[list of regional statistical training institutes.]

12.5.7.3 Role of regional training networks

In recent years, training institutes of NSOs and other training providers in a region have created a regional network to facilitate the sharing of resources and information on training developments and design common curricula for selected areas.

Links to guidelines, best practices and examples:

- [Network for the Coordination of Statistical Training in Asia and the Pacific](#), SIAP.

12.5.7.4 Role of global training network

The Global Network of Institutions for Statistical Training ([GIST](#)) is a network of international and regional training institutions that build sustainable statistical capacities through efficient, effective, and harmonized delivery of training established by the UN Statistical Commission. The overarching goal of GIST is to build sustainable statistical capacities through efficient, effective, and harmonized delivery of training at global and regional levels. GIST aims to achieve this goal by facilitating collaboration, coordination, and outreach among key providers of statistical training at the regional and international levels.

12.6 Job rotation

12.6.1 Definition and objectives of job rotation

([Source](#))

Job rotation is a management approach where employees are shifted between two or more assignments or jobs ideally at regular pre-planned intervals of time to serve several objectives, including:

- a) **Reducing Monotony of the Job:** The first and foremost objective of job rotation is to reduce the monotony and repetitiveness of a job. It allows employees to experience different type of jobs and motivates them to perform well at each stage of job replacement.
- b) **Creating Right-Employee Job Fit:** The success of an organization depends on the on-job productivity of its employees. If they're rightly placed, they will be able to give the maximum output. In case, they are not assigned the job that they are good at, it creates a problem for both employees as well as organization. Therefore, fitting the right person in the right vacancy is one of the main objectives of job rotation.
- c) **Testing Employee Skills and Competencies:** Testing and analysing employee skills and competencies and then assigning them the work they excel at is one of the major functions of the job rotation process. It is done by moving them to different jobs and assignments and determining their proficiency and aptitude. Placing them what they are best at increases their on-job productivity.
- d) **Exposing Staff to All Operations of the Organization:** Another main function of job rotation is to expose employees to all operations of the organization to make them aware of how the company operates and how tasks are performed. It gives them a chance to understand the organization's working and different issues that crop up while working.
- e) **Developing a Wider Range of Work Experience:** Employees may not want to change their area of operations. Once they start performing a specific task, they may be reluctant to leave their "comfort zone". Through job rotation, managers prepare them to have a wider range of work experience and develop different skills and competencies. It is necessary for the overall development of an individual. Along with this, they understand the problems of various departments and try to adjust or adapt accordingly.
- f) **Succession Planning:** The concept of succession planning is 'Who will replace whom'. Its main function of job rotation is to develop a pool of employees who can be placed at a senior level when someone gets retired or leaves the organization. The idea is to create an immediate replacement of a high-worth employee from within the organization. See [here](#) for more information.

Links to guidelines, best practices and examples:

- [Job Rotation - Meaning and its Objectives](#), Management Study Guide (MSG).

12.6.2 Models of job rotation

An agency's "staff model" may fall anywhere in a wide range of configurations in relation to job rotation or mobility. At one end of the spectrum is the "no one moves" model. Its objective

is to maximize specialized human capital by allowing staff members to learn more about their respective areas of responsibility (e.g., industry; health; education; retailing; balance of payments). Staff members would be expected to have a purely vertical career and leave their areas only when called upon to discharge agency-wide responsibilities.

At the other extreme, the driving principle is versatility. Staff members are encouraged (or required) to acquire the widest possible experience by moving from one job to another. When the office of personnel directs this movement, it is likely to be in keeping with an optimal pattern so that the acquired experience would provide the most versatility. However, there is an obvious downside to rotating staff with highly specialised skills in national accounts or sampling or data scientists working on Big Data.

It is difficult to quantify the many factors that affect how an agency will balance the needs of both specialized knowledge and versatility. For example, staff morale is an important consideration, and if the idea of permanent rotation goes against habits and expectations, its introduction in an extreme form may create negative reactions that outweigh its benefits.

Conversely, in a culture where the staff are used to and expect to change jobs every so many years, the absence of opportunities to try different assignments might lead to frustration and atrophy.

Somewhere in between is a point of equilibrium that capitalizes on the inherent strengths of the two extremes. For example, an institution may require that at a certain level no one is allowed to remain on the same job for more than five years; if one opts to keep the same job for an indefinite period of time, it would be with the knowledge that one's chances of advancement are correspondingly reduced, even if job performance is entirely satisfactory. Using a voluntary rather than mandatory scheme would imply having rotation as an incentive for staff who aspire to a more senior position.

12.6.3 Examples of job rotation schemes in NSOs

a) French Statistical System

An important feature of the French Statistical System (FSS) is the existence of a common culture and very similar views on statistics shared between the National Institute for Statistics and Economic Studies (INSEE) statisticians and most of the hierarchy of the Ministerial Statistical Departments (MSDs). A large share of staff of the MSDs has either worked for INSEE or come from one of the two High French National Economics and Statistics Schools. This common culture is created through a feature of the French civil service called "corps" (like the concept in English of "Army corps" or "diplomatic corps"). The two corps of statisticians are trained after recruitment in INSEE schools, one being focussed on statistics, econometrics, economy and finance, and the other mainly on statistical production. These staff are rotated regularly in their career, with the rotation coordinated and synchronised between INSEE and the MSDs. INSEE coordinates promotions and transfers, and statisticians can easily move between INSEE and the ministries. This process of regular movement has created a common statistical culture across the FSS.

- Source: [Rotation across the NSS \(France\)](#), Peer Review Report (France).

b) Statistics Finland

How often should such moves happen? rule of thumb of 3-5 years in one task ...

The first year for learning, the second year for becoming efficient and bringing earlier learning fully in, the third-year employees start to contribute to the development of the area. During the fourth and fifth year, the work has become easy for the employee; beyond this point, the task may have become monotonous and boring.

12.7 Staff retention and exit

Success in recruiting the right staff for the job in an NSO is partly due to clearly and attractively making known what the statistical office can offer. For example, the [Office for National Statistics \(ONS\) “Career” page](#) starts with the message:

If you want your contribution to count and to work where you'll be really valued, come and join us.

We know that excellent results can only be achieved by investing in and retaining the people who work for us. Therefore, our people count in more ways than one.

Apart from crunching the numbers that shape big decisions, we look after the interests of our staff. We invest in training and development to enhance skills and also offer a good work-life balance to improve well-being and staff retention.

As well as a competitive salary, you'll enjoy ...

Retaining staff is one of the major challenges for statistical office, whether large or small, well or poorly endowed. The smaller and lower capacity the office, the greater the loss sustained when a talented individual leaves the office. The loss is even greater if the organization has invested much in the training and development of talents. Several methods of retaining staff are worth exploring, but none is fool proof. Ultimately, losses of employees to other offices and the private sector must be included as part of the expected cost of running a statistical organization.

A talent management strategy based on performance, learning and development assessments would help the NSO identify, develop, and retain high calibre staff (see Chapter 12.5.1.1 ‘Talent management’). An example of a forward-looking strategy for staff retention is to have special programmes that involve recruiting qualified persons (such as the “cadet” programme of the Australian Bureau of Statistics) in which the statistical office pays for the education and training of talented future statisticians. Some NSOs provide educational scholarships to staff who in turn have contractual obligations to serve for a pre-specified number of years after obtaining the degrees or diplomas.

However, it is evident that an NSO, as it happens for all employers in the public and private sector, cannot keep all its most talented people forever. One strategy would be to convince government departments to attract talented professionals with quantitative analysis abilities and place such people in the statistical organization for a while on a secondment basis or any other staff arrangements. Moreover, such sharing of staff will help the statistical organization sort out its priorities, connect the agencies and create a better basis for ongoing dialogue. Since these features are always valuable, the initial stationing of people in the NSO as well as an ongoing exchange policy could become permanent features of a government-wide personnel management programme. Another way to reduce staff turnover is to provide positions of

increased responsibility to young and talented people as soon as they have demonstrated their capability. While this strategy implies some risk, it is preferable to retaining talented staff members than mediocre employees. Another option is to form a contractual relationship with recruits that will deter them from leaving the statistical organization for frivolous reasons. In Suriname, recruits would spend their first year on a particular assignment, after which they would have the possibility to participate in a specific training programme, provided they have signed up for a stay of at least three to five years in the statistical organization.

Traditionally the problem of staff retention has been the sharpest for experts in information technology (IT). The rapid developments in IT and data science applications have created a huge demand for skilled individuals in these areas, particularly in the private sector. However, the supply of qualified people did not increase as quickly, and thus it became virtually impossible for a government institution to compete with the private sector, the banking sector, or international companies. Government institutions could not offer competitive salaries, and what they could offer - job security - was not an overriding concern for the young and mobile professional with the desired skills. The standard response to this situation, which has shown no great variation in the recent past, was to recruit ever younger, less- experienced technicians and provide them with training. However, this policy, in addition to consuming resources, converted statistical agencies into an unrecognized training centre for the private sector. As soon as recruits were trained, some other enterprise stepped in, offering to double or triple their salaries.

It is considered a good practice when an employee leaves to conduct an exit interview which could provide insights on reasons for leaving. The interview would also provide an opportunity to identify staff who the NSO could encourage and support to be advocates for official statistics in the agencies or companies they move to. Maintaining this relationship could also be a means for attracting them back to work with the NSO—this time with additional experience and competencies.

12.8 Options available for a new chief statistician

12.8.1 The role of the chief statistician

The chief statistician is the leader of the entire NSS, with responsibilities (ideally) defined and assigned in the Statistics Law, including specific provisions related to his/her appointment and dismissal in relation to the principles of objectivity and professional independence (see Chapter 4.3.3 - *Introduction*). In most cases, the function of chief statistician is assigned to the head of the NSO, but in a few rather large countries, the chief statistician is the head of a statistical authority or a coordinating body outside the NSO and overseeing the entire NSS. This section refers to the most common scenario where the chief Statistician is heading the NSO but could also apply, with some adaptations, to other organization structure of the NSS.

The expected qualifications and skills of the chief statistician are the following (see also Chapter 5.4.1 - *Chief statistician* and Chapter 4.3 - *Organization of national statistical systems*):

- a) should be proficient in statistics or have a profound understanding of statistics;

- b) should have a proven track record and relevant professional experience as an economist, statistician, demographer, data scientist, IT expert, government specialist, sociologist;
- c) should be capable of running a large professional organization and understand and be sensitive to the wishes of users;
- d) have communication skills that are required for public communication and user relations
- e) ability to understand complex processes which is essential for day-to-day decision-making.

The job of a chief statistician is not only about professional statistics-related competencies. With the rapidly changing landscape of official statistics where NSOs operate in new environments, and expectations have developed (data stewardship, data custodian, open data, etc.) the chief statistician must be able to:

- a) Provide expert opinion on many different subjects. Perceived gaps in their expertise may diminish the perception of professionalism that is expected from an NSO.
- b) Be a master strategist who can recognise threats and opportunities, a psychologist who can understand and address the problems of people working in the NSO and a political scientist who understand interests of the environment in which the NSO is functioning.
- c) Demonstrate an enormous capacity of dialogue, listening, understanding, appreciation, discernment and other soft-skills required for such a position.

Links to guidelines, best practices and examples:

- [Appointment of US chief statistician](#);
- [Appointment of India chief statistician](#);
- [Appointment of PSA chief statistician](#).

Choosing a chief statistician can be a difficult task for the nominating authority, as the post requires a combination of skills that is not easy to find in one person. An illustration of the difficulty in filling the post of chief statistician:

- [UK fails to fill the national statistician role](#) (April 2019); but eventually, [UK national statistician was appointed](#) (August 2019).

12.8.2 Challenges facing a new chief statistician

Given the complex and multi-faceted responsibilities and expectations, a new chief statistician would need staff with specialist knowledge, institutional memories and the relationships they have established with NSS members and stakeholders to provide recommendations and consult them as much as possible. One main challenge is that a new chief statistician inherits the current staff and can only operate minor staff changes. Annual recruitment represents only a small share of the total number of employees and is unlikely to make a profound difference in the short term. Sometimes, and this is bad practice, the new chief will inherit a completely new middle-management team after a change in government. This practice might create a change in direction as often as once every four or five years, or even less; corresponding to the election cycle. Moreover, the management being called up to tender its resignation may have just mastered the mechanisms of the system, whereas their successors are unfamiliar with them.

The result is that the second level of the staff, or perhaps an even lower level, must take charge of day-to-day operations.

Whether or not the existing team is ideal, it is prudent to keep it intact (to do so may also be the only option under the law) and make improvements through gradual additions, taking advantage of voluntary departures and retirements. However, a newly appointed chief statistician may worry about being overly dependent on the existing staff and be concerned that they may take advantage of the situation. This would be less of a concern if the new chief is an internal appointee (e.g., former deputy chief statistician). In either case, new chief statisticians may wish to bring in someone they have worked with, whose judgement they trust and with whom they can discuss options. While this practice may provide a certain cushioning, it may well have the unintended effect of widening the gap between the head of the NSO and the regular staff; particularly, if the chief statistician's adviser is hired at a high-hierarchical level.

One of the first actions of a new chief statistician should be to organize and meet with the internal management committee (see Chapter 5.4.2 - *Internal advisory and decision-making bodies*). The new chief statisticians should also communicate their leadership vision and strategies to the entire organization early on when they take on the position. One of four key functions of *leadership and coordination* is to ensure that the appropriate foundations (for planning, management and control) are in place to support the production, management, availability and use of high-quality statistical information.

To provide the appropriate foundations for a national statistical organization, planning, management and control mechanisms must be in place, along with the infrastructure needed to achieve the desired results:

- a) **Sound human-resource management:** leadership does not mean running the system single-handedly; rather, it means that the leader implements and builds an organization and a team that will mobilize to achieve the organization's objectives.
- b) **Effective communication networks within the organization:** to promoting the leader's vision, one must ensure that employees follow a shared vision and values, as well as keep information and communication channels open and transparent. Employees must be consulted and mobilized around the organization's activities and priorities.
- c) **Implementation and development of a transparent and effective planning process:** this process should also be flexible enough to remain open to new initiatives and innovation.
- d) **Budget management:** in general, the chief statistician has full authority to establish the organization's priorities within an overall budgetary envelope. By implementing a control system with the appropriate checks and balances, the leader can delegate his or her powers, while ensuring that the system is managed appropriately.

12.8.3 Practices of Onboarding New chief statisticians

One option for a *new* chief statistician is to participate in customised leadership training programmes. In 2016, PARIS21 launched a [*Leadership Training Programme for Director-Generals \(DGs\) of NSOs*](#)—targeting chief statisticians who have recently been appointed to the position. The programme helps chief statisticians actively lead the “strengthening of the NSO's co-ordination role in the new data ecosystem and develop partnerships with new actors from

the private sector, civil society, media and academia to integrate new data sources into statistical production and work for the greater and better use of data and improved statistical literacy”. The training's main objective is to improve and strengthen the leadership, management, governance, and coordination capabilities of chief statisticians within statistical offices. The training provides them with a forum to discuss operational matters, share experiences, network, and elaborate on personal-development action plans. Finally, the training workshops equip heads of statistical offices with the skills needed to become successful national statistical system leaders.

CARICOM Statistics, recognizing the need for Training in Leadership and Management, provided a Training to Heads of Statistical Offices in the CARICOM Region in 2011, as an activity under the 9th European Development Fund and recommended that this be continued. Since then, the Inter-American Development Bank (IDB), in collaboration with other partners, has provided support in the region by providing similar training to Heads of Statistical Offices, Deputy Heads and other Senior Managers.

Links to guidelines, best practices and examples:

- [Compendium of Management Practices for Statistical Organizations](#), Statistics Canada, International Fellowship Program.

12.9 Human resources management: a policy package

12.9.1 HRM defined

HRM (HRM) is a strategic, integrated and coherent approach to the employment, development and well-being of the people working in organizations. A strategic approach focuses on long-term people issues within the context of the NSO's goals and the evolving nature of its work.

HRM (HRM) is the practice of recruiting, hiring, deploying and managing an organization's employees. An organization's human resource department (HRD) is usually responsible for creating, putting into effect and overseeing policies governing workers and the organization's relationship with its employees.

Box 8: HRD as an enabler for innovation- Statistics Mongolia

The Human Resources Development Policy of NSOM focuses on outreach, training and retention of staff. NSOM developed a training programme for staff members working at central and territorial statistical offices, including various modules at different levels, from basic to advance. The personnel of NSOM included a large number of relatively experienced staff: 33% having 0-5 years of service, 28% having 6-10 years of experience, 19% having 11-15 years of experience, 8% having 16-20 years of experience, 12 % above 21 years of experiences. However, most employees (66%) have a bachelor's degree, 31% have a master's degree and 2% a PhD.

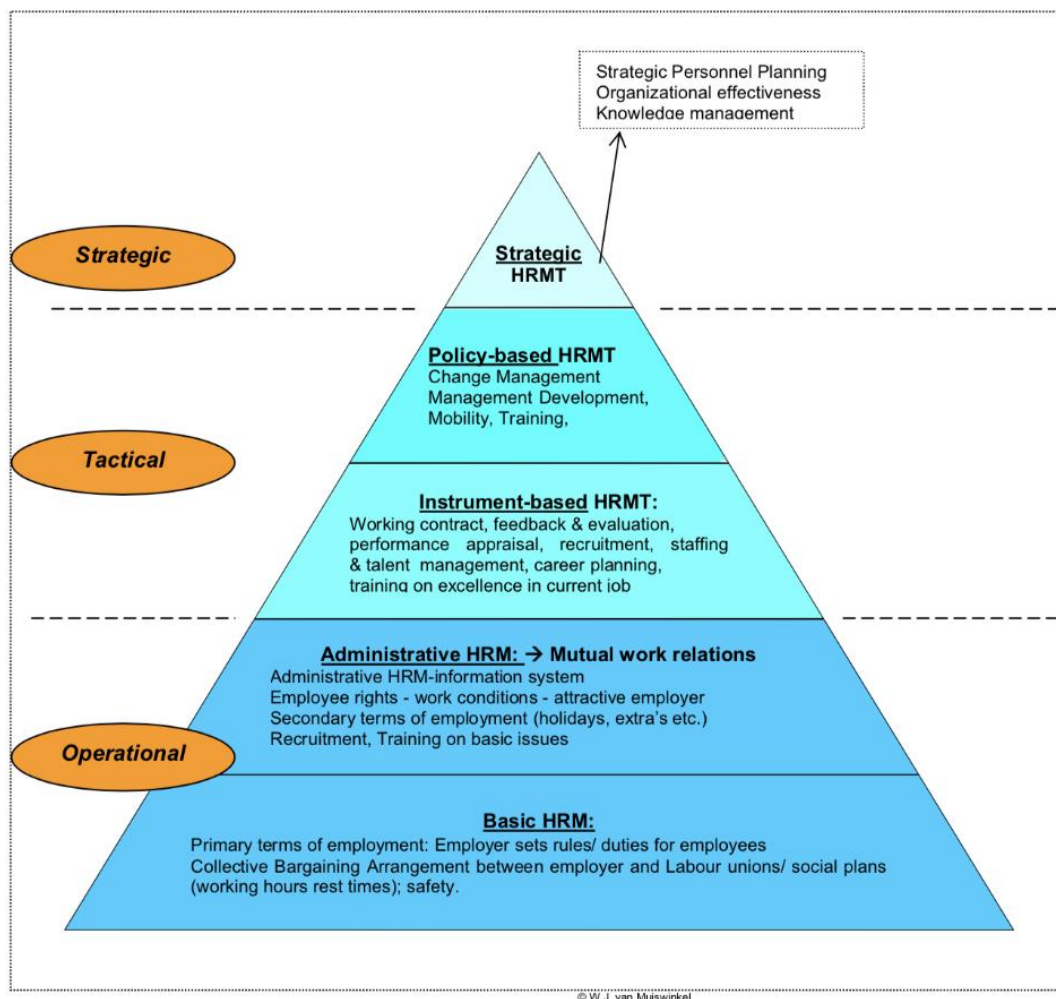
An estimated 90-100 students with majors in statistics, economics or demography graduate every year from three universities. A database of qualified individuals has been created to support outreach efforts when vacancies arise. Outreach efforts also include making available internships for statistics majors.

12.9.2 The objectives of HRM

The objectives of HRM can be broken down into four categories:

- Societal objectives:** measures put into place that respond to the ethical and social needs or challenges of the organization and its employees. This includes legal issues such as equal opportunity, and equal pay for equal work, sexual harassment in the workplace.
- Organizational objectives:** actions taken to help ensure the organization's efficiency, including increasing its effectiveness and capability and ability to change and manage change. This includes providing training, hiring the right number of employees for a given task or maintaining high employee retention rates.
- Functional objectives:** guidelines used to keep the HR functioning properly within the organization as a whole. This includes making sure that all of HR's resources are being allocated to its full potential.
- Personal objectives:** resources used to support the personal goals of each employee. This includes offering the opportunity for education or career development as well as maintaining employee satisfaction.

Figure 17: HRMS in a national statistical organization

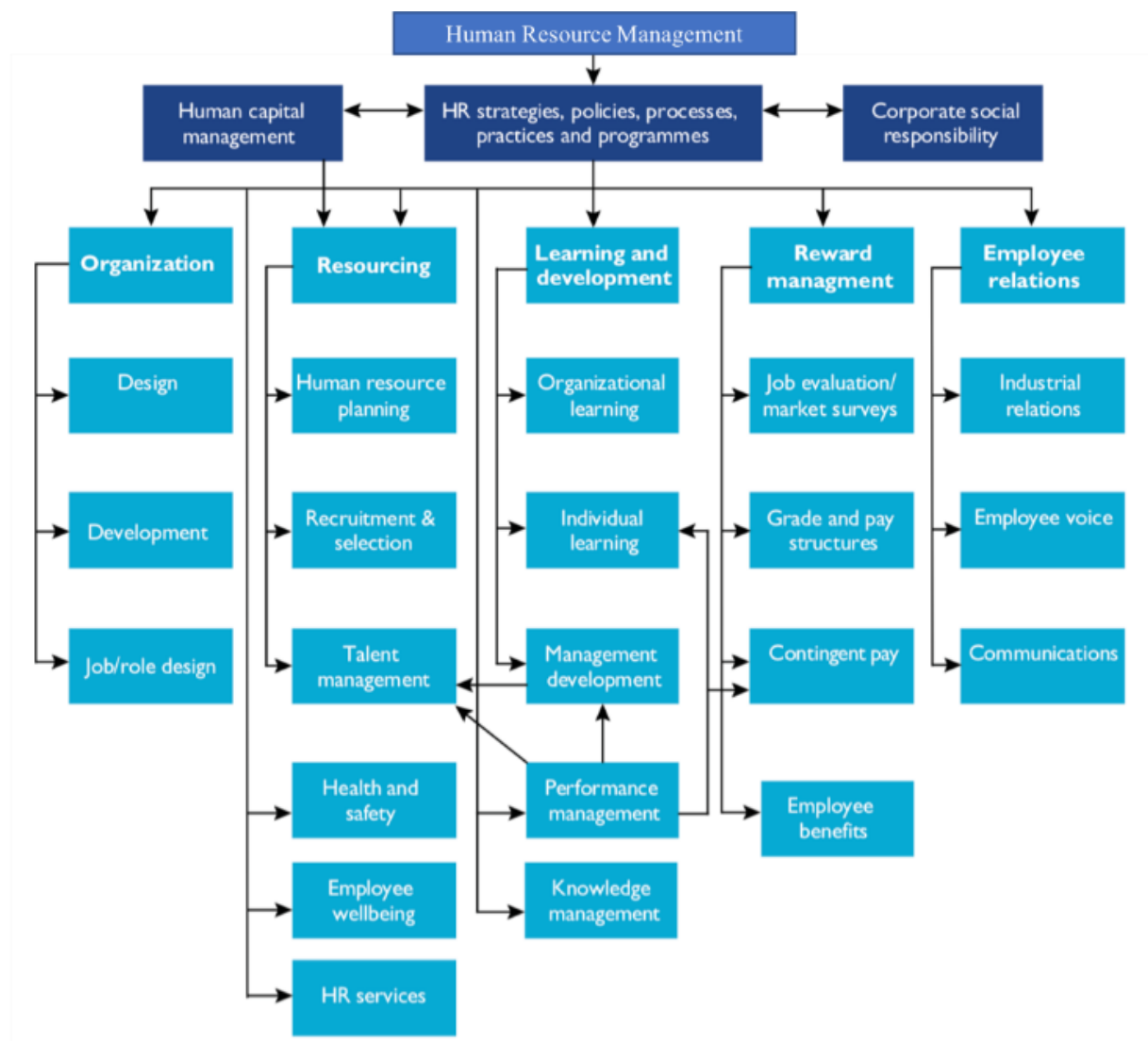


12.9.3 Elements of an HRM system

A Human Resources Management System (HRMS) brings together HR philosophies that describe the overarching values and guiding principles adopted in managing people. HR strategies define the direction in which HRM intends to go. HR policies provide guidelines defining how these values, principles and strategies should be applied and implemented in specific areas of HRM. HR processes comprise the formal procedures and methods used to put HR strategies and policies into effect. HR practices consist of the approaches used in managing people, and HR programmes that enable HR strategies, policies, and practices to be implemented according to plan.

A [generic representation](#) of an HRM system is shown in Figure 18. Some of these elements have been discussed in the previous sections of this Chapter. An application to a national statistical organization presented in Chapter 1 of the HRMT Compilation of good practices from UNECE (2013) is shown in Figure 17.

Figure 18: Generic representation of an HRM system



Links to guidelines, best practices and examples:

- [Office for National Statistics people and staff](#), ONS;
- [Management of Human Resources](#), Annual Report 2017-18, ABS;
- Moving from introduction towards integration of new employees – objectives and methods at Statistics Norway, Chapter 11, [HRM – Compilation and Good Practices in Statistical Offices](#), UNECE (2013).

Chapter 13. Data, Information and Knowledge Management

13.1 Introduction

This chapter covers the management of data, information, and knowledge in a national statistical office (NSO). Statistical data are the major asset and *raison d'être* of an NSO. Producing statistics information, and knowledge is the core work of an NSO, but NSOs are also leaders in the national statistical system (NSS). With increasing amounts of data becoming available from NGOs, businesses, and other actors, the NSO's role in managing data has expanded. To ensure that data are available to the people who need them, in the right format, and at the right time requires appropriate and well-functioning data systems, information systems, and knowledge management systems. These systems cut across many domains involving information governance, information management, information security, records management, information access and customer information management.

The following activities are covered in this chapter:

- a) Data and metadata management.
- b) Information management.
- c) Knowledge management.
- d) Management of archives.

Data and metadata management deals with the requirements of the statistical data processing life cycle from collection through dissemination to archiving. Information management covers the ways to organize, analyse, and retrieve data and information and how information management systems can make data and information searchable, accessible, easily retrievable and as widely available as possible within an NSO. Knowledge management concerns how collective information, knowledge and expertise can be used to be more effective as an organization. It covers the management of data flow, the sharing of “know-how”, knowledge retention, collective information, knowledge and expertise. The management of archives covers policies for data archiving and data retention.

The [Generic Activity Model for Statistical Organizations](#) (GAMSO) describes and defines the activities that take place within a typical NSO and provides supplementary text for this chapter of the most essential activities needed to manage the data, information, and knowledge in an NSO. In particular, the GAMSO section ‘Manage information and knowledge’ describes the activities covering the ownership or custody of records, documents, information and other intellectual assets. It also covers the governance collection, arrangement, storage, maintenance, retrieval, dissemination, archiving, and destruction of information. It includes the activities needed to maintain the policies, guidelines, and standards regarding information management and governance

13.2 The relationship between data, information, and knowledge

The relationship between data, information, and knowledge can be described as follows: data consist of collections of concrete facts, measurements or observations. Once data have been categorised, analysed, interpreted and summarised to give them structure and meaning, they become information (statistics). When human experience, expert opinion, and insight are applied to information, it is transformed into knowledge. Data are the basic facts; information is data with context; knowledge is processed information with meaning. Taken a step further, wisdom is knowledge coupled with judgment or insight.

As an example, taking the temperature of a patient generates a number: this is data. Checking the temperature and comparing it against other facts indicates that the patient has a high temperature: this is information. Based on this and other information, a doctor uses expertise to conclude the patient has a particular type of fever: this is knowledge. The doctor then uses wisdom to prescribe an appropriate cure.

13.3 Managing statistical data and metadata

Data and metadata management involves the management of documents and records, archiving, managing knowledge, standards and access rights as well as metadata and data management. A data and metadata management policy should consider the entire statistical production process from data collection to dissemination and archiving as described below (derived from [GAMSO](#)):

- a) **Collection** covers surveys and censuses (see Chapter 8.2 - *Surveys and censuses*) and administrative data. This is typically the most labour-intensive phase of the statistical process. The organizing of data collection operations will need to satisfy a number of strategic goals. The management of collection includes the effective planning and coordination of data collection across statistical domains, deciding what data are needed and what data items need to be collected directly from respondents. It should ensure the continuous improvement of efficiency of data management. It should work towards the effective reduction of response burden and costs for both respondents and the statistical authority and follow the principle of “collect once, use many times” to avoid duplicate requests being made to those providing data. It is fundamentally important to keep individuals’ and businesses’ information secure and confidential, regardless of whether it has been collected from a survey or non-survey sources.
- b) **Arrangement/sorting** covers the organization of data into collections of data. It includes data modelling, which is the process of creating a data model for the data to be stored in a database. It should, where possible, use existing standards such as SDMX Data Structure Definitions (see Chapter 14.4.5 ‘*Statistical Data and Metadata Exchange*’) for efficiency, reusability and interoperability.
- c) **Storage** covers database management systems (DBMS), which are designed to define, manipulate, retrieve and manage data in a database. Such database systems vary according to the capacity of an NSO and can range from simple spreadsheet-based systems to highly sophisticated (hierarchical) database systems (see Chapter 14.6 -*Basic IT Infrastructure Needs and Skill Requirements*)

- d) **Processing** covers the sub-processes of the GSBPM process phase which are: integrate data, classify and code, review and validate, edit and impute, derive new variables and units, calculate weights, calculate aggregates and finalise data files.
- e) **Retrieval** covers the production and dissemination systems an NSO has in place to locate and retrieve data, information and knowledge.
- f) **Dissemination** covers the systems an NSO has in place to disseminate data. This covers the GSBPM sub-processes update output systems, produce dissemination products, manage release of dissemination products, promote dissemination products, manage user support (see Chapter 10 '*Dissemination of Official Statistics*')
- g) **Archiving** covers the systems to archive data and metadata, and in accordance with the rules and regulations removing data (both physical and digital) in line with relevant legislation.

Links to guidelines, best practices and examples:

- Statistics Canada - [Data collection planning and management](#).
- Philippines Statistics Authority [data management](#).
- Philippine Statistics Authority [Statistical Survey Review and Clearance System \(SSRCS\)](#). This mechanism aims to: ensure sound design for data collection; minimize the burden placed upon respondents; effect economy in statistical data collection efforts; eliminate unnecessary duplication of statistical data collected; and, achieve better coordination of government statistical activities.
- UK Office of National Statistics - [Data use and management policies](#).

13.3.1 Managing statistical data

An NSO manages data from many sources including censuses, surveys, administrative data and, increasingly, new, non-traditional data sources often referred to as Big Data (see Chapter 8.5 - *Big Data*).

13.3.1.1 Common Statistical Data Architecture

Guidance for data management is provided by a reference architecture for data, such as the [Common Statistical Data Architecture \(CSDA\)](#). A data architecture is composed of models, policies, rules or standards that govern which data are collected, how they are stored, arranged, integrated, and used in data systems. Well-designed data architecture can result in improved timeliness and more disaggregated statistics at higher frequencies.

The CSDA can support an NSO in the design, integration, production and dissemination of official statistics. It acts as a reference template for an NSO in the development of data architecture (see Chapter 14.2.13 - *Common Statistical Data Architecture*) that can guide IT staff in the development of systems to be used by statisticians in the production of statistical products. The CSDA shows how an NSO can organize and structure its processes and systems for efficient and effective management of data and metadata in order to help in the modernization and the improved efficiency of statistical production processes. It can help an NSO manage the newer types of data sources such as Big Data, scanner data, citizen-generated data and web scraping.

The CSDA covers the following:

- a) How information is managed as an asset throughout its lifecycle.
- b) Accessibility of information.
- c) Describing data to enable reuse.
- d) Capturing and recording information at the point of creation/receipt.
- e) Using an authoritative source.
- f) Using agreed models and standards.
- g) Information security.

CSDA is focused on capabilities related to data and metadata. These include data input; data transformation; data integration and provisioning; metadata management; data governance; provenance and lineage; and security. CSDA is a “data-centric” view of an NSO’s architecture, putting emphasis on the value of data and metadata, the need to treat data as an asset and to focus on the way an NSO could treat their data and metadata.

13.3.1.2 The Modernisation Maturity Model

The companion to CSDA is the [Modernisation Maturity Model](#) (MMM). The MMM and its roadmap focus on how to build organizational capabilities through the implementation of the models and standards identified as key to statistical modernisation, such as the Generic Statistical Business Process Model ([GSBPM](#)), and its extension the Generic Activity Model for Statistical Organizations ([GAMSO](#)), the Generic Statistical Information Model ([GSIM](#)) and the Common Statistical Production Architecture ([CSPA](#)). See Chapter 14.4 - *Use of Standards and Generic Models in an NSO*.

The MMM is a self-evaluation tool to assess the level of organizational maturity against a set of pre-defined criteria. There are multiple aspects of maturity in the context of modernisation, and there are several distinct dimensions. Within each of these dimensions, an NSO may have different levels of maturity. A maturity self-assessment should be carried out by a cross-cutting group involving members of the corporate planning, statistical production, information, methodology, applications and technology functions in order to ensure a comprehensive review.

The MMM allows statistical organizations to evaluate their current level of maturity against a standard framework. This assessment will provide a clear picture of the organizational maturity level, which can then be compared between organizations, and between statistical domains/business units within an organization.

13.3.1.3 The Modernisation Maturity Roadmap

The MMM has an associated roadmap that provides clear guidelines on the steps to take to reach higher levels of organizational maturity more quickly and efficiently. The roadmap includes supporting instruments to help statistical organizations, at different maturity levels, to implement the different standards. The MMM and the roadmap can help an NSO regardless of its capacity level. They acknowledge that there can be different maturity levels depending on the statistical domain or part of the NSO. The roadmap addresses the needs of an NSO,

particularly those in the earlier stages of modernisation, to have clearer information about how to progress in the most efficient way.

Links to guidelines, best practices and examples:

- [CSDA Reference Architecture](#).
- [Modernisation Maturity Model](#) and the Roadmap for Implementing Modernstats Standards.

13.3.2 Managing statistical metadata

Principle 3 of the United Nations Fundamental Principles of Official Statistics ([UNFPOS](#)) states that to facilitate a correct interpretation of the data, the statistical agencies are to present information according to scientific standards on the sources, methods and procedures of the statistics. NSOs must be fully transparent for all users about their methods and provide comprehensive metadata linked to statistical data that is publicly accessible. Many NSOs have standard metadata templates that accompany each release of statistics.

An NSO must ensure that its users are properly informed regarding the location of data, how data were defined and compiled, the level of quality assigned to the data, and what related data can be used for comparison or to provide context. NSOs are obliged to describe accurately and openly the strengths and weaknesses of the data they publish and to explain how much inference the data can support. Thus, metadata provide information to enable the user to make an informed decision about whether the data are fit for the required purpose. Metadata management is an overarching GSBPM process. Some of the metadata serve as internal guidance on statistical production, and some support the user of statistics.

Statistical metadata consists of data and other documentation that describe data in a formalised way, and describe the processes and tools used in the production and usage of statistical data. Metadata describe the collection, processing and dissemination of data as well as relating directly to data themselves. All published or released statistics should be accompanied by metadata. Many NSOs have implemented metadata-driven systems that use metadata as input to configure processes so that a common process can serve despite the differences between statistical domains (and organizations). Using metadata as input parameters in this way can create highly configurable process flows. Good metadata management is essential for the efficient operation of statistical business processes. Metadata are present in every phase of a statistical production process and should be captured as early as possible and stored in each phase. Metadata management systems are vital and have the goal to make it easier for a user or application to locate specific data. This requires designing a metadata repository, populating the repository and making it easy to locate and use information in the repository. A number of data and metadata management systems are available to an NSO (see Chapter 10.4 - *Metadata management*)

The [Common Metadata Framework](#) is a repository of knowledge and good practices related to statistical metadata and identifies the following principles for metadata management:

a) **Metadata handling**

- Manage metadata with a focus on the overall statistical business process model.

- Make metadata active to the greatest extent possible to ensure they are accurate and updated. Active metadata are metadata that drive other processes and actions.
- Reuse metadata where possible for statistical integration as well as efficiency.
- Preserve history of metadata by preserving old versions.

b) Metadata authority

- Ensure the registration process and workflow associated with each metadata element is well documented, so there is clear identification of ownership, approval status, date of operation, and so forth.
- Single source: Ensure that a single, authoritative source exists for each metadata element.
- One entry/update: Minimize errors by entering once and updating in one place.
- Standards variations: Ensure that variations from standards are tightly managed, approved, documented, and visible.

c) Relationship to statistical cycle/processes

- Make metadata-related work an integral part of business processes across the organization.
- Ensure that metadata presented to end-users matches the metadata that drove the business process or was created during the process.
- Describe metadata flow with the statistical and business processes, data flow, and business logic.
- Capture metadata at their source, preferably automatically as a by-product of other processes.
- Exchange metadata and use them for informing both computer-based processes and human interpretation. The infrastructure for the exchange of data and associated metadata should be based on loosely coupled components, with a choice of standard exchange languages, such as XML.

d) Users

- Ensure that users are clearly identified for all metadata processes and that all metadata captured will create value for them.
- Metadata is diverse. Different views correspond to different uses of the data; users require different levels of detail; and, metadata appear in different formats depending on the processes and goals for which they are produced and used.
- Ensure that metadata are readily available and useable in the context of the external or internal users' information needs.
- Ensure feedback is collected from the knowledge management process and technology user.

13.3.3 The Statistical metadata system

Statistical metadata systems play a fundamental role in NSOs. Such systems comprise the people, processes and technology used to manage statistical metadata. Statistical metadata systems generate and manage metadata. It is an integral part of an NSO and is cross-cutting by nature and needs the involvement of managers, subject-matter statisticians, methodologists, information technology experts, researchers, respondents and end-users. Their needs and obligations vary according to whether they participate in the system as metadata users, metadata suppliers, designers, developers, producers, administrators and/or evaluators.

As noted in the UNECE publication '[Statistical Metadata in a Corporate Context: A guide for managers](#)' the statistical metadata 'management system can effectively support the following functions:

- a) Planning, designing, implementing and evaluating statistical production processes.
- b) Managing, unifying and standardising workflows and processes, and making workflows more transparent by sharing work instructions.
- c) Documenting data collection, storage, evaluation and dissemination.
- d) Managing methodological activities, standardizing and documenting concept definitions and classifications.
- e) Managing communication with end-users of statistical outputs and gathering of user feedback.
- f) Improving the quality of statistical data, in particular consistency, and transparency of methodologies.
- g) Managing statistical data sources and cooperation with respondents.
- h) Improving discovery and exchange of data between the NSO and its users.
- i) Improving the integration of statistical information systems with other national information systems. Growing demands to use administrative data for statistical purposes require better integration and sharing of metadata between statistical and administrative bodies, to ensure coherence and consistency of exchanged information.
- j) Disseminating statistical information to end-users. End-users need reliable metadata for searching, navigation, and interpretation of data. Metadata should also be available to assist post-processing of statistical data.
- k) Improving integration between national and international organizations. International organizations are increasingly requiring integration of their own metadata with metadata of national statistical organizations in order to make statistical information more comparable and compatible, and to monitor the use of agreed standards.
- l) Developing a knowledge base on the processes of statistical information systems, to share knowledge among staff and to minimize the risks related to knowledge loss when staff leave or change functions.
- m) Improving the administration of statistical information systems, including administration of responsibilities, compliance with legislation, performance and user satisfaction.
- n) Facilitating the evaluation of costs and revenues for the statistical organization.

- o) Unifying statistical terminology as a vehicle for better communication and understanding between managers, designers, subject-matter statisticians, methodologists, respondents and users of statistical information systems.

Links to guidelines, best practices and examples:

- The OECD [data and metadata reporting and presentation handbook](#);
- [Metadata Management - GSBPM and GAMSO](#);
- UNECE [Terminology on Statistical Metadata](#);
- [Metadata Concepts, Standards, Model and Registries](#);
- A basic framework for [the role of the SMS in statistical organizations](#) as defined in the UNFPOS;
- [Core principles for metadata management](#), UNECE;
- UNECE [Common Metadata Framework](#) – A guide for managers;
- Eurostat [metadata-driven process for handling statistical data end-to-end](#);
- UNECE [Statistical Metadata in a Corporate Context](#): A guide for managers;
- Philippine Statistics Authority – [Inventory of Statistical Standards in the Philippines \(ISSiP\)](#).

13.4 Information and knowledge management systems

13.4.1 Information management

Statistical information is constantly sought after within an NSO and by its external users. With the ever-increasing amount of information, we receive in our daily lives, finding relevant information can be a time-consuming challenge. Information can be scattered across a multitude of disconnected systems, repositories, databases and data warehouses, and access to it can also be restricted. This often leads to the creation of ‘information silos’ that evolve, reflecting the way organizations are structured, in that different departments have different priorities, responsibilities and visions. This can lead to inefficiencies in communication and collaboration between business units, making it difficult to find and retrieve information. This in turn, contributes to duplication of information and inconsistencies, thereby reducing efficiency and productivity, as well as leading to frustration.

Fostering a culture of information sharing and the use of information management tools can improve the ways to find, retrieve and deliver information in order to facilitate better sharing of information and knowledge, thereby maximising the use of statistical data. This can help in the identification of new trends and opportunities, improve the sharing of information with other agencies and help protect vital information. It brings together data, information, technology, information systems and business processes with the goal of providing information to users according to their needs.

13.4.2 Knowledge management

Knowledge management concerns how collective information, knowledge and expertise are used in order to be more effective as an organization. It covers the management of data flow, the sharing of “know-how”, knowledge retention, collective information, knowledge and expertise. The creation of knowledge systems can help filter out what content is important to a user, encourage collaboration across boundaries and break down organizational silos and base organizational actions on knowledge, sharing experiences and learning from them, so that the wheel is not constantly reinvented. With the increasing demand for transparency and accountability from governments, knowledge management is a key component of a strategy to efficiently manage knowledge in a multi-stakeholder environment like an NSO.

Knowledge management systems refer to any kind of IT system that stores and retrieves knowledge, improves collaboration, locates knowledge sources, mines repositories for hidden knowledge, captures and uses knowledge, or in some other way enhances the knowledge management process. To succeed, a knowledge management system requires both tools and a culture of collaboration. Technology is obviously important to implement a knowledge system, but the focus should be on people and processes rather than IT systems and on creating a culture of collaboration and knowledge sharing. Knowledge management systems are software that specialise in the way information is collected, stored and accessed, combined with an open and collaborative approach.

Knowledge management requires the expertise to organize information and knowledge in a systematic way, and when properly applied, it can reduce the time needed to find information, prevents the loss of knowledge, and allow people to work faster in a more efficient and agile manner. Simply put, knowledge management can make an NSO more effective. An NSO can benefit from a knowledge management system using collective information and knowledge irrespective of its capacity level. Such a system can range from basic process documentation to more sophisticated systems using knowledge management software and work practices.

Information and knowledge management tools

There are a number of tools and best practices for implementing information and knowledge management systems. These include:

- a) **Content Management Systems** manage the creation and modification of digital content. They typically support multiple users in a collaborative environment. They support the separation of content and presentation and are widely used for organizational content management and web content management. Main functions include web-based publishing, format management, history editing and version control, indexing, search, and retrieval.
- b) **Groupware** is collaborative software which can be used to exchange knowledge and expertise. It is designed to help people involved in a common task to achieve their goals. Groupware refers to programs that help people work together collectively while located remotely from each other.
- c) **Search engines** are information retrieval tools that connect knowledge seekers with experts and answers.

- d) **Knowledge portals** are web-based applications that provide a single point of access to organizational knowledge, integrating knowledge repositories, expert directories, collaboration tools, and other knowledge-intensive applications.
- e) **Communities of practice** are networks of individuals working with a common, shared purpose grouped together to facilitate knowledge building, idea creation and information exchange.
- f) **Enterprise social media** focuses on the use of online social networks or social relations among people who share business interests and/or activities.
- g) **Mentoring and knowledge transfer** is the practice of retaining and transferring knowledge within an organization by mentoring and late-career knowledge transfer to develop talent, skills and careers.
- h) **Post-mortems, lessons learnt** is a systematic way of recording experiences lessons learnt that can be subsequently made findable throughout the organization with the use of taxonomies.
- i) **Transfer of best practices** is a systematic way of recording best practices that can be subsequently made findable throughout the organization with the use of taxonomies.
- j) **Classification of content** using taxonomies within a content management system. Taxonomy can refer both to the hierarchical structure into which content is authored as well as the metadata elements and vocabularies created for tagging content.

Links to guidelines, best practices and examples:

- Examples of [Knowledge Management Software](#).

13.5 Managing archives

Data archiving is the process of moving data that is no longer actively used to a separate storage device for long-term retention. Archive data is older data that remains important to the organization or must be retained for future reference or regulatory compliance reasons.

In GSBPM, archiving has been incorporated into the process of data and metadata management, to reflect the view that archiving can happen at any stage in the statistical production process, so archiving is not considered to be necessarily a final stage.

Many archives exist for the purpose of making data actively available, whereby data and metadata are systematically stored, protected, and made available according to agreed rules. Laws may require content to be kept for specific periods. Internal and external audits may require document retention. Archiving ensures the continued viability and usability of data now and in the future and provides access to these data within the framework of the national legislation by ensuring confidentiality and protecting privacy.

Microdata sets contain information on individual persons, households or business entities collected through a census, survey, interview or administrative recording systems. NSOs and other producers of official statistics generate vast amounts of microdata from surveys and censuses, and these data represent a significant investment by an NSO and have considerable value for both existing and future users for the production of national statistics and research.

An NSO should therefore have a policy and the mechanisms in place to ensure that microdata and metadata can be archived.

When archiving data, the need to keep information online should be balanced with the fact that keeping too much old information available online consumes valuable storage which could be better used for newer information. It can also increase the number of irrelevant search results returned and adds to the effort required to maintain, migrate, and reclassify content. Long-term storage of this material adds to storage costs and to the security burden of safeguarding the confidentiality of the records.

Archives should be indexed and searchable so that files can be easily located and retrieved. A microdata catalogue and a document management system can help to manage the creation, capture, indexing, storage, retrieval, and disposition of the records and information assets of an NSO. Records management addresses the issues of knowing what data the NSO has, where it is stored, how long it should be kept and how secure it is.

Archiving rules for specific statistical processes depend on the general statistical legislation and any archiving policy of the NSO. These rules include consideration of the medium, location of the archive, and the requirement for keeping duplicate copies. They should also consider the conditions (if any) under which data and metadata should be disposed of.

The [Generic Longitudinal Business Process Model](#) (GLBPM) has been derived from the GSBPM and provides a generic model that can serve as the basis for informing discussions across organizations conducting longitudinal data collections, and other data collections repeated across time. The model is intended to serve as a reference model against which implemented processes are mapped, for the purposes of determining where they may be similar to or different from other processes in other organizations. It may also prove useful to those designing new longitudinal studies, providing reminders of steps which may need to be planned.

GLBPM covers the following phases:

- a) Evaluating and specifying needs;
- b) Design and re-design of data collection instruments;
- c) Build and re-build of data collection instruments;
- d) Data collection;
- e) Processing and analysis;
- f) Archive/preserve/curate;
- g) Dissemination and discovery;
- h) Research and publish;
- i) Retrospective evaluation.

Links to guidelines, best practices and examples:

- The [NADA Microdata Cataloguing](#) Tool.
- UK Office of National Statistics [Code of Practice Protocol on Data Management, Documentation and Preservation](#).

- ICPSR Guide to [Social Science Data Preparation and Archiving](#).
- Philippine Statistics Authority – [PSA Data Archive](#).
- Philippine Statistics Authority [Data Archive \(PSADA\)](#).

13.6 Policy on retention of data and related information

A data retention policy is part of an NSO's overall data management strategy. A comprehensive data retention policy outlines the business reasons for retaining specific data as well as what to do with it when targeted for disposal. A data retention policy, or records retention policy, is an organization's established protocol for retaining information for operational or regulatory compliance needs.

A data retention policy should treat archived data differently from backup data. Archived data is no longer actively used by the NSO but still needed for long-term retention. An NSO may need data shifted to archives for future reference or for compliance. An NSO's backup data can help it recover in the event of data loss. A backup policy is important to make sure the NSO has the right data and that the right amount of data is backed up. Too little data backed up means that any recovery needed after a data loss will not be as comprehensive as needed, while too much can be difficult to manage. Achieving a balance between these conflicting requirements is the objective underlying a data retention policy.

The policy should cover all technologies that are used to obtain data and cover a variety of formats such as paper forms, Computer Assisted Telephone Interview (CATI) records, Computer Assisted Interview (CAI) records, electronic administrative data, data streams, scanned images and faxes. The policy should cover legislative responsibilities for the data it collects, publishing what is collected, and doing so in a manner that will not enable identification. For proper creation and implementation of a data retention policy, especially regarding compliance, the IT team will need to work with the legal team. The legal team will know how long data must be retained by law while IT will carry out the actual implementation of the policy.

Defining a retention schedule depends on the type of data, the data collection cycle and will be according to the specific needs and policy of an NSO, and the legislation of each country. Each data collection should be retained according to its merits and can be destroyed after all processing, and likely provider queries have been resolved. Some NSOs have adapted their backup software archiving functionality to automate data disposal. In some countries, a central government agency has responsibility for the storage and archiving of important documents and files.

Links to guidelines, best practices and examples:

- [IHSN Archiving](#).
- Australian Bureau of Statistics Policy on [Retention of Collection Forms and Administrative Material](#).

13.7 Skills needed.

Specific skills needed to implement data, information and knowledge management systems include the following:

- a) Content management systems, groupware and social media.
- b) Database technology and decision support systems.
- c) Subject matter experts for constructing taxonomies.

For more information see Chapter 12 - *Human Resources Management and Development*.

Chapter 14. Information Technology Management

14.1 Introduction

Information Technology (IT) continues to play an essential role in all aspects of statistical processing throughout the entire production life cycle from data collection through to dissemination. This is a fast-moving and rapidly changing environment with new innovations being developed at a breath-taking rate. Since the publication of the last handbook in 2003, the IT landscape has changed almost beyond recognition - at that time many national statistical offices (NSOs) were just emerging from the mainframe era and have since evolved through the phases of personal computers, distributed databases, the explosion of the internet, smartphones and tablets, cloud technology and new data sources. An NSO can expect a continued and accelerating rate of change in the years to come with further advances in Artificial Intelligence, machine learning, increased computing power, smart data and the “Internet of Things”. These developments, combined with changing work practices, increased user expectations, competition from other data providers and a constant drive for modernisation and increased efficiency provide an ongoing challenge for an NSO. Harnessing the power of IT can help to meet these challenges by innovating in new products and processes – the rapidly changing environment also provides challenges of its own.

The ability to harness IT, of course, depends on capacity level – different approaches are required for different countries. This chapter will describe changes in the IT landscape since the last handbook, review emerging and existing standards, and look at the technology infrastructure required by a modern NSO.

14.2 Review of changes since last edition and current trends

14.2.1 User expectations for IT services in an NSO

It is a question of survival for NSOs the world over to modernise their statistical information systems in order that official statistics can stay relevant amid competition from other data sources, increasing demands from users and stakeholders combined with financial constraints.

NSOs are under constant pressure to do more with less in a continued climate of financial constraint. The levels of expectations from users are rising from all levels of government, policymakers, civil society, academia, research bodies and the general public – who demand high-quality statistics ever more rapidly – today’s users expect data immediately and are no longer prepared to wait weeks or months for information to be made available by an NSO. In addition, an NSO is expected to access and make use of new sources of data, adding value and statistical know-how before making them available. Users now expect easy access on all platforms, telephones and tablets as well as via computers. Traditional users of official statistics expect secure, high performance, stable and modern applications to deliver data to meet the needs of decision-makers – and this is especially important in the context of the SDGs. The recent generation of millennials and digital natives expect immediate free access to data and interactive visualisations.

NSOs are now also in competition from other non-official providers of data - data is no longer the monopoly of the NSO – and users are no longer willing to wait months for official data to be released when unofficial alternative without the same constraints of ensuring quality can be available much more quickly.

14.2.2 Changes in the way of working

14.2.2.1 Collaboration between organizations

In this time of constant change, an agile and adaptive approach to working is needed. One way in which NSOs have responded to deal with these challenges and increased expectations is to work together to solve common problems.

Recent years have seen an increase in collaboration between organizations working on projects and sharing software having recognised the need to work together to modernise statistical systems, standardise processes and industrialise statistics production in the face of shrinking budgets so as to stay relevant in the face of alternative non-official sources of information. The model of developing in isolation is inefficient and obsolete: the future is in collaborating.

At the time of the last handbook, there were only a handful of collaborative projects between NSOs and International Organizations – today, this way of working is becoming mainstream. There are different modes of collaboration: An NSO can share its own software with other organizations, they can reuse existing software made available by another organization, or they can collaborate together with one or more other NSOs to develop tools for their common use that can then, in turn, be made available to others in the statistical community.

Recent years have seen the formation of international groups and communities to facilitate this process and organizations are now collaborating within formal frameworks. Such collaborations are not only a very important development for an NSO in saving costs, but it also sends a positive message to stakeholders that they are getting value for money by not wasting resources reinventing the wheel.

Working collaboratively does require investment, it can be complex, and staff will need to adapt to new ways of working and new methods of project management, but it is the most efficient way of working for an NSO in the long run.

14.2.2.2 Reusing software

An NSO should always seek to gain advantage of the tools available from the international statistics community rather than develop software for their own use. The move is away from in-house development towards collaboration and the first instinct of the NSO when there is a need to upgrade their processes should be to inspect the various inventories of software maintained by international and regional bodies such as the High-Level Group for the Modernisation of Official Statistics (HLG-MOS), the Common Statistical Production Architecture (CSPA), the Statistical Information System Collaboration Community (SIS-CC) and the Statistical Data and Metadata Exchange (SDMX) Toolkit.

Regional agencies have an important role to play in offering guidance and impartial advice on which tools would best meet the requirements of the NSO and to act as centres of expertise and training. This is of particular importance for countries with low capacity and limited

infrastructure in order to avoid being overburdened with software from specialist agencies that does not meet precise needs and is complex to maintain.

This is especially relevant in the context of the SDG and the urgent need to provide indicators on development goals in a timely manner using standard interchangeable format. Common tools encourage the use of standards such as SDMX for improving data exchange processes.

If, however, an NSO does need to develop a specific software tool in the future, it should be developed with a view to future reuse by other organizations according to CSPA principles of being component-based and ‘plug and play’ ready.

Links to guidelines, best practices and examples:

- The UNECE [High-Level Group for the Modernisation of Official Statistics \(HLG-MOS\)](#) is a group of chief statisticians discussing the modernisation of statistical organizations. Their mission is to work collaboratively to identify trends, threats, and opportunities in modernising statistical organizations. Modernisation groups cover Supporting Standards, Sharing Tools, Organizational Resilience and “Blue Skies Thinking” Network.
- The OECD [Statistical Information System Collaboration Community \(SIS-CC\)](#) is a community of dissemination software (“*.Stat*”) users which was set up so that participating members could benefit from a broad collaboration, sharing experiences, knowledge and best practices, and to enable cost-effective innovation.

14.2.3 Increase in use of web

14.2.3.1 Implications for an NSO of increased internet use

The massive increase in access to and use of the internet has, of course, had a huge impact on the NSO. Since the publication of the last handbook in 2003, internet usage has increased from 608 million users to over 4.2 billion at the time of writing. This figure is expected to rise further in the years to come as coverage expands even further and costs of access continue to drop. This obviously has had and will continue to have, a profound effect on the way statistics are accessed. Access to data via the internet has evolved from basic static pdf downloads through to interactive browsers and machine-to-machine connections. The internet affects how an NSO communicates, especially via social media and increased usage, in turn, raises the bar for expectations. The internet permits the merging of data sources between official statistics and other data sources to produce ‘mashups’ whose content are not in the control of an NSO. This is both an opportunity and a challenge as while it can increase access to data, it also carries the risk of data being misused for political or other purposes.

14.2.3.2 The ‘Internet of Things’

In addition to the vast increase in the use of the web, the “Internet of Things” (IoT) is emerging as one of the next technology mega-trends. IoT consists of the networked connection of billions of devices to the internet covering such diverse objects as household appliances, motor vehicles, planes and industrial equipment. By connecting these devices to the Internet, they generate further huge quantities of data available for analysing how we live.

The number of networked devices was 8.4 billion in 2017, and it is estimated to reach 30 billion objects by 2020.

In this way, IoT will open up new opportunities (and challenges) for additional data sources for an NSO as it integrates the physical world into new data sources. Tools for analysing IoT data sets are already available via commercial service providers such as Amazon Web Services.

There are both opportunities and challenges for an NSO as to how it can most effectively access and utilise this data. It could have an impact in the future on data collection and offer the possibility of real-time data on a number of sectors such as energy use, transportation, household consumption and industrial output.

The challenges posed will be the same as those for other Big Data (see Chapter 8.5 – *Big Data*) sources on how an NSO should adapt to new technologies required to store and use this data, how to gain access to this data, to integrate and mix it with traditional official data sources to compile new products.

Links to guidelines, best practices and examples:

- An article “[The Internet of Things Explained: Making sense of the next mega-trend](#)” providing an explanation and facts and figures concerning the IoT.

14.2.4 Cloud technology

14.2.4.1 Increase in use of cloud technology

The “Cloud” is another growing web-based technology trend. Cloud technology is computing power made available as a utility that can be tapped on demand. In this way, services such as servers, storage, and application software are delivered to a user via the internet enabling rapid access to shared networks of system resources. Cloud computing barely existed as a service at the time of the last handbook. Its use was initially driven by the private sector, but it is now making significant inroads in NSOs. There, it is widely used for storage and communication such as web-based email and calendars and the sharing of documents. The next phase will be to use Software as a Service (SaaS) for data processing and Big Data analytics.

14.2.4.2 Pros and cons of cloud technology for an NSO

Cloud computing offers solutions to an NSO irrespective of capacity level but is especially useful for allowing countries with weak infrastructure to access more advanced computing technology. As the cloud requires only reliable internet access, it can eliminate high upfront costs of installing hardware and software infrastructure and reduce the resources needed for ongoing maintenance.

Cloud technology is scalable and can enable IT teams to more rapidly tailor resources to meet fluctuating and unpredictable demand and can remove the layers of complexity in setting up infrastructure. It can enable the sharing of software as applications can be saved on the cloud by one organization and used by other NSOs as needed.

The inherent security capabilities of large-scale Cloud computing services can guarantee a higher level of security for some lower capacity NSOs than their own infrastructure.

For some NSOs problems could be related to confidentiality as data on citizens is not stored on-site, which may go against the national legislation.

Links to guidelines, best practices and examples:

- An article from the Statista Statistics portal “[Cloud Computing - Statistics & Facts](#)”.
- Examples of [local governments using cloud computing](#).
- An example from the OECD Statistical Information System Collaboration Community (SIS-CC) where [cloud computing is proposed as a solution for countries with weak infrastructure](#).

14.2.5 Smartphones and tablets

14.2.5.1 Increase in use of smartphones and tablets

The most visible and unavoidable technology trend in recent years has been the massive increase in the use of smartphones and tablets. The ubiquity of these devices has had an impact on the NSO as in every other aspect of modern life. Smartphones have advanced computing capabilities and connectivity, and at the time of writing over a third of the world’s population is projected to own a smartphone, an estimated total of almost 2.5 billion.

14.2.5.2 Implications for an NSO of smartphones and tablets

Due to the increasing functionalities and decreasing costs of mobile phones, they have been employed in a variety of ways by NSOs for both data collection and dissemination throughout the world.

Data collection using these devices can improve the quality of data by incorporating editing and validation rules in phone apps. The timeliness can also be improved as data can be used to update a central database in real-time via the device if there is sufficient network coverage. If there is no coverage in a remote area, data can be stored on the device and used to update the database later.

Smartphones can have interactive survey questions sent directly to respondents to input and transmit data in structured ways. Simpler basic low-end ‘dumbphones can use simple text messaging or voice to send out short queries by phone to a list of phone numbers, prompting users to reply with a short response.

For an NSO, the use of smartphones in data collection has the advantages of increased speed of data transmission, higher quality and accuracy. It also allows for the inclusion of additional geolocation information and images.

Links to guidelines, best practices and examples:

- UN Global Pulse and MobileActive.org [inventory of mobile phone-based data collection projects](#).
- The Partnership in Statistics for the 21st Century (PARIS21) [Platform for Innovation in Statistics \(PISTA\)](#) maintains a list of examples where smartphones and tablets have been used in an online platform that collects information on innovations and statistical capacity in official statistics.
- Pilot projects [using mobile phones for high-frequency data collection](#) in Tanzania and South Sudan.

- Real-time macroeconomic and human development trends [Smartphone application to track consumer prices globally](#) in order to deliver transparency on price developments.
- Mobile monitoring and reporting system in a [national HIV counselling and testing campaign and a national anti-retroviral treatment expansion programme](#).
- Computer-Assisted Personal Interview (CAPI) [using Tablets to leverage private cloud technology](#) and the use of tablets for data entry.

14.2.6 Data visualisation software

14.2.6.1 The importance of data visualisation

Visualisation tools play a key role in making complex data understandable and accessible to a wide audience. It can support and underscore messages to influence policy and evidence-based decision making. Visualisations can reveal compelling stories from complex underlying data and have become an important element of communication strategy. Data visualisations increase users' knowledge of statistics to help make better decisions – and easily understandable statistics are a public good - which will help ensure that data is being used more often, thereby increasing their value.

As with other technology fields, there has been an explosion in data visualisation technology and use in recent years. Until fairly recently data visualisations used by NSOs were mainly static images and simple graphics; advances in technology have led to a wide range of visualisation methods and sophisticated graphics that border on artistic design that can be reused, linked to datasets and embedded in websites and via apps in social media.

Good visualisations capture users' attention. This is a scarce commodity, and there is intense competition for this attention from information from many other sources. Data visualisation has a role in data analysis for finding patterns and correlations in different data sources, in particular in the spheres of Big Data analytics and data science.

Data visualisation brings together the skills of statisticians, analysts, IT experts, graphic designers and psychologists into one single domain. There is a challenge to recruit staff of the correct profile to undertake this kind of work.

14.2.6.2 Types of data visualisation

A number of tools are available for an NSO to visualise data. The most basic type is simple charts derived from data that cover all the standard graphics such as line charts, bar charts, pie charts and scatter plots. These can be generated from the data using office software such as Excel and then saved as static images to be posted in a document or website.

Other tools allow data to be dynamically linked to visualisations on a web site using third party graphical plug-ins. Using this method, an end-user can create and save their own visualisations that will also show the latest available data according to their own specifications.

Pre-prepared animated graphics can be used as 'storytelling' devices. In this way, a set of data can be used to illustrate a phenomenon with the graphic moving over a timeline accompanied by text describing events at each stage. These graphics can be used to explain complex topics in a visually appealing and more easily understandable way for wider audiences.

Interactive visualisations allow users to enter their own data into an online graphic to observe different scenarios or add their own criteria.

14.2.6.3 The increase in use of data visualisations by NSOs

Almost all NSOs use data visualisations today on their websites or as phone apps. They are often the most appealing part of a web site and are important for giving a positive image of the NSO. They can be particularly appealing to the younger audience in the form of interactive visualisations that have an educative role, or for storytelling purposes.

Links to guidelines, best practices and examples:

- United Nations Economic Commission for Europe (UNECE) guidelines [part 1](#) and [part 2](#) for using data visualisation to make data more meaningful.
- Environmental Systems Research Institute (ESRI) geographic information system ([GIS software visualisations](#)).
- UK Office for National Statistics (ONS) data visualisation [guidelines for creating charts and tables](#).
- Statistics Netherlands (CBS) [guidelines for data visualisation](#).
- UK Government [guidelines for effective tables and graphs](#) in official statistics.

14.2.7 Big Data

14.2.7.1 The growth of Big Data

The term Big Data was coined in recent years - the term has several definitions but refers in general to the huge proliferation of data generated by business transactions, social media, phone logs, communication devices, web scraping, sensors etc. Perhaps the most well-known definition of Big Data is data of “increasing volume, velocity and variety”.

Big data is often unstructured as such data sources have no pre-defined data model and often does not fit well into conventional relational databases.

A huge amount of hype has been generated around the topic which has generated pressure on the NSO to use Big Data to create new products and to complement or replace existing data outputs at low cost and in a more timely manner, particularly in the context of the so-called “Data Revolution” for using new data sources to fill some of the most critical data gaps, particularly in development.

Despite the high expectations for using Big Data, the reality is currently proving to be that while the technology needed to process these huge data sets is available and maturing, the biggest obstacle for an NSO is to actually gain access to the data. This lack of access can be due to reluctance of a business to release their data, legal obstacles or concerns about privacy (see also Chapter 8.5 - *Big Data*).

14.2.7.2 Implications of Big Data for an NSO IT infrastructure and skill requirements

At the time of writing, there are very few cases of using Big Data in NSO production processes apart from geolocation data. This type of data has the advantage of being both relatively simple

to access and also structured in a standardised way that allows integration with traditional datasets to provide additional and more granular information on location.

There has been much discussion on what the position of an NSO should be vis-à-vis Big Data – scenarios include the NSO developing a role as a ‘broker’ of Big Data which has been integrated by a third party, or simply providing a stamp of official quality to such datasets once they have validated its content and methodologies.

In order to make use of Big Data, an NSO will require access to High-Performance Computing resources and staff with new skills. The processing of increasingly high-volume data sets for official statistics requires staff with statistical skills and an analytical mindset, strong IT skills and a nose for extracting valuable new insights from data – often referred to as “Data miners” or “Data scientists” (see Chapter 14.2.16 - *Data Science*).

An NSO needs to develop these new analytical capabilities through specialised training. Skills will include how to adapt existing systems to integrate Big Data into existing datasets and processes (ref para.) using specific technology skills as Massively Parallel Processing (MPP), Hadoop, R, Elastic Map Reduce, Visualisation methods and text mining.

Links to guidelines, best practices and examples:

- UNECE [Guidelines for the establishment and use of partnerships in Big Data Projects](#) for Official Statistics.
- UN [Global Working Group on Big Data](#) includes an [inventory of ongoing projects](#).
- UNSD paper on [uses of Big Data for Official Statistics](#): Privacy, Incentives, Statistical Challenges, and Other Issues.
- European Statistical System [Big Data project](#).
- Paper on “[Big Data: What Can Official Statistics Expect?](#)”
- OECD ‘[Smart Data Framework](#)’ – 4 steps to create new evidence for policy, source new data, develop a smart data platform, and to cultivate new data ecosystems.
- UN [Data Revolution Group](#).
- UNECE [classification of Big Data types](#).
- Example of [ONS Big Data project](#) - How alternative sources of data and data science methods will affect our processes and outputs.
- The HLG-MOS [Big Data sandbox project](#).

14.2.8 Open data initiatives

14.2.8.1 The growth of the open data movement

The first Fundamental Principle of official statistics states that data should “made available on an impartial basis by official statistical agencies....” and recognises the “citizen’s entitlement to public information,” (see Chapter 10.9 - *The Open data movement*). This is a strong statement for an NSO to provide open access to all information produced by the national statistical system.

The term Open Data means that data and content can be freely used, modified, and shared by anyone for any purpose. However today open access to the data produced by NSOs remains limited – according to the Open Data Barometer that monitors open data initiatives around the world, only 11% of dataset entries in the index currently meet the criteria for the data to be considered open.

The criteria for an NSO to make its data open are: that data should be available in a machine-readable format (not PDF files or images); be in non-proprietary formats such as comma-separated values (CSV), text, or Extensible Mark-up Language (XML); provide options for selecting data and for bulk download; and, include any related metadata.

The NSO should make its full range of statistics available via its website, be simple to locate and at the most granular level possible while considering privacy issues. Open data sets should be regularly updated, and an updating schedule published. They should use recognised international standards and definitions for the compilation and documentation of statistics should be used and be fully documented. They should include metadata describing the relevant characteristics (including standards and definitions) of the data, should be readily available with the data and be free of political considerations. The terms under which the data may be used or reused should be non-discriminatory, and the license permit the use and reuse of data without restriction. The data should be interoperable, allowing diverse systems and organizations to work together. In this case, it is the ability to interoperate and intermix different datasets (“Mashups”).

14.2.8.2 Implications of open data for an NSO IT infrastructure and skill requirements

NSO open data sets should be as accessible as possible, and there should be no barriers such as completing forms or submitting requests or having to use specific browser-oriented technologies (e.g., Flash, JavaScript, cookies or Java applets). An NSO should provide a published Application Programming Interface (API) to facilitate access to data by other systems (also known as Machine-to-Machine access).

Information should be stored in widely-used file formats that easily lend themselves to machine processing and accompanied by documentation related to the format explaining how to use it in relation to the data.

Open Data principles state that data should remain online with appropriate archiving over time and that all data should be available free of charge.

Links to guidelines, best practices and examples:

- [Data Barometer](#) / World Wide Web Foundation global measure of how governments are publishing and using open data for accountability, innovation and social impact. The table shows the ranking of countries by the number of open data sets.
- The [Global Open Data Index](#) (GODI) is the annual global benchmark for publication of open government data, run by the Open Knowledge Network. Our crowdsourced survey measures the openness of government data.
- The [5-star deployment scheme for Open Data](#) with examples for each step of the star rating and explanations of the associated costs and benefits.

- The [Open Data Handbook](#) which includes guides, case studies and resources for government & civil society, on the "what, why & how" of open data.
- The European Data Portal workshop on [official statistics as Open Data](#).
- [Open Data Watch](#) is an international, non-profit, NGO that monitors open data policies and offers strategic advice and practical assistance to national governments, international organizations, and other NGOs.

14.2.9 Open-source software

The term Open-source refers to software that has its source code made available by use of a license in which the copyright holder provides the rights to change and distribute the software freely to anyone and for any purpose. Open-source software is frequently developed in a collaborative public manner.

In recent years, the adoption of open-source technologies has increased in NSOs to replace commercial software products. These technologies range from Operating systems (Linux), database management systems (MySQL) and programming languages (PHP, "R").

Most programming languages in use today have a free software implementation available. There are two main Open-Source models. The first is known as "Cathedral" where the source code is originally developed by a small group of developers who subsequently distribute each release free of charge – an example is the "R" language. The second is termed the "Bazaar" where source code is developed in public over the internet by a wider group of volunteer developers –examples of this are Linux and Apache. These models benefit from distributed peer review and the transparency of process. Advantages for an NSO include avoiding being locked into using a specific commercial product, flexibility and lower costs.

Links to guidelines, best practices and examples:

- EU Guidelines on [Open-Source Software for Official Statistics](#).
- UK Government paper "[Open-Source Software Options for Government](#)".
- Canadian Government [guidelines on the use of Open Source Software](#).
- The [Open-Source Initiative \(OSI\)](#) protects and promotes open-source software, development and communities.
- [Blog guide to Open-Source Software](#).

14.2.10 New methods of dissemination, M2M, web services etc.

14.2.10.1 New methods of dissemination

Disseminating data is one of the main activities of an NSO, and constant technological advance has to be taken into account. In recent memory, the majority of statistical systems produced paper publications as the main output. This progressed to the production of diskettes and CD-ROMs with the data in simple tables. The growth of the web meant that these files could be made available as downloadable files, and subsequently, data could be accessed interactively via online dissemination systems (see chapter 10 - *Dissemination of Official Statistics*).

The current trend is towards machine-to-machine (M2M) access where computer systems access data directly using Application Programming Interfaces (APIs) and web services. This allows for automated transmission of data between systems in a standard format without human intervention. Using such APIs and standard data formats allows end-users to create new outputs using multiple data sources (known as ‘mashups’). While such mashups have great potential for combining data to find new insights, a concern for an NSO is the lack of control they have over the end uses of their own data in these outputs, and misunderstandings and misinterpretations could arise without clear documentation explaining the data sources and methodologies used in their compilation.

14.2.10.2 Implications of new dissemination methods for an NSO IT infrastructure and skill requirements

Modern dissemination methods require the appropriate technology infrastructure and skillsets. Staff with the necessary skills to develop the web services and APIs are needed as well as institutional knowledge of the data exchange standards such as SDMX (see Chapter 14.4.5 - *Statistical Data and Metadata Exchange*). These rapid, automated data dissemination techniques are crucial in the SDG context as they provide the means for countries to deliver high-quality development indicators in a rapid and efficient manner.

Links to guidelines, best practices and examples:

- The [African Information Highway](#) is a network of live open data platforms (ODPs) electronically linking all African countries and 16 regional organizations to increase public access to official and other statistics across Africa.
- The [SIS-CC.Stat](#) is an SDMX (ref para) based modular platform covering the complete end-to-end data lifecycle (GSBPM) from collection through to dissemination.
- [Australia Bureau of Statistics \(ABS\) data portal](#).
- [Italian Statistics Office \(ISTAT\) data portal](#).
- The [ESRI Data Hub for the Sustainable Development Goals](#) combines geospatial and statistical information to visualize patterns to monitor, and report their progress on achieving the SDGs within a geographic context.
- [Ireland's official boundary data](#) as part of a collaborative project between the Central Statistics Office (CSO) and Ordnance Survey Ireland (OSi) to link geography and statistics.
- [Kenya Open Data](#).

14.2.11 Linked data

14.2.11.1 The growth of linked data

The term Linked Data refers to the method of publishing structured data so that it can be interlinked through semantic queries, connecting related data that weren't formerly related. It is defined as "a term used to describe a recommended best practice for exposing, sharing, and connecting pieces of data, information, and knowledge on the Semantic Web".

In practice, Linked Data builds upon standard Web technologies such as HTTP, the Resource Description Framework (RDF) and Uniform Resource Identifiers (URI), but instead of using them to generate standard web content as pages to be read by users, it extends them to connect information in a way that can be read automatically by computers.

In this way, data is linked to other data, fully exploiting these connections so its value increases exponentially. Thus, data becomes discoverable from other sources and is given a context through links to textual information via glossaries, dictionaries and other vocabularies.

14.2.11.2 Uses of linked data for an NSO

There are a number of examples of NSOs using Linked data that can be interlinked and become more useful. The process is lengthy and requires significant investment.

Links to guidelines, best practices and examples:

- LinkedSDGs showcases the usefulness of adopting semantic web technologies and Linked Open Data (LOD) principles [for extracting SDG related metadata from documents and establishing the connections among various SDGs](#).
- SpringerLink [Methodological Guidelines for Publishing Government Linked Data](#).
- The World Wide Web Consortium (W3C) open standards community best practices for [publishing statistical Data in Linked Data format](#).
- UK ONS examples of [Linked Data products](#).
- IStat paper on data innovation in Official Statistics - [the leading role of Linked Open Data](#).
- The Joint Research Centre (JRC) of the European Commission draft [guidelines and pilots on Linked Data and Open Data Portals](#).
- Australian government [guidelines for publishing linked datasets](#).

14.2.12 Common Statistical Production Architecture (CSPA)

14.2.12.1 The growth in use of CSPA by NSOs

The Common Statistical Production Architecture (CSPA) is a framework for developing statistical processing components that are reusable across projects, platforms and organizations - it is often referred to as ‘plug and play’. CSPA has been developed in recent years by the international statistical community under the auspices of the High-Level Group for the Modernisation of Official Statistics (HLG-MOS).

CSPA is an enabler of collaboration and modernisation and has potentially enormous advantages for NSOs of all capacity levels. It aims to align the enterprise architectures of different organizations to create an “industry architecture” for the whole “official statistics industry”. CSPA provides guidance for building software services that can be shared and reused within and across statistical organizations and enables international collaboration initiatives for the development of common infrastructures and services. In addition, it encourages alignment with other statistical industry standards such as the Generic Statistical Business Process Model (GSBPM) and the Generic Statistical Information Model (GSIM).

CSPA components focus on statistical production processes as defined by GSBPM and are based on the Service Oriented Architecture (SOA) approach wherein the components (Services) are self-contained and can be reused by a number of business processes either within or across statistical organizations without imposing a technology environment in terms of specific software platforms.

14.2.12.2 Potential advantages of CSPA for an NSO

There are great potential advantages for an NSO in using CSPA. Its goal is eventually to have components covering all processes and sub-processes covered by GSBPM. This is important for countries of all capacity levels. GSBPM is especially useful for countries of low capacity with weak infrastructure as it can, in theory, allow any country to take advantage of developments by the international statistics community. In this way, an NSO could assemble a complete statistical information system component by component according to their specific needs.

Links to guidelines, best practices and examples:

- Common Statistical Production Architecture – the [Logical Information Model \(LIM\)](#).
- Common Statistical Production Architecture - [the Global Artefacts Catalogue](#).
- Common Statistical Production Architecture – [list of CSPA-compliant services](#) developed and under preparation.
- Software available via [CSPA inventory](#).

14.2.13 Common Statistical Data Architecture

Data architecture consists of the rules put in place for the collection and storage of data in an organization. The [Common Statistical Data Architecture \(CSDA\)](#) project has been set up to define a reference architecture and guidance for the modernisation of statistical processes and systems.

14.2.14 Data integration / data linkage

14.2.14.1 The importance of data integration and data linkage for an NSO

As new data sources are becoming available, an NSOs faces the challenge of finding ways to integrate changeable and often unstructured data with traditional data maintained by the NSO in order to produce new and reliable outputs.

Data integration provides the potential to augment existing datasets with new data sources, and produce timelier, more disaggregated statistics at higher frequencies than traditional approaches alone.

New and emerging technologies are available to support data integration, and an NSO needs to ensure that staff have the necessary new skills, in particular, the need for data scientists - new skills, new methods and new information technology approaches, designing new concepts or aligning existing statistical concepts to the concepts in new data sources.

14.2.14.2 Examples of data integration and data linkage

There are many possible types of data integration which include using administrative sources with survey and other traditional data; new data sources (such as Big Data) with traditional data sources; geospatial data with statistical information; micro-level data with data at the macro level; and validating data from official sources with data from other sources.

Links to guidelines, best practices and examples:

- Modernstats Guide to [Data Integration for Official Statistics](#).
- Statistics New Zealand Data Integration [guidelines](#) and [manual](#).
- HLG-MOS [Review paper on Data Integration](#).

14.2.15 Artificial Intelligence

Artificial Intelligence (AI) is the development and application of computer systems that can perform tasks normally requiring human intelligence. These tasks include visual perception, speech recognition, decision-making, and translation between languages. The growth in AI has major potential for an NSO.

A main component of AI is Machine Learning which is the way the computer can learn without being explicitly programmed. The goal of machine learning is to build computer systems that can adapt and learn from their experience. It is an application of AI that provides the system with the ability to automatically learn and improve from experience. Machine Learning, at its most basic, is the practice of using algorithms to examine data, learn from it, and then make a judgement or prediction on a particular question. Thus, rather than hand-coding software routines with a specific set of instructions to accomplish a particular task, the machine is “trained” using large amounts of data and algorithms that give it the ability to learn how to perform the task.

An NSO using AI will need to engage staff with a number of new skills, including the various methods of Machine Learning such as Supervised Learning, Unsupervised Learning, Reinforcement Learning and Deep Learning.

There is a strong relationship between AI and Big Data - Machine Learning needs a vast amount of data to learn, whereas Big Data uses AI techniques to extract value from Big Data sets.

AI-based applications can replace or augment certain tasks allowing staff resources to be freed up to do other work, with people having time to focus on creative projects and deal directly with clients and customers. A careful communication strategy will be required for such a game-changing technological transformation.

Links to guidelines, best practices and examples:

- EU Paper on [Artificial Intelligence, Robotics, Privacy and Data Protection](#).
- Eurostat paper on [AI and data mining](#).
- Paper: [How much time and money can AI save government?](#).

14.2.16 Data science

The job title of ‘Data scientist’ has emerged in recent years in parallel with the growth of Big Data. The two fields go hand in hand in the pursuit of extracting knowledge and insights from new data collections in various forms, both huge structured datasets and unstructured alternative data sources.

Data science requires a mix of expertise. Technology skills are required to manipulate Big Data using techniques such as massive parallel processing to analyse volatile unstructured data, perform data cleansing and then distilling it into a format suitable for analysis. Mathematical skills are needed to write the complex algorithms used in analysing these data. Statistical skills are needed to investigate the data and to respond to questions and derive insights from them. Other skills, like [Machine Learning](#) and [Deep Learning](#), may also be required.

Data Scientist candidates are consequently a highly sought-after species, and many universities now offer data science courses. Given the range of skills involved in data science, the reality is that such tasks are carried out by a team rather than a single individual. Such teams consist of a data engineer who would access the primary data source and render it into a structured format, a software developer to write the routines to clean and aggregate the data and the data scientist who would create algorithms and use statistical techniques to gain insights from the data.

A typical list of the required competences for a Data Science position would include:

- a) Programming Skills;
- b) Statistics;
- c) Machine Learning;
- d) Multivariable Calculus & Linear Algebra;
- e) Data mining;
- f) Data Visualisation & Communication;
- g) Software Engineering.

Links to guidelines, best practices and examples:

- UK Government [Data Science Ethical Framework](#).

14.2.17 Data security

Data security is of paramount importance for an NSO. Confidentiality and privacy are, therefore, one of the most important of the Fundamental principles (Chapter 3.2.6 - *Principle 6 - Confidentiality*) and a major concern for citizens. Maintaining data security is vital for the good reputation of an NSO.

National statistics are aggregated from individual records and often contain personal or commercial information - thus security measures must be designed to preserve data confidentiality and ensure data is accessible only by authorised people and only on as-needed basis. Alongside public concerns with data confidentiality and privacy, there is a growing demand for researchers to access microdata – and this access is often limited by the fear that confidentiality protection cannot be guaranteed.

There are a number of ways an NSO can address data security. Security measures can be implemented at the level of the data by using anonymisation techniques so that individual records in a microdata set have personal details removed so that identification of individuals is highly unlikely.

Security measures can be put in place at the physical level by restricting access to where the data is stored and implementing strict data controls. Many NSOs have set up Data Laboratories where on-site access to microdata is under NSO supervision with strict audit trails and supervision to ensure no confidential data leaves the premises.

An alternative to Data Laboratories is Remote Access Facilities (RAFs). RAFs are becoming increasingly important as a way of facilitating secure access to microdata in order that researchers do not have to suffer the inconvenience of having to go to the NSO premises but can rather launch algorithms for microdata remotely via the internet. The job is then run by the NSO and results returned to the researcher while the microdata does not actually leave the NSO.

Procedural measures include vetting processes to approve requests for an individual researcher to access microdata and the signing of contractual agreements with these researchers that include penalties if security rules are breached.

Links to guidelines, best practices and examples:

- UNSC Principles and Guidelines for [Managing Statistical Confidentiality and Microdata Access](#).
- European Statistical System [Handbook on Statistical Disclosure Control](#).
- International Household Survey Network – [guidelines on Microdata anonymisation](#).

14.3 IT management models

There are a number of models for managing IT staff and resources in an NSO. These range from in-house development, out-sourcing and off-shoring IT work to external companies, a hybrid in-house/out-sourced approach, and more recently, a collaborative approach to development. There has been a continuous cycle of changing approaches to management over the years – these depend on a number of factors: the size of the organization; government policy; budgetary issues; general management attitude toward managed IT or IT support models; overall staff resources; and global IT trends.

Insufficient resources for IT functions will create problems for the entire organization so it is vital to understand which support model is best to run an organization effectively. Each different approach has its advantages and challenges which are discussed below.

14.3.1 In-house development

The In-house model is the case where all software development and maintenance are carried out within the NSO by the staff of the IT department. This model was quite common in the past but is much less so today as IT and other support services are wholly or partially outsourced to external companies or individual freelance IT experts.

Statistical processing is a niche market for software vendors and very few ‘off the shelf’ products exist for managing the statistics processing life cycle. Consequently, an NSO may have a legacy of internally developed statistical software (unlike, say Human Resources or budget planning which have a large range of commercial software solutions). This can make maintenance and evolution more complex as upgrades have to be coded rather than being provided by vendors.

An advantage of the in-house model is the autonomy of development, and the stability of teams can ensure the technical know-how of often complex processes is retained by the NSO. A common challenge with this approach is the difficulty of attracting and retaining IT staff, as salaries in the NSO are often not competitive with those in the private sector, particularly in developing countries. This can result in a high turnover as staff leave once, they have been trained in the IT skills which are in high demand in the marketplace.

In-house IT development can be more costly than the out-sourced model given the necessary investment in time, training, employee salaries and benefits, and management.

14.3.2 Out-sourced development

With an Out-source IT management model, the main part of development and support is carried out by external resources. External resources can be onsite and come from local suppliers, be offshore and coordinated remotely, or a mixture of the two.

Using external resources has the advantage of flexibility in that resources are used only when needed for specific tasks which can save costs. Points to take into consideration when using external resources include the loss of institutional knowledge when a consultant leaves and the lack of continuity in a project when an out-source provider changes personnel due to their own priorities. This is a particular risk for low-capacity countries when external staff are brought in, often by a donor agency, to implement a system – once the work is completed and the consultants leave there is inadequate internal capacity to maintain and use the system.

One should also consider vendor incentives as it can be in the interest of external staff to extend a task as long as possible and create a dependency for maintenance and further development of a software product, so it is important to ensure a transparent and ethical relationship with vendors and close monitoring of projects.

This also applies to low-capacity countries where donor aid can be linked to adopting a particular software package implemented by external consultants that the NSO is then unable to maintain themselves once the consultants leave. Cases exist where countries have been left with multiple tools meeting similar needs, particularly in the domain of dissemination software.

Outsourcing is typically a less expensive option than in-house development, as there are minimal training and time involved with IT management. Outsourcing typically converts fixed IT costs into variable costs which allow for effective budgeting as services are only paid for as they are needed.

14.3.3 Hybrid in-house/out-source model

In the hybrid In-house/Out-source model, the NSO uses both its own staff and also external staff. A hybrid IT model requires internal and external IT professionals to support the business capabilities of the enterprise. With this model, in some cases, only the IT managers are NSO

staff members while all development and support are carried out by external staff. Other cases can include more of a mix of both managers and IT experts.

This model is widely adopted in NSOs and is the most common approach because it reflects the realities of the IT market - high mobility of staff with the latest skills are highly mobile and difficult to retain.

This approach typically allows an organization to maintain a centralised approach to IT governance, while using experts to deal with the functionality that is beyond the capabilities of the organization's IT staff.

14.3.4 Collaborative model

The collaborative model of NSOs working together on IT projects is a trend that is increasing considerably in recent years. Collaborations can take the form of several organizations working together to develop a software that they will then all use; it can be a single organization developing a software tool that is then adopted and, possibly, further developed by other NSOs.

In the past, most of the statistical software used by an NSO would have been developed within an NSO for use only by that NSO. Today, the trend is for there to be a mix of the older legacy software and common shareable tools.

The collaborative approach has many obvious advantages for an NSO. These advantages include sharing the software development burden and also sharing experiences, knowledge and best practices through multilateral collaboration and help build collective capacity. It also reduces the risk for new developments through additional scrutiny and testing according to open-source principles with all members benefiting from each other in terms of ideas and methods.

Collaborating on projects does, of course, have its own challenges for an NSO – particularly in determining how to balance development priorities between the different partner organizations and the increased complexity of project management in the context of multiple-partner collaboration. To achieve this model, partnership management capabilities will need to be developed in an NSO (see Chapter 12 - *Human Resources Management and Development*).

Links to guidelines, best practices and examples:

- UN Public Administrations Network paper “[ICT Outsourcing: Inherent Risks, Issues and Challenges](#)”.
- Singapore Government paper “[Strategic Considerations for Outsourcing Service Delivery in the Public Sector](#)”.

14.4 Use of standards and generic models in an NSO

14.4.1 The importance of standards

Standards are enablers of modernisation - by using common standards, statistical systems can be modernised and “industrialised” allowing internationally comparable statistics to be produced more efficiently. Standards facilitate the sharing of data and technology in the development of internationally shared solutions which generate economies of scale.

Standards are expected to provide benefits in the following areas:

- a) **Efficiency:** standards offer per definition re-usable solution patterns, they are a means to capture knowledge and promote best practices, allowing interested parties to re-use solutions without having to support a full investment.
- b) **Quality and trust:** standards help to build trust by providing widely validated and accepted solutions to common problems.
- c) **Collaboration and competition:** Standards often provide a common language which can support collaboration among organizations and at the same time stimulate competition among service providers by reducing dependency and vendor lock-in that may be associated with particular solutions.
- d) **Innovation:** Standards foster innovation as they offer a solid basis for developments of all nature by formalising knowledge and best practices.

A number of major statistical standards are in use today, while others are emerging and maturing.

14.4.2 Generic Activity Model for Statistical Organizations (GAMSO)

The Generic Activity Model for Statistical Organizations (GAMSO) covers activities at the highest level of the statistics organization. It describes and defines the activities that take place within a typical organization that produces official statistics. GAMSO was launched in 2015 and extends and complements the Generic Statistical Business Process Model (GSBPM) by adding additional activities beyond business processes that are needed to support statistical production. GAMSO is also described in more detail in Chapter 5.5.4 - *The Generic Activity Model for Statistical Organizations*.

The GAMSO activities specifically concerned with IT management cover coordination and management of information and technology resources and solutions. They include the management of the physical security of data and shared infrastructures:

- a) Manage IT assets and services;
- b) Manage IT security;
- c) Manage technological change.

Links to guidelines, best practices and examples:

- Modernstats – the [Generic Activity Model for Statistical Organizations](#).

14.4.3 Generic Statistical Business Process Model (GSBPM)

The Generic Statistical Business Process Model (GSBPM) is a statistical model that provides a standard terminology for describing the different steps involved in the production of official statistics. GSBPM can be considered the "Production" part of GAMSO. Since its launch in 2009, it has become widely adopted in NSOs and other statistical organizations. GSBPM allows an NSO to define, describe and map statistical processes in a coherent way, thereby making it easier to share expertise. GSBPM is part of a wider trend towards a process-oriented approach rather than one focused on a particular subject-matter topic. GSBPM is applicable to all activities undertaken by statistical organizations which lead to statistical output. It

accommodates data sources such as administrative data, register-based statistics, and also Census and mixed sources.

GSBPM covers the processes that cover specifying needs, survey design, building products, data collection, data processing, analysis, dissemination, and evaluation. Within each process, there are a number of sub-processes. These are described in detail in Chapter 5.5.5 - *Definition of an integrated production system* and in Chapter 14.4.3 - *Generic Statistical Business Process Model (GSBPM)*.

GSBPM can play an important role in the modernisation of the statistical system, especially concerning the statistical project cycle, and can accommodate emerging issues in data collection such as the introduction of mobile data collection and Big Data.

Links to guidelines, best practices and examples:

- Modernstats – the [Generic Statistical Business Process Model](#).
- Modernstats – the [GSBPM resources repository](#).

14.4.4 Generic Statistical Information Model (GSIM)

The Generic Statistical Information Model (GSIM) standard was launched in 2012 and describes the information objects and flows within a statistical business process. GSIM is complementary to GSBPM, and the framework enables descriptions of the definition, management and use of data and metadata throughout the statistical information process.

GSIM is a conceptual model, and the information objects are grouped into four broad categories: Business; Production; Structures; and Concepts. It provides a set of standardized information objects, inputs and outputs in the design and production of statistics, regardless of the subject matter. By using GSIM, an NSO is able to analyse how their business could be more efficiently organized.

As with the other standards, GSIM helps improve communication by providing a common vocabulary for conversations between different business and IT roles, between different subject matter domains and between NSOs at national and international levels. This common vocabulary contributes towards the creation of an environment for reuse and sharing of methods, components and processes and the development of common tools. GSIM also allows an NSO to understand and map common statistical information and processes and the roles and relationships between other standards such as SDMX and DDI.

Links to guidelines, best practices and examples:

- Modernstats – the [Generic Statistical Information Model](#).
- Statistics Finland Project to adopt [the GSIM Classification model](#).
- Statistics Sweden project to incorporate [GSIM in the information architecture and the information models](#).

14.4.5 Statistical Data and Metadata Exchange (SDMX)

The Statistical Data and Metadata Exchange (SDMX) standard for statistical data and metadata access and exchange was established in 2000 under the sponsorship of seven international organizations (IMF, World Bank, UNSD, Eurostat, BIS, ECB and OECD).

The importance of a standard for statistical data exchange is well known and cannot be underestimated. The labour-intensive nature of data collection and dissemination mapping to different formats is a problem well known to an NSO, and in the context of the timely transmission of SDG indicators, it has become even more vital.

SDMX is a standard for both content and technology that standardises statistical data and metadata content and structure. SDMX facilitates data and metadata exchange between an NSO and international organizations – and also within a national statistical system. SDMX aims to reduce the reporting burden for data providers and provide faster and more reliable data and metadata sharing. Using SDMX facilitates the standardisation of IT applications and infrastructure and can improve the harmonisation of statistical business processes. There is much reusable software available to implement SDMX in an NSO which can reduce development and maintenance costs with shared technology and know-how.

SDMX ensures data quality as it incorporates data validation into its data structures and validation rules as well as with the many tools made freely available with the standard as part of its open-source approach. SDMX is an ISO standard⁴² and has been adopted by the UNSC as the preferred standard for data exchange.

Thanks to its provision of a common Information Model, SDMX greatly facilitates reuse of software products and components. Software products such as SDMX Reference Infrastructure have made it possible to establish SDMX APIs by connecting to dissemination databases and mapping their structures to DSDs. This enables an NSO and international agencies to establish standards-based APIs without any software development involved, thus greatly lowering the barrier to entry. Furthermore, tools exist and are widely used that enable implementation of SDMX for data sharing without any dissemination infrastructure in place, by utilizing, e.g., Microsoft Excel or CSV files. This has greatly sped up the adoption of standards-based data sharing by statistical offices.

SDMX tools are not limited to data exchange or dissemination, and as they mature, are increasingly used to automate various business processes along the statistical production chain in conjunction with other standards such as CSPA and DDI.

14.4.6 SDMX and SDGs

A specific SDG indicator data structure (Data Structure Definition) will be used to report and disseminate the indicators at national and international levels. SDMX compliance has been built into a number of internationally used dissemination platforms such as the African Information Highway, the IMF web service and the OECD.Stat platform to ensure efficient transmission of SDG Indicator data and metadata.

Links to guidelines, best practices and examples:

- [SDMX official website](#).
- The [SDMX Content-Oriented Guidelines \(COG\)](#) recommend practices for creating interoperable data and metadata sets using the SDMX technical standards. The guidelines

⁴² ISO standard 17369 :2013 – Statistical data and metadata exchange (SDMX): <https://www.iso.org/standard/52500.html>.

are applicable to all statistical domains and focus on harmonising concepts and terminology that are common to a large number of statistical domains.

- [Inventory of software tools for SDMX](#) implementers and developers which have been developed by organizations involved in the SDMX initiative and external actors.
- Eurostat [main SDMX page](#).
- European Statistical System's [SDMX standards for metadata reporting](#).
- Guidelines for [managing an SDMX design project](#).
- The [SDMX Global Registry](#) is the technical infrastructure containing publicly available metadata material, data structure definitions (DSD), and related artefacts (concept schemes, metadata structure definitions, code lists, etc.).
- The [SDMX Starter Kit](#) - a resource for an NSO wishing to implement the SDMX technical standards and content-oriented guidelines for the exchange and dissemination of aggregate data and metadata.
- The African Development Bank [Open Data for Africa](#) project.
- The [IMF SDMX Central](#) project allows users to Validate, Convert, Tabulate, and Publish data to the IMF SDMX Central.

14.4.7 Data Documentation Initiative (DDI)

The Data Documentation Initiative (DDI) is an international standard for describing metadata from surveys, questionnaires, statistical data files, and social sciences study-level information. DDI focuses on microdata and tabulation of aggregates/indicators.

DDI is a membership-based alliance of NSOs, international organizations, academia and research bodies. The DDI specification provides a format for content, exchange, and preservation of questionnaire and data file information. It fills a need related to the challenge of storing and distributing social science metadata, creating an international standard for the design of metadata about a dataset.

In many NSOs, the exact processing in the production of aggregate data products is not well documented. DDI can be used to describe the processing of data in a detailed way to document each step of a process. In this way DDI can be used not just as documentation but can help use metadata to automate throughout the entire process, thus creating “metadata-driven” systems. In this way, DDI can also act as the institutional memory of an NSO.

DDI is a standard that promotes greater process efficiency in the “industrialised” production of statistics. DDI can be also be used for facilitating microdata access as well as for register data.

Links to guidelines, best practices and examples:

- [DDI Specifications](#).
- Paper - [DDI and SDMX are complementary, not competing, standards](#).
- Guidelines on [Mapping Metadata between SDMX and DDI](#).

14.5 Enterprise architecture

Enterprise architecture (EA) is a conceptual blueprint that defines the structure and operation of an organization whose role is to determine how the organization can most effectively achieve its current and future objectives.

EA maps the goals and priorities of an organization to Information Technology that is fit to support those goals as far as it can by managing information and delivering it accurately and in time where and when it is needed, and in a way that is cost-effective for the business. It seeks to guide the process of planning and designing the IT capabilities of an organization in order to guide them through the business, information, process, and technology changes necessary to meet desired organizational objectives.

EA helps enforce discipline and standardisation of business processes, and enable process consolidation, reuse, and integration. EA is basically designed for the whole system of systems across the "enterprise" - and like any design, it has to start from the business requirements and specify the best fit IT solutions. The IT part of EA is split into systems and data and finally infrastructure such as servers and networks.

There is an emerging trend of organizations using storage repositories that hold vast amounts of raw data in native format ('Data Lakes') from disparate sources. These data lakes are used to respond to business questions by linking and querying relevant data and thus require a new type of EA to manage such linked datasets.

Benefits to the NSO of a well-designed EA include achieving better business performance as per the business goals, reducing investment risk in IT. EA also facilitates a more agile enterprise by making the IT architecture more flexible to transform business models. Agile Architecture practices support the evolution of the design and architecture of a system while implementing new system capabilities thus allowing the architecture of a system to evolve incrementally over time while simultaneously supporting the needs of current users.

Links to guidelines, best practices and examples:

- European Statistical System ([ESS](#)) [Enterprise Architecture Reference Framework](#).
- ISTAT project - [Business Architecture model within an official statistical context](#).
- Statistics Korea project - [Building an Enterprise Architecture](#).
- Statistics Poland project - [Introducing Enterprise Architecture Framework](#).

14.6 Basic IT infrastructure needs and skill requirements

There are a number of technology infrastructure components and skill requirements that are essential for an NSO to be able to manage its statistical life cycle processing. These requirements are not uniform and will, of course, depend on the capacity of the NSO. A small, low-capacity NSO in a developing country will operate under a very different set of conditions than an NSO in a medium-capacity country and even more so than a developed, high-capacity country. However, there are certain technologies that are common for all NSOs in order to efficiently collect, process and disseminate quality statistics in a timely manner.

The term IT infrastructure is defined in the Information Technology Infrastructure Library (ITIL) version 3 as a combined set of hardware, software, networks and related facilities, used to develop, test, deliver, monitor, control or support IT services. People, processes and documentation are not considered part of IT Infrastructure.

The key infrastructure components are outlined below.

- a) **Computer hardware platforms** consist of client and server machines and in some cases, mainframes. A server is a computer that is dedicated to managing network resources dedicated to a particular task. These specialist server roles include print servers, file servers, network servers, database servers and web servers.

Skills required: Software Engineer (Hardware specialist).

- b) **Operating systems (OS)** are software that manage the resources and activities of the computer and act as an interface for the user. The best-known client OS is Windows operating systems. Server OS are dominated by the various forms of the UNIX operating system or Linux.

Skills required: Software Engineer (OS specialist).

- c) **Software applications** are the IT tools used to manage production activities in an NSO from data collection to dissemination as covered by the main processes and sub-processes in GSBPM. These applications can be developed by the NSO, commercial tools, generic software developed collaboratively, or software developed by another statistical organization.

Skills required: Systems analyst, Software developer.

- d) **Data management and storage** is handled by database management systems (DBMS). DBMS is a collection of programs that manages the database structure and controls access to the data stored in the database. A relational database management system (RDBMS) is used for creating, storing and connecting structured data and then rapidly retrieving via a query language. Rules can be applied for data security, connecting data and enforcing referential integrity. This is vital for an NSO to ensure data quality which cannot be guaranteed using unmanaged data stores such as Excel. The most widely used commercial DBMS are Microsoft SQL Server, Oracle, Sybase and IBM. A number of open-source examples are also available including MySQL, MariaDB, MongoDB and PostgreSQL.

Skills required: Database Administrator, Database Architect, Data Modeller.

- e) **Network infrastructure** consists of the hardware and software resources that enable network connectivity and communications. It provides the communication path and services between users, processes, applications, services and external networks and the internet. The most widely used networking and telecommunications platforms include Windows server operating systems, Novell, Linux, and UNIX. A network firewall protects a computer network from unauthorized access.

Skills needed: Network administrator.

- f) **Internet-related infrastructure** includes the hardware, software and services to maintain corporate web sites, intranets, and extranets, as well as web hosting services and web software application development tools.

Skills required: Webmaster, web developer.

- g) **Legacy systems** are generally older transaction processing systems created for mainframe computers that continue to be used to avoid the high cost of replacing or redesigning them.

Skills required: System Analyst, Software developer.

Links to guidelines, best practices and examples:

- [Information Technology Infrastructure Library \(ITIL\)](#), a globally recognized collection of best practices for managing information technology.
- [ICT plan for Laos Statistics Bureau](#) is covering all aspects of the information & communication technology.
- [Standard architecture implemented in the Tunisian Statistical Institute](#) (INS).

14.7 Specialist statistical processing/analytical software

A number of specialist statistical and econometric processing and analytical software packages are available for use in an NSO, both on a commercial and open-source basis. Some of the more widely used products are described below.

- a) [Analytica](#) is a visual software package for creating, analysing and communicating quantitative decision models. It combines hierarchical influence diagrams for visual creation and view of models, intelligent arrays for working with multidimensional data, Monte Carlo simulation for analysing risk and uncertainty, and optimization, including linear and nonlinear programming.
- b) [EViews](#) is a statistical package used mainly for time-series oriented econometric analysis. EViews can be used for general statistical analysis and econometric analyses, such as cross-section and panel data analysis and time series estimation and forecasting.
- c) [MATLAB](#) Matrix laboratory is a programming language that allows matrix manipulations, plotting of functions and data, implementation of algorithms, creation of user interfaces, and interfacing with programs written in other languages.
- d) [Minitab](#) is a statistics package developed at the Pennsylvania State University. It is a general-purpose statistical software package used as a primary tool for analysing research data.
- e) [Wolfram Mathematica](#) is a system whose programming language and capabilities cover neural networks, machine learning, image processing, geometry, data science, visualizations, and others.
- f) [SPSS](#) is a program for statistical analysis in social science.
- g) [SAS](#) is a software suite that can mine, alter, manage and retrieve data from a variety of sources and perform statistical analysis on it.
- h) [Stata](#) is a general-purpose statistical software package whose capabilities include data management, statistical analysis, graphics, simulations, regression, and custom programming.

- i) **“R”** open-source R is a programming language and free software environment for statistical computing and graphics. The R language is widely used among statisticians and data miners for developing statistical software and data analysis.
- j) **CSPPro** The Census and Survey Processing System is a public domain data processing software package. The main purpose of this software framework is to design application for data collection and processing.

14.8 Questionnaire design tools

There are many questionnaire-design tools available commercially or developed by international statistical organizations and NSOs. A number of the more widely used ones are described below.

- a) **BLAISE** (<https://blaise.com/>) is a software system developed by Statistics Netherlands used for statistical and scientific research. It is used for creating and processing computer-assisted surveys of varying size and complexity and supports questionnaire design and all types of computer-assisted data collection. It can be used to create small and simple questionnaires and large, complex and hierarchically structured questionnaire models and to link them to available external data files. In addition to questionnaire design, Blaise provides data entry facilities for all the various interview modes; namely, computer-assisted personal interview (CAPI), computer-assisted telephone interview (CATI), computer-assisted self-interview (CASI), computer-assisted web interview (CAWI), all of which can be combined within a survey. For telephone interviewing (CATI), a complete management system is available to schedule calls to respondents automatically, and follow-up calls after busy or no-answer responses. System developers can customize or expand the functionality of Blaise applications to use in their own applications.
- b) **Survey Solutions** (<https://mysurvey.solutions/>) Survey Solutions is free software developed by the World Bank. It supports questionnaire design with a full range of standard questions, nesting, cascading and linked questions. It supports validation of answers and direction of interview flow using .Net; use macros, calculated variables and lookup tables to construct sophisticated data validation algorithms. It enables collection of data offline on tablets (CAPI), online using web-interface (CAWI), from phone interviews (CATI), and conduct of mixed-mode surveys. It can scan barcodes, capture pictures and audio, and record information from external sensors. It facilitates collection of detailed GIS information on locations, distances, and areas, application of geofencing and guidance of interviewers to the point of interview offline using high-resolution satellite images and built-in GPS receivers.
- c) **EUSurvey** (<https://ec.europa.eu/eusurvey/home/>) EUSurvey is an open-source online survey management system developed by the European Union for creating questionnaires and other forms and using them to collect data through the Internet. While its main purpose is to create official surveys of public opinion and forms for internal communication and staff management (for example, staff opinion surveys, evaluation forms, and registration forms), it can support the design of any type of web-based questionnaire. It provides a wide variety of elements used in questionnaires, ranging from

the simple (such as text questions and multiple-choice questions) to the advanced (such as editable spreadsheets and multimedia elements).

- d) **Google Forms** (<https://www.google.com/forms/>) Google forms is a free software tool that can support an unlimited number of surveys, each with an unlimited number of respondents. It allows the addition of custom logos, images and videos. It enables simple skip logic and page branching. The survey can be delivered by a link to a website or by e-mail. Survey answers and data are automatically collected in Google Spreadsheets. The tool is appropriate for an NSO with very limited resources wishing to conduct a simple survey.
- e) **SurveyMonkey** (<https://www.surveymonkey.co.uk/>) is similar to Google Forms in that it supports any kind of online survey. The free version supports only a very small number of respondents. The paid version has no such limitations.

Links to guidelines, best practices and examples:

- [Comprehensive list of statistical packages](#) (Wikipedia).

14.9 Dissemination tools

A number of data dissemination tools are available for use by an NSO (see Chapter 10.7.1 ‘*Dissemination by websites and data portals*’).

Links to guidelines, best practices and examples:

- [CountrySTAT](#) is a collection of software tools, methods, and standards for the analysis of data coming from different sources. Data can be manipulated and visualized directly online, and various types of charts allow users to perform further analysis.
- Example of CountrySTAT [implementation in Uganda](#).
- The [Integrated Multi Information System \(IMIS\)](#) is an integrated system providing users with access to national socio-demographic and economic data.
- The [NADA](#) dissemination platform provides access to the International Household Survey Network (IHSN) microdata.
- The [OECD.Stat](#) system allows users to search for and extract data from OECD databases. The platform is used by a number of other NSOs and International Organizations.
- [Knoema](#) is a subscription-based dissemination platform that provides access and visualisation tools for use with national databases.
- [PC-Axis](#) is a consortium led by Statistics Sweden that has developed a number of programs used to present statistical information for a number of NSOs.
- [SDMX Reference Infrastructure \(SDMX-RI\)](#) is a software suite produced by Eurostat, available as open-source, that enables the establishment of APIs for SDMX data dissemination and exchange directly from dissemination databases, without any software development required.
- [Fusion Registry](#) is an integrated statistical data and metadata solution developed by Metadata Technology that facilitates data collection, integration, exchange, reporting,

dissemination using SDMX standard. The basic Community Edition is available as a free download, while the full-featured Enterprise Edition is commercial software.

14.10 Other current IT issues

The continuously evolving IT environment means that an NSO has to be permanently alert to the constant flow of new products becoming available from technology companies and from the international statistics community.

In the quest to modernise statistical systems in order to provide even more high-quality data more rapidly to meet increasing demands, an NSO needs to be aware of new developments and to learn from the experience of others within the community. For this to happen, an NSO will need to engage with the numerous collaborative bodies such as HLG-MOS and the SDMX community coordinated by regional institutions and international standards communities.

Of course, a balance needs to be struck between maintaining stable and reliable systems and the continual implementation of changes in order to keep up with the latest technology. Assessments of needs and risks must be built into the strategy and planning of an NSO as an ongoing process.

Chapter 15. Management of Buildings, Physical Space and Finance

15.1 Managing environmental, mechanical, and electrical needs

Building management and the management of building-related resources are often closely connected to physical characteristics of building(s). It is in the interest of every national statistical office (NSO) to have a cost-effective building, but the main motive for trying to change the building is usually a lack of space and a desire to consolidate the NSO (or at least a logical set of its organizational units) into a single location. The decision to move to another building is often outside of the NSOs control and is usually taken (or influenced) by a government department that oversees government property. However, a well-organized lobbying campaign can sometimes be helpful, particularly if it includes a solution that includes cost savings or can be seen as beneficial to multiple organizations. As government organizations, NSOs are often located in old spaces that are not suited for the needs of a modern organization, but these can have the advantage of being in prestigious locations that might be exchanged for more space on a less expensive location. Ideally, an NSO should rent, buy or be awarded a building that suits its activities, including adequate meeting places. The building should be cost-effective, have adequate IT infrastructure, and be located in an environment where an adequate pool of potential qualified employees is available. Location in the vicinity of other government offices may also be considered an advantage.

Even though heating, ventilation and air-conditioning, fire-extinguishing systems, electrical utilities and elevator(s) depend on physical characteristics of the building, they should not be taken for granted. These systems must be regularly serviced and maintained to ensure safety during their operation. Maintenance is usually planned and performed according to an annual maintenance plan. Of course, unscheduled repairs cannot be avoided (particularly in older buildings), but regular maintenance, refurbishment and upgrades can minimise such incidents and reduce the long-term maintenance costs.

NSOs' operations impact the environment, and the assessment of this impact can also be beneficial in cost-saving. This assessment should not include only cost-saving measures such as better management of energy (i.e., shutting down the heating, air conditioning and non-essential electricity outside office hours), but also the analysis of possible savings through energy refurbishment (i.e., improvement of the insulation properties, heating/cooling equipment upgrades, and installation of LED lighting). In some cases, an energy-inefficient building could be replaced with a new building, as the cost of refurbishment may be greater than the construction costs. Programmes for improving public buildings' energy efficiency may be available and statistical offices as public institutions would be eligible for refurbishment in such cases. Particular attention should also be paid to waste management, as promotion of responsible practices can significantly reduce both the costs and total environmental impact. Even though that waste management and recycling are heavily dependent on local regulations, awareness, and infrastructure, much can be done at the organization's level. Establishing a waste management plan that includes materials-recovery facilities for recyclable resources and providing open and controlled dumpsites is highly recommended.

Technological advancements in computer hardware have significantly reduced the energy and space requirements for servers. Servers previously required installation into specially designed refrigerated rooms but nowadays can easily fit into relatively small cabinets with integrated cooling. Having an outdated server can incur high electricity costs and at the same time occupy large space that could have been retrofitted for office or other purposes.

Links to guidelines, best practices and examples:

- [Office space study](#): A review from facilities management context.

15.2 Managing office space

15.2.1 Managing office layout

The office layout is important because of its impact on the flow of work, the economy of floor space and equipment, employee comfort and satisfaction, and impressions given to visitors. Layout planning is easier and most effective in new buildings. A more common problem is having to layout office facilities in a building that was not tailored to fit a statistical office's needs, where space is often limited, and units must be fitted into predefined areas.

A general recommendation for office space arrangement is to optimise the 'natural' flow of work. This can be done by simulating the daily routines and arranging equipment to minimise unnecessary travel and delays. Organizational units that often cooperate or have related functions should be placed nearby to reduce travel time. Cross-cutting and overarching services, such as data processing or IT, should be placed conveniently near the departments that most often use their services. Special attention should also be paid when designing social and meeting spaces, as functional spaces can be particularly beneficial for improving communication, cooperation and well-being.

Revisions of office layout should be carried out whenever a situation calls for a change, usually linked to decreases or increases in personnel. Minor reviews, on the other hand, should be performed at least every second year. The standard tool for the office space review is to regularly calculate, monitor and compare the average amount of space allocated to each staff per surface unit; bearing in mind the recommended space minimums and other specificities, such as placement of specialised equipment, printers, etc.

Links to guidelines, best practices and examples:

- A step-by-step list of things to consider when planning an office layout - [Office Layout and Space Management](#).

15.2.2 Distribution of offices

As employee satisfaction is one of the most important aspects of any successful activity, managing office space should be handled with particular care. Changes in office arrangements should be carefully planned, announced in advance and swiftly executed (the move should be organized over the weekend if possible). As the public sector has limited opportunity to provide wage increases, having a nice office may be seen as a sign of prestige. Distributing the office space in any organization can easily turn into a major management problem as changes in office layouts can motivate (and demotivate) staff as much as a promotion or demotion.

15.2.3 Open-space

Some statistical offices have introduced open-space layouts, where office areas are divided by as few fixed walls as possible. The arguments speaking in favour of open-space office reduce costs, increased flexibility, collaboration, and teamwork. However, the main disadvantages of open-space offices are the lack of intimacy, noise and distraction.

15.2.4 Hot-desking

Open office layouts are often combined with hot-desking, where workers take whatever desk is available, instead of having one assigned space. These arrangements are particularly useful for organizations, or units within an organization, that can use flexible working arrangements and organize the work so that multiple tasks can be performed remotely. The main benefit of hot-desking is cost reduction as it helps cut down on unnecessary real estate expenses by eliminating the waste of excess space. It is useful for organizations where workers spend much of their time travelling or spend part of the week working remotely and can create an atmosphere of open spaces and freedom. However, besides strong hygiene concerns, it puts rather high stress on employees that like to personalize their working environment and configure their workstation.

15.3 Building security

Since NSOs possess confidential and personal information, they must take building security seriously and restrict not only digital but also physical access to buildings and related infrastructure. The key to managing building security focuses on two main aspects: visitor management and [access control](#), both of which start at the entrance to the building. Access control can be implemented using electronic devices (such as keys, electronic locks on automatically closing doors or mantraps), ideally combined with surveillance devices such as cameras. The general recommendation is to limit the number of visitor access points and enforce the rule that both visitors and staff must wear identification badges that are visible at all times and visitors escorted by staff. Electronic gates enabling access control are introduced at multiple locations are recommended if finance is available. This also allows structuring the building space into different zones with specific access control depending on the security restrictions needed. For most sensitive areas, to increase the access security, control should be organized with two- or three-factor authentication, which includes:

- a) something the user knows, e.g., a password, passphrase or PIN;
- b) something the user has, such as smart card or a key fob;
- c) something the user is, such as fingerprint, verified by biometric measurement.

Ensuring the safety of personnel should be a major preoccupation of any manager. Every employee should pass basic safety training (that includes handling a fire extinguisher), and at least one person in each organizational unit should be trained in providing first aid. Evacuation plans should be displayed in every room, evacuation routes should be marked, and evacuation exercises should be performed regularly (preferably at least once every two years). Secure and monitored access to buildings is also important in ensuring personnel's safety, including protecting personal and organizational property.

15.4 Critical statistical infrastructure protection

The production of official statistics is a complex chain of operations. An NSO requires the same critical statistical infrastructure to fulfil its core functions irrespective of its size or capacity. This infrastructure comprises physical space where the NSO is hosted; trained NSO staff with expertise and institutional knowledge; IT infrastructure necessary to manage its computer systems, data maintained by the NSO; and software systems used to store and process the NSO's data. Therefore, an NSO must take necessary measures to ensure the production of statistics can be maintained in the event of any disastrous situation.

15.4.1 *The COVID-19 pandemic*

The COVID-19 pandemic has created a previously unencountered set of problems. NSOs have tried to organize statistical production in conditions where businesses are less inclined to provide data, where physical contact with respondents is to be avoided to prevent spreading the infection and where remote work is putting huge pressure on IT infrastructure which is a particular problem in developing countries. Other issues have arisen during the quarantine such as bandwidth, connection security and remote access, how to organize communication between various parts of the organization, how to ensure attendance of skeleton workforce in the absence of public transport, how to improve motivation for remote work, how to organize childcare and other new challenges.

Links to guidelines, best practices and examples:

- [UN COVID-19 Data Hub](#). This United Nations Department of Economic and Social Affairs resource makes data relevant to COVID-19 response readily available as geospatial data web services, suitable for the production of maps and other data visualizations and analyses, and easy to download in multiple formats.
- [Impact of the COVID-19 pandemic on the 2020 census](#). The United Nations Statistics Division website provides an overview of the pandemic's consequences in census-taking in the year 2020.
- [Official Statistics in the context of the COVID-19 crisis](#). This website focuses on the role that official statistics will have to play in the phase of world-wide recovery from the pandemic and the rapid investments and actions needed to properly fulfil this role.
- [UNECE website dedicated to the COVID-19 response](#) in the context of official statistics. It contains information on the role of national statistical offices (NSOs) in the COVID-19 response, impacts of the crisis on statistical production and related resources.
- [UNECA African System Collaboration Platform](#) enables teams across the continent to engage with each other and share best practices, methodologies, and guidelines during the COVID-19 crisis and beyond. The platform is designed to be a community of practice to discuss the contemporary issues faced by national statistics organizations.

15.4.2 *Climate change*

Climate change brings its own set of risks. The Intergovernmental Panel on Climate Change (IPCC) [summary for policymakers](#) lists the following consequences:

- a) Sea-level rise (SLR). SLR is projected to be directly related to the degree of global warming and proximity to the equator. SLR estimates range from 50cm with 1°C global warming up to 1m with 4°C global warming by the 2050s depending on carbon emissions. SLR raises the risk of storm surges, tropical cyclones, and tsunamis, as well as persistent flooding and coastal erosion.
- b) Extreme temperatures. Global warming is projected to result in more frequent and more intense episodes of extreme heat. While the marginal impact is projected to be smaller for countries closer to the equator, this comes on top of already high average temperatures for small states in the Caribbean, Pacific, and Africa.
- c) Geotectonic phenomena. Countries, especially those within the Pacific Ring of Fire, shall mitigate the impact brought about by disasters such as volcanic eruptions, earthquakes, tsunami and other related geotectonic phenomena.

15.4.2.1 Particular vulnerability of small island developing states

This risk of such events applies particularly to NSOs in countries more vulnerable to natural disasters and the consequences of climate change, particularly for small island developing states (SIDS). As noted in the [IMF policy paper on small states' resilience to natural disasters and climate change](#), many small island states are highly vulnerable to storm damage. Some face a difficult future due to sea-level rise. Projections of climate parameters by IPCC and Maplecroft's 2016 climate change vulnerability index suggest that countries closer to the equator and low-lying coastal countries (including many small states) are extremely or highly vulnerable to climate change. Roughly three-quarters of low-income countries and one-third of small developing states are assessed as extremely or highly vulnerable to climate change, compared to one-quarter of the rest of the world.

15.4.2.2 What steps should an NSO take?

Any steps an NSO takes to allay the risks of such natural disasters would normally be part of a wider government disaster recovery programme. It could be argued that official statistics are part of the critical national infrastructure; as such, should be under special protection and covered by appropriate regulations and protocols for disaster recovery and backup and contingency plans to restore a basic setup after any disaster. However, a thorough risk analysis should be carried out by NSOs to identify and quantify the major disaster or climate change risks, their likelihood of realisation, potential impacts, and key vulnerabilities (infrastructures at risk, vulnerable communities and populations).

This risk analysis should also identify what actions should be taken to mitigate them in the event of a natural disaster. (see Chapter 5.9 - *Risk Management*). Logically an NSO should focus on dealing with risks particular to the NSO itself - examples being large scale server failure, fire in the building and flooding. Actions to mitigate these risks should cover data backup policies, disaster drills and evacuation planning.

Of course, it is one thing to list what actions should be taken and quite another to finance and implement them as they can be very costly and are dependent on appropriate funding outside of the regular operational budget. PARIS21 [SIDS – NSDS guidelines](#) suggest that small states should integrate risk reduction and disaster response programs into their core budget and debt management frameworks.

As noted in the PARIS21 report ‘[Advancing statistical development in small island developing states in the post-2015 era](#)’ there is a need for proper backup in situations when national systems fail, political and security conditions deteriorate, data is lost or unavailable, and/or when personnel are unavailable or have been replaced or transferred. Resources to upgrade much-needed ICT infrastructure (e.g., computers, databases, software) to support statistical work in NSS is beyond the means of several SIDS. This is a serious obstacle to daily statistics work which also hampers communication with data users. NSOs rely on donor support in most cases as part of statistics projects (i.e., census or survey operation) to upgrade their computers and buy new software.

Regional bodies provide support in terms of identification and provision of adapted equipment for use by NSS. In some instances, regional data processing facility is established using pooled resources from country contributions to aid NSS in data processing, analysis, and statistical information storage. The importance of the NSO in providing data during and after a natural disaster should also be taken into consideration. As noted in the UNECE report ‘[Recommendations on the Role of Official Statistics in Measuring Hazardous Events and Disasters](#)’, in many countries, the national statistical system's roles in disaster risk management and monitoring of hazardous events and disasters are not clear. The information needs for dealing with hazardous events and disasters are complex and involve many different agencies. Official statistics can meet some needs, but others require different types of information that cannot be provided by the national statistical system. Therefore, clarifying its roles in providing information related to hazardous events and disasters regarding institutional cooperation, integration of statistical and geographical information, and statistical confidentiality, among other issues, is important.

Links to guidelines, best practices and examples:

- [UN office for Disaster Risk Reduction](#) (UNISDR).
- [UNISDR Small Island Developing States](#), disaster risk management, disaster risk reduction, climate change adaptation and tourism.
- The Importance of a [Disaster Recovery Plan](#).

15.4.3 Examples

a) Statistics Mauritius

Statistics Mauritius has an established [data backup system](#) of its statistical data as well as business data and website. The frequency of the backup is determined by the level of criticality of the data. Core databases such as labour, prices, trade and demographic statistics are backed up daily. The central source code repository for all core applications is backed up twice weekly. Shared network data files for dedicated units are backed up weekly.

b) St. Vincent and the Grenadines

Adoption of the [World Bank Caribbean Digital Transformation](#) program to improve: capacity, storage and resilience.

c) Suriname

Back up methods to deal with possible disasters: The NSO of Suriname (ABS/GBS-Suriname) utilizes different [options to back up](#) its data.

15.5 Managing finance

NSOs and other producers of official statistics are government-financed institutions, and as such are expected to be transparent and cost-effective in terms of the use of resources. As the main share of the budget is usually related to wages, optimal utilisation of workforce is extremely important even when/where general government considerations determine their level outside of the influence of the statistical office. Issues related to budgetary allocations, optimal strategies to face cost-cutting or ensure additional financing and the ability to gain additional resources by providing services to the market are covered in Chapter 5.3 - *National statistical office as an organization*, while this chapter addresses general issues that are related to finance and cost management that are not covered in other chapters.

15.5.1 Monitoring costs

Some NSOs have set up systems that link statistical activities with costs incurred at each phase of the production process (cost accounting systems). This allows for cost monitoring of statistical activities but also monitoring of costs of each phase. This type of information provides valuable insights into the allocation of budgets and enables evaluation of plans and performance. By analysing the results of cost accounting systems (or ad-hoc estimates), priorities for optimisation can be identified. Further, this type of information makes negotiating for funding easier, as they provide concrete evidence that can be used in negotiations with Ministries of finance or other relevant line ministries.

Links to guidelines, best practices and examples:

- [Austria statistical office accounting system](#) (regulation and system).

15.5.2 Reducing costs

As household survey collection costs correspond to a significant part of the total budget, measures aimed at optimising survey collection (such as hiring surveyors for specific areas of the master sample for a longer period or by reducing the response burden through integration with administrative data) may be used to rationalise the total costs. Costs of software licences can be high, so it may be rational to consider developing a strategy to move the statistical production to open-source solutions. Investing in digitisation may also reduce the long-term cost, as printing many paper forms may be quite costly, however, sometimes digitisation also requires a change in legislation, as in some countries NSOs are obliged by law to use a paper-based collection system.

15.5.3 Managing budgetary difficulties

NSOs may encounter situations in which expenses must be prematurely restricted, due to lack of financial foresight, and often with little regard for the effects of such abrupt reductions. This is generally the case when, just before the end of a fiscal review, the head of financial administration realizes that certain obligations will not be met unless some immediate sacrifice is made. It may also transpire that financial administrators find that the NSO still possesses a

considerable portion of its resources at the end of a fiscal review. In such a case, a response might be to find a way to spend these funds to not lose funding for the next fiscal period. However, arbitrary spending can be more harmful than hurried measures to curtail expenditure, leading to poor managerial decisions and waste of the public treasury. Regular monitoring of the expected gaps between expenditures and resources should be taken to prevent such situations. To fulfil this requirement, the financial administration unit must have the information base and the analytical capacity to provide warnings. Effective management often comprises determining and allocating resources where they are needed. Sometimes this includes reallocating resources from areas where they are abundant. Strategies on how to gain additional resources and minimise cuts are presented in Chapter 5.3.1.2 - *Organizing an NSO*.

Chapter 16. The International Statistical System (ISS)

16.1. Introduction and definitions

16.1.1 The UNFPOS in the context of international statistical activities

This chapter focuses on international statistical activities—*who* undertakes them, *what* they are and *why* they are undertaken.

It is structured to provide concise information and guidance on how national statisticians can implement principles 9 and 10 of the United Nations Fundamental Principles of Official Statistics ([UNFPOS](#)) through *coordination*, *cooperation* and *collaboration* mechanisms operating within the international statistical system:

- a) **UNFPOS 9:** The use by statistical agencies in each country of international concepts, classifications and methods promotes the consistency and efficiency of statistical systems at all official levels.
- b) **UNFPOS 10:** Bilateral and multilateral cooperation in statistics contributes to the improvement of systems of official statistics in all countries.

On UNFPOS 9, pages 80-90 of the [Implementation guidelines of the UNFPOS](#) highlight that without common standards and metadata, comparability of data produced by different agencies would be impossible. This applies equally within a country and across countries.

Comparability is an important dimension of quality. If data are not comparable, they lose a lot of their utility. If data lose their utility, the organization that produces them loses relevance. It is also a key principle of work to modernise official statistics production and services that the use of common standards improves efficiency, both within individual agencies, and within the official statistics “industry” as a whole.

Therefore, the objective of the Fundamental Principle 9 is to ensure that official statistics (and their producers) remain relevant to users and provide good value for money to national governments. This principle further extends the scientific independence principles and standard related aspects of Principle 2: *To retain trust in official statistics, the statistical agencies need to decide according to strictly professional considerations, including scientific principles and professional ethics, on the methods and procedures for the collection, processing, storage and presentation of statistical data.*

Statistical frameworks discussed in earlier chapters of the handbook provide standards and requirements for sectoral statistics (e.g., SNA, environment, labour, gender), multi-sectoral statistics (including indicator frameworks such as that for the SDGs), and quality assurance for official statistics. As described in the current chapter, these products are the results of UNFPOS actions taken by national statistical systems and the international statistical system to implement 10 —bilateral and multilateral cooperation in statistics to improve systems of official statistics in all countries.

16.1.2 Definitions for purposes of this chapter

Main definitions used in this chapter are listed hereunder and in the glossary at the end of the Handbook:

- a) **International statistical system (ISS)**- the international organizations, or structural entities thereof, involved primarily or exclusively in developing, producing, and disseminating official statistics at global, regional and sub-regional levels. In principle organizations or structural entities within the ISS conform to the Principles Governing International Statistical Activities.
- b) **International organization (IO)**- a body with an international membership, scope, or presence that promotes cooperation and coordination between or among its members. There are many types of international organizations. One way of categorizing them is to distinguish between *intergovernmental organizations*, *supranational organizations* and *international non-governmental organizations*.
- c) **Inter-governmental organization (IGO)**- an international organization that involves two or more countries working on issues of common interest and that has been established by a treaty that acts as the charter founding the organization. The secretariat of an IGO is the organ that fulfils its central administrative or general secretary duties. The United Nations is an intergovernmental organization.
- d) **Supranational organization**- an international organization with mandate, legislative power, and authority that goes beyond its member states' boundaries. It differs from an intergovernmental organization in that within it, decisions are made by institutions specific to the organization, and not systematically by meeting of heads of state or their representatives. The European Union is one of the most prominent examples of a supranational organization.
- e) **Non-governmental organization (NGO)**- an organization which is independent of government involvement. NGOs are a subgroup of organizations founded by citizens, including associations that provide services to their members and others.
- f) **International non-governmental organization (INGO)**- a citizen-based organization independent of government involvement, with an international membership, scope, or presence, mobilizing resources and acting as implementer and catalyst to support its members and others.
- g) **International partnership (IP)**- An international body established between inter-governmental organizations, supranational organizations, national bodies, corporations, philanthropic foundations and/or local and national civil society/non-governmental organizations working towards a similar or shared goal. It is common to consider INGOs and IPs as being part of the same category of international organizations. The Global Partnership for Sustainable Development Data is an example of an international partnership, and PARIS21 is an IP engaged in statistical capacity development.
- h) **International financial institution (IFI)**- a [financial institution](#) that has been established (or chartered) by more than one country, and hence is subject to [international law](#). Its owners or shareholders are generally national governments, although other [international institutions](#) and other organizations may be shareholders. The International Monetary Fund is an example of IFI.

- i) **Multilateral development bank (MDB)**- an IFI, created by a group of countries, provides [financing](#) and professional advising for [development](#). MDBs can be global (e.g., World Bank) or regional (e.g., African Development Bank) in coverage.

16.1.3 Introduction to the international statistical system

The international statistical system (ISS) comprises international or structural entities of international organizations involved primarily or exclusively in the development, production and dissemination of official statistics at global, regional or sub-regional levels. In principle, organizations or structural entities within the ISS conform to the *Principles Governing International Statistical Activities* (Refer to Box 9).

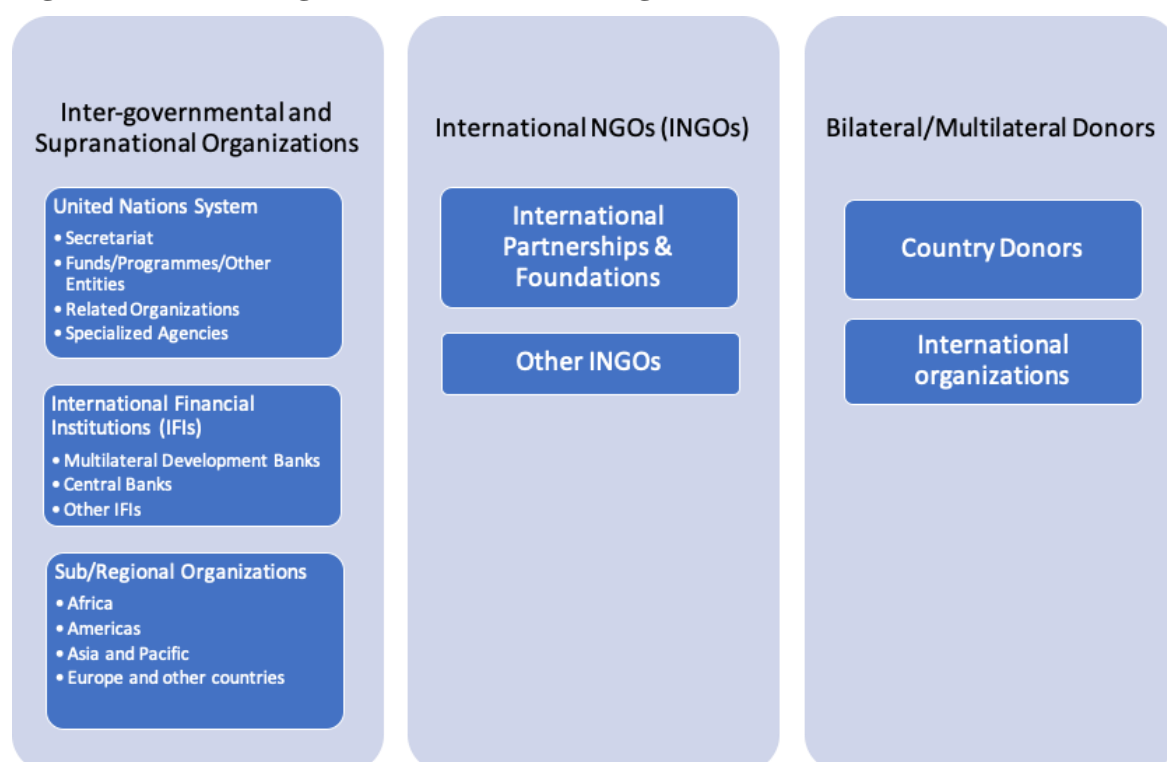
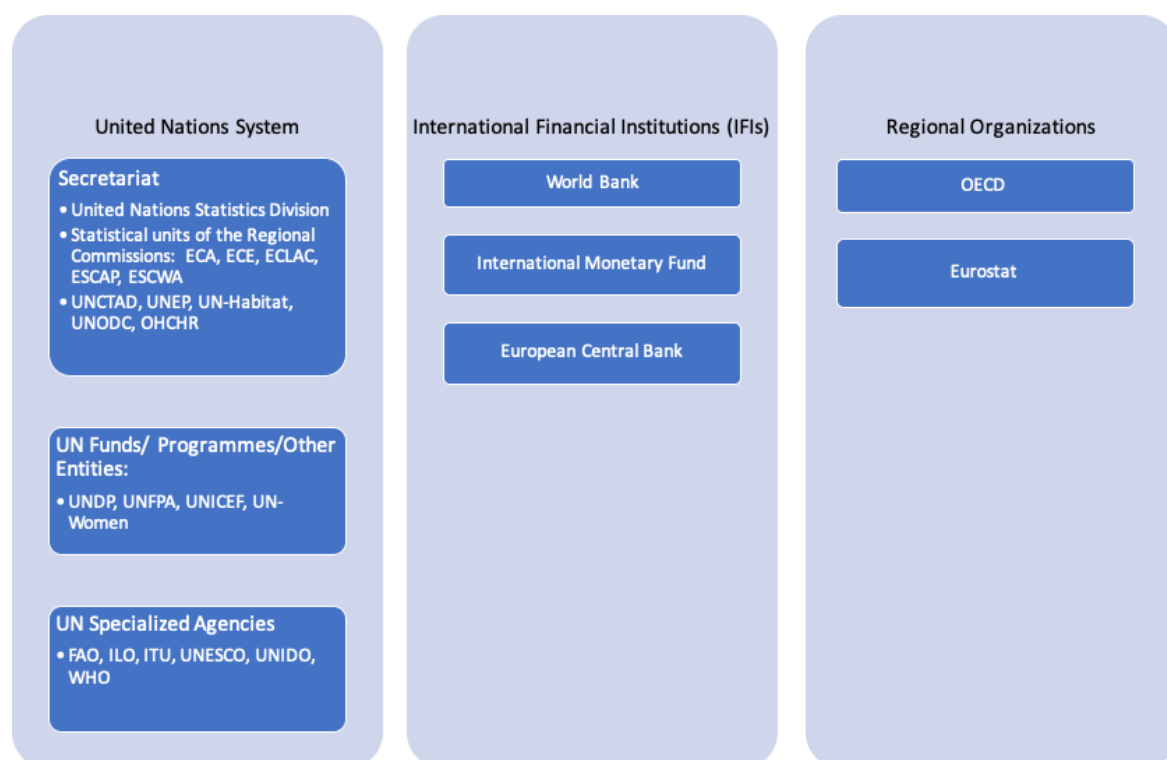
Box 9: [Principles Governing International Statistical Activities](#)

Bearing in mind that statistics are essential for sustainable economic, environmental and social development and that public trust in official statistics is anchored in professional independence and impartiality of statisticians, their use of scientific and transparent methods and equal access for all to official statistical information, the chief statisticians or coordinators of statistical activities of United Nations agencies and international and supranational organizations assembled in the Committee for the Coordination of Statistical Activities are implementing ten principles to enhance the functioning of the international statistical system.

The ISS and national statistical systems collaborate and voluntarily cooperate through various mechanisms on a wide range of areas and concerns covered in this Handbook, including:

- a) development of statistical methodologies to address new data needs;
- b) formulation and endorsement of internationally agreed recommendations on statistical standards, infrastructure, analytical frameworks, quality assurance frameworks, modernization models etc. and the relevant implementation manuals or guides;
- c) technical cooperation and technical assistance in the adoption of internationally agreed recommendations;
- d) coordinated capacity development of national statistical agencies and systems; and
- e) systematic data flows, and exchange with enhanced comparability of official statistics and internationally agreed development indicators.

A broad overview of the categories of organizations comprising the ISS is depicted in Figure 19. Some key entities of the ISS are indicated in Figure 20. More detailed descriptions of the statistical mandate, domains, programmes and products, technical cooperation and capacity development activities of the various organizations are presented in subsequent sections.

Figure 19: Main categories of international organizations in the ISS**Figure 20: Some key organizations of the ISS**

16.2. The United Nations System in the ISS

The “family” of UN entities and their relationships to each other (United Nations System) is pictured in Annex 6.⁴³ United Nations entities with statistical mandates and/or engage in discussions on statistical development issues either report to or whose work is coordinated through the Economic and Social Council ([ECOSOC](#)).

16.2.1 Economic and Social Council (ECOSOC)

ECOSOC is the principal body for coordination, policy review, policy dialogue and recommendations on economic, social and environmental issues, as well as the implementation of internationally agreed development goals. It serves as the central mechanism for activities of the UN System and its specialized agencies in the economic, social and environmental fields, supervising subsidiary and expert bodies⁴⁴. It has 54 Members, elected by the General Assembly for overlapping three-year terms. It is also responsible for the follow-up to major United Nations conferences and summits. The latter includes its functions relating to the *National Voluntary Reviews* on the status of implementation of the SDGs that are part of the annual discussions of the [High-Level Political Forum on Sustainable Development](#) (HLPF).

The [HLPF](#) is the main United Nations platform on sustainable development, and it has a central role in the follow-up and review of the [2030 Agenda for Sustainable Development](#) the [Sustainable Development Goals \(SDGs\)](#) at the global level. The Forum meets annually under the auspices of the [Economic and Social Council](#) for eight days, including a three-day ministerial segment and every four years at the level of Heads of State and Government under the auspices of the [General Assembly](#) for two days.

As part of its follow-up and review mechanisms, the 2030 Agenda encourages member states to conduct regular and inclusive reviews of progress at the national and sub-national levels, which are country-led and country-driven. These [national reviews](#) are expected to serve as a basis for the regular reviews by the HLPF. These reviews by the HLPF are voluntary, state-led, undertaken by both developed and developing countries, and provides a platform for partnerships, including through the participation of major groups and other relevant stakeholders.

A related crucial dimension of the HLPF follow-up and review process of implementing the 2030 Agenda is the regional forums for sustainable development (see Chapter 16.14.2 - *High-level Group for Partnership, Coordination and Capacity-Building for statistics for the 2030 Agenda for Sustainable Development (HLG-PCCB)*). These regional forums are convened annually by the five regional commissions. The regional forums serve as an important mechanism, not only for tracking progress in implementation at the regional level, but also for keeping all the stakeholders mobilized and engaged in strengthening their commitment to concerted action, and in garnering international support for efforts to translate the SDGs into measurable and shared prosperity that benefits the planet and its people.

⁴³ More information on the United Nations is available @ <https://www.un.org/en/sections/about-un/overview/index.html>.

⁴⁴ More information on the ECOSOC in brochure @ https://www.un.org/ecosoc/sites/www.un.org.ecosoc/files/files/en/2020doc/ecosoc_brochure_2020_digital_2th.pdf

16.2.2 United Nations Statistical System

The UN statistical system can be loosely described as the set of all statistical units of the United Nations system. Over the years, it has grown significantly, reflecting the increasing complexity of the development phenomena with which the United Nations is concerned and demonstrating that solid and high-quality statistical information is an indispensable prerequisite for global development. The institutional complexity of the United Nations statistical system mirrors the institutional complexity of the United Nations itself.

The United Nations Statistical Commission (UNSC), the “apex” entity of the international statistical system is a creation of the United Nations and a functional commission of the ECOSOC.

Four broad groups of UN System entities with statistical mandates can be distinguished.

- a) First, there is a group comprising the (#2) *secretariat units*, including the Statistics Division (UNSD) under the Department of Economic and Social Affairs (#2.1- DESA) and the statistical units of the five regional commissions (#2.2).
- b) Second, there are the statistical units of (#3) *funds and programmes and other entities*--for example, the United Nations Development Programme (UNDP), the United Nations Children’s Fund (UNICEF), the United Nations Population Fund (UNFPA) and the United Nations Entity for Gender Equality and the Empowerment of Women (UN-Women). Each has its own funding and, therefore, its own administrative and programming procedures.
- c) Third, there are the statistical units of the (#4) *specialized agencies* such as the International Labour Organization (ILO), the United Nations Educational, Scientific and Cultural Organization (UNESCO), the Food and Agriculture Organization of the United Nations (FAO) and the World Health Organization (WHO), each being mandated by a governing body. The members of the specialized agencies, which decide on their budgets and programmes, are composed mostly of governmental bodies of member States, but, in some cases, such as the ILO, employers’ and workers’ organizations are also members. The members decide the budgets and programmes.
- d) Fourth, there are the statistical units of (#5) *related organizations*—the International Atomic Energy Association (IAEA), International Organization for Migration (IOM) and the World Trade Organization (WTO). These are organizations whose cooperation agreement with the United Nations has many points in common with that of Specialized Agencies but does not refer to Article 57 and 63 of the United Nations Charter, relevant to Specialized Agencies.

This decentralized approach has enabled the various statistical units to develop a high degree of technical specialization, thereby allowing them to serve their specific constituencies and users well. On the other hand, this decentralization has created a need for a functioning coordination mechanism, to ensure coherent data outputs and the effective utilization of scarce resources across the units.

Chapter 16.3 - *United Nations Statistical Commission* discusses the UNSC. The rest of section A describes the ISS entities organized around the categories shown in Figure 19. The subsections briefly describe the statistical mandates of the entities. More detailed information for each of the entities is available in “Cards”. The cards can be accessed by clicking the

embedded link in the name of the organization in the subsections or in the list of organizations in Annex 7.

16.2.3 United Nations Statistical Quality Assurance Framework

In March 2018, the chief statisticians of the UN⁴⁵ System ratified the *UN Statistical Quality Assurance Framework*⁴⁶. This framework is intended to complement and support the *Principles Governing International Statistical Activities*⁴⁷, in particular principle 4, which strives to continuously improve the quality and transparency of statistics and identifies the adoption of a quality assurance framework by each international organization as best practice.

The *UN Statistical Quality Assurance Framework* (SQAF) is an overarching framework, intended to provide a common language and understanding of quality across all UN entities, funds and programmes. It was prepared to address the UN statistical governance infrastructure gap, identified in the *Principles Governing International Statistical Activities*, noted above. The UN SQAF also provides a generic template, so that each UN agency can develop their own bespoke SQAF, tailored to their specific circumstances, and yet retain overall coherence, and common look and feel across all agencies.

The UN SQAF provides a comparable framework to the UN National Quality Assurance Framework (UN NQAF) discussed in Chapter 7 – *Quality Management*, except rather than being designed for national statistical systems and national official statistics, the UN SQAF is written for the UN statistical system and international official statistics. In fact, this is one of the most novel aspects of the UN SQAF – the clear distinction made between official national and official international statistics. The UN SQAF defines Official International statistics as:

“statistics, indicators or aggregates produced by a UN agency or other international organization in accordance with the Principles Governing International Statistical Activities formulated by the Committee for the Coordination of Statistical Activities” (UN SQAF: Page 9).

Key priorities of UN statistics, and international statistics generally, are adherence to international standards and by extension, international comparability across countries. Consequently, modifications may occasionally be made to national statistics. Thus, the UN SQAF notes, it is not sufficient to describe or define official international statistics as simply the reproduction of official national statistics. Differences between national and international official statistics generally arise where national statistics have been adjusted to ensure adherence to international standards, classifications, definitions or methods, or when national statistics are erroneous. The UN SQAF also highlights the fact that UN agencies and international organizations may use unofficial data to compile international aggregates. In this regard, UN agencies and international organizations are guided by ECOSOC Resolution 2006/6⁴⁸ para 5c, that calls on international agencies to avoid imputation unless specific country data are available for reliable imputations following consultations with concerned countries and through transparent methodologies.

⁴⁵ <https://unstats.un.org/unsd/unsystem/>

⁴⁶ <https://unstats.un.org/unsd/unsystem/documents/UNSQAF-2018.pdf>

⁴⁷ https://unstats.un.org/unsd/ccsa/principles_stat_activities/

⁴⁸ <https://www.un.org/en/ecosoc/docs/2006/resolution%202006-6.pdf>

It is envisaged that the UN SQAF will bring several benefits, including providing a systematic mechanism for identifying problems with the quality of statistical outputs, and possible actions for their resolution; creating awareness and culture of quality within agencies; and bring greater transparency to the processes by which statistics are produced, and their quality assured. But perhaps most importantly, the UN SQAF is a statement of intent; it makes explicit the objective or vision that all UN statistics will be assessed in accordance with the framework and that quality improvement possibilities are identified and implemented.

Like many national assurance frameworks or codes of practice, the UN SQAF comprises three quality components: institutional; process; and output. These in turn, together, comprise 8 quality dimensions, as shown in Figure 21. The UNCTAD SQAF is presented as an example in Box 10.

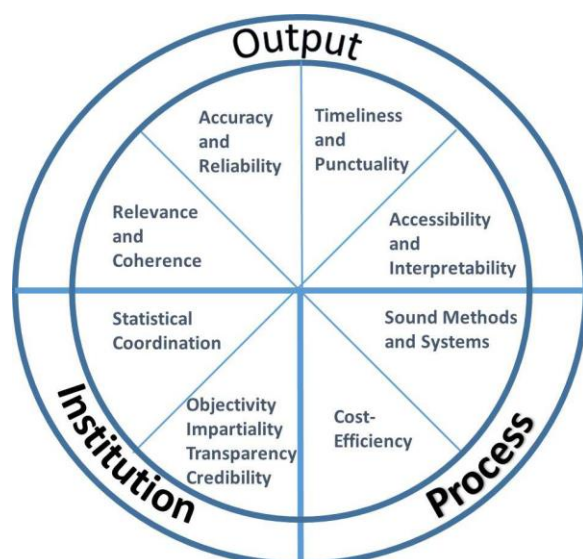
Box 10: UN SQAF - UNCTAD

In July 2019, UNCTAD launched its [Statistical Quality Assurance Framework](#). This framework was prepared by their Statistics Coordination Committee, approved by UNCTAD's Secretary-General, and then presented and approved by the Trade and Development Board, UNCTAD's inter-governmental governing body.

Two notable features of the UNCTAD SQAF are:

- (1) The SQAF is prefaced by a [statistics quality declaration](#) where UNCTAD's commitment to statistical excellence and making available high quality, independent statistics to inform research, debate and decision-making is reaffirmed, as is their commitment to the *Fundamental Principles of Official Statistics* and the *Principles Governing International Statistical Activities*.
- (2) The UNCTAD SQAF includes 26 Quality Performance Indicators. These QPIs set out explicit benchmarks against which UNCTAD's statistical quality will be assessed. Critically, these indicators are also the basis upon which UNCTAD will conduct their first self-assessment during 2020. For transparency, UNCTAD has published its [self-assessment questionnaire](#).

Figure 21: Quality components & dimensions



16.3 United Nations Statistical Commission (UNSC)

The [United Nations Statistical Commission](#) (UNSC), established in 1946 and convened for the first time in 1947, is the highest body in the international statistical system. It brings together the chief statisticians of member states from around the world. It is the highest decision-making body for international statistical activities, especially the setting of statistical standards, the development of concepts and methods and their implementation at the national and international level. In this sense, the UNSC is referred to as the apex entity of official statistics globally.

16.3.1. Mandate of the UNSC

The UNSC is one of eight functional commissions of the ECOSOC. It assists the ECOSOC in:

- a) promoting the development of national statistics and the improvement of their comparability;
- b) the coordination of the statistical work of specialized agencies;
- c) the development of the central statistical services of the Secretariat;
- d) advising the organs of the United Nations on general questions relating to the collection, analysis and dissemination of statistical information; and
- e) promoting the improvement of statistics and statistical methods generally.

16.3.2. Members of the UNSC

The UNSC consists of 24 member countries of the United Nations elected by the ECOSOC based on equitable geographical distribution, as follows:

Area	# of Members
Africa	5
Asia	4
Eastern European	4
Latin America and the Caribbean	4
Western Europe and other areas	7

The term of office of an elected member is four years. [Information on the current membership](#) is provided.

16.3.3. Methods of work of the UNSC

16.3.3.1 Annual session of the UNSC

The UNSC convenes formally in a four-day annual session. These four days, it considers issues of special concern in international statistical development, methodology, coordination and

integration of international statistical programmes, and support of technical cooperation activities in statistics and organizational matters. With the adoption of Agenda 2030 and the SDGs monitoring and evaluation indicator framework, the UNSC in its annual sessions has provided broad and targeted guidance to support national statistical offices in capacity strengthening and addresses new and emerging data and statistics challenges.

See here for a [summary of agenda items](#) for 2010-2019 and an [archive of past sessions](#).

In addition to the formal sessions, a programme of side-events that typically starts during the week before the formal sessions features informal discussions, informative briefings, informal consultations and networking of participants and organizations, and meetings of organizations, working groups and bureaus of intergovernmental statistical bodies. In recent years, the programme of events has included a Friday Seminar on Emerging Issues and a Monday High-Level Forum on Official Statistics; the outcomes of which are reported to the UNSC at its formal session.

The sessions are attended by its 24 members with all other member States of the United Nations invited to attend as observers. The five United Nations regional commissions, other United Nations entities (funds, programmes, specialized agencies and other bodies, entities and related organizations—refer to Figure 20) may also attend as observers.

Organizations that do not belong to the United Nations that belong to the international statistical system may also attend the annual sessions as observers. In addition, the UNSC generally welcomes the participation of non-members and the representatives of civil society organizations (CSOs) in various aspects of its work, as observers.

The Commission submits a report on each session to the ECOSOC. The report contains an account of the Commission's proceedings and the action taken/decisions on each agenda item. An archive of reports of past sessions can be found [here](#). The report of the 51st session can be found [here](#).

16.3.3.2 Officers and secretariat of the UNSC

The officers of the UNSC also referred to as *the Bureau*, are the Chairman, 3 Vice-chairmen and the Rapporteur. Elections are held at the beginning of a session.

The sessions of the UNSC are substantively serviced by the United Nations Statistics Division (UNSD).

16.3.3.3 Groups of the UNSC

Over the years, numerous groups have been established under the auspices of the UNSC to examine topics of methodological interest, develop normative documents, and coordinate statistical work. Typically, the outputs of the groups are submitted to the Commission for discussion and eventually for endorsement. These arrangements have allowed the Commission to fulfil the high expectations associated with being the highest body in the international statistical system. Collaborative work among national statistical offices and statistical units of international, regional and supranational organizations has resulted in a myriad of accomplishments in established and emerging areas of statistics.

Table 1.**Number of active groups under the Statistical Commission, by type of group and pillar (October 2019)**

<i>Type of group/pillar</i>	<i>Economic</i>	<i>Environmental</i>	<i>Social</i>	<i>Cross-cutting</i>	<i>Number of groups in type</i>
City groups	4	2	3	–	9
Friends of the Chair groups	1	–	–	1	2
Task forces	2	–	–	1	3
Working groups	4	2	2	2	10
Expert groups	2	1	5	3	11
Partnerships	–	–	–	1	1
Committees	1	2	–	2	5
Inter-agency and expert groups	–	1	1	1	3
Other ^a	–	–	–	2	2
Total number of groups	14	8	11	13	46

^a Other includes the high-level group and networks.

Source: <https://unstats.un.org/unsd/StatCom/51st-session/documents/2020-27-WorkingMethods-E.pdf>

Currently, a total of 46 groups operate under the UNSC. The arrangements and mandates of these various groups reflect a spirit of inclusiveness and collective ownership. In order to address the wealth and breadth of official statistics, ten distinct types of groups can be identified: city groups, friends of the Chair groups, task forces, working groups, expert groups, committees, inter-agency and expert groups, partnerships, high-level groups and networks.

Table 1 provides a breakdown of the types of groups by sustainable development pillar⁴⁹. [More information](#) on these groups is available.

16.4 United Nations Secretariat

16.4.1 Overview of the United Nations Secretariat

The Secretariat comprises the [Secretary-General](#) and international UN staff members who carry out the day-to-day work of the UN as mandated by the General Assembly and the Organization's other principal organs. It is organized along departmental lines, with each department or office having a distinct area of action and responsibility. Offices and departments coordinate with each other to ensure cohesion as they carry out the Organization's day-to-day work in offices and duty stations around the world.

Secretariat entities with statistical mandates, as shown in Figure 20 are the following:

a) Department of Economic and Social Affairs (DESA)

⁴⁹ The UNSC is overseeing a comprehensive and continuing review of the various types of groups that are currently operating and explores potential issues with a view to streamlining the current arrangements to achieve more coordinated and coherent working methods. The review started with the examination of the city group mechanism during the forty-ninth session and is intended to continue in the agenda item discussions on the working methods of the Commission.

- [United Nations Statistics Division \(UNSD\)](#);
 - [United Nations Population Division \(UNPD\)](#).
- b) **Regional commissions**
- [Economic Commission for Africa \(ECA\)](#);
 - [Economic Commission for Europe \(ECE\)](#);
 - [Economic Commission for Latin America and the Caribbean \(ECLAC\)](#);
 - [Economic and Social Commission for Asia and the Pacific \(ESCAP\)](#);
 - [Economic and Social Commission for Western Asia \(ESCWA\)](#).
- c) **Other agencies of the UN Secretariat**⁵⁰
- [Office for the Coordination of Humanitarian Affairs \(OCHA\)](#);
 - [Office of the United Nations High Commissioner for Human Rights \(OHCHR\)](#);
 - [United Nations Conference on Trade and Development \(UNCTAD\)](#);
 - [United Nations Environment Programme \(UNEP\)](#);
 - [United Nations Human Settlements Programme \(UN-Habitat\)](#);
 - [United Nations Office for Drugs and Crime \(UNODC\)](#).

16.4.2 DESA: United Nations Statistics Division

“The United Nations Statistics Division is committed to the advancement of the global statistical system. We compile and disseminate global statistical information, develop standards and norms for statistical activities, and support countries' efforts to strengthen their national statistical systems. We facilitate the coordination of international statistical activities and support the functioning of the United Nations Statistical Commission as the apex entity of the global statistical system.”

In the field of statistics, the United Nations Statistics Division has a unique role in setting global statistical standards, pulling SDG data together and coordinating the work of the entire UN Statistical System in capacity building to strengthen national statistical systems under the leadership of national statistical offices. This central role stems from the UNSD role as Secretariat of the Statistical Commission, ensuring that countries are clearly in the driving seat.

The Statistics Division's [main functions](#) are:

- a) **Data:** Collection, processing and dissemination of statistical information;
- b) **Methodology:** Standardization of statistical methods, classifications and definitions;
- c) **Capacity Development:** Technical cooperation programme;
- d) **Coordination:** Coordination of international statistical programmes and activities.

⁵⁰ Secretariats of UNEP and UN-Habitat, agencies classified under Programmes and Funds, are part of the UN Secretariat. Likewise, the secretariat of UNCTAD, classified under Other Entities, is part of the UN Secretariat.

16.4.3 DESA: Population Division

The UN Population Division provides comprehensive and scientifically sound inputs for the analysis of progress made in achieving the goals and objectives on population and development contained in the outcomes of major United Nations summits and conferences, especially the Programme of Action of the International Conference on Population and Development, the key actions for its further implementation, and the 2030 Agenda for Sustainable Development.

It produces population estimates and projections and provides statistics and analyses on patterns of rural and urban population change; international migration; the implications on the development of the changing age structure of the population; fertility and mortality levels and trends; the interrelations among the population, the resources, the environment and the development and the evolution of population policies.

16.4.4 United Nations Regional Commissions (UNRCs)

The United Nations has five regional commissions, each one with statistical mandates. The statistical mandates are carried out by intergovernmental statistical bodies serviced by a statistics unit of the secretariat. The statistical units report to both their respective Commissions and the UNSC. Table 2 lists the commissions and the corresponding bodies and units. *More information in the weblink.*

In general, the statistical mandate of the UNRCs includes technical cooperation with NSOs in the implementation of international standards, methods and analytical frameworks; contributing to the development of international statistical standards; and collection and dissemination of statistical data on the region. Their bi-annual work programmes are deliberated on and endorsed by their respective intergovernmental statistical bodies; these then go through the UN programming and budgetary processes.

Table 2. United Nations Regional Commissions and Statistics

Regional Commission	Intergovernmental Statistical Body	Secretariat Statistics Unit
Economic Commission for Africa (UNECA)	Statistical Commission for Africa	African Centre for Statistics
Economic Commission for Europe (UNECE)	Conference of European Statisticians	Statistical Division
Economic Commission for Latin America and the Caribbean (ECLAC)	Statistical Conference of the Americas	Statistics Division
Economic and Social Commission for Asia & the Pacific (ESCAP)	Committee on Statistics	Statistics Division
Economic and Social Commission for Western Africa (ESCWA)	Statistical Committee	Statistics Division

16.4.4.1 Economic Commission for Africa (UNECA)

The general mandate of UNECA is to promote inclusive and sustainable economic and social development in support of accelerating the economic diversification and structural transformation of Africa.

Its statistical mandate is to enable the African statistical system to produce high-quality statistics, data and geospatial information to inform sound and evidence decision-making through capacities building, advocacy, appraisal of relevant standards, and research on statistical concepts, methods and processes.

16.4.4.2 Economic Commission for Europe (UNECE)

UNECE has 56 member States in Europe, North America, Western and Central Asia, and aims to promote pan-European economic integration. All interested United Nations member States may participate in the work of UNECE.

Its statistical mandate is to support national statistical systems through methodological guidance, standards models and forums for various statistical domains, the modernization of statistics, and capacity development. By bringing together experts from across the statistical community, UNECE looks for common efficiencies and innovative ways to tackle persistent and emerging challenges in official statistics.

16.4.4.3 Economic Commission for Latin America and the Caribbean (ECLAC)

The 33 countries of Latin America and the Caribbean, together with several Asian, European and North American nations with historical, economic and cultural ties with the region, comprise the 46 Member States of ECLAC. Fourteen non-independent territories in the Caribbean are Associate Members of the Commission. Its purpose is to contribute to the region's economic and social development, coordinate actions directed towards this end, and reinforce economic ties among countries and with other nations of the world.

Its statistics mandate is to improve, in tandem with pertinent sub-regional bodies, the production, dissemination and use of statistics for evidence-based decision-making in the region.

16.4.4.4 Economic and Social Commission for Asia and the Pacific (ESCAP)

ESCAP is the regional intergovernmental platform and development arm of the United Nations in Asia and the Pacific and is responsible for assisting its members and associate members in integrating the three sustainable development dimensions. Its research, intergovernmental and capacity-building functions support members in implementing the 2030 Agenda for Sustainable Development through nine subprogrammes. Its mandate derives from the priorities established in relevant resolutions and decisions of the General Assembly and the Economic and Social Council, including Council resolution 37 (IV), by which ESCAP was established.

The mandates of the Statistics subprogramme arise from a number of General Assembly, ECOSOC and ESCAP resolutions, see [a/75/6 \(Sect.19\)](#).

16.4.4.5 Economic and Social Commission for Western Asia (ESCWA)

ESCWA provides a framework for the formulation and harmonization of sectoral policies for member countries, a platform for congress and coordination, a home for expertise and knowledge, and an information observatory. Its aims for member countries are to support economic and social development; promote interaction and cooperation; encourage the exchange of experience, best practice and lessons learned; achieve regional integration and ensure interaction between Western Asia and other regions; and, raise global awareness of the circumstances and needs of member countries.

Its statistics mandate is to: act as the regional focal point for the UN Statistics Division, United Nations organizations, other international and regional organizations and Member States; organize and coordinate activities to strengthen national statistical systems and harmonize official statistics; and coordinate the statistical data work of the ESCWA secretariat and the collection, production and dissemination of statistics.

16.4.5 United Nations Office for the Coordination of Humanitarian Affairs (OCHA)

OCHA is the part of the United Nations Secretariat responsible for bringing together humanitarian actors to ensure a coherent response to emergencies. OCHA also ensures there is a framework within which each actor can contribute to the overall response effort.

OCHA provides information management services to the humanitarian community to inform a rapid, effective and principled response. It gathers, shares and uses data and information, underpinning coordination, decision-making and advocacy. OCHA also adapts tools and methodologies for monitoring humanitarian response, including developing joint analysis with local communities, and with development, peace building, environment and other actors.

OCHA manages the [Centre for Humanitarian Data](#), which focuses on increasing the use and impact of data in the humanitarian sector.

16.4.6 Office of the United Nations High Commissioner for Human Rights (OHCHR)

OHCHR is the leading United Nations entity on human rights. It is mandated to promote and protect the enjoyment and full realization, by all people, of all rights established in international law, including human rights treaties. The mandate includes preventing human rights violations, securing respect for all human rights, promoting international cooperation to protect human rights, coordinating throughout the United Nations related activities, strengthening and streamlining the United Nations system in the field of human rights.

In implementing its mandate, OHCHR employs a wide range of methodologies, including statistical methods for human rights analysis, assessment, monitoring, and advocacy. It engages in data collection, analysis, and dissemination of statistics and indicators related to human rights and the SDGs, including the compilation and publication of world maps and meta-data.

16.4.7 United Nations Conference on Trade and Development (UNCTAD)

Founded in 1964, the first United Nations Conference on Trade and Development (UNCTAD) was held in Geneva, to address developing countries' growing concerns on international trade and development issues. Today, UNCTAD is mandated to support developing countries to access the benefits of a globalized economy more fairly and effectively towards an inclusive

and equitable global economic environment for trade and development. UNCTAD's statistics are mandated as part of the broader mandate.

16.4.8 United Nations Environment Programme (UNEP)

The United Nations Environment Programme (UNEP) is the leading global environmental authority that sets the global environmental agenda, promotes the coherent implementation of the environmental dimension of sustainable development within the United Nations system, and serves as an authoritative advocate for the global environment.

The UNEP statistics mandate focuses on strengthening the integration of environmental data and analysis, including the use of statistics and accounting to promote sustainable development and enhancing multi-agency collaboration on environmental indicators and monitoring. The mandate also covers scaling-up actions informed by environmental statistics and science, including integrated analyses across the three pillars of sustainable development.

16.4.9 United Nations Human Settlements Programme (UN-Habitat)

UN-Habitat is the United Nations agency for human settlements. Its mandate is to promote socially and environmentally sustainable towns and cities to provide adequate shelter for all.

The statistics mandate of UN-Habitat is geared towards improving the worldwide urban knowledge base by supporting governments, local authorities, academia, private sector and civil society in the development, production and application of policy-oriented urban indicators, statistics and other urban information and influence local, national and global policy debates and help set the agenda for sustainable urban and human settlements development.

16.4.10 United Nations Office on Drugs and Crime (UNODC)

The UNODC draws its mandate from the [Commission on Narcotic Drugs](#) and the [Commission on Crime Prevention and Criminal Justice](#) who address the need to integrate human rights in States' responses to drugs, crime and terrorism, through various resolutions, among others.

UNODC collects, analyses and disseminates drugs and crime statistics. In line with these mandates, in addition to the World Drug Report and the annual report to the Commission on Crime Prevention and Criminal Justice on world crime trends, UNODC maintains several on-line databases and ad hoc statistical, thematic and analytical reports. UNODC also has a mandated role in supporting capacity building efforts that assist Member States in providing reliable and comparable statistical drug and crime information.

16.5 Statistical Programmes of UN Funds and Programmes and Other Entities

16.5.1 Overview

UN funds and programmes and other entities (cards) included are:

- a) [United Nations Development Programme \(UNDP\)](#);
- b) [United Nations Population Fund \(UNFPA\)](#);
- c) [United Nations Children's Fund \(UNICEF\)](#);

- d) [United Nations Entity for Gender Equality and the Empowerment of Women \(UN Women\)](#);
- e) [International Trade Centre \(ITC\)](#);
- f) [Office of the United Nations High Commissioner for Refugees \(UNHCR\)](#).

16.5.2. United Nations Development Programme (UNDP)

UNDP was established in 1965 by the United Nations General Assembly. UNDP is the UN's global development network, and one of the world's largest inter-governmental development agencies.

UNDP helps countries achieve the eradication of poverty and reduce inequalities and exclusion through support for development policies, leadership skills, partnering abilities, institutional capabilities, and building resilience to sustain development results. UNDP is working to strengthen new frameworks for development, disaster risk reduction and climate change. UNDP supports countries' efforts to achieve the 2030 Agenda for Sustainable Development, guiding global development priorities through 2030.

UNDP's Strategic Plan 2018-2021 directly contributes to the 2030 Agenda principles of *leaving no one behind* and *reaching the furthest behind first*. The Strategic Plan includes a Common Chapter, shared with the Strategic Plans of UNICEF, UNFPA and UN-Women, which commits the four agencies to work together in "Ensuring greater availability and use of disaggregated data for sustainable development", among other key areas of collaboration.

16.5.3 United Nations Population Fund (UNFPA)

The [mandate of UNFPA](#), as established by the United Nations Economic and Social Council (ECOSOC) in 1973 and reaffirmed in 1993, is (1) to build the knowledge and the capacity to respond to needs in population and family planning; (2) to promote awareness of population problems and possible strategies to deal with these problems; (3) to assist countries in addressing their population problems in the forms and means best suited to the individual countries' needs; (4) to assume a leading role in the UN system in promoting population programmes, and to coordinate projects supported by the Fund.

At the International Conference on Population and Development (ICPD), held in Cairo in 1994, these broad ideas were elaborated to emphasize the gender and human rights dimensions of population.

UNFPA contributes to strengthening national population data systems by building or strengthening a data-centred approach worldwide, supporting modern data generation in all forms (population and housing census, household surveys, and civil registration); data processing and dissemination; and data analysis for demographic intelligence and measuring programme impact. In all activities, UNFPA strengthens or builds national statistical capacity.

16.5.4 United Nations Children's Fund (UNICEF)

UNICEF is the United Nations Fund responsible for providing humanitarian and developmental aid to children worldwide. It was founded in 1946 to advocate for the protection of children's rights, help meet their basic needs, and expand their opportunities to reach their

full potential. UNICEF is guided by the Convention on the Rights of the Child and strives to establish children's rights as enduring ethical principles and international standards of behaviour towards children. UNICEF works in over 190 countries and territories to protect the rights of every child through country programmes and National Committees.

UNICEF is the world's leading statistical data source on children used by over 1 million people annually. UNICEF is the sole or joint custodian for 19 SDG indicators and as such, the official source for most global data on children.

16.5.5 United Nations Entity for Gender Equality and the Empowerment of Women (UN Women)

UN Women is the United Nations entity dedicated to gender equality and the empowerment of women. A global champion for women and girls, UN Women was established in July 2010 to accelerate progress on meeting their needs worldwide. UN Women supports the UN Member States as they set global standards for achieving gender equality and works with governments and civil society to design laws, policies, programmes and services needed to ensure that the standards are effectively implemented and truly benefit women and girls worldwide. The entity works to position gender equality as fundamental to the SDGs and a more inclusive world.

UN Women's statistics mandate derives from the [Beijing Declaration and Platform for Action](#) which provides the framework for the work of the Entity (Strategic Objective H.3 Generate and disseminate gender-disaggregated data and information for planning and evaluation), as established by UN General Assembly Resolution A/RES/64/289. [UN Women's strategic plan, 2018–2021](#) outlines UN Women's strategic direction, objectives and approaches to support efforts to achieve gender equality and empower all women and girls. It supports the implementation of the Beijing Declaration and Platform for Action and contributes to the [gender-responsive implementation of the 2030 Agenda for Sustainable Development](#).

16.5.6 International Trade Centre (ITC)

Established in 1964, ITC is a joint agency of the United Nations and the World Trade Organization. ITC supports their parent organizations' regulatory, research, and policy strategies. It focuses on implementing and delivering practical trade-related technical assistance (TRTA) projects, dedicated to the development of micro, small and medium-sized enterprises.

The provision of innovative, cutting-edge market information to enable improved business decision-making has been at the heart of ITC's mandate since its foundation in 1964. In this regard, ITC's work is focused on: enhancing global public goods as the foundation for trade and market intelligence; strengthening the skills of local partners in effectively using trade and market intelligence to make business decisions; working with local trade and investment support institutions to improve their trade and market intelligence-related portfolio of services; developing new and innovative approaches to intelligence, including competitive intelligence; and facilitating evidence-based policy reform, with a focus on addressing non-tariff obstacles to trade in goods and services.

Together with UNCTAD and WTO, ITC has provided data and statistics for the trade related targets of the MDG and SDG agenda.

16.5.7 Office of the United Nations High Commissioner for Refugees (UNHCR)

The core mandate of the High Commissioner for Refugees, and thus the role and functions of UNHCR which was established in 1950, is to pursue protection, assistance and solutions for refugees. UNHCR also helps prevent statelessness by providing technical and advisory services to States on nationality, legislation and practice.

UNHCR is the provider of official, government-approved refugee statistics released annually in its Global Trends report on World Refugee Day since the beginning of this century. Accurate and up-to-date statistics on the forcibly displaced are for planning, monitoring and evaluation purposes, and for official reporting to UNHCR's Executive Committee, to ECOSOC, and to satisfy general information needs from the UN common system, donors, NGOs, for public information purposes, fund raising/appeals, speeches, research, and maps.

16.6 Statistical Programmes of UN Specialized Agencies

16.6.1 Overview

The UN specialized agencies (cards) included here are:

- a) [Food and Agriculture Organization of the United Nations \(FAO\)](#);
- b) [International Civil Aviation Organization \(ICAO\)](#);
- c) [International Labour Organization \(ILO\)](#);
- d) [International Telecommunication Union \(ITU\)](#);
- e) [United Nations Educational, Scientific and Cultural Organization \(UNESCO\)](#);
- f) [United Nations Industrial Development Organization \(UNIDO\)](#);
- g) [World Tourism Organization \(UNWTO\)](#);
- h) [Universal Postal Union \(UPU\)](#);
- i) [World Health Organization \(WHO\)](#);
- j) [World Intellectual Property Organization \(WIPO\)](#);
- k) [World Meteorological Organization \(WMO\)](#).

16.6.2 Food and Agriculture Organization of the United Nations (FAO)

Founded in 1945, the Food and Agriculture Organization (FAO) is a specialized agency of the United Nations that leads international efforts to defeat hunger. Its goal is to eradicate hunger, food insecurity, and malnutrition; eliminate poverty; promote progress in the form of economic and social development; and foster the sustainable management and utilization of natural resources to benefit present and future generations.

Statistics is a core component of FAO's overall mandate and strategic goals. The FAO Constitution (Article 1 paragraph 1) states that the Organization's function is to 'collect, analyse, interpret and disseminate information relating to nutrition, food and agriculture.'

16.6.3 International Civil Aviation Organization (ICAO)

The International Civil Aviation Organization (ICAO) is a UN specialized agency, established by States in 1944 to manage the administration and governance of the [Convention on International Civil Aviation](#) (Chicago Convention). ICAO works with the Convention's 193 Member States and industry groups to reach consensus on international civil aviation Standards and Recommended Practices and policies in support of a safe, efficient, secure, economically sustainable and environmentally responsible civil aviation sector.

Article 55 of the *Convention on International Civil Aviation* (Chicago Convention) specifies the importance of conducting research and studies “into all aspects of air transport and air navigation which are of international importance, communicate the results of its research to the contracting States...”. ICAO's work on Big Data and the dissemination of the analytical results is carried out, keeping in mind this requirement of the Chicago Convention.

16.6.4 International Labour Organization (ILO)

The only tripartite United Nations agency, the ILO, founded in 1919, brings together governments, employers and workers of 187 member States, to set labour standards, develop policies and devise programmes promoting decent work for all women and men.

The ILO fulfils multiple roles in relation to statistics on work and the labour market. International statistical standards on work are adopted through the tripartite International Conference of Labour Statisticians (ICLS) which has been meeting since 1923 and currently convenes once every 5 years and is hosted by the ILO.

The ILO Department of Statistics promotes and supports the wide implementation of statistical standards and provides high-quality information on decent work through a wide-ranging programme of technical assistance and capacity building activities, supported by its network of regional labour statisticians.

In addition, the ILO hosts the leading global database of statistical information on work and the labour market, ILOSTAT and produces a range of statistical publications on decent work and related issues.

16.6.5 International Telecommunication Union (ITU)

The ITU is the United Nations specialized agency for information and communication technologies (ICTs). Founded in 1865 to facilitate international connectivity in communications networks, ITU allocates global radio spectrum and satellite orbits, develops the technical standards that ensure networks and technologies seamlessly interconnect, and strives to improve access to ICTs to underserved communities worldwide.

ITU is the official source for global ICT statistics. ITU's work on statistics originated in 1973, when member states attending the World Administrative Telegraph and Telephone Conference in Geneva, instructed the ITU to publish telecommunication statistics, and a “Yearbook of Common Carrier Telecommunication Statistics”, in addition to several other telephone and telegraph indicators.

16.6.6 United Nations Educational, Scientific and Cultural Organization Institute of Statistics (UNESCO-UIS)

Founded in 1999, the UNESCO-UIS is the official and trusted source of internationally comparable data on education, science, culture and communication. As the official statistical agency of UNESCO, the UIS produces a wide range of indicators by working with national statistical offices, line ministries and other statistical organizations. To produce these indicators, the Institute develops the international standards, methodologies and capacity-building tools needed by countries to improve data quality and use at the national and global levels.

The UIS has been tasked with producing data needed to monitor progress towards the UN's Sustainable Development Goal on education (SDG 4), as well as key global targets related to science, culture and communications. The [Education 2030 Framework for Action](#) recognizes the UIS as “the official source of cross-nationally comparable data on education” and has given the Institute the mandate to “work with partners to develop new indicators, statistical approaches and monitoring tools to better assess progress across the targets related to UNESCO's mandate.”

16.6.7 United Nations Industrial Development Organization (UNIDO)

UNIDO is the United Nations' specialised agency for industrial development, promoting productive activities to reduce income poverty and contribute to environment-friendly technology of industrial production. Founded in 1966, UNIDO's mandate is to help the Member States promote and accelerate [inclusive and sustainable industrial development](#). UNIDO's mandate is fully integrated in-line with SDG-9, which calls to “Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation”.

UNIDO's statistics mandate is to produce reliable and internationally comparable industrial statistics for the use of international knowledge institutions.

16.6.8 World Tourism Organization (UNWTO)

The UNWTO, established in 1974, is the United Nations agency responsible for the promotion of responsible, sustainable and universally accessible tourism.

The United Nations recognizes the World Tourism Organization as the appropriate organization to collect, analyse, publish, standardize and improve the statistics of tourism, and promote the integration of these statistics within the sphere of the United Nations system.

16.6.9 Universal Postal Union (UPU)

The UPU was established in 1874 to ensure universal access to affordable public postal services of the highest standard.

UPU is the official source for global postal statistics. Its first statistical yearbook was published in 1877-- a time series for certain indicators dating back to 1875. Thus, it has the longest tradition in publishing official statistics among international organizations.

16.6.10 World Health Organization (WHO)

Its 1946 Constitution establishes that the objective of the WHO “shall be the attainment by all peoples of the highest possible level of health” to guarantee the enjoyment of the highest attainable standard of health as a fundamental right of every human being without distinction of race, religion, political belief, economic or social condition. The thirteenth general programme of work summarizes WHO’s mission to promote health, keep the world safe and protect the vulnerable.

Its statistics mandate is drawn from the 1946 WHO Constitution that stipulates as a core function of the Organization “to establish and maintain such administrative and technical services as may be required, including epidemiological and statistical services”.

16.6.11 World Intellectual Property Organization (WIPO)

WIPO, established in 1967, is the global forum for intellectual property (IP) services, policy, information and cooperation. WIPO’s mission is to lead the development of a balanced and effective international IP system that enables innovation and creativity for the benefit of all.

Reliable intellectual property (IP) statistics are an important tool in understanding policy, business, and technology trends worldwide. WIPO cooperates with IP offices from around the world to provide the most up-to-date global IP data. WIPO also publishes statistical reports on worldwide IP activity and on the use of WIPO-administered treaties in protecting IP rights internationally.

16.6.12 World Meteorological Organization (WMO)

The general mandate of the WMO, established in 1950, is international cooperation for the development of meteorology, climatology and operational hydrology and their application. WMO provides the framework for such international cooperation.

WMO provides statistics on climate on various times scales ranging from monthly to annual and decadal and multi-decadal.

16.7 Statistical Programmes of Related Organizations

16.7.1 Overview

The three related organizations to the UN included here are:

- a) [International Organization for Migration \(IOM\)](#);
- b) [International Atomic Energy Agency \(IAEA\)](#);
- c) [World Trade Organization \(WTO\)](#).

16.7.2 International Organization for Migration (IOM)

Established in 1951, the IOM has been engaging with its partners in the international community to: assist in meeting the growing operational challenges of migration management; advance understanding of migration issues; encourage social and economic development through migration; and, uphold the human dignity and well-being of migrants.

IOM's statistics mandate is to strengthen the global evidence base on migration; develop the capacities of states and other relevant partners; and ensure more evidence-based IOM and UN-wide engagement.

16.7.3 International Atomic Energy Agency (IAEA)

Established in 1957, the International Atomic Energy Agency (IAEA) is the world's central intergovernmental forum for scientific and technical co-operation in the nuclear field. It works for the safe, secure and peaceful uses of nuclear science and technology, contributing to international peace and security and the United Nations' Sustainable Development Goals.

Statistical data on commercial nuclear power plants and their contribution to electricity generation has been collected by the IAEA's Department of Nuclear Energy for over 50 years and maintained in the Power Reactor Information System (PRIS). [PRIS](#) is a unique nuclear power data source with comprehensive information on nuclear power reactors of all IAEA Member states.

16.7.4 World Trade Organization (WTO)

Founded in 1995, at the heart of WTO's mandate are the agreements, negotiated and signed by the bulk of the world's trading nations. These documents provide the legal ground-rules for international commerce. They are essentially contracts, binding governments to keep their trade policies within agreed limits. Although negotiated and signed by governments, the goal is to help producers of goods and services, exporters, and importers conduct their business while allowing governments to meet social and environmental objectives.

WTO is the official source of consolidated bound and applied tariffs as well as services commitments. In addition, it maintains trade flow-related information on merchandise and trade in commercial services (in cooperation with UNCTAD and ITC).

16.8 Statistical Programmes of International Financial Institutions (IFIs)

16.8.1 Overview

International financial institutions with statistical programmes include multilateral development banks and central banks. Multilateral development banks (MDBs) support the national, regional, and international statistical systems to improve the scope and quality of basic data and statistics.

The IMF and the World Bank are also specialized agencies in the United Nations system. For purposes of this Chapter, their statistical mandates are presented in this section.

World Bank and the International Monetary Fund (IMF) are also referred to as Bretton Woods institutions. They were set up at a meeting of 43 countries in Bretton Woods, New Hampshire, USA in July 1944 to build a framework for international economic cooperation. The original Bretton Woods agreement also included plans for an International Trade Organization (ITO). Instead, the General Agreement on Tariffs and Trade (GATT) was established in 1948 as a provisional agency that provided the rules for much of world trade until the World Trade Organization (WTO) was created in 1995. Whereas the GATT mainly dealt with trade in goods, the WTO and its agreements also cover trade in services and intellectual property.

In 2013, a memorandum of understanding on cooperation in statistical activities was signed by the heads of regional MDBs, the International Monetary Fund, the World Bank and the United Nations—now known as the [**MoU Group**](#). The objective of this Group is to enhance collaboration so as to support the strengthening of statistical capacity in the Member States and facilitate the sharing of data, tools, standards and analysis to improve statistics for the monitoring of development outcomes, including those of the 2030 Agenda for Sustainable Development.

The IFIs (cards) included in this section are the following:

a) **Multilateral Development Banks**

- [World Bank \(WB\)](#);
- [African Development Bank \(AfDB\)](#);
- [Asian Development Bank \(ADB\)](#);
- [Caribbean Development Bank \(CDB\)](#);
- [Inter-American Development Bank \(IaDB\)](#);
- [Islamic Development Bank \(IsDB\)](#).

b) **Central Banks**

- [European Central Bank \(ECB\)](#);
- [Eastern Caribbean Central Bank \(ECCB\)](#).

c) **Other IFIs**

- [International Monetary Fund \(IMF\)](#);
- [Bank for International Settlements \(BIS\)](#).

16.8.2 Multilateral Development Banks

16.8.2.1 World Bank (WB)

The WB Group is one of the world's largest sources of funding and knowledge for developing countries. Its five institutions share a commitment to reducing poverty, increasing shared prosperity, and promoting sustainable development.

The WB is mandated to strengthen member countries' capacity to produce and use statistical information, including work across the WB's Development Data Group (DDG), sectoral Global Practices, and Regions. In particular, this support includes providing high-quality advice and support for clients and partner organizations to develop new statistical methods, data collection activities, analytics, and use across the full data value chain. This particularly includes collecting data (or helping others collect data) according to international standards; then processing, analysing, disseminating, and visualizing data to enable use by researchers, policy analysts, policymakers, and the public at large.

The DDG is also mandated to compile external debt statistics on 123 World Bank borrowing countries and produce the income classifications of these economies. It also manages the

International Comparison Program global partnership producing key indicators on the size of the economies and their relative price levels.

Likewise, WB is a leader in open data for public goods, which draws more than 30 million unique users every year to the Bank's [Open Data platform](#). The DDG is also responsible for the Secretariat of WB's Development Data Council, which provides data governance support and coordination for the Bank's vision, priorities and activities related to development data. The DDG is further mandated to improve country capacity through technical expertise, including implementing the system of national accounts, household surveys, and debt statistics.

16.8.2.2. African Development Bank (AfDB)

Established in 1964, the AfDB is the premier pan-African development institution, promoting economic growth and social progress across the continent. The Bank's development agenda delivers financial and technical support for transformative projects that will significantly reduce poverty through inclusive and sustainable economic growth.

The AfDB has over the years, positioned itself as a leading institution and partner of choice for supporting statistical development across Africa. Through successive statistical capacity building programs (SCB) that provide grants for supporting statistical work in African countries, as well as co-funding with other bilateral and multilateral development partners, the Bank has contributed to notable improvements in statistical capacity over time.

16.8.2.3. Asian Development Bank (ADB)

Established in 1966, ADB envisions a prosperous, inclusive, resilient, and sustainable Asia and the Pacific, while sustaining its efforts to eradicate extreme poverty in the region. ADB assists its members and partners by providing loans, technical assistance, grants, and equity investments to promote social and economic development.

Its statistical work aims to contribute to knowledge generation in ADB, through the use of statistics and data innovation in its institutional priorities and operational effectiveness in developing member countries. ADB initiated its statistical capacity building assistance in 1971 and since then has engaged through technical assistance grants to its developing member countries to improve their capacity in institution building, technical skills training, data production, methodological development, and innovation.

16.8.2.4 Caribbean Development Bank (CDB)

The Caribbean Development Bank (CDB) is a financial institution that helps Caribbean nations finance social and economic programs in its member countries. CDB was established by an Agreement signed on October 18, 1969, in Kingston, Jamaica, and entered into force on January 26, 1970. With headquarters located in Bridgetown, Barbados, CDB has 19 borrowing member countries and nine non-borrowing members.

The Caribbean Development Bank invests in the economic and social development of its Borrowing Member Countries. These investments, geared towards poverty reduction, span sectors such as agriculture and rural development, energy, and water and sanitation.

The Bank has several programmes through which it serves its Borrowing Member Countries. The programmes provide technical assistance and grant funding, among other things, and in some cases, are funded in partnership with other development agencies.

16.8.2.5 Inter-American Development Bank (IaDB)

The IaDB works to improve lives in Latin America and the Caribbean. Through financial and technical support for countries working to reduce poverty and inequality, the Bank helps to improve health and education, and advance infrastructure. Their aim is to achieve development in a sustainable, climate-friendly way. With a history dating back to 1959, today the Bank is the leading source of development financing for Latin America and the Caribbean. It provides loans, grants, and technical assistance; and conducts extensive research.

The Bank's current focus areas include three development challenges – social inclusion and equality, productivity and innovation, and economic integration – and three cross-cutting issues – gender equality and diversity; climate change and environmental sustainability; and institutional capacity building and the rule of law.

16.8.2.6 Islamic Development Bank (IsDB)

The mission of the IsDB is to promote comprehensive human development, with a focus on the priority areas of alleviating poverty, improving health, promoting education, improving governance and bringing prosperity to the people.

The following objectives guide IsDB's statistical work: facilitate the strengthening of statistical capacities of member countries, especially the Least Developed Member Countries, in collaboration with other international agencies and donors to help monitor socio-economic development and progress; maintain an updated statistical database of Macroeconomic and social indicators covering IsDB Member Countries; and data acquisition, processing, analysis and dissemination from different internal and reliable external sources.

16.8.3 Central Banks

16.8.3.1. European Central Bank (ECB)

The ECB is a supranational organization of the European Union member states. The ECB and the member states' national central banks make up the European System of Central Banks (ESCB). The Eurosystem consists of the ECB and the national central banks of the 17 Member States that have introduced the euro. The ECB is responsible for the Eurosystem single monetary policy and contributes to the smooth conduct of policies relating to the prudential supervision of credit institutions and the financial system's stability. The ECB has legislative powers in the areas within its mandate. Its regulations are binding in their entirety and directly applicable in all countries of the euro area.

ECB statistics support the institution's monetary policy, financial stability and supervisory functions, as well as other [tasks](#) of the [Eurosystem and the ESCB](#). Article 5 of the ESCB/ECB Statute sets out the ECB's responsibilities in the area of statistics.

European statistics are developed, produced and disseminated by both the ESCB and the European Statistical System. The division of labour between the Directorate-General Statistics of the ECB and Eurostat is laid down in a [Memorandum of Understanding on Economic and Financial Statistics](#).

16.8.3.2 Eastern Caribbean Central Bank (ECCB)

The ECCB regulates the availability of money and credit; promotes and maintains monetary stability; promotes credit and exchange conditions and a sound financial structure conducive to the balanced growth and development of the economies of the territories of the eight participating Governments; and, actively promotes through means consistent with its other objectives the economic development of the territories of the participating Governments.

Its core statistical mandate is to compile, transform, analyse and disseminate monetary and financial statistics and macroeconomic data for the Eastern Caribbean Currency Union and to provide high quality, high-frequency statistics based on international standards, through a fully integrated, web-based, interactive statistical solution.

16.8.4 Other international financial institutions

16.8.4.1 International Monetary Fund (IMF)

The IMF was conceived in July 1944 at the United Nations Bretton Woods Conference in New Hampshire, United States. The 44 countries in attendance sought to build a framework for international economic cooperation, including to avoid repeating the competitive currency devaluations that contributed to the Great Depression of the 1930s.

The IMF's primary mission is to ensure the stability of the international monetary system—the system of exchange rates and international payments that enables countries and their citizens to transact with each other. This facilitates international trade and promotes employment and sustainable economic growth, thereby helping to reduce global poverty.

The IMF Statistics Department supports member country statistical operations, disseminates member country data and is responsible for the methodological development of the following statistical domains:

- a) [Government Finance Statistics](#);
- b) [Balance of Payments and International Investment Position](#);
- c) [Monetary and Financial Statistics](#);
- d) National Accounts and Price Statistics;
- e) [Financial Soundness Indicators](#);
- f) [Financial Access Survey](#);

The IMF Statistics Department also oversees the IMF's data dissemination initiatives ([e-GDDS](#), [SDDS](#), [SDDS+](#)), which guide member countries on the publication of economic and financial data in support of domestic and international financial stability. The initiatives encourage the dissemination of data along the following statistical categories: real sector, fiscal sector, external sector and financial sector.

16.8.4.2 Bank for International Settlements (BIS)

The BIS is owned by 62 central banks, representing countries worldwide that together account for about 95% of world GDP. The mission of the BIS, established in 1930, is to serve central

banks in their pursuit of monetary and financial stability, foster international cooperation in those areas, and act as a bank for central banks.

BIS statistics on the international financial system shed light on issues related to global financial stability. Compiled in cooperation with central banks and other national authorities, they are designed to inform analysis of financial stability, international monetary spill overs and global liquidity.

16.9 Regional and sub-regional organizations

16.9.1 Overview

Regional/sub-regional entities that have statistical programmes and participate in the UNSC annual sessions, as well as the intergovernmental statistical bodies (statistical conferences or committees) of the UNRCs as observers, are described below.

The organizations in this category are presented by geographic areas that generally represent their areas of operation. *An exception is the OECD whose members cut across regions. See links to cards below.*

a) Africa

- [African Union \(AU\)](#);
- [Economic and Statistical Observatory of Sub-Saharan Africa \(AFRISTAT\)](#);
- [Common Market for Eastern and Southern Africa \(COMESA\)](#);
- [East African Community \(EAC\)](#);
- [Economic Committee of Central African States \(ECCAS\)](#);
- Economic Community of West African States (ECOWAS); [card not received]
- [Intergovernmental Authority on Development \(IGAD\)](#);
- [Southern African Development Community \(SADC\)](#);

b) The Americas

- [Andean Community \(CAN\)](#);
- [Caribbean Community \(CARICOM\)](#);
- South Common Market (MERCOSUR); [card not received]
- [Organization of Eastern Caribbean States \(OECS\)](#);
- [Central American Integration System \(SICA\)](#).

c) Asia and Pacific (including Arab regions; excluding Eurasian organizations)

- [Arab Institute for Training and Research in Statistics \(AITRS\)](#);
- [Association of Southeast Asian Nations \(ASEAN\)](#);
- [Economic Cooperation Organization \(ECO\)](#);
- [Statistical Centre for the Gulf Cooperation Council \(GCC-Stat\)](#);

- [Statistical, Economic and Social Research and Training Centre for Islamic Countries \(SESRIC\)](#);
 - [ESCAP Statistical Institute for Asia and the Pacific \(SIAP\)](#);
 - [Pacific Community \(SPC\)](#).
- d) **Europe and other countries** (including Eurasian organizations)
- [Commonwealth of Independent States \(CIS\)](#);
 - [Eurasian Economic Commission \(EEC\)](#);
 - [European Free Trade Association \(EFTA\)](#);
 - [Eurostat](#);
 - [Organization for Economic Cooperation and Development \(OECD\)](#).

16.9.2 Africa

16.9.2.1 African Union (AU)

The AU promotes Africa's growth and economic development by championing citizen inclusion and increased cooperation and integration of African states. The AU is guided by its vision of *“An Integrated, Prosperous and Peaceful Africa, driven by its own citizens and representing a dynamic force in the global arena.”*

It has a statistical mandate— provision and promotion of harmonised quality statistical information and good practice in support and monitoring of the implementation of the Agenda 2063 for the integration and the development of Africa. This mandate is vested in the Institute for Statistics (STATAFRIC), a specialised technical office of the AU.

16.9.2.2 Economic and Statistical Observatory of Sub-Saharan Africa (AFRISTAT)

Founded in 1993, the AFRISTAT is an intergovernmental organization with capacity building in statistics as its main objective. AFRISTAT devotes most of its resources to building the statistical capacities of its 22 Member States and sub-regional institutions for economic integration.

AFRISTAT focuses on three modalities in implementing its mandate—harmonization and regional integration through common methodologies; training; and facilitating dialogue among African statisticians mainly from French-speaking countries.

16.9.2.3 Common Market for Eastern and Southern Africa (COMESA)

COMESA was established as “an organization of free independent sovereign states which have agreed to co-operate in developing their natural and human resources for the good of all their people”. COMESA's mission is “to endeavour to achieve sustainable economic and social progress in all Member States through increased co-operation and integration in all fields of development particularly in trade, customs and monetary affairs, transport, communication and information, technology, industry and energy, gender, agriculture, environment and natural resources”.

Member States undertake to co-operate in the field of statistics to create an enabling environment for the regular flow of up-to-date, reliable, harmonised and comparable statistical data on various sectors of economic activity, required for an efficient implementation of the objectives of the Common Market.

16.9.2.4 East African Community (EAC)

The objective of the Community is to “develop policies and programmes aimed at widening and deepening co-operation among the Partner States in political, economic, social and cultural fields, research and technology, defence, security and legal and judicial affairs, for their mutual benefit”.

In pursuance of the above objective, the Partner States have undertaken to “... establish among themselves and in accordance with the provisions of this Treaty, a Customs Union, a Common Market, subsequently a Monetary Union and ultimately a Political Federation...”.

16.9.2.5 Economic Committee of Central African States (ECCAS)

The Economic Community of Central African States (ECCAS) is an Economic Community of the African Union for promotion of regional economic co-operation in the Middle region of Africa. It was established on October 18, 1983 with the signing in Libreville of its Constitutive Treaty. This treaty was revised and adopted on December 18 and subsequently entered into force on August 28, 2020. With nearly 200 million inhabitants in 2020 and covering an area of 6.67 million km², ECCAS is made up of eleven Member States. ECCAS aims to achieve collective autonomy, raise the standard of living of its populations and maintain economic stability through harmonious cooperation.

16.9.2.6 Economic Community of West African States (ECOWAS) [card not received]

Established on May 28 1975 via the Treaty of Lagos, the Economic Community of West African States (ECOWAS) is a 15-member regional political and economic union located in West Africa. Collectively, these countries comprise an area of 5,114,162 km² (1,974,589 sq. mi), with an estimated population of 349 million. ECOWAS is considered one of the pillars of the African Economic Community and as a trading union, it is meant to create a single, large trading bloc through economic cooperation. ECOWAS includes two sub-regional blocs: the West African Economic and Monetary Union (also known by its French-language acronym UEMOA) and the West African Monetary Zone (WAMZ). The body of ECOWAS is made up of Institutions and Specialised Agencies. ECOWAS uses three co-official languages—French, English, and Portuguese.

16.9.2.7 Intergovernmental Authority on Development (IGAD)

The IGAD region covers Djibouti, Ethiopia, Eritrea, Kenya, Somalia, South Sudan, Sudan and Uganda. IGAD replaced in 1996 an earlier regional community, the Intergovernmental Authority on Drought and Development (IGADD), founded in 1986. IGADD was formed to address severe and recurrent drought and other natural disasters responsible for ecological degradation that caused widespread famine and economic hardship in the IGAD Region. The mandate of IGAD was expanded to encompass food security and environmental protection, economic co-operation and political and humanitarian affairs.

IGAD's statistical work is envisioned to: ensure availability of highly relevant and quality harmonized statistical information for IGAD planning, formulation, implementation, monitoring and evaluation of its programmes and protocols; strengthen the integration process of Member States and support implementation, monitoring and evaluation of the agenda 2063 for Africa and 2030 agenda for sustainable development; and leads harmonisation of statistical concepts, definitions and methods in the IGAD Region.

16.9.2.8 Southern African Development Community (SADC)

The Southern African Development Community (SADC) is an organization founded and maintained by countries in southern Africa that aim to further the socio-economic, political and security cooperation among its 16 Member States and foster regional integration to achieve peace, stability and wealth. SADC Secretariat is the body that facilitates the implementation of SADC programmes and activities to meet its objectives and the overall goal of poverty eradication and regional integration.

The overarching objective of the SADC Regional Statistical System is to support regional integration by making available relevant, timely and accurate regional statistical information to be used for policy formulation, planning, and protocol monitoring and decision-making.

16.9.3 The Americas

16.9.3.1 Andean Community (CAN)

The Andean Community is an international organization, comprised of several institutions that make up the Andean Integration System (SAI), whose objective is to achieve a comprehensive, balanced and autonomous development, through Andean integration, with projection towards South American and Latin American integration.

The General Secretariat of the Andean Community (SGCAN), among several responsibilities, is in charge of producing comparable statistics information about the economic and social situations of its member countries, aggregated at the regional level, required by the SAI's institutions for the formulation and implementation of Andean Community policies. This statistical information is also important for the CAN to be understood by the public.

16.9.3.2 Caribbean Community (CARICOM)

Established in 1973, CARICOM consists of 15 Member and 5 associate Member States. The CARICOM Secretariat's mandate is to contribute, in support of Member States, to the improvement of the quality of life of the People of the Community and the development of an innovative and productive society in partnership with institutions and groups working towards attaining a people-centred, sustainable and internationally competitive Community.

The Regional Statistics Programme (RSP) of the CARICOM Secretariat, which functions as a Regional Statistical Office (RSO), coordinates the functioning of the Standing Committee of Caribbean Statisticians (SCCS) and its subsidiary groups and is the focal point for monitoring the achievements of the CARICOM Statistical System (CSS).

Statistics are to be collected, stored and disseminated that are relevant for the achievement of CARICOM objectives. This includes facilitating statistical development of CARICOM through the SCCS that seeks to foster increased recognition of the importance of adequate

statistical services to the countries of the region; widen the scope and coverage of statistical data collection; and improve the quality, comparability and timeliness of statistics produced.

16.9.3.3 MERCOSUR [card not received]

MERCOSUR, officially the Southern Common Market, is a [South American trade bloc](#) established by the [Treaty of Asunción](#) in 1991 and [Protocol of Ouro Preto](#) in 1994. The Southern Common Market is a regional integration process. Mercosur's purpose is to promote [free trade](#) and the fluid movement of goods, people, and currency; it promotes free intra-zone trade and a common trade policy between member countries

Through its Resolution 14/10 of April 9, 2010, the Common Market Group - the executive body of MERCOSUR - created the Specialized Meeting of MERCOSUR Statistics (REES) to prepare a Strategic Statistical Plan of MERCOSUR that allows the adoption of a Harmonized Statistical System within the block.

The REES, a body that is made up of the government representatives in charge of the national statistical systems of the States Parties, must take into account its general objectives.

16.9.3.4 Organization of Eastern Caribbean States (OECS)

The OECS is a sub-regional inter-governmental organization of 11 member states. Its major purpose is to establish the Eastern Caribbean Economic Union (ECEU) as a single economic and financial space by pursuing regional integration of its members.

The OECS's mandate for statistics supports achieving the Organization's purposes through coordination, harmonization and joint actions and pursuing joint policies.

16.9.3.5 Central American Integration System (SICA)

SICA is the institutional framework of the Regional Integration of Central America, and its fundamental objective is the realization of the integration, to constitute Central America in a Region of Peace, Freedom, Democracy and Development.

The Central American Statistical Commission of SICA (CENTROESTAD in Spanish) is a specialized technical commission, established in December 2008. Its main purpose is to facilitate the development of a regional statistical system, generate updated and timely regional statistical information (based on information from national and regional institutions) and standardize methodologies and definitions to allow comparability and aggregated data from the region.

16.9.4 Asia and Pacific (including Arab regions; excluding Eurasian organizations)

16.9.4.1 Arab Institute for Training and Research in Statistics (AITRS)

AITRS is an intergovernmental organization founded in 1977 to build the capacity of Arab national statistical offices in all areas of statistical work.

AITRS provides face-to-face and distance training courses in official statistics for employees of the Arab statistical offices and produces manuals on statistical methodologies to ensure that the statistical processes and products comply with the Fundamental Principles of Official Statistics.

16.9.4.2 Association of South-East Asian Nations (ASEAN)

The Association of Southeast Asian Nations (ASEAN) was established on 8 August 1967 in Bangkok, Thailand, with the signing of the ASEAN Declaration (the Bangkok Declaration). The Declaration was signed by the founding members of ASEAN, namely Indonesia, Malaysia, Philippines, Singapore and Thailand. Since then, Brunei Darussalam, Cambodia, Lao PDR, Myanmar and Viet Nam have joined the ASEAN.

On 2 November 2011, the [ASEAN Community Statistical System \(ACSS\)](#) Committee was inaugurated as the highest regional policymaking and coordinating body on ASEAN statistics at the regional and national statistical systems. Its mandates:

- a) To define ASEAN statistical priorities and promotes wider use of regional statistics;
- b) To promote the improvement of statistical infrastructure;
- c) To facilitate human resource and institutional capacity building; and
- d) To enhance institutional linkages with international statistical bodies.

16.9.4.3 Economic Cooperation Organization (ECO)

The overall objective of the Organization is the sustainable economic development of its Member States and the Region as a whole.

As research/statistics supporter for various activities/directorates of the ECO Secretariat and responsible for providing Member States with the economic and financial data and information, statistical data, and analytical publications and papers related to the cooperation among them in the ECO Region.

16.9.4.4 Statistical Centre for the Cooperation Council for the Arab Countries (GCC-Stat)

The six Arab countries of the Gulf formed the GCC in 1981, to achieve high-level institutional coordination in economic, social, political, defence and security fields. The Statistical Centre of the Cooperation Council for the Arab Countries of the Gulf (“GCC-Stat”) was established in June 2011 to provide a common official pool of statistics and data to the member states of the Cooperation Council for the Arab Countries of the Gulf (short form is Gulf Cooperation Council or “GCC”).

GCC-Stat is the official source of statistics on the GCC. It coordinates the statistical cooperation between GCC countries and contributes to developing human and institutional capacities in member countries.

16.9.4.5 Statistical, Economic and Social Research and Training Centre for Islamic Countries (SESRIC)

SESRIC is a subsidiary organ of the Organization of Islamic Cooperation (OIC) established in pursuance of Resolution No. 2/8-E adopted by the 8th Islamic Conference of Foreign Ministers (ICFM), held in Tripoli in May 1977. The Centre started its activities in Ankara on 1 June 1978. As the statistical arm of the OIC, it is mandated to collate, process and disseminate socio-economic statistics and information on and for the utilisation of the member countries; study and evaluate the economic and social developments in the member countries to generate proposals that will initiate and enhance co-operation among them; and, organize training

programmes in selected fields geared to the needs of the member countries and the general objectives of the OIC. SESRIC acts as the Secretariat of the [OIC Statistical Commission \(OIC-StatCom\)](#), which is the apex cooperation platform of the NSOs of OIC countries to facilitate exchanging experiences and best practices.

16.9.4.6 ESCAP Statistical Institute for Asia and the Pacific (SIAP)

SIAP is a United Nations regional training institute for official statistics. As part of the statistics programme of ESCAP, particularly in capacity development, its mandate is to strengthen, through practically oriented training of official statisticians, the capability of the developing members and associate members and economies in transition of the region to collect, analyse and disseminate statistics as well as to produce timely and high-quality statistics for economic and social development planning, and to assist those developing members and associate members and economies in transition in establishing or strengthening their statistical training capability and other related activities.

16.9.4.7 Pacific Community (SPC)

The Pacific Community (SPC) is the principal scientific and technical organization in the Pacific region, supporting development since 1947. SPC is an international development organization owned and governed by 26 country and territory members sharing the Pacific vision of a region of peace, harmony, security, social inclusion and prosperity so that all Pacific people can lead free, healthy and productive lives. The unique organization covers more than 20 sectors.

Under Goal 1 of SPC's development goals, SPC's Strategic Plan (2016 to 2020) aims to 'Strengthen access to and use of development statistics in policy development and monitoring progress'. All SPC's divisions and cross-cutting programs have a statistical mandate. Some examples include statistics relating to gender, disability, climate change, education, fisheries, agriculture, health, youth and culture.

The Statistics for Development Division (SDD) plays a central role in coordinating and supporting the development, production and delivery of official statistics in 22 [Pacific Island Countries and Territories](#). This includes a comprehensive technical assistance program to support the development of administrative, economic, census and survey and geospatial statistical systems, including analysis and dissemination.

16.9.5 Europe and other countries (including Eurasian organizations)

16.9.5.1 Commonwealth of Independent States (CIS)

In 1991, heads of governments of the CIS established the Statistical Committee coordinating the statistical services of the Commonwealth of Independent States. In 1992, heads of the CIS Statistical Services signed an Agreement on the Statistical Service of the Commonwealth of Independent States which was renamed in 1995 as the Interstate Statistical Committee of the Commonwealth of Independent States (CIS-Stat).

The CIS-Stat develops harmonized common statistical methodologies; compiles and disseminate statistical data of the 10 Commonwealth states and maintains databases; engages

in capacity development and international statistical cooperation; prepares analyses on socio-economic development issues of the Commonwealth, among others.

16.9.5.2 Eurasian Economic Commission (EEC)

[EEC](#) was founded in 2015 as a permanent regulating body of the Eurasian Economic Union (EAEU), with 5 member states and one observer. The basic objective of EEC is to enable the functioning and development of EAEU, as well as to develop proposals in the sphere of economic integration within EAEU.

EEC is the official source for EAEU statistics. EEC's work on statistics originated in 2008, when the Member States of the Customs Union of the Republic of Belarus, the Republic of Kazakhstan and the Russian Federation agreed to keep statistics on foreign and mutual trade in goods and instructed the Customs Union Commission (since February 2, 2012 – EEC) to develop a unified methodology as well as to compile and publish Customs Union Trade Statistics.

16.9.5.3 European Free Trade Association (EFTA)

EFTA was set up in 1960 by its then seven Member States (currently four-- Iceland, Liechtenstein and Norway, Switzerland) to promote free trade and economic integration between its members.

Statistics is defined in the [EEA Agreement](#) as one of several “horizontal and flanking” policy areas. Article 76 states that “The Contracting Parties shall ensure the production and dissemination of coherent and comparable statistical information for describing and monitoring all relevant economic, social and environmental aspects of the EEA.”

Besides the EEA Agreement which applies to three EFTA Member States (Iceland, Liechtenstein and Norway) and the EU Member States, the EFTA Statistical Office (ESO) is also active for all four EFTA Member States in the field of statistical technical cooperation with third countries.

16.9.5.4 Eurostat-Statistical Office of the European Union

Eurostat is the Statistical Office of the European Union and is situated in Luxembourg. Eurostat was established in 1953 to meet the requirements of the Coal and Steel Community. When the European Community was founded in 1958, it became a Directorate-General (DG) of the European Commission.

Eurostat's mission is to provide high-quality statistics on the EU. While fulfilling its mission, Eurostat shares the following values: respect and trust, fostering excellence, promoting innovation, service orientation, and professional independence.

In June 1997, Article 285 was inserted in the EU Treaty, providing Community statistics with a constitutional basis for the first time. Article 285 was a key step for EU statistics. More and more statistics necessary for the performance of the EU activities have to be collected. In March 2009, the European Regulation establishing a legal framework for the development, production and dissemination of European statistics was adopted; followed in 2012 by the Commission Decision regarding the role and responsibilities of Eurostat within the European Commission.

The European Statistical System (ESS) is the partnership between the Community statistical authority, which is the Commission (Eurostat), and the national statistical institutes (NSIs) and other national authorities responsible in each Member State for the development, production and dissemination of European statistics. This Partnership also includes the EEA and EFTA countries. The European Statistical System Committee ([ESSC](#)) is the main governance body in the European Statistical System.

16.9.5.5 Organization for Economic Cooperation and Development (OECD)

The OECD works to build better policies for better lives. Its goal is to shape policies that foster prosperity, equality, opportunity and well-being for all.

With governments, policymakers and citizens, the OECD works to provide evidence-based international standards and solutions to various social, economic and environmental challenges. From improving economic performance and creating jobs to fostering strong education and fighting international tax evasion, the OECD provides a unique forum and knowledge hub for data and analysis, exchange of experiences, best-practice sharing, and advice on public policies and international standard-setting.

The OECD Statistics and Data Directorate (SDD) provides statistics, across the spectrum of economic and social accounts, for evidence-based policymaking in traditional and emerging policy areas. SDD also supports and coordinates the OECD statistical system, providing tools and “smart data” solutions.

16.10 International non-governmental organizations

16.10.1 Overview

International non-governmental organizations (INGOs) are increasingly engaged in statistical capacity development, particularly by developing related frameworks and initiatives addressing new data needs. They have become important actors in the international statistical system-- working in close partnership with international and national statistical agencies. In addition, many statisticians working for their national statistical systems as well as for the global statistical system are members and/or participate in statistical meetings and conferences of international professional organizations on statistical topics including official statistics. Key INGOs are described through the respective cards in this section.

a) International Partnerships and Foundations

- [Partnership in Statistics for Development in the 21st Century \(PARIS21\)](#);
- [Open Data Watch \(ODW\)](#);
- [Global Partnership for Sustainable Development Data \(GPSDD\)](#);
- [Thematic Research Network on Data and Statistics \(TReNDS\)](#);
- [Data2X](#);
- [Development Initiatives \(DI\)](#);
- Global Open Data for Agriculture and Nutrition (GODAN). [Card not received]

b) Other INGOs

- [International Statistical Institute \(ISI\)](#);
- [International Association for Official Statistics \(IAOS\)](#);
- [International Association for Research on Income and Wealth \(IARIW\)](#);
- [Inter-American Statistical Institute \(IASI\)](#).

16.10.2 International Partnerships and Foundations**16.10.2.1 PARIS21**

The Partnership in Statistics for Development in the 21st Century (PARIS21) works to advance statistical capacity and improve the production and use of data and statistics for sustainable development and more effective and inclusive policymaking. PARIS21 facilitates statistical capacity development, advocates for integrating reliable data in decision-making, and coordinates donor support to statistics. Its mission is to strengthen statistics and promote timely, high-quality, and robust statistical information by policymakers and citizens, mainly focusing on low-income countries.

PARIS21 publishes an annual [Partner Report on Support to Statistics](#) (PRESS), a comprehensive global analysis of donor financial flows to data and statistics. The 2020 edition will feature a new tool that enables forward-looking prediction to facilitate coordination and planning of development partners.

16.10.2.2 Open Data Watch (ODW)

ODW is an international non-governmental organization, founded in 2013, whose mission is to bring change to organizations that produce and manage official statistical data to increase their quality, availability, and use. ODW monitors advances in the development data revolution to learn and share findings on how they can benefit national statistical systems (NSSs), particularly those in developing countries. ODW's flagship product, the [Open Data Inventory](#) (ODIN) has been an annual assessment (since 2015) applying international standards of the availability and openness of official statistics in national databases.

ODW works at the intersection of open data and official statistics, with the goal of increasing governments' responsiveness to citizens by increasing transparency, participation, and use of robust research and data in decision - making.

16.10.2.3 Global Partnership for Sustainable Development Data (GPSDD)

GPSDD is a network of 260 organizations worldwide, spanning from governments, United Nations agencies, civil society, private sector and academia. The network works closely with UNSD on many initiatives, including work to support NSOs on increasing timely data, unlocking privately held data and advocating for better financing for the data ecosystem.

GPSDD is working to create a world where good data is used to achieve just and sustainable societies. It works closely with several Members States that want to improve their data ecosystems and foster a wide government approach to leveraging data to achieve the Sustainable Development Goals.

16.10.2.4 Thematic Research Network on Data and Statistics (TReNDS)

The UN Sustainable Development Solutions Network (SDSN) has been operating since 2012 under the auspices of the UN Secretary-General. SDSN mobilizes global scientific and technological expertise to promote practical solutions for sustainable development.

SDSN's Thematic Research Network on Data and Statistics (TReNDS) convenes cross-sector technical and policy knowledge from across the global scientific, development, public and private sector data communities. The mission of SDSN TReNDS is to catalyse learning and investment in the data revolution for development. Specifically, the aims are to: help strengthen local, national & global statistical systems by generating and curating ideas; improve learning on data sharing and incubate technical coalitions to establish practice standards for new data approaches; inform investment in emerging data opportunities; and contribute critical insights and offer technical and policy-oriented solutions on the rapidly evolving sustainable development data ecosystem.

16.10.2.5 Data2X

Data2X is an independent technical and advocacy platform housed at the United Nations Foundation, working to improve the availability, quality, and use of gender data to make a practical difference in the lives of women and girls worldwide.

Data2X strengthens the production and use of gender data by partnering with data producers to improve established data systems, including through capacity building; experimenting with new data sources and methods; and, building the case for gender data among donor and policy audiences.

16.10.2.6 Development Initiatives (DI)

DI was founded in the UK in 1993 on the premise that without better data on people in poverty and the resources that could be helping them, it would be impossible to sustainably end poverty.

DI provides rigorous information to support better decisions, influence policy outcomes, increase accountability and strengthen the use of data to eradicate poverty.

16.10.2.7 Global Open Data for Agriculture and Nutrition (GODAN) [Card not received]

The Global Open Data for Agriculture and Nutrition (GODAN) initiative seeks to support global efforts to make agricultural and nutritionally relevant data available, accessible, and usable for unrestricted use worldwide. The initiative focuses on building high-level policy, and public and private institutional support for open data.

The initiative encourages co-operation among existing agriculture and open data activities, bringing stakeholders together to solve long-standing global problems. On a practical level, GODAN lends its expertise to advising on open data policy and funding proposals and, where appropriate, submitting joint proposals with members and partners. GODAN is in a position to use its credibility and expertise to support initiatives that aim to make a positive impact in the fields of agriculture and nutrition through the use of open data, helping advise on applications, assembling partner network technical, policy and legal expertise, and acting as a facilitator.

16.10.3 Other INGOs

16.10.3.1 International Statistical Institute (ISI)

The ISI is a membership organization open to all institutions or individuals on annual subscription. ISI's catchphrase 'Statistical Science for a Better World' reflects its mission and mandate.

The ISI was established in 1885. Before the Second World War, the ISI sought to influence governmental statistical agencies by facilitating collaboration and encouraging uniformity in statistical definitions and data collection. But this role was largely taken over by the newly created United Nations. The ISI mission was modified in 1947 to emphasize international communication among statisticians rather than with governments and supporting the international promotion and dissemination of research and practice of statistics.

The ISI's mission is to lead, support and promote the understanding, development and good practice of statistics worldwide, by providing the core global network for statistics.

16.10.3.2 International Association for Official Statistics (IAOS)

Founded in 1985, IAOS is a membership association open to all institutions or individuals on annual subscription. It was created and developed as a specialised section of the International Statistical Institute (ISI).

IAOS brings together producers and users of official statistics to promote the understanding and advancement of official statistics and related subjects and to foster the development of effective and efficient official statistical services, particularly in developing countries, through international contacts among individuals and organizations, including users of official statistics as well as research institutions.

16.10.3.3 International Association for Research on Income and Wealth (IARIW)

The IARIW is an association founded in September 1947, dedicated to advancing knowledge relating to national income and wealth. In particular, it advances education and knowledge in the general area of income and wealth by organizing conferences and publications. The specific fields of interest include the definition, measurement, and analysis of national income and wealth; the distribution of income and wealth, and poverty; and, the development of economic and social accounting systems and their use for economic policy.

16.10.3.4 Inter-American Statistical Institute (IASI)

The IASI, founded in May 1940, is a professional organization whose purpose is to promote statistical development in the American region by, among others, promotion and dissemination of advances in statistical theory and methods; promotion of measures aimed at improving comparability and availability of economic and social statistics; and, cooperation with national and international organizations in activities aimed at statistical improvement.

IASI has observer status at the UN Statistics Commission and maintains cooperation agreements with the ISI, several national statistical institutes, and national statistics associations.

16.11 Coordination of International Statistical Activities

16.11.1 Global coordination mechanisms

The UN Statistical Commission has established two global coordination mechanisms for international statistical activities—the Committee for the chief statisticians of the United Nations System (CCS-UNS) and the Committee for the Coordination of Statistical Activities (CCSA). Both report to the United Nations Statistical Commission⁵¹. This section will also briefly describe the regional coordination of international statistical activities.

16.11.1.1 Committee for the chief statisticians of the United Nations System ([CCS-UN](#))

The Committee for the chief statisticians of the United Nations System (CCS-UN) was formally established on 10 September 2014 in accordance with the decision 45/112 of the UNSC. The [Committee comprises](#) the statistical services of United Nations funds and programmes, United Nations specialized agencies and the United Nations Secretariat, including the regional commissions, the mandates of which include the provision of international official statistics in the context of the [Principles Governing International Statistical Activities](#). The Committee adopted its [terms of reference](#) in 2016.

The Committee operates in close collaboration with the Committee for the Coordination of Statistical Activities (CCSA). All members of the CCS-UN are also member of the CCSA (see [E/CN.3/2020/6](#)).

The 51st session of the UNSC recommended to the Economic and Social Council the adoption of the draft resolution “*Strengthening coordination of the statistical programmes in the United Nations system*”. The resolution *requests* ([Chapter I of the Final Report of the session](#)):

- a) CCS-UN to strengthen coordination of statistical programmes more effectively within the United Nations system, guided by and in support of the work of the Statistical Commission; and
- b) UNSD, as the secretariat of the CCS-UN to provide adequate support to the coordination function of the Statistical Commission as well as related activities of the Committee, by pursuing a range of activities aiming at improving functional coordination, regional and national coordination, coordination in thematic areas, coordination with other professional networks and coordination of the secretariat.

16.11.2.2 Committee for the Coordination of Statistical Activities ([CCSA](#))

In September 2002, the Committee for the Coordination of Statistical Activities (CCSA) was established to continue coordination in the statistical sector, which had been done by the Administrative Committee on Coordination (ACC) Subcommittee on Statistical Activities prior to 2002. The terms of reference can be viewed and downloaded [here](#). [Members of the Committee](#) comprise international and supranational organizations, whose mandate includes the provision of international official statistics regarding the *Principles Governing*

⁵¹ The latest report to the UNSC of the CCS-UNS is @ <https://unstats.un.org/unsd/statcom/51st-session/documents/2020-5-UNSystem-E.pdf>. The latest report to the UNSC of the CCSA is @ <https://unstats.un.org/unsd/statcom/51st-session/documents/2020-6-CCSA-E.pdf>

International Statistical Activities, and which have a permanent embedded statistical service in their organization and regular contacts with countries.

16.11.2 Regional Coordination Mechanisms

Many entities of the UN statistical system have regional offices. These regional offices include, for example, the five FAO Regional Offices (Africa; Asia and the Pacific; Europe and Central Asia; Latin America and the Caribbean; and, Near East and North Africa), ILO Regional Offices, UNDP, UNESCO regional offices in Asia and the Pacific (Bangkok and Jakarta), UNFPA, UNICEF (ROSA and EAPRO in Asia, among five others), six UN Women regional offices (Latin America and the Caribbean; Asia and the Pacific; Europe and Central Asia; West and Central Africa; East and Southern Africa; and, Arab States), UNODC, and WHO. One of the mandates of the UN Regional Commissions (UNRCs) is the coordination of statistical activities in their respective regions. This coordination is typically implemented through the respective intergovernmental statistical bodies and other regional coordination mechanisms.

The ongoing Secretary-General's United Nations development system reforms propose establishing a new regional coordination mechanism (RCM): a regional coordination platform (RCP), to replace the regional coordination mechanism bodies.

16.11.2.1 Example of regional coordination mechanisms in Asia -Pacific

For example, in the Asia-Pacific region, the RCM has a [statistics thematic working group](#) that has been sustaining the implementation of the 2030 Agenda by supporting monitoring and statistical capacity development of national statistical systems and stakeholders. The Thematic Working Group on Statistics has prepared to continue under the Regional Coordination Platform, probably with a renewed name and terms of reference.

UN Regional Coordination Group on Data and Statistics for Europe and Central Asia ([RCGDS-ECA](#)) was created in January 2020 in response to the recommendations of the UN Secretary-General on the reform of the UN development system. It is co-chaired by UNECE and UNEP, and it reports to the [Conference of European Statisticians](#).

The aim of the group is to promote coherence and integrated system-wide action amongst regional actors from the UN system and beyond - with the ultimate aim of improved national statistics with respect to the collection, analysis, and dissemination of accurate, reliable and comparable data, disaggregated by sex, age, migration status and other characteristics towards better monitoring of national policies and priorities, including those related to the SDGs.

16.11.2.2 Example of regional coordination mechanisms in Latin America and the Caribbean

Considering the commitment of the ECLAC member States to the regional processes deriving from the 2030 Agenda and set out in the Quito "Mitad del Mundo" Declaration of the VIII meeting of the Statistical Conference of the Americas in November 2015, and bearing in mind the need to decide on joint actions in response to the statistical challenges involved in implementing the Agenda, the countries of Latin America and the Caribbean expressed their intention of implementing a regional work plan that would combine and coordinate all the region's statistical activities related to the SDGs and their indicators, to generate synergies within the regional statistical community.

Thus, at its XV meeting, held in June 2016, the Executive Committee of the Statistical Conference of the Americas approved the creation of the Statistical Coordination Group for the 2030 Agenda in Latin America and the Caribbean as a joint working mechanism for establishing a regional plan to address the information requirements arising from the implementation of the 2030 Agenda. The Statistical Coordination Group for the 2030 Agenda in Latin America and the Caribbean will be composed of representatives of the national statistical systems member of the IAEG-SDG and the HLG-PCCB, ensuring the representation of subregional groupings.

Since its creation, the Group provides strategic leadership in the process of implementing the SDGs in the region with regard to the development and calculation of indicators, statistical monitoring and reporting and promote national ownership of the regional statistical monitoring framework for the 2030 Agenda; and foster capacity-building, cooperation and coordination, including by ensuring coherence between regional and global follow-up, acting as a hub for the region's major statistical actors.

16.12 International Statistical Cooperation

16.12.1 Overview

For members of the international statistical system, cooperation and coordination are integral features in carrying out their mandates and priorities. These hold for (1) setting standards, frameworks and methods, (2) in statistical capacity development initiatives for member States and (3) in the production of international statistics and statistical series in their respective areas of responsibility. Starting with the MDG indicators, and carried forward to the SDG indicator framework, the concept of “custodian agencies” has further highlighted the importance of cooperation and coordination in these processes. The [Classification of International Statistical Activities](#) developed by UNECE gives a structured overview of activities carried out by international organizations.

National statistical offices engage with the international statistical system. Related to the three processes mentioned above is the importance of “partnership and national ownership”; i.e., NSSs should actively participate in the main discussion forums pertaining to statistics, such as in the United Nations Statistical Commission and the regional statistical committees, to ensure continuous improvement of statistics at all levels-- the national, the (sub)regional and the international level.

Due to the scarcity of international cooperation resources allocated to statistics, the areas of concern for which cooperation will be sought need to be prioritized and different forms of cooperation and new sources of cooperation with the private sector need to be explored. Illustrative examples of the importance of statistical cooperation are presented in the [Implementation Guidelines of the UNFPOS](#).

Links to guidelines, best practices and examples:

- [A strategy to improve the statistical credibility of the Human Development Report](#) (HDR)
- SIDA - [Gender statistics](#) As part of its development assistance, the Swedish International Development Cooperation Agency (Side) offers Advanced International Training

Programmes (ITP) in strategically important subjects to the social and economic development in the participants' countries.

- Eurostat and ESS - [European Master in Official Statistics](#) a network of Master programmes providing post-graduate education in official statistics at the European level. EMOS is a joint project of universities and data producers in Europe.
- SESRIC and the Palestinian International Cooperation Agency (PICA) - PICA receives a high-level delegation from the Statistical, Economic and Social Research and Training Centre for Islamic Countries (SESRIC) and holds a [roundtable with national partners](#).
- The [technical cooperation of the](#) National Institute of Statistics of Cabo Verde (NISCv/INECV) embraces the improvement of techno-institutional capacity in statistics. In this context, the important role of bilateral cooperation with some statistics institutions is highlighted. These include i.e. Portugal (INE), Spain (INE), Brazil (IBGE), Luxembourg (STATEC), The Canary Islands (ISTAC), Peru (INEI), Italy (ISTAT), The High Commission of Plan of Morocco.

The cooperation with the Portuguese speaking countries has a very important place at NISCv. In particular, it has enormously contributed to the development of statistics in legislation, planning, classifications, concepts and nomenclatures, statistics infrastructures and production, consumer price index (CPI), census mapping, population census and finally national accounts. NIS equally counts on the financial partnership in statistics production with organizations such as the United Nations, the African Development Bank, the World Bank, the Luxembourg Cooperation, the Spanish Cooperation and the European Union.

16.12.2 Key actors in statistical cooperation: standards, frameworks and methods and the SDG indicators

The various standards, frameworks, and methods discussed in chapters 7, 9 and 11 of this Handbook are international statistical cooperation and coordination products. Typically, their development and implementation are facilitated through:

- a) the various groups of the UNSC (see Chapter 16.3.3.3 - *Groups of the UNSC*);
- b) working groups of the intergovernmental statistical bodies of the UNRCs; and
- c) the standards-setting processes of the international statistical agencies with specific sectoral mandates; e.g., ILO for labour statistics; FAO for agriculture and rural statistics; ITU for ICT statistics.

11: Global Inventory of Statistical Standards

The [Global Inventory of Statistical Standards](#) was developed under the auspices of the Committee for the Coordination of Statistical Activities ([CCSA](#)). *Statistical standards consist of statistical classifications, concepts and definitions relating to statistical processes and outputs, and statistical methodologies and procedures.* The inventory is a work-in-progress; it aims to:

Compile standards recommended by the main International Organizations, in one database, systematized by types of standard and by statistical or geographical themes and subthemes of national interest.

Provide basic information about the standard, such as objective, the international organization that recommends it, version, description of the standard and the URL to the original information source from which the standard is obtained.

Identify the international organizations involved in the development and dissemination of these statistical standards.

The Global Inventory of Statistical Standards gives access to the following information:

- 1- [Standards by Type/Category](#)
- 2- [Standards by Statistical Activity/Domain](#)
- 3- [Standards by Maintenance Organizations](#) (custodian agency)

The development of the methodology for Tier II and Tier III indicators for SDGs monitoring are coordinated by the respective custodian and co-custodian agencies.

Information on the contributions of the UNRCs and other international agencies to work on statistical standards, frameworks and methods can be found in their respective *Cards*. Likewise, information on the SDGs indicators and their custodian agencies can be found in the cards and the UNSD website: [SDG Indicators, data collection Information & Focal points](#).

16.12.3 International support for national statistical development

Over the last decade, international support for capacity development of national statistical offices and national statistical systems has expanded. According to the 2019 Partnership Report on Support to Statistics (PRESS)⁵², between 2016 and 2017, official development assistance to data and statistics rose by 11%, from US\$ 623 million to US\$ 689 million. This was largely driven by the adoption of the SDG monitoring framework and is more than six-times the amount of US\$ 214 million in 2006. The Report suggests that with the surge of funding to statistics and the diversification of donor pools, a global alliance for more and better financing for development data should work to support better identification of needs, improve investment proposals, promote better coordination at the country level and link domestic and external financial support for low-capacity countries. Recommendations for coordination mechanisms

⁵² The Partner Report on Support to Statistics (PRESS 2019) @ <https://paris21.org/press-2019>

from the Report are presented in Chapter 16.11.3.1 - *Example of regional coordination mechanisms in Asia-Pacific*.

16.12.3.1 Coordinating international support for capacity development in statistics

Possible coordination mechanisms involving a code of good practice, funding transparency and country compacts to support statistics could be applied. Such a mechanism could help fund a multi-annual joint response to close the most urgent data gaps among the least developed countries, building on national assessment tools and investment proposals. Donors could also sign up for an international code of practice to ensure coherence and alignment with national priorities. It could, also, support seeding and blend-financing for transformative data architecture and service delivery applications.

The six-fold increase in global capacity development support to national statistical systems from 2006 to 2017 has been driven by key frameworks that addressed the demands for more relevant official statistics for monitoring national and international development goals (e.g., the MDGs and the SDGs) through well-defined principles and action plans. The frameworks, listed below, built on the success and lessons learned from the preceding ones. Click on the hyperlink for more information on the plans.

- a) 2004 [Marrakech Action Plan for Statistics](#) (MAPS);
- b) 2005 [Paris Declaration on Aid Effectiveness](#);
- c) 2009 [Dakar Declaration on Development of Statistics](#);
- d) 2011 [Busan Action Plan for Statistics](#) (BAPS).

Each of these focus on country statistical capacity development through country-owned and country-led development strategies and at the same time recognizes the interdependence of national and international statistical activity.

The national strategy for the development of statistics (NSDS) is an invaluable coordination mechanism (see also Chapter 4.4 – *Annual and multi-annual planning and priority setting*). A National Strategy for the Development of Statistics (NSDS), which establishes priority statistical programs and activities, is a valuable coordination mechanism that informs how national statistical systems are financed. As it responds to national data demands arising from major policies such as the national development plan, it provides a robust framework for investment in data and statistics. Through a consultative process with different actors, the NSDS, together with sectoral statistical plans, aims to be a multi-donor focal point for funding statistics, with counterpart domestic funding. This is largely due to strong government ownership in the development of the NSDS, which serves as a basis for donor funding.

16.12.3.2 Cape Town Global Action Plan for Sustainable Development

The most recent global action plan is the 2017 [Cape Town Global Action Plan for Sustainable Development](#) (CTGAP). The CTGAP was informally launched on 15 January 2017 at the [first United Nations World Data Forum](#) in Cape Town South Africa. It was subsequently formally adopted by the United Nations Statistical Commission at its 48th Session in March 2017.

The Plan describes six strategic areas to address key statistical capacity building needs:

- a) Coordination and strategic leadership on data for sustainable development;

- b) Innovation and modernization of national statistical systems;
- c) Strengthening of basic statistical activities and programmes, with particular focus on addressing the monitoring needs of the 2030 Agenda;
- d) Dissemination and use of sustainable development data;
- e) Multi-stakeholder partnerships for sustainable development data;
- f) Mobilize resources and coordinate efforts for statistical capacity building.

This global plan, which benefitted from the dynamic of Transformative Agenda for Official Statistics in support of the Post-2015 Development Agenda ([Transformative Agenda](#)), is intended to provide a framework for discussion, planning and implementing statistical capacity-building needed to achieve the scope and intent of the 2030 Agenda. The plan acknowledges that this work will be country-led, and will occur at sub-national, national, and regional levels and proposes to leverage and coordinate these many efforts.

Regional and national statistical organizations will have the opportunity to develop or adjust their action plans and road maps related to SDG monitoring in line with the Global Action Plan. Regional and national specificities can thus be addressed, and the production of regional and national indicators facilitated by capacity building and technical assistance targeted to the specific needs of regions and countries.

It calls for a commitment by governments, policy leaders and the international community to undertake key *actions* proposed for each of the *objectives* that further define each of the *strategic areas*⁵³. Strategic areas 5 and 6, further developed hereunder, are of particular relevance to international cooperation and capacity building:

- a) **Strategic area 5:** Multi-stakeholder partnerships for sustainable development data

Objective 5.1: Develop and strengthen partnerships of national and international statistical systems with governments, academia, civil society, private sector and other stakeholders involved in the production and use of data for sustainable development.

Key Actions:

- Improve the transparency and accessibility of official statistics to the public.
- Create frequent and periodic opportunities to consult with all stakeholders on the production and use of statistics for sustainable development by (i) mobilization a UN World Forum on Sustainable Development Data every second year; (ii) establishing similar venues for on-going consultations and cooperation at regional and national levels.
- Develop the institutional arrangements needed for public-private cooperation, including the use of data from non-official sources, in accordance with the UN Fundamental Principles of Official Statistics.
- Improve the transparency and accessibility of official statistics to the public.

⁵³ The descriptions of the strategic areas, objectives and actions are detailed in *Cape Town Global Action Plan for Sustainable Development Data* @ <https://unstats.un.org/sdgs/hlg/Cape-Town-Global-Action-Plan/>.

- Create frequent and periodic opportunities to consult with all stakeholders on the production and use of statistics for sustainable development by (i) mobilization a UN World Forum on Sustainable Development Data every second year; (ii) establishing similar venues for on-going consultations and cooperation at regional and national levels.
 - Develop the institutional arrangements needed for public-private cooperation, including the use of data from non-official sources, in accordance with the UN Fundamental Principles of Official Statistics.
- b) **Strategic area 6:** Mobilize resources and coordinate efforts for statistical capacity building

Objective 6.1: Ensure that resources are available to implement the necessary programmes and actions as outlined in this global action plan (both domestic and from international cooperation)

Key actions:

- Provide an overview of capacity needs based on the implemented or existing needs assessments and consider appropriate matches between types of support and types of needs.
- Identify and coordinate existing resources, including south-south and triangular cooperation mechanisms, to strategically address these needs, and identify resource gaps.
- Develop a programme for statistical capacity building on capacity needs.
- Mobilize donor support towards the priorities agreed in national and regional statistical strategies and promote reporting on financing for statistics.
- Create opportunities for participation of non-state actors in funding statistical activities through innovative financing mechanisms using means consistent with the UN Fundamental Principles of Official Statistics.
- Promote nationally and/or regionally owned coordination mechanisms of capacity building initiatives.
- Support countries in the implementation of the SDG indicator framework.
- Engage in communication and advocacy activities at the policy-making level to raise awareness and understanding of implementation aspects of the SDG indicator framework.
- Develop criteria and mechanisms to set priorities for the mobilization of resources.
- Promote the sharing of relevant implementation experiences between countries.

16.12.3.3 The Dubai Declaration

To strengthen the capacity of national data and statistical systems and channel financial resources at scale, domestic and international funds need to be mobilized in new ways that would create efficiencies in current spending, leverage existing resources and attract new funding. At the UN World Data Forum in October 2018 in Dubai, the statistical community

and other key stakeholders announced the [Dubai Declaration](#). The Declaration recognized that innovative funding strategies are critical for the successful implementation of the CTGAP and called for the establishment of an innovative funding mechanism to improve the quality and quantity of development data. In 2019, the Dubai Declaration was endorsed by the UN Statistical Commission.

As envisaged in the Dubai Declaration, the purpose of the financing mechanism is to provide an organized platform to:

- a) support national statistical systems in identifying where investments are needed to mobilize the necessary funds, and help to identify ways to access needed funds;
- b) evaluate outcomes and establish a feedback mechanism to better target future investments, detect areas of public policy that demand data for program design (i.e., Governments Digitalization), considering that it is important to act at the beginning of the public policy process; and
- c) focus on disaggregated data that are more useful to policymakers and development partners to ensure “evidence-based policy-making”.

The HLB-PCCB presented a proposal for such a financing mechanism⁵⁴ to the UNSC51 which welcomed the way forward in the area of financing for data and statistics and the proposed financing mechanism around three pillars to i) secure domestic funding; ii) to improve the efficiency of existing resources through better coordination; and, iii) to increase the overall amount of funding. On this occasion, the UNSC stressed that more statistical capacity building and financing for statistics were needed and welcomed the efforts undertaken by the High-level Group, in cooperation with all stakeholders, including the private sector and the [Bern Network on Financing Data for Development](#), to mobilizing commitments for more and better funding.

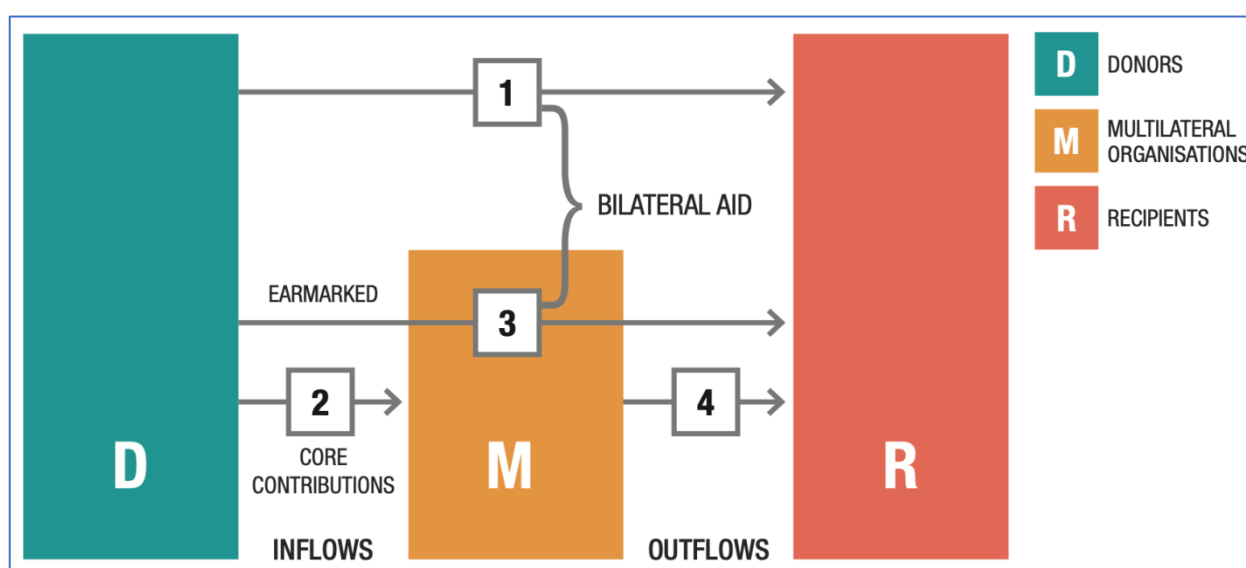
16.12.4 Main donors/contributors to statistical capacity development

Some official development aid is channelled to statistical capacity development through bilateral or multilateral technical cooperation. A full picture of flows of international development aid to statistics is depicted in Figure 22. The PARIS21 Partner Report on Support to Statistics (PRESS)⁵⁵ provides a comprehensive global analysis of donor financial flows to data and statistics.

From 2015-2017, Canada, Sweden, UK and USA were the top country donors. The other top donors were World Bank, Eurostat, IMF, UNFPA, UNICEF and the Gates Foundation. The top five donors– the World Bank, USA, the European Commission/Eurostat, IMF and the UK – provided 66% of total commitments. While the UNFPA and USA were strongly engaged in country-specific aid to statistics, Gates Foundation and the IMF were among the top donors for unallocated commitments to regional or sectoral commitments.

⁵⁴ Full proposal @ https://unstats.un.org/unsd/statcom/51st-session/documents/BG-Item3a_Mechanism-for-SDG-data-and-statistics-E.pdf

⁵⁵ Refer to https://paris21.org/sites/default/files/inline-files/UNV002_Press%202019%2011.pdf

Figure 22: Flows of official aid ([PRESS 2019](#), [PARIS21](#))

16.12.5 Key INGOs/Networks engaged in statistical capacity development

Some international non-governmental organizations (INGOs) listed in Chapter 16.10 - *International Non-Governmental Organizations* are engaged in statistical capacity development. Several of them were established in response to the call of UN Secretary-General's Independent Expert Advisory Group on a Data Revolution for Sustainable Development (IEAG). As described in their statistical mandates, the areas of work, statistical capacity development priorities and modes of cooperation focus on frameworks and initiatives addressing new data needs, innovative solutions, and strengthening national statistical systems. They have become important actors in the international statistical system-- working in close partnership with international and national statistical agencies. PARIS21 is definitely the main global partnership involved in statistical capacity building activities.

The Data4Now, [officially launched](#) on the side lines of the UN General Assembly in September 2019 by UN Deputy Secretary-General Amina Mohammed, aims to increase the use of robust methods and tools that improve the timeliness, coverage, and quality of SDG data through collaboration and partnership, technical and capacity support, and information sharing. Four operating partners anchor this initiative: GPSDD, World Bank, UNSD, and [SDSN TReNDS](#). More information is available [here](#).

16.12.6 International coordination amidst COVID-19

The COVID-19 pandemic brought to the forefront the need for high-frequency data in very challenging circumstances. Traditional data collection based on PAPI and face-to-face interviews were not feasible with “lockdown” and “social-distancing” protocols.

Amid the global COVID-19 crisis, there is an unprecedented need for data to enable decision makers to inform policies and planning and minimize the risk for all, especially the vulnerable population groups. For this purpose, timely data disaggregated by age, sex, location and other markers is important to inform decision-makers and the general public. Stakeholders from across the international statistical community support national statistical offices in addressing

multiple challenges brought about by the crisis. The initial wave of responses of the ISS included the following:

- a) UNSD in collaboration with the Global Partnership for Sustainable Development Data and Open Data Watch has launched a [website](#) to share guidance, best practices, information resources and tools to help statistical organizations function during an emergency situation in which most of their staff are suddenly unable to work on-site.
- b) UNSD in partnership with Esri launched [UN COVID-19 Data Hub](#) for sharing available data and web services in an open and interoperable environment, linked to a federated network of national and global COVID-19 data hub.
- c) Under the aegis of the CCSA, thirty-six international organizations produced a report on [How COVID-19 is changing the world: a statistical perspective](#).

Other international statistical agencies have made available statistical resources, as well. Note: The listed initiatives capture mainly the first wave of responses of the ISS (up until July 2020). Rapid and continued development of resources to help NSSs continues and are made available through the websites:

- a) [ILO](#);
- b) [UN Women](#);
- c) [FAO – Data lab](#);
- d) [FAO – Data analysis](#);
- e) [UNECE](#);
- f) [UNECLAC](#);
- g) [ESCAP: Asia-Pacific Stats Café Series](#);
- h) [UNECA- African Centre for Statistics: COVID-19-related stories](#);
- i) [ESCWA- Data Portal](#);
- j) [ECLAC- COVID-19 Observatory for Latin America and the Caribbean](#);
- k) The [ECA and GPSDD](#) have unveiled an initiative to strengthen Africa’s data ecosystems in the face of COVID-19. The ECA-GPSDD partnership will receive capacity support from Data, for Now. More information.

16.13 Statistical forums to facilitate international cooperation

In recent years, new discussion forums engaging players in the larger data ecosystem have been established by the international statistical system. These forums facilitate cooperation in addressing the rapid developments and increased demands for modernization of statistical systems and strengthening capacities of official statisticians to use new data sources.

These include the following:

- a) UN World Data Forum (UNWDF);
- b) International Conference on Big Data for Official Statistics (ICBDOS);

- c) High-Level Group for the Modernisation of Official Statistics (HLG-MOS).

16.13.1 [UNWDF](#)

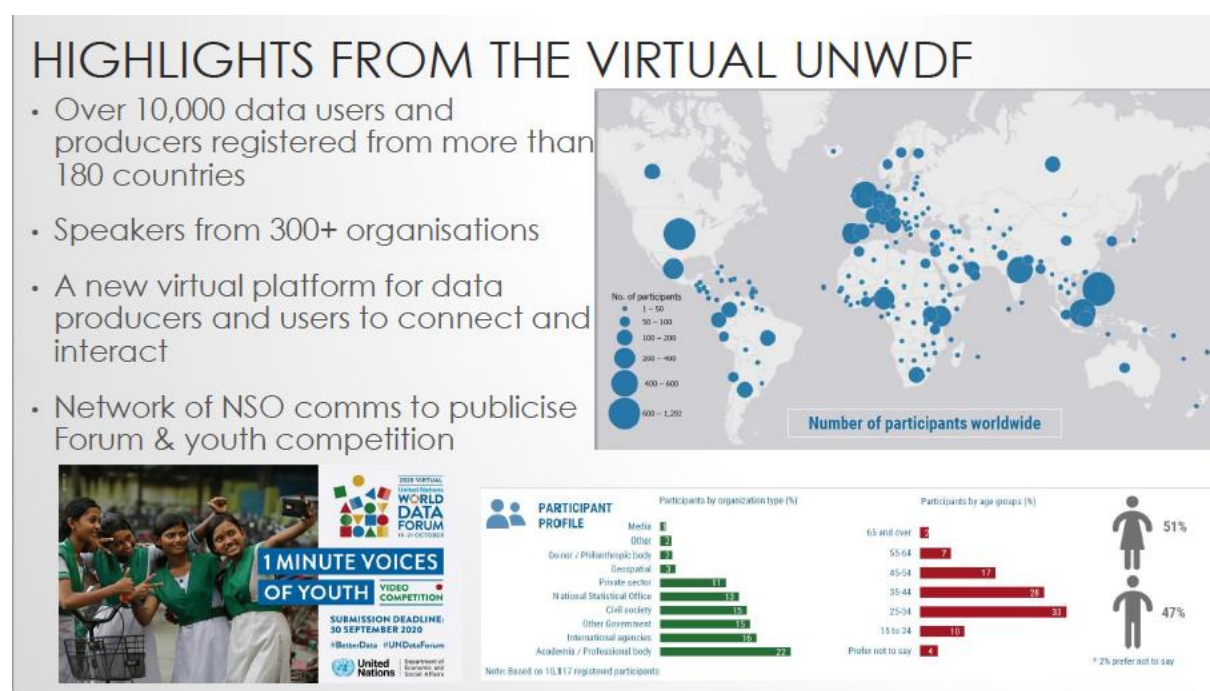
Following one of the main recommendations contained in the report entitled [“A World That Counts”](#), presented in November 2014 by the United Nations Secretary-General’s Independent Expert and Advisory Group on Data Revolution for Sustainable Development, the [Statistical Commission](#) agreed that a United Nations World Data Forum on Sustainable Development Data (UN World Data Forum) would be the suitable platform for intensifying cooperation with various professional groups, such as information technology, geospatial information managers, data scientists, and users, as well as civil society stakeholders.

The High-level Group for Partnership, Coordination and Capacity-Building for Statistics for the 2030 Agenda for Sustainable Development ([HLG-PCCB](#)) leads the UN World Data Forum organization, under the guidance of the United Nations Statistical Commission and in close consultation with the Member States and international partners. The Statistics Division of the United Nations Department of Economic and Social Affairs supports the forum's organization in its role as Secretariat of the Commission and the HLG-PCCB.

The first United Nations World Data Forum was hosted from 15 to 18 January 2017 by [Statistics South Africa](#) in Cape Town, South Africa. The second UN World Data Forum was hosted by the [Federal Competitiveness and Statistics Authority](#) of the United Arab Emirates from 22 to 24 October 2018 in Dubai. The [Virtual United Nations World Data Forum](#) took place from 19 to 21 October 2020 in digital format due to COVID-19. The online 2020 edition brought together more than 10000 participants from over 100 countries. Figure 23 captures the virtual forum's key features as presented in a report by the HLG-PCCB at the [11th meeting](#) of the IAEG-SDGs.

Figure 23: The 2020 Virtual UNWDF

(11th Meeting IAEG-SDGs, [Agenda item 3 presentation](#))



16.13.2 ICBDOS

The UNSC mandated the Global Working Group on Big Data for Official Statistics ([GWG-BG](#)) to:

- a) provide a strategic vision, direction and coordination for a global programme on Big Data for official statistics, including for indicators of the post-2015 development agenda;
- b) encourage practical use of Big Data sources, including cross-border data, while building on existing precedents and finding solutions for the many existing challenges, including methodological issues, covering quality concerns and data analytics; legal and other issues in respect of access to data sources; privacy issues, in particular, those relevant to the use and reuse of data, data linking and re-identification; security, information technology issues and management of data, including advanced means of data dissemination, assessment of cloud computing and storage, and cost-benefit analysis;
- c) promote capacity-building, training and sharing of experience;
- d) foster communication and advocacy of the use of Big Data for policy applications, especially for the monitoring of the post-2015 development agenda;
- e) build public trust in the use of Big Data for official statistics.

The International Conferences on Big Data for Official Statistics (ICBDOS) is the main platform for engaging the wider statistical community— official statisticians, data scientists, researchers—in carrying out this mandate. Five conferences have been held, with the [6th International Conference on Big Data for Official Statistics](#) taking place in the form of a virtual event. Like the first five, this Conference discussed the use of Big Data in other fields, such as data collection for SDG indicators and evidence-based policymaking. But with the challenging situation brought about by the huge demand for data in the context of COVID-19, the topics increased scrutiny in accelerating the use of Big Data—honing in on how new technologies - such as AI and machine learning- can be used to assess the socio-economic impact of COVID-19.

16.13.3 HLG-MOS

The UNECE High-Level Group for the Modernisation of Official Statistics (HLG-MOS) was formed in 2010 by a group of chief statisticians interested in pooling resources, sharing experiences, improving efficiency and accelerating the pace of modernisation within the official statistics community. It reports to the Conference of European Statisticians annually and has been asked to provide regular updates to the UN Statistical Commission.

The HLG-MOS oversees two major international collaboration projects each year, as well as expert groups on specific aspects of modernisation, including standards, human resources and various aspects of the methodology. A “Blue-Skies Thinking Network” acts as the innovation hub, exploring new ideas to see if they have the potential to add value for official statistics. Annual HLG-MOS workshops bring together chief statisticians and experts from around the world, to identify the key priorities for the international statistical community in the coming year. Outputs have included a suite of modernisation models and standards, including the globally used Generic Statistical Business Process Model (GSBPM), the Common Statistical Production Architecture (CSPA), and guidelines on the use of Big Data, strategic communications and machine learning.

More information about the [HLG-MOS activities and outputs](#) can be found on its wiki.

16.14 SDGs-related forums that facilitate cooperation

Cooperation and capacity development for the implementation of the SDGs indicator framework are guided and facilitated by key groups and forums:

- a) Interagency and Expert Group on SDG Indicators (IAEG-SDGs);
- b) [High-level Group for Partnership, Coordination and Capacity-Building for statistics for the 2030 Agenda for Sustainable Development \(HLG-PCCB\)](#);
- c) [Regional Forums for Sustainable Development](#).

16.14.1 Interagency and Expert Group on SDG Indicators ([IAEG-SDGs](#))

The UNSC created the Inter-agency and Expert Group on SDG Indicators (IAEG-SDGs) at its 46th session to develop and implement the global indicator framework for the Goals and targets of the 2030 Agenda. The Group is composed of Member States and includes regional and international agencies as observers.

The global indicator framework was developed by the IAEG-SDGs and agreed upon, including refinements on several indicators, at the 48th session of the United Nations Statistical Commission. The indicator framework was subsequently adopted by the General Assembly on 6 July 2017 and is contained in the Resolution adopted by the General Assembly on Work of the Statistical Commission pertaining to the 2030 Agenda for Sustainable Development ([A/RES/71/313](#)).

The group's current terms of reference can be found [here](#) and its current members are listed [here](#).

The IAEG-SDGs has three working groups to address specific areas relevant to SDG indicator implementation. The groups address the Statistical Data and Metadata Exchange (SDMX), Geo-spatial information, and Development support. In addition to IAEG-SDGs members, the Working Groups include countries that are not members of the IAEG-SDGs, international organizations, civil society, academia and the private sector. The terms of reference of the working groups are found in the links below:

- a) [Working Group on Geo-spatial Information](#);
- b) [Working Group on SDMX](#);
- c) [Working Group on Measurement of Development Support](#).

Further information on the work of the IAEG-SDGs. Including outcomes of meetings and consultations can be found [here](#).

16.14.2 High-level Group for Partnership, Coordination and Capacity-Building for statistics for the 2030 Agenda for Sustainable Development ([HLG-PCCB](#))

At its forty-sixth session, the UNSC created the High-level Group for Partnership, Coordination and Capacity-Building for statistics for the 2030 Agenda for Sustainable Development (HLG-PCCB). HLG-PCCB was tasked to provide strategic leadership in

addressing the statistical capacity needs of NSOs in the follow-up and review of the implementation of the 2030 Agenda and the SDGs indicator framework. To achieve this, the HLG-PCCB coordinates closely with the IAEG-SDGs. To facilitate the exchange, the co-chairs of each group are included in each other's meetings to share updates and connect the work of these two UNSC bodies. The group's current terms of reference can be read [here](#).

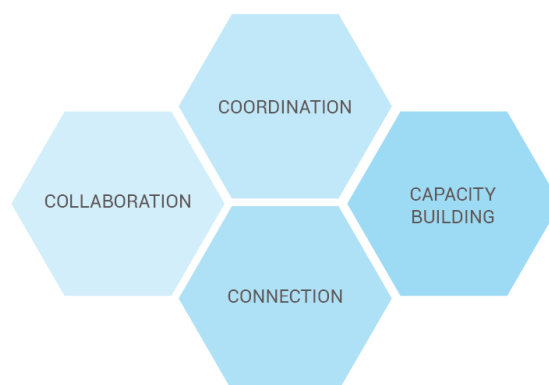
The HLG-PCCB consists of the chief statisticians from 22 national statistical offices (NSOs) representing the continental regions of the World (5 from the Asia and Pacific region, three from Northern Africa and Western Asia, five from Northern America and Europe, five from Latin America and the Caribbean and four from Sub-Saharan Africa), with the chair of the UNSC as an ex-officio member. Current members are listed [here](#).

As mentioned earlier, the HLG-PCCB launched the CTGAP at the first UNWDF to address the key data and statistical capacity needs of NSS. The UNWDF, now held every two years, under the leadership and guidance of the HLG-PCCB continues to be a primary mechanism to engage the wider data ecosystem to discuss expanding capacity needs, foster partnerships and cooperation (both intergovernmental and public-private) and showcase potential solutions. To provide a more routine mechanism to discuss these issues, the HLG-PCCB meets up to three times a year outside of the UNWDF cycle.

More information on the HLG-PCCB, including outcomes of meetings, can be read [here](#).

Box 12: The Global Network of Data Officers and Statisticians

The [Global Network of Data Officers and Statisticians](#) is a global professional network for statisticians, data officers, data scientists and geospatial information experts of national statistical systems (NSSs), UN System entities, and other international and regional organizations. It is a facilitated professional online social community – hosted on the Yammer platform – which aims to help national governments build resilient and sustainable national data and information systems for the full implementation of the SDGs through collaboration, knowledge-sharing, networking, and technical support.

**The main objectives of the Global Network are:**

- Improve coordination and collaboration between and among NSSs, Resident Coordinator Offices / UN Country Teams, UN entities, and international and regional organizations, as well as within regions (via the Regional Commissions).
- Connect existing but not necessarily well-connected networks, initiatives, and intergovernmental bodies by providing a single and unique meeting place for the users and entities described above.

The Global Network offers its users:

- A community of practice around data and statistics;
- Build new partnerships and foster synergies;
- Fostered collaboration through the creation of thematic and regional groups;
- Information on capacity-building events;
- Global Network Webinars in identified fields and to improve communication skills;
- Fruitful collaboration between statisticians, geospatial information experts, and Resident Coordinator Offices / UN Country Teams;
- Support from a pool of experts;
- An organically built knowledge base;
- Sharing job and consultancy opportunities;
- Provide members with an essential training and resource environment.

16.14.3 Regional forums for sustainable development

The regional forums for sustainable development, convened annually by the UN regional commissions, are strategically placed on linking the national and global discourse and serving as multi-stakeholder platforms to promote the implementation of the 2030 Agenda. These Forums were set up following the General Assembly resolutions 67/290, 70/1 and 70/299 in which it acknowledged the importance of the regional dimensions of sustainable development; invited the regional commissions to contribute to the work of the High-Level Political Forum on Sustainable Development (HLPF), including through annual regional meetings; and encouraged member States to identify the most suitable regional forum, as a further means to contribute to the follow-up and review at the HLPF.

One of the key outcomes of the regional forums is the endorsement by the member States of SDG Regional Roadmaps. The roadmaps facilitate regional and sub-regional cooperation in the implementation of the SDGs. These roadmaps highlight *data and statistics* as a key means of implementing and supporting the statistical action plans for capacity development on the SDGs emanating from the respective intergovernmental statistical bodies.

Examples of initiatives for regional roadmaps:

- a) **ESCAP:** The [regional road map for implementing the 2030 Agenda](#) for Sustainable Development in Asia and the Pacific was agreed on during the 4th Asia Pacific Forum on Sustainable Development and subsequently endorsed by the ESCAP Member States at the ESCAP's 73rd Commission Session. The road map identifies priority areas of regional cooperation for implementation of the 2030 Agenda. These priority areas underline the major challenges still faced in the region. Priority actions under the means of implementation for the 2030 Agenda are also identified in the road map, *including data and statistics*, technology, finance, policy coherence and partnerships.
- b) **UNECE:** the regional roadmap [guides to national statistical offices on producing statistics for SDGs](#). It lays out what needs to be done, who the stakeholders are, and the opportunities for cooperation. The Road Map deals with establishing national mechanisms for collaboration, assessing data gaps, developing national indicators, providing data on global SDG indicators, statistical capacity building and communication. The Road Map can be used in communications with other stakeholders involved in implementing SDGs to explain the issues related to statistics for SDGs, and the critical role of official statistics.

The Road Map was developed by the Conference of European Statisticians (CES) Steering Group on Statistics for SDGs, including 17 countries, Eurostat, OECD and UNECE. The Heads of statistical offices of more than 60 countries from UNECE, OECD and beyond approved the Road Map in June 2017.

- c) **CARICOM:** The Strategic Framework for the [CARICOM Regional Strategy for the Development of Statistics](#) (RSDS) is the roadmap to strategically support the Modernisation and Transformation of the CARICOM Statistical System (CSS). This Strategy document results from the extensive work undertaken over several years by the Standing Committee of Caribbean Statisticians (SCCS) and the Caribbean Community (CARICOM) Secretariat.

The RSDS is guided by the five strategic priorities: standards and harmonisation; governance; integrated statistical systems; innovation; and, Advocacy and Communication. Additionally, four strategic drivers or enablers will underscore the strategic priorities: information communication technology geared to driving the solutions to data production; the SDGs; sustainable capacity building; and, gender mainstreaming.

The Heads of Government, the highest decision-making body in the Community, endorsed the CARICOM RSDS at their Thirty-Ninth Regular Meeting in July 2018.

16.15. The NSO and the international statistical system

16.15.1 Engagement of NSO with the ISS and international cooperation activities

Capacity development programmes such as training, technical assistance, and statistical strategies, are likewise designed around bilateral and multilateral cooperation. These are implemented in various schemes. The actors may be NSOs, in schemes often referred to as “South-South” or North-South” cooperation. In many cases, NSOs mainly from the North are the implementing arms of their respective aid and cooperation agencies or donors for bilateral cooperation. For example—Statistics Canada and CIDA, Statistics Sweden and SIDA, USA and USAID, UK and DFID, Japan and JICA, Norway and NORAD, and Australia and DFAT. The programmes may be multilateral, such as programmes of international or sub-regional entities involving several of their member states.

International cooperation on statistics also includes responding to data collection questionnaires from international statistical organizations, which serve as inputs to international statistics produced by the organizations in accordance with their mandates. These statistics are described in the agency profiles (Cards) provided [here](#) and in Annex 7.

16.15.2 NSO functional unit responsible for international cooperation in statistics

For NSOs, engaging in international cooperation requires carrying out logistical, coordination and communication functions. The activities may include preparation of project proposals; working with legal and financial requirements of capacity development projects; internal and external coordination of statistical development projects as recipients or providers. Participation in regional and global statistical intergovernmental meetings and technical meetings (expert group meetings, Friends of the Chair, advisory groups, etc.) is a major part of international cooperation activities. Some NSOs may also co-host international forums with international agencies. In many NSOs, an “international cooperation unit” has been established to serve as the focal point for managing the abovementioned activities. Examples of such at the national level are provided hereunder.

Examples of international cooperation units and functions of NSOs

- a) Foreign Statistics and International Cooperation Department (FSIC) of the **General Statistical Office (GSO) of Viet Nam** is a public administration unit of GSO with advisory function to assist the General Director of GSO in guiding, managing and conducting the work of foreign statistics and international cooperation in the field of statistics: [Mandate and responsibilities](#).

- b) **The National Statistics Office of Mongolia (MNSO)** has a [Foreign Relations and Cooperation Unit](#) under its Administration Department (one of five departments) that manages —bilateral and multilateral cooperation and engagement of the MNSO in the Global Statistical System.
- c) **Statistics Poland (GUS)** has an [International Cooperation Department](#) within its organizational structure as a separate unit subordinate to the chief statistician. The Department is responsible for four main areas of international cooperation: (1) organizational aspects of this cooperation, (2) receiving EU funds for statistical development and carrying out international capacity building projects, (3) dealing with EU law-making process; (4) coordinating the cooperation with the European Statistical System and other international organizations (mainly UN and OECD).

16.15.3 Participation in international meetings and events

With respect to participation in intergovernmental meetings such as the UNSC sessions or regional statistical committees/conferences, staff members of national statistical offices, including chief statisticians and senior managers, can contribute most effectively to and learn from discussions when they follow some ground rules.

This section aims to guide participants in strategic and technical intergovernmental meetings and international forums at global, regional and sub-regional levels.

- a) **Registration and logistics:** it is crucial to register (or confirm) as early as possible and through the appropriate national channels, the nominated participant(s) to an international statistical event. The NSS may also consider informing the national Resident Coordinator's Office (RCO) for UN meetings. For high-level UN meetings, one may also consider informing the Permanent Mission to the United Nations of their meeting participation. If the meeting is organized remotely, make sure well in advance that you have the right IT configuration and solutions to connect. If needed, ask the organizers to conduct a test before the event.
- b) **Before the meeting:** study the meeting agenda and identify the topics for which you plan to prepare interventions. If needed, hold internal coordination meetings and consult with members and stakeholders of the NSS such as data providers, producers of official statistics and main users to gather comprehensive national views on the topic. Where needed, these consultations may be used to obtain a consensus on joint statement or position of the NSS.

For high-level international events such as the UN Statistical Commission, where the NSS wishes to have their country's view or position reflected in the regional or sub-regional statement, you may formally or informally coordinate with the region's or sub-region's representative.

To be well - prepared, be sure to participate in studies and surveys conducted by international organizations. When meeting organizers request feedback and inputs on issues, success stories or discussion points for the meeting, send on time your written contributions so that these can be incorporated into the documents and materials to be made available to participants of the meeting.

- c) **During the meeting:** quality rather than quantity is the key. Speak with authority and make interventions brief and to the point. Where relevant or requested, prepare presentations or contributions aligned with the session's topic and limit yourself to the allocated time. Presenting or speaking based on the allocated time allows others to share insights challenges and success stories; a presentation is a way to engage with other participants in a discussion. Hence, it is important to focus on the essence of the presentation and share the key messages, challenges, solutions, and learnings.

Interventions or comments that lead to constructive solutions or action points moving forward are always well-received. It is important to be consensus-oriented and provide constructive solutions and support countries that share the same national position. To avoid unnecessary repetitions, connect the interventions to the ongoing discussions, making references to delegations that share the same views.

Where relevant, such as when additional discussions beyond the time allocated to the sessions are needed, hold informal meetings over coffee and lunch breaks. Such interactions may help identify common positions and opinions or further technical details you are interested in. For practices or experiences that you may consider replicating, this is also the time to express interest and obtaining contact information for further discussions after the meeting.

- d) **After the meeting:** provide feedback to the meeting organizers by responding to the evaluation survey typically issued at the end of the meeting or electronically a few days later.

Prepare a meeting's report with main outcomes to be disseminated to the staff of the NSO and, if relevant, to other partners within and outside the NSS. In some instances, a general report for administrative purposes and a second one would be useful at a more technical level. In particular, never forget to report back and share the report with all data providers, producers of official statistics, main users and other important stakeholders consulted before the meeting. Use the outcome of the meeting! Identify the good practices presented by participants at the meeting. Do not delay implementing, with appropriate adaptation to the national context; starting with those that could be replicated in your country swiftly and at low cost.

16.15.4 Donor-partners coordination group on data and statistics

An increasing number of donors and statistical development partners working with NSOs and the NSS in countries, with encouragement from the government, have established coordination groups. These groups' objective is to increase coordination in the introduction, planning and/or implementation of statistical capacity development initiatives within the country.

Coordination of capacity development activities across the NSS should be led by the NSO. A National Strategy for the Development of Statistics (NSDS), which establishes priority statistical programs and activities, is a valuable coordination mechanism that an NSO can use to inform donors and development partners about specific needs of the NSS. As it responds to national data demands arising from major policies such as the national development plan, it provides a robust framework for investment in data and statistics. Through a consultative process with different actors, the NSDS, together with sectoral statistical plans, aims to be a multi-donor focal point for funding statistics, with counterpart domestic funding.

The coordination groups are frequently part of the data mechanisms established for the implementation of the SDGs monitoring framework—typically established by the United Nations Country Team (UNCT) in the country as a mechanism that is part of the coordination function of the UN Resident Coordinator for the country. Box 13 provides an informative note on the UN Resident Coordination system’s role in statistical development activities at the national level as envisioned by the proposed financing mechanism for implementing the CTGAP.

Box 13: The UN Resident Coordination System

The purpose of the proposed financing mechanism for implementing the CTGAP is to support national priorities and NSOs, and thus, there will be a strong connection to the UN Country Teams (UNCTs). Working with UNCTs, which provide inter-agency coordination at the country level, the financing mechanism can further enhance the delivery of capacity development activities as an integrated process.

This financing mechanism builds upon the existing role of the UN system in countries to facilitate national ownership. The UNCTs can help with the coordination at the national level of projects carried out by the mechanism and ensure that these projects are integrated, when appropriate, into activities of the UN system's entities active in the country. As the mechanism will match the national priorities to existing projects and funding available, the UNCTs offer an opportunity to work within this existing structure, potentially broadening the impact of the financing mechanism’s initiatives and deepening support for the NSOs.

National priorities and national development plans will guide the financing mechanism to meet national data needs. Working with the UNCTs, the financing mechanism can further ensure that capacity development initiatives reflect the reality of priorities established by the governments.

Glossary

Term	Abbr./ Acronym	Definition	Explanatory notes
Administrative data		Data collected by a government department or other public agency primarily for administrative (not research or statistical) purposes.	Administrative data are collected for the purposes of registration, transaction and/or record-keeping, usually during the delivery of a service. They include data in an <i>administrative register</i> (for example, names and addresses of enterprises subject to VAT), and data resulting from administrative transactions (for example, VAT payments).
Administrative register		<i>Register</i> maintained for administrative purposes.	An <i>administrative register</i> is typically maintained by a government ministry, department or agency to assist it in fulfilling an administrative function.
Administrative source		Government department or other public agency that collects <i>administrative data</i> .	
Aggregate data		(same as) microdata	Aggregate data are also referred to as <i>aggregated data</i> .
Agricultural holding		A unit of agricultural production under single management comprising all livestock kept and all land used wholly or partly for agricultural	<i>Single management</i> may be exercised by an individual or household, jointly by two or more individuals or households, by a clan or tribe, or by a juridical person such as a corporation, cooperative or government agency. The holding's land may

Term	Abbr./ Acronym	Definition	Explanatory notes
		production purposes, without regard to title, legal form or size.	consist of one or more parcels, located in one or more separate areas or in one or more territorial or administrative divisions, providing the parcels share the same production means, such as labour, farm buildings, machinery and draught animals.
Anonymization		A process by which individual data records are altered in such a way that the entities to which the records refer can no longer be identified directly or indirectly.	<p>Anonymisation always includes removal of <i>direct identifiers</i> to prevent <i>direct identification</i>. It may involve more than removal of direct identifiers as their removal alone may not be sufficient to prevent <i>indirect identification</i> using other fields in the record.</p> <p><i>Anonymisation</i> is distinct from <i>pseudonymization</i>, which is a process in which the identifiers of the original data set are replaced with aliases or pseudonyms. Unlike anonymisation, pseudonymization is a reversible process that de-identifies data but allows reidentification later if necessary.</p> <p>The benefits of anonymization are that it may enable access to microdata for research purpose, or transfer of microdata across the boundary of a national statistical system (for example to an international statistical organization) with greatly reduced or negligible risk of unintended disclosure.</p>

Term	Abbr./ Acronym	Definition	Explanatory notes
Application programming interface	API	Computing interface which defines interactions between multiple software intermediaries.	An <i>application programming interface</i> defines the kinds of calls or requests that can be made, how to make them, the data formats that should be used, the conventions to follow.
Artificial intelligence	AI	Development and application of computer systems that are able to perform tasks normally requiring human intelligence.	The tasks include visual perception, speech recognition, decision-making, and translation between languages. The growth in AI has major potential for statistical organizations.
Autonomous national statistical office		National statistical office in which the head of the office reports directly to an executive board and is not accountable to a member of the government or parliament.	Sometimes called semi-autonomous national statistical office. Note that reporting autonomy does not imply financial autonomy. An NSO under an executive board is no more financially autonomous than one reporting to a government minister. In both cases, the NSO budget is determined by the central government budget as decided by the legislative assembly.
Big data		Data generated by business or government transactions, social media, phone logs, communication devices, web scraping, sensors, etc., characterised by high volume, velocity and variety.	Big data are often largely unstructured, meaning that they have no pre-defined data model and do not fit well into conventional relational databases.
Business		Broad definition: an <i>enterprise</i> Narrow definition: a commercial <i>enterprise</i>	<i>Enterprise</i> is a term that is very precisely defined by the 2008 SNA. By contrast, in common usage, <i>business</i> is more broadly defined as an <i>organization engaged in commercial, industrial, or professional</i>

Term	Abbr./ Acronym	Definition	Explanatory notes
			<i>activities</i> . It may also refer to <i>the organized efforts and activities of individuals to produce and sell goods and services for profit</i> . <i>Enterprise</i> is a term that is very precisely defined by the 2008 SNA.
Business register		A register of businesses maintained for administrative or statistical purposes.	A business register may be a <i>statistical register</i> or an <i>administrative register</i> of businesses. Here the term business is an adjective and refers to set of units specific to the administrative or statistical purpose. For example, it may refer to the set of entities that are registered as businesses under national legislation, or the set of businesses registered for VAT.
Business survey		<i>Survey</i> in which the <i>sampled population</i> and/or the set of <i>observation units</i> are <i>businesses</i> .	If a <i>survey</i> includes not only <i>businesses</i> but also <i>non-profit institutions</i> and/or <i>government units</i> , it should more precisely be referred to as an <i>economic survey</i> .
Census		Operation of systematically enumerating, acquiring and recording information about the members of a given population.	In some statistical offices, the term <i>census</i> is reserved for situations where the target population is <i>all the units</i> in a country or in a particular region or district. If it is not, the survey may be referred to as a <i>full enumeration survey</i> or a <i>take-all survey</i> rather than a <i>census</i> .
Centralised national statistical system		<i>National statistical system</i> in which official statistics are predominately produced by the	

Term	Abbr./ Acronym	Definition	Explanatory notes
		<i>national statistical office</i> rather than by statistical units in ministries, departments and agencies.	
Chief statistician		The most senior official statistician in a country.	The <i>chief statistician</i> is typically the chief executive of the <i>national statistical office</i> , leading the strategic development and coordination of the national statistical system, in compliance with statistical legislation and international principles.
Citizen generated data	CGD	Data produced by non-state actors with the active consent and participation of citizens primarily to tackle issues that affect them directly.	Citizen generated data are innovative data sources (secondary data sources) for the production of official statistics and may be leveraged to support the effective tracking of progress on the Sustainable Development Goals (SDGs).
Cloud technology		Computing power made available as a utility that can be tapped on demand.	In this way, services such as servers, storage, and application software are delivered to a user via the internet enabling rapid access to shared networks of system resources.
Collaborative project		Website or application that enables users to create and share content or to participate in social networking.	
Commercial data		Data collected by non-government organizations, such as commercial and non-profit organizations, during the course of their operations for their own purposes.	Commercial data happens to be used as <i>secondary data</i> by a national statistical office or other producers of official statistics.

Term	Abbr./ Acronym	Definition	Explanatory notes
Commercial enterprise		An enterprise that is a <i>corporation</i> or a <i>household unincorporated enterprise</i> .	<i>Non-profit institutions</i> and <i>government unincorporated enterprises</i> are not <i>commercial enterprises</i> .
Common metadata framework		Repository of knowledge and good practices related to statistical metadata that identifies the principles of metadata management.	
Common statistical infrastructure		Statistical tools and systems that support the activities constituting a generic statistical process, but that are not part of any specific statistical process, together with the statistical activities required for development or acquisition, maintenance and promotion of these tools and systems.	For example, the subprocesses of designing and building a survey questionnaire (GSBPM subprocesses 2.3 and 3.1) are typically supported by a questionnaire design and construction tool/system, which is independent of the survey. This tool/system is an element of the common statistical infrastructure and is developed or purchased, maintained and promoted by a national statistical organization for use in building the surveys it conducts.
Composite Indicator		An <i>indicator</i> obtained by combining individual indicators based on an underlying model of the multi-dimensional concept being measured.	Typically, a composite indicator measures a multi-dimensional concept (e.g. competitiveness, e-trade, or environmental quality) that cannot be captured by a single indicator. Ideally, a composite indicator should be based on a theoretical framework/definition, that allows individual indicators to be selected, combined and weighted in

Term	Abbr./ Acronym	Definition	Explanatory notes
			a manner which reflects the dimensions or structure of the concept being measured.
Community of practice		Network of individuals working with a common, shared purpose, grouped together to facilitate knowledge building, idea creation and information exchange.	
Computer hardware platform		Consists of client and <i>server</i> machines, and in some cases mainframes.	
Confidential data		Data that allow natural or legal persons to which the data refer to be identified, either directly or indirectly.	If confidential data are disseminated, individual data will be revealed.
Confidentiality		(same as) <i>statistical confidentiality</i> .	When the context is evidently statistical, the term <i>confidentiality</i> is used rather than <i>statistical confidentiality</i> .
Content community		Allows users to upload, share, and view multimedia content such as videos, pictures, music or presentations.	Example: YouTube, Flickr, Soundcloud
Content management system		A system that manages the creation and modification of digital content. The main functions include web-based publishing, format management, history editing and version control, indexing, search, and retrieval.	A content management system typically supports multiple users in a collaborative environment. It supports the separation of content and presentation. Such systems are widely used for organizational content management and web content management.

Term	Abbr./ Acronym	Definition	Explanatory notes
Corporation		Legally constituted corporation, cooperative, limited liability partnership, notional resident unit or quasi-corporation	This broader interpretation of the notion of corporation, which was developed especially for the SNA, means that every enterprise can be classified a <i>corporation, non-profit institution</i> or <i>unincorporated enterprise</i> . Here <i>notional resident unit</i> refers to an artificial unit created for SNA purposes to account for ownership of immovable assets (such as land, buildings and natural resources) by non-residents.
Coverage		Population of units to which a statistical input or output refers.	For a survey, the population is the <i>survey frame</i> , also referred to as the <i>sampled population</i> . For administrative <i>data</i> , the population is the set of units providing data. For <i>statistical output</i> , the population is the population(s) associated with the input data from which the statistics have been generated. The coverage is the population that is obtained, not necessarily the target population. Units that are in the target population but not the population are collectively referred to as the <i>under coverage</i> . Units that are in the population but not the target population are collectively referred to as the <i>overcoverage</i> .
Data architecture		Rules in place for the collection and storage of data in an organization.	

Term	Abbr./ Acronym	Definition	Explanatory notes
Data archiving		Process of moving data that are no longer actively used to a separate storage device for long-term retention.	
Data ecosystem		The entire network of data collectors, data producers, data analysts and other data users that directly or indirectly collect, process disseminate, analyse and/or otherwise consume data and associated services within a specified country or region.	The data ecosystem within a country is broader than the national statistical system because it includes all producers of data not simply those producing official statistics, and it includes all users of data.
Data integration		Bringing together data from more than one source.	<i>Data integration</i> is a means of expanding <i>coverage</i> and/or <i>content</i> of statistical output.
Data interoperability		Ensuring that systems are using the same set of definitions, classifications and methodology, as well as technologically compatible platforms allowing for full harmonization of interfaces and access protocols.	
Data item		Attribute of an <i>observation unit</i> , or count, or other item derived from such attributes.	Also called a <i>variable</i> or an <i>indicator</i> . Survey methodologists tend to prefer the term <i>variable</i> , economists tend to prefer <i>indicator</i> and survey staff, and IT specialists tend to prefer <i>data item</i> .
Data portal		Web-based interface designed to make it easier to find data.	Like a library catalogue, a portal contains metadata about the information that is available for re-use. Typically, a portal refers to information in the form

Term	Abbr./ Acronym	Definition	Explanatory notes
			of raw, numerical data rather than textual documents
Data provider		An individual or organization providing data to a <i>national statistical office</i> or <i>other producer of official statistics</i> .	The definition is as used in the Handbook and is from the perspective of a statistical organization. A more general definition would be <i>an individual or organization providing data</i> , which would include the <i>national statistical office</i> and <i>other producers of official statistics</i> within its scope.
Data reseller		Pulls data from NSO websites re-packages and re-sells without having to engage in any specific relationship with the NSO.	
Data science		An interdisciplinary field that uses scientific methods, processes, algorithms and systems to extract knowledge and insights from many structural and unstructured data.	Data science is related to data mining, machine learning and Big Data.
Database management system	DBMS	Collection of programs that manage the database structure and control access to data stored in a database.	Data management and storage is handled by database management systems (DBMS).
Dataset		A collection of data.	<i>Dataset</i> may be written <i>data set</i> . In the case of tabular <i>microdata</i> , a <i>dataset</i> corresponds to one or more database tables, where each column of a table represents a particular variable, and each row corresponds to a particular record in the dataset.

Term	Abbr./ Acronym	Definition	Explanatory notes
Decentralised national statistical system		National statistical system in which the responsibility for compiling <i>official statistics</i> rests with several national or regional government ministries, departments or agencies as well as with the <i>national statistical office</i> .	
Disclosure control		Measures applied to eliminate (or at least significantly reduce) the risk of releasing data about individual <i>legal</i> or <i>natural persons</i> .	The measures usually modify or restrict the amount of the data released. Disclosure control is typically required to ensure <i>confidentiality</i> of statistical outputs.
Dissemination		Activity of making official statistics, statistical analyses, statistical services and metadata accessible to users.	In the <i>Generic Statistical Business Process Model</i> , the <i>Disseminate phase</i> is broken down into five sub-processes, namely: <i>Update output systems</i> ; <i>Produce dissemination products</i> ; <i>Manage release of dissemination products</i> ; <i>Promote dissemination products</i> ; and <i>Manage user support</i> .
Dynamic visualisation		Representation that goes beyond static forms, such as printed media. Its defining characteristics are animation, interaction and real-time data access.	
Economic production		An activity that is carried out under the responsibility, control and management of an <i>institutional unit</i> and that uses inputs of labour, capital, and goods and services to produce outputs of goods and services.	For national accounts purposes, household activities that produce domestic or personal services for final consumption within the same household are excluded, except housing services provided by owner-occupiers to themselves and services produced by paid domestic staff.

Term	Abbr./ Acronym	Definition	Explanatory notes
Economic survey		Survey in which (1) the <i>sampled population</i> and/or the set of <i>observation units</i> are <i>enterprises, local units, kind of activity units or establishments</i> and/or (2) the primary contents of the survey are economic data.	This definition allows a survey of household income and expenditure to be referred to as an <i>economic survey</i> as well as a <i>household survey</i> .
Enterprise		<i>Institutional unit</i> in its role as a producer of goods and services.	An <i>enterprise</i> may be a <i>corporation</i> , a <i>quasi-corporation</i> , a <i>non-profit institution</i> or an <i>unincorporated enterprise</i> . An enterprise is a precisely defined version of the rather vaguely defined term <i>business</i> .
Enterprise architecture	EA	Conceptual blueprint that defines the structure and operation of an organization and whose role is to determine how the organization can most effectively achieve its current and future objectives.	
Enterprise group		Association of enterprises bound together by legal and/or financial links.	Enterprises may be linked to one another by complete or partial common ownership and/or a shared management structure. They may also share the outputs and costs of research and development activities. If the ties are sufficiently close it is desirable to consider the enterprises as forming an <i>enterprise group</i> .
Enterprise social media		Online social networks or social relations among people who share business interests and/or activities.	

Term	Abbr./ Acronym	Definition	Explanatory notes
Establishment		An <i>enterprise</i> or part of an <i>enterprise</i> at a single location, engaged in essentially a single activity, and capable, in principle, of providing the data required for the production and generation of income accounts.	<i>Establishment</i> and <i>local kind of activity unit</i> are synonyms. Establishment is the preferred term.
Farm		(same as) <i>agricultural holding</i>	Farm is the colloquial term; agricultural holding is the precisely defined term used for statistical purposes.
Farm register		Register of agricultural holdings maintained for administrative or statistical purposes.	A farm register may be a <i>statistical farm register</i> or an <i>administrative register</i> of farms.
Federal statistical system		Comprises two independent layers of producers of official statistics, one at the federal/central level and the other at the sub-national level.	A <i>federal statistical system</i> is usually associated with a federal system of government that combines a federal/central government with sub-national governments in a single political system. However, a country that has a federal system does not necessarily have a federal statistical system.
Formal sector		The set of enterprises that are not in the <i>informal sector</i> and are not <i>household unincorporated non-market enterprises</i> .	The ILO Resolution from the 1993 ICLS defines only the <i>informal sector</i> . Thus, the formal sector has to be defined by exclusion of those enterprises that are informal sector and those household enterprises that do not have market production.
Frame		(same as) <i>survey frame</i> .	<i>Frame</i> is used as an abbreviation for <i>survey frame</i> where the context is clear.

Term	Abbr./ Acronym	Definition	Explanatory notes
Gender		Socially constructed differences in the attributes and opportunities associated with being female or male.	<i>Gender</i> refers to social interactions and relationships between women and men. <i>Gender</i> determines what is expected, allowed and valued in a woman, or man, in a given context. In official statistics, <i>gender</i> is distinct from <i>sex</i> .
Gender statistics		Statistics that adequately reflect the lived realities of women and men, girls and boys.	
General economic production		Activities carried out under the control and responsibility of institutional units that use inputs of labour, capital, and goods and services to produce outputs of goods and services.	
Generic quality management system		<i>Quality management system</i> model or standard that can be applied to any type of organization.	Examples are the ISO 9001:2015 Quality Management System - Requirements, and the European Foundation for Quality Management (EFQM) Excellence Model.
Geographic information system portal		Specialised platform for the dissemination and visualisation of geospatial data. Data are combined with maps typically from publicly available sources such as Google Maps.	
Geospatial data		Data that combine location information (usually coordinates on the earth), attribute information (the characteristics of the object, event, or phenomena concerned), and often but not always, temporal	

Term	Abbr./ Acronym	Definition	Explanatory notes
		information (the time or life span at which the location and attributes exist).	
Government unincorporated enterprise		Government unit in its role as an enterprise.	
Government unit		Legal entity that is established by political/government process and that has legislative, judicial or executive authority over other <i>institutional units</i> within a given area.	The principal functions of a government unit are (1) to assume responsibility for the provision of goods and services to the community or to individual households and to finance their provision out of taxation or other incomes; (2) to redistribute income and wealth by means of transfers; and (3) to engage in non-market production. A government unit may be a ministry, department or agency.
Groupware		Collaborative software that can be used to exchange knowledge and expertise.	Designed to help people involved in a common task to achieve their goals.
Household		Group of persons who share the same living accommodation, who pool some, or all, of their income and wealth and who consume certain types of goods and services collectively, mainly housing and food.	The concept of household is based on the arrangements made by persons, individually or in groups, for providing themselves with food or other essentials for living. A household may be either (a) a one-person household, that is to say, a person who makes provision for his or her own food or other essentials for living without combining with any other person to form part of a multi-person household, or (b) a multi-person household, that is

Term	Abbr./ Acronym	Definition	Explanatory notes
			to say, a group of two or more persons living together who make common provision for food or other essentials for living. The persons in the group may pool their resources and may have a common budget; they may be related or unrelated persons or constitute a combination of persons both related and unrelated.
Household master sample frame		Set of <i>households</i> with characteristics required for sampling and contact purposes available as a <i>frame</i> for <i>household surveys</i> .	Abbreviated <i>master sample frame</i> when the context is clear.
Household register		Register of households maintained for administrative or statistical purposes.	
Household survey		<i>Survey</i> in which the <i>sampled population</i> and/or the set of <i>observation units</i> are <i>households</i> .	
Household unincorporated enterprise		An <i>unincorporated enterprise</i> that is a <i>household</i> .	
Household unincorporated market enterprise		A <i>household unincorporated enterprise</i> that is producing for the market.	The distinction between a <i>household unincorporated enterprise</i> that produces for the market and one that does not (i.e., that consumes its own products) is important in defining the <i>informal sector</i> .

Term	Abbr./ Acronym	Definition	Explanatory notes
Identifier		A sequence of characters allowing identification of an individual statistical unit from its name, exact geographical location or identification number.	An identifier allows <i>direct identification</i> , meaning the identification of an individual statistical unit based on one identified, or a combination of identifiers. Identification done by any other means is referred to as <i>indirect identification</i> .
Index		A <i>composite indicator</i> comprising a compound measure of changes in a group of data points that are representative of a particular phenomenon.	A well-known example is the Consumer Price Index (CPI) which provides a measure of the average change over time in the prices paid by consumers for a specified basket (set) of goods and services.
Indicator		Summary measure related to a key issue or phenomenon derived from a series of observed facts or reported opinions, attitudes or expectations.	An <i>indicator</i> may be any summary measure of the data – a mean, count, percentage, etc. It may be related to or based on a conceptual model or context on which it provides information.
Industry		A group of establishments engaged in the same, or similar, kinds of activity.	The Standard International Classification of All Industries (ISIC) Rev 4 provides a prescriptive list of all industries.
Informal sector		The set of <i>enterprises</i> within a country that is (1) engaged in the production of goods or services for the market with the primary objective of generating employment and incomes to the persons concerned, (2) operating at a low level of organization, with little or no division between labour and capital as factors of production, and on a small scale and (3) with labour relations (where they exist) based	The definition is derived from Resolution II of the Fifteenth International Conference of Labor Statisticians 1993, which also provides a framework for operationalising it. In essence, the informal sector should be defined to comprise the set of household unincorporated market enterprises that are: (1) own account enterprises (optionally, all, or those that are not registered under specific forms of

Term	Abbr./ Acronym	Definition	Explanatory notes
		mostly on casual employment, kinship or personal and social relations rather than contractual arrangements with formal guarantees.	national legislation); and (2) enterprises with employees that have less than a specified number of employees or (optionally) are not registered under specific forms of national legislation, or whose employees are not registered. Agricultural businesses may (optionally) be excluded.
Institutional unit		An entity that is capable, in its own right, of owning assets, incurring liabilities and engaging in economic activities and in transactions with other entities.	There are two types of institutional units, namely <i>legal entity</i> and <i>household</i> .
Inter-governmental organization	IGO	An international organization that involves two or more countries working on issues of common interest and that has been established by a treaty that acts as the charter founding the organization.	The <i>secretariat</i> of an IGO is the organ that undertakes the central administrative and/or general secretarial duties of the IGO.
International financial institution	IFI	A financial institution that has been established, or chartered, by more than one country, and hence is subject to international law.	The owners or shareholders of an international financial institution are generally national governments, although other international institutions and other organizations may occasionally be shareholders.
International non-governmental organization	INGO	A citizen-based organization independent of government involvement, with an international membership, scope, or presence, mobilizing resources and acting as implementer and catalyst to support its members and others.	<i>INGOs</i> are typically <i>non-profit organizations</i> operating without government control and relying on a variety of funding sources from private donations and membership dues to government contribution. It is common to consider INGOs and

Term	Abbr./ Acronym	Definition	Explanatory notes
			International Partnerships being part of the same category of international organizations.
International organization		A body with an international membership, scope, or presence that promotes cooperation and coordination between or among its members.	There are many types of international organizations. One way of categorizing them is to distinguish between <i>intergovernmental organizations</i> , <i>supranational organizations</i> and <i>international non-governmental organizations</i> .
International partnership	IP	An international body established between <i>inter-governmental organizations</i> , <i>supranational organizations</i> , national bodies, corporations, philanthropic foundations, and/or local and national civil society organizations working towards a similar or shared goal.	(1) An <i>international partnership</i> can benefit its member organizations with an increased fundraising base, more networking opportunities and greater awareness of their common cause. (2) It is common to consider <i>international non-governmental organizations and international partnerships</i> being part of the same category of international organizations.
International statistical system		The international organizations, or structural entities thereof, involved primarily or exclusively in the development, production and dissemination of official statistics at global, regional and sub-regional levels.	In principle organizations or structural entities within the international statistical system should conform to the Principles Governing International Statistical Activities.
Internet-related infrastructure		Hardware, software and services to maintain corporate web sites, intranets, and extranets, as well	

Term	Abbr./ Acronym	Definition	Explanatory notes
		as web-hosting services and web software application development tools.	
Kind of activity unit		Enterprise, or part of an enterprise, that is situated in a single location and in which only a single productive activity is carried out or in which the principal productive activity accounts for most of the value-added.	An <i>industry</i> is defined in terms of establishments.
Knowledge management		How collective information, knowledge and expertise are used in order to be effective as an organization. Covers the management of data flow, the sharing of “know-how”, knowledge retention, collective information, knowledge and expertise.	
Knowledge management system		Any kind of IT system that stores and retrieves knowledge, improves collaboration, locates knowledge sources, mines repositories for hidden knowledge, captures and uses knowledge, or in some other way enhances the knowledge management process.	
Knowledge portal		Web-based application that provides a single point of access to organizational knowledge, integrating knowledge repositories, expert directories, collaboration tools, and other knowledge-intensive applications.	

Term	Abbr./ Acronym	Definition	Explanatory notes
Legacy system		Older transaction processing system that continues to be used to avoid the cost of replacement or redesign.	Often refers to a system created for mainframe computer.
Legal entity		An entity whose existence is recognized by law or society independently of the persons, or other entities, that may own or control it.	A <i>legal entity</i> has the right to ownership, to dispose of assets, to engage in activities and to enter into contracts and to institute legal proceedings. There are three types of legal entity: <i>corporations</i> , <i>non-profit institutions</i> and <i>government units</i> .
Legal person		(same as) <i>legal entity</i>	
Legal unit		Legal person or natural person	In the context of a <i>statistical business register</i> , it is more practical to think of the enterprises as being owned by <i>legal units</i> (i.e., <i>legal persons</i> and <i>natural persons</i>) than by <i>institutional units</i> (i.e., <i>legal persons</i> and <i>households</i>) as the administrative data sources used in constructing the register refer to legal persons and natural persons, not to households.
Linked data		Method of publishing structured data so that it can be interlinked through semantic queries, connecting related data that weren't formerly related.	Linked data build upon standard Web technologies such as HTTP, the resource description framework (RDF) and uniform resource identifiers (URI), but instead of using them to generate standard web content as pages to be read by users, it extends them to connect information in a way that can be read automatically by computers. In this way, data is

Term	Abbr./ Acronym	Definition	Explanatory notes
			linked to other data, fully exploiting these connections so its value increases exponentially. Thus, data becomes discoverable from other sources and is given a context through links to textual information via glossaries, dictionaries and other vocabularies.
Local kind of activity unit		(same as) <i>establishment</i>	Establishment is the preferred term.
Local unit		An <i>enterprise</i> , or a part of an <i>enterprise</i> , that engages in productive activity at or from one location.	Location may be interpreted according to the purpose, narrowly, such as a specific address, or more broadly, such as within a province, state, county, etc.
Machine-to-machine access	M2M	Automated transmission of data between systems in a standard format without human intervention.	<i>Machine to machine access</i> occurs when systems access data directly using <i>application programming interfaces</i> and web services.
Macrodata		Data generated by aggregating microdata according to a well-defined statistical methodology.	(1) <i>Macrodata</i> are also referred to as <i>aggregate data</i> or <i>aggregated data</i> . (2) In the case of data from a sample survey, the aggregation methodology includes weighting. (3) <i>Macrodata</i> may refer to a single table or multiple tables. An example of macrodata is a statistical table containing counts of businesses within a country by economic activity and region. Another example is a set of quarterly unemployment statistics.

Term	Abbr./ Acronym	Definition	Explanatory notes
Mentoring and knowledge transfer		Practice of retaining and transferring knowledge within an organization by mentoring and late-career knowledge transfer to develop talent, skills and careers.	
Metadata		Data and other documentation that describe <i>statistical data</i> and <i>statistical processes</i> in a standardised way by providing information on data sources, methods, definitions, classifications and data quality.	In general terms, <i>metadata</i> are <i>data about data</i> . In the statistical context, and hence as defined here for the purposes of the Handbook, <i>metadata</i> are <i>data about statistical data</i> .
Microdata		Data on individual units.	(1) <i>Microdata</i> are also called <i>unit record data</i> . They are non-aggregated observations, or measurements of characteristics of individual units, before or after editing. (2) The units to which the data refer are termed <i>observation units</i> . They may be of any particular type, for example, persons, households, businesses, farms, institutions, transactions, scientific measurements, etc. (3) <i>Microdata</i> may be acquired by survey, from an <i>administrative data</i> source or <i>commercial data</i> source, or any combination of these. (4) <i>Statistics</i> are typically derived by aggregating microdata.
Microdataset		<i>Dataset</i> containing <i>microdata</i> .	(1) Microdataset can be written <i>microdata set</i> . (2) A microdata set comprises a set of records each containing data on individual units.

Term	Abbr./ Acronym	Definition	Explanatory notes
Modernisation maturity model		Self-evaluation tool to assess the level of organizational maturity against a set of pre-defined criteria.	There are multiple aspects of organizational maturity in the context of modernisation, and there are several distinct dimensions. Within each of these dimensions, an NSO may have different levels of maturity.
Multilateral development bank	MDB	An international financial institution that provides to its member states financing and professional advice for the purpose of development.	A multilateral development bank can be global (e.g., World Bank) or it can be regional in membership, scope and presence, such as regional development banks.
National statistical institute	NSI	(same as) <i>National statistical office</i>	
National statistical office	NSO	The main producer of official statistics in a country and/or the organization responsible for coordinating all activities related to the development, production, and dissemination of official statistics in the national statistical system.	The actual name given to the <i>national statistical office</i> in a country may be National Statistical Institute (NSI), National Bureau of Statistics (NBS), Central Bureau of Statistics (CBS), National Statistical Agency (NSA), Central Statistical Agency (CSA), Central Statistics Agency (CSA), etc.
National statistical system	NSS	Comprises the <i>national statistical office</i> and all <i>other producers of official statistics</i> in the country.	The <i>national statistical system</i> is sometimes referred to as the national system of official statistics.
Natural person		Human being	In the context of the 2008 SNA and economic statistics, there are two types of person, namely <i>natural person</i> and <i>legal person</i> .

Term	Abbr./ Acronym	Definition	Explanatory notes
Network infrastructure		Hardware and software resources that enable network connectivity and communications that provide the communication path and services between users, processes, applications, services and external networks and the internet.	
Non-observed economy		Economic activities that are missing from the basic data used to compile the national accounts because they are underground, illegal, informal, household production for own final use, or due to deficiencies in the basic data collection system.	Collectively <i>underground activities</i> are often referred to as the <i>underground economy</i> or the <i>hidden economy</i> , or the <i>concealed economy</i> or the <i>shadow economy</i> . The <i>underground economy</i> is a subset of the <i>non-observed economy</i> .
Non-profit institution		Legal or social entity created for the purpose of producing goods and services but whose status does not permit it to be a source of income, profit or other financial gain for the units that establish, control or finance it.	In practice, the entity's productive activities are bound to generate a surplus or deficit, but any surplus it happens to make cannot be appropriated by other institutional units.
Non-profit organization		(same as) <i>non-profit institution</i> .	<i>Non-profit institution</i> is the term defined in the 2008 SNA. <i>Non-profit organization</i> is the term most commonly used outside the immediate context of the 2008 SNA.
Observation unit		Unit about which data are acquired and statistics compiled.	Usually but not necessarily the same as the unit comprising the target population or (in the case of a survey) the sampled population.

Term	Abbr./ Acronym	Definition	Explanatory notes
Official statistics		Statistics produced in accordance with the <i>Fundamental Principles of Official Statistics</i> by a <i>national statistical office</i> or by another <i>producer of official statistics</i> that has been mandated by the national government or certified by the <i>national statistical office</i> to compile statistics for its specific domain.	Typically, <i>official statistics</i> are produced and disseminated in compliance with the respective national statistical legislation and are identified as such in the national statistical programmes. All statistics produced by a <i>national statistical office</i> are assumed to be official with the exception of those explicitly stated by the <i>national statistical office</i> as not official.
Open data		Data and content that can be freely used, modified, and shared by anyone for any purpose.	
Open-source software		Software that has its source code made available by use of a license in which the copyright holder provides the rights to change and distribute the software freely to anyone and for any purpose.	Open-source software is frequently developed in a collaborative public manner.
Operating system	OS	Software that manages the resources and activities of the computer and act as an interface for the user.	The best-known client operating systems are Windows operating systems. Server operating systems are dominated by the various forms of the UNIX operating system or Linux.
Other producer of official statistics	OPOS	Organizational entity within a government ministry, department or agency, other than the <i>national statistical office</i> , that develops, produces and disseminates <i>official statistics</i> .	Other producers of official statistics have to be professionally independent organizational entities and exclusively or primarily focused on statistical work.

Term	Abbr./ Acronym	Definition	Explanatory notes
Peer review		Evaluation of a statistical organization, statistical process and/or statistical output by one or more people with similar competencies to the producer.	Often used for quality evaluation of a national statistical system, statistical process and/or statistical output by peers from within the same statistical organization or from another statistical organization.
Population register		Register of persons maintained for administrative or statistical purposes.	
Primary data		Data collected directly by a producer of official statistics exclusively for official statistical purposes.	Primary data are typically collected by sample surveys and censuses, in compliance with applicable national regulatory frameworks, such as national statistical legislation.
Primary data source		Organization that produces <i>primary data</i> .	
Privacy		The limitations on the use, and the degree of protection, guaranteed by a statistical organization collecting data to the entity providing the data.	The definition refers to privacy in the context of a <i>national statistical office</i> or <i>other producer of official statistics</i> . In a general (as opposed to statistical) context, <i>privacy</i> is the ability of an entity to seclude itself or information about itself. When something is private to an entity, it usually means that it is inherently special or sensitive. Privacy thus defined partially overlaps with security, which can embody the concepts of appropriate use and protection of information.

Term	Abbr./ Acronym	Definition	Explanatory notes
Producer of official statistics		<i>National statistical office</i> or other producer of <i>official statistics</i> .	
Profiling		Procedure for identification of appropriate statistical and observation units for an enterprise or enterprise group.	Based on information about the enterprise collected from the enterprise, and, in the case of corporations, from publicly available annual reports.
Quality		Degree to which a set of inherent characteristics of an object fulfils requirements.	This is a general definition from ISO 9000:2015 Quality Management Systems. In the context of a <i>national statistical system</i> , the <i>object</i> being referred to may be a <i>statistical output</i> , the <i>statistical process</i> that produced it, the <i>institutional environment</i> housing the process, or the whole statistical system. Users' needs define <i>output quality</i> , which is typically expressed in terms of a set of <i>quality dimensions</i> such as <i>relevance, accuracy and reliability, timeliness and punctuality; accessibility and clarity; and coherence and comparability</i> . Simpler characterisations of output quality are fit for use and fit for purpose.
Quality assessment		The part of quality assurance that focuses on assessing the extent to which quality requirements have been fulfilled.	In the context of statistical organizations, <i>quality assessment, quality evaluation, and quality review</i> are regarded as synonyms. For brevity where the context is clear, they are all referred to simply as <i>evaluation</i> , the term used in the <i>Generic Statistical Business Process Model</i> .

Term	Abbr./ Acronym	Definition	Explanatory notes
Quality assurance		The part of quality management focused on providing confidence that needs or expectations regarding quality will be met.	Quality assurance provides an organization's guarantee that the product and service it offers meet accepted quality standards. In the context of a statistical organization, it comprises a planned and systematic pattern of actions necessary to provide confidence that a product, and the process that produces it, conform to established requirements.
Quality assurance framework	QAF	The procedures and systems that support quality assurance within an organization.	The term quality assurance framework is used in the context of statistical organizations to mean the part of the quality management framework that provides confidence that the stated needs or expectations of users are being met. It is based on the definition of quality, the <i>statistical quality principles</i> , and the methods and tools that are used to ensure the principles are implemented. A <i>quality assurance framework</i> together with the procedures for application of <i>general quality management principles</i> constitute a <i>quality management framework</i> .
Quality evaluation		(same as) <i>quality assessment</i>	
Quality framework		(same as) quality management system	

Term	Abbr./ Acronym	Definition	Explanatory notes
Quality management		Coordinated activities to direct and control an organization with regard to quality.	Quality management includes establishing quality policies and objectives, and processes to achieve these objectives through quality planning, quality assurance, quality control, and quality improvement.
Quality management framework		(same as) quality management system	
Quality management principles		Comprehensive set of principles on which a quality management system is based.	The most widely used articulation of quality management principles is included in the ISO 9000:2015 and accompanying documents. In the context of statistical organizations, and in this Handbook, a distinction is made between <i>general</i> quality management principles, which are associated with an organization as a whole, and <i>statistical</i> quality principles, which are associated with the core statistical infrastructure and processes.
Quality management system	QMS	Set of interrelated or interacting elements of an organization to establish quality policies and quality objectives, and processes to achieve those objectives.	In the context of statistical organizations, a quality management system is more commonly referred to as a <i>quality management framework</i> , or simply a <i>quality framework</i> .
Quality report		Report conveying information about the quality of a statistical output and/or process.	A quality report is a typical way of recording the results of a quality evaluation.

Term	Abbr./ Acronym	Definition	Explanatory notes
Quality review		(same as) <i>quality assessment</i>	
Quasi-corporation		An <i>unincorporated enterprise</i> that operates as if it were a <i>corporation</i> and thus must be treated as such.	Typically, this includes enterprises owned by non-resident or government institutional units.
Reference metadata		<i>Statistical metadata</i> that describes the contents and the quality of the statistical data from a semantic point of view.	Examples are explanatory texts on the context of the statistical data, methodologies for data collection and data aggregation, and quality and dissemination characteristics.
Register		List of units maintained for administrative or statistical purposes, including characteristics of the units needed to meet the purposes.	A register may be an administrative register or a statistical register. The characteristics vary according to the purpose but invariably include name and contact details.
Release		<i>Dissemination</i> activity by which official statistics become publicly known for the first time.	
Release calendar		Pre-defined schedule when key indicators and datasets are planned to be released at regular intervals and/or on given dates.	
Release schedule		(same as) release calendar	Release calendar is the preferred term.

Term	Abbr./ Acronym	Definition	Explanatory notes
Residual disclosure		Identification of a value that has been suppressed in a table by reference to the values of other cells in the table.	
Sampled population		The type of <i>statistical unit</i> and the particular population of these units from which a <i>survey sample</i> is drawn.	The sampled population is typically the closest approximation to the <i>target population</i> that can be achieved given the resources available to the <i>survey</i> and taking into account the need for producing coherent statistics, i.e., referring to compatible populations.
Scope		(same as) <i>target population</i>	
Search engine		Information retrieval tool that connects knowledge seekers with experts and answers.	
Seasonal adjustment		Statistical method for removing the <i>seasonal component</i> of a time series.	
Seasonal component		Fluctuations in a time series that exhibit a regular pattern at a particular time during the course of a year which are similar from one year to another.	
Secondary data		Data that are initially collected by a public or private organization for administrative or commercial purposes, not for the purpose of producing official statistics, and that are	Secondary data include <i>administrative data</i> collected by government organizations and <i>Big Data</i> collected by private organizations.

Term	Abbr./ Acronym	Definition	Explanatory notes
		subsequently acquired and re-used by a producer of official statistics.	
Secondary data source		Organization that produces <i>secondary data</i> .	A <i>secondary data source</i> is sometimes termed a non-traditional data source. Its scope has been gradually extended from <i>administrative data sources</i> to include data collected by non-governmental organizations and citizen-generated data sources.
Server		Computer that is dedicated to managing network resources dedicated to a particular task.	Specialist server roles include print servers, file servers, network servers, database servers and web servers.
Sex		Biological differences between women and men.	Biological differences are relatively fixed and unchangeable and tend not to vary across cultures or over time.
Social media		Websites and applications that enable users to create and share content or to participate in social networking.	
Social networking site		Online service, platform or site that focuses on building and reflecting social networks or social relations among people who share interests or activities.	Example: Facebook, LinkedIn.

Term	Abbr./ Acronym	Definition	Explanatory notes
Social survey		Survey in which the content of the survey primarily concerns social conditions.	
Software application		A program or group of programs designed for end-users.	A <i>software application</i> may also termed an <i>application</i> or <i>application software</i> . In the context of a statistical organization, it is an Information technology tool used to manage production activities in the organization from data collection to dissemination. It can be developed by the NSO, or collaboratively with other statistical organization or commercially.
Standard		Set of standard concepts or variables, standard classification, or standard method that underpins harmonisation and/or integration and that typically supports implementation of policies.	
Statistical advisory council		Body established by statistical <i>law</i> , by government or by a national statistical office, composed of representatives of the main categories of private and public users, with the mandate to advise the chief statistician and the government on issues of strategic importance to official statistics.	
Statistical business register	SBR	(1) A <i>statistical register</i> containing a list of businesses and the characteristics of those businesses required to provide frames for business surveys. (2) These data, together with the	The <i>businesses</i> in an SBR can be <i>enterprises</i> or <i>establishments</i> or both. An SBR may include all types of <i>enterprises</i> or may be confined to <i>commercial enterprises</i> . Statistical business register

Term	Abbr./ Acronym	Definition	Explanatory notes
		procedures, systems and human resources that support their use.	is often abbreviated business register (BR) where the statistical context is clear. As indicated by item (2) in the definition, the term SBR can be interpreted in a broader sense to include not only the data but also the procedures, systems and human resources that support their use.
Statistical confidentiality		Ensuring that individual data collected by, or in possession of, a producer of official statistic are used exclusively for statistical purposes and in such a way that natural or legal persons cannot be identified, either directly or indirectly.	Statistical confidentiality is a fundamental principle of Official Statistics.
Statistical data		Data collected, processed or disseminated by a statistical organization for statistical purposes.	(1) The data that a statistical organization uses to manage its own operations (for example its payroll) are not <i>statistical data</i> . They may be <i>statistical metadata</i> , for example, if they describe statistical production. (2) Data acquired by a statistical organization from an <i>administrative source</i> are <i>administrative data</i> at the point of acquisition. They may be transformed into <i>statistical data</i> during processing.
Statistical farm register		A <i>statistical register</i> containing agricultural holdings identified for statistical purposes.	Abbreviated <i>farm register</i> when the content is clear.

Term	Abbr./ Acronym	Definition	Explanatory notes
Statistical law		National legal framework governing the development, <i>production</i> and <i>dissemination</i> of <i>official statistics</i> .	The statistical law may be complemented by, and further articulated in, by-laws such as regulations, orders and decrees. The statistical law is applicable to the <i>national statistical office</i> and may be partially or fully applicable to <i>other producers of official statistics</i> .
Statistical literacy		Ability to understand and reason with statistical data.	Applies to all age groups and categories of society so they can better understand data presented to them in its various forms in daily life and can consequently allow them to make better evidence-based and informed decisions.
Statistical metadata		Data and other documentation that describe statistical data and statistical processes in a standardised way by providing information on data sources, methods, definitions, classifications and data quality.	
Statistical organization		Organization, or unit within an organization, whose primary role is the production of official statistics.	A statistical organization may be national or international. In the case of a <i>national statistical organization</i> , the term is synonymous with producer of official statistics.
Statistical output		Output from a statistical process accessible by the users.	Statistical output can be in the form of aggregate statistics, analysis, and/or microdatasets. It can be services associated with any of these. It can be by any medium.

Term	Abbr./ Acronym	Definition	Explanatory notes
Statistical production		Activity that is carried out by a <i>national statistical office</i> or <i>other producer of official statistics</i> and that is aimed at producing <i>statistics</i> .	<i>Statistical production</i> may be abbreviated <i>production</i> where the context is clear.
Statistical unit		Any type of unit that is defined and used for statistical purposes.	A statistical unit can be a survey <i>target population</i> unit, a <i>sampled population</i> unit or an <i>observation unit</i> .
Statistical yearbook		Compendium of statistical information dealing with a wide range of development pertinent topics.	
Statistics		<i>Statistical output</i> in the form of aggregate datasets and tables.	
Statistics code of practice		Principles governing the development, production and dissemination of official statistics and the institutional environment within which a national or regional statistical system operates.	(1) Also referred to as a <i>statistical code of practice</i> or <i>code of good practice for official statistics</i> . (2) May be at national or regional level. (3) Is typically aligned with the <i>UN Fundamental Principles of Official Statistics</i> . (4) In the case of a national level code, is typically aligned with national statistical law. (5) The <i>European Statistics Code of Practice</i> is the first and probably the best-known code of this kind, comprising 16 key principles, each of which is complemented by set of indicators that provide a reference for assessing or reviewing the implementation of the code.

Term	Abbr./ Acronym	Definition	Explanatory notes
Structural metadata		<i>Statistical metadata</i> that is used to identify, formally describe or retrieve statistical data.	Examples are dimension names, variable names, dictionaries, dataset technical descriptions, dataset locations, and keywords for finding data.
Supranational Organization		An international organization with a mandate, legislative power and authority that go beyond the boundaries of its member states.	A supranational organization differs from an intergovernmental organization in that, within it, decisions are made by institutions specific to the organization and not systematically by meeting of heads of state or their representatives. The European Union is one of the most prominent examples of supranational organization.
Survey		Collection of data for statistical purposes.	A survey may be conducted once or repeated at regular intervals or at irregular intervals. A survey may be a <i>census</i> or a <i>sample survey</i> .
Survey cycle		A single conduct of a <i>survey</i> .	Repetitions of a survey with essentially the same objectives and methodology are referred to as <i>survey cycles</i> , or <i>survey repetitions</i> , or <i>survey occasions</i> . <i>Survey cycles</i> are the preferred term. The whole set of survey repetitions is deemed to constitute the survey.
Survey frame		The set of units comprising the sampled population for a survey together with the attributes of those units required for sampling.	

Term	Abbr./ Acronym	Definition	Explanatory notes
Target population		The type of statistical unit and the particular population of these units that a survey is intended to cover.	For example, all manufacturing enterprises with employees.
Time series		A set of values of a particular variable at consecutive periods of time.	Time series is a basic building block for many datasets. It groups data that share the same dimension values (for example region or industry) except for the time dimension, allowing users to see changes in values of variables over time, holding all other dimensions constant. Series is the generic concept, of which time series is the most common example.
Time series analysis		Period to period comparisons in a <i>time series</i> , and detection of the underlying trend which may otherwise be obscured by seasonal and calendar effects.	Time series analysis depends on <i>seasonal adjustment</i> and upon identification and removal of the <i>irregular component from the series</i> , also referred to as <i>extracting the signal</i> from the signal and noise.
Unincorporated enterprise		Government unit, non-profit institution or household in its role as an enterprise that is not considered to be a quasi-corporation.	
Unit record data		(Same as) <i>microdata</i>	
User group		Group convened by a <i>national statistical office</i> with the aim of collecting feedback on statistical outputs,	The name <i>user council</i> or <i>user committee</i> is sometimes used for a user group formally

Term	Abbr./ Acronym	Definition	Explanatory notes
		typically comprising the most important users in a particular subject matter area.	established by decision of the <i>chief statistician</i> or of the Statistical Advisory Council.
Variable		Attribute of an observation unit, count or other item derived from such attributes.	Also called a <i>data item</i> . Survey methodologists tend to prefer the term <i>variable</i> , survey staff, and IT specialists tend to prefer <i>data item</i> .

Annex 1: The Handbook Series

1st edition (1954): Handbook of Statistical Organization

- https://unstats.un.org/unsd/publication/SeriesF/SeriesF_6E.pdf

2nd edition (1980): Handbook of Statistical Organization - A study on the organization of national statistical services and related management issues

- https://unstats.un.org/unsd/publication/SeriesF/SeriesF_28E.pdf
- https://unstats.un.org/unsd/publication/SeriesF/SeriesF_28F.pdf
- https://unstats.un.org/unsd/publication/SeriesF/SeriesF_28S.pdf
- https://unstats.un.org/unsd/publication/SeriesF/SeriesF_28R.pdf

3rd Edition (2003): Handbook of Statistical Organization - The Operation and Organization of a Statistical Agency

- https://unstats.un.org/unsd/publication/SeriesF/SeriesF_88E.pdf
- https://unstats.un.org/unsd/publication/SeriesF/seriesf_88e_corr.pdf
- https://unstats.un.org/unsd/publication/SeriesF/SeriesF_88A.pdf
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- https://unstats.un.org/unsd/publication/SeriesF/seriesf_88c.pdf
- https://unstats.un.org/unsd/publication/SeriesF/Seriesf_88s.pdf

Annex 2a: Illustrative Reading Roadmaps by User

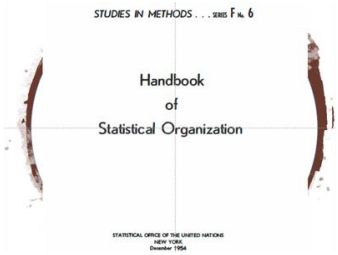
Chapter	Title	User*						
		1	2	3	4	5	6	7
1	Introduction	x	x	x	x	x	x	x
2	Official Statistics – a general overview	x	x	x	x	x	x	x
3	The Basis of Official Statistics	x	x	x	x	x	x	x
4	National Statistical System	x	x	x	x	x		
5	National Statistical Office	x	x	x	x	x		
6	Users and their Needs	x	x	x	x	x	x	x
7	Quality Management	x	x		x	x		
8	Data Sources, Collection and Processing	x			x	x	x	
9	Analysis and Analytical Frameworks	x		x	x	x	x	
10	Dissemination of Official Statistics	x	x	x	x	x	x	x
11	Common Statistical Infrastructure	x	x		x	x		
12	Human Resources Management and Development	x			x	x		
13	Data, Information and Knowledge Management	x	x		x	x		
14	Information Technology Management	x	x		x	x		
15	Management of Buildings, Physical Space and Finance	x	x	x		x		
16	The International Statistical System	x	x	x	x	x	x	

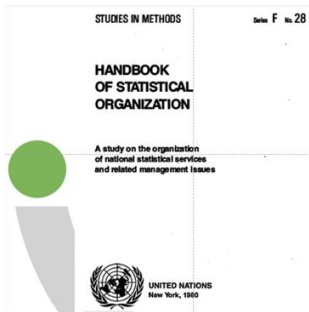
***User codes:** 1-Chief statistician; 2-NSO governing/advisory council member; 3-Ministers with statistics in their portfolio; 4-Other NSS members/producers; 5-Organizations in the international statistical system; 6-Other international and regional agencies; 7-General reader/public

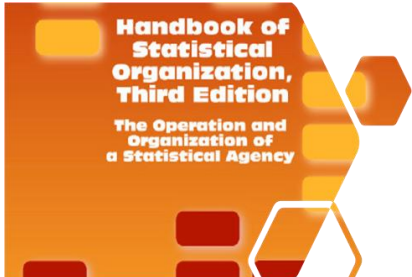
Annex 2b: Illustrative Reading Roadmaps by Reading Objectives

Reading Objective/Interest		Chapter/Topic	
1	Institutional and organizational frameworks of national statistical systems		3- The basis of official statistics
			4- National statistical system
			5- National statistical office
2	Transformation of statistical production processes		8- Data sources, collection, and processing
			10- Dissemination of official statistics
			11- Common statistical infrastructure
			13- Data, information, and knowledge management
			14- Information technology management
3	Securing quality and improving data coherence		6- Users and their needs
			7- Quality management
			9- Analysis and analytical frameworks
4	Mobilizing and securing resources and cooperating for capacity development		12- Human resources management and development
			15- Managing of buildings, physical space, and finance
			16- The international statistical system

Annex 3: Evolution of Usage of Terms in the Handbook Series

Handbook Year	Official Statistics	National Statistical System	National Statistical Office
 <p>1954</p>	<p>The term is used throughout the handbook but never specifically defined. The usage seems to refer to the products (statistical data series) of government agencies.</p> <p>First instance of use: <i>“The expansion in the non-statistical functions of government is an important factor in the recent growth of official statistics.”</i></p>	<p>Explicitly defined in introduction of Chapter 3- Types of Statistical Systems.</p> <p>First instance of use: <i>“The term statistical system is used here to include the full range of national official statistical activities. This includes such bodies as the major statistical operating offices; the specialized statistical offices which may exist in departments or ministries of the government concerned with special subject-matter fields; the statistical functions of provinces, states, cities or other political sub-divisions in so far as they are a part of or contribute to the national statistical result; and the official committees, or boards, that have responsibilities related to the national statistical activities - in brief, the national statistical system in its entirety.”</i></p>	<p>The term is used once.</p> <p>Only instance of use (in Chapter 3- Types of statistical systems)- statistical system with one department responsible for statistics: <i>“Finally, a single national statistical office has certain advantages in obtaining general recognition as an impartial producer of objective data and becomes known as a single source to which official bodies and the public can go for data in all fields.”</i></p>

Handbook Year	Official Statistics	National Statistical System	National Statistical Office
 <p>1980</p>	<p>Official statistics is defined in section B of the Introduction chapter, as follows:</p> <p><i>“The term “official statistics” denotes the statistics provided by a national statistical service to others. It does not include statistics a government agency produces for its own use only and that have no interest or are not accessible to others.”</i></p>	<p>The term is used once—under the topic ‘organization of internal and interagency integration and coordination’—“<i>if a national statistical system is decentralized, it is essential to establish a strong central co-ordinating body to promote the integration of statistics and co-ordination of activities.</i>”</p> <p>Instead, the term national statistical service is used and defined as follows: “<i>The term “national statistical service”, as used in the Handbook, refers to the totality of units of the central government engaged in statistical work. The term “statistical agency” refers to the individual units of the service. Sometimes the term “central statistical office” is used to denote the main statistical agency of a centralized statistical service.</i>”</p>	<p>The term is used once—in the context of a central statistical agency as defined as part of the national statistical service as opposed to sub-national statistical offices.</p> <p>Only instance of use: “<i>In many countries the national statistical service has its own local offices covering the entire country or parts of the country. As a rule, these offices collect micro-data and may perform some additional functions, such as coding, editing and dissemination of the statistics, while the remaining functions are left to the national statistical office. In some countries, the local offices also produce statistics for their own areas.</i>”</p>

Handbook Year	Official Statistics	National Statistical System	National Statistical Office
 <p>2003</p>	<p>The term is used throughout the handbook but never specifically defined. The implied definition is the concept referred to in the Fundamental Principles of Official Statistics.</p> <p>First instance of use: In the Introduction—<i>The two main intended audiences of the Handbook ... are (a) the chief statistician (or soon to be chief statistician of a statistical agency) ...; and (b) those charged with oversight of the official statistics function.</i></p>	<p>Although there is a whole chapter on “II-The statistical system”. The term is not specifically defined. The term ‘national statistical system’ appears three times; ‘statistical system’ is mainly used throughout the document. Through the context in which the terms are used, it refers to a group of agencies responsible for producing “official statistics”—much in line with the definition in the 1980 Handbook of a national statistical service. The discussion is mainly on centralized vs decentralized systems.</p>	<p>The term “national statistical office” is generally used to refer to a statistical agency whose core functions make it responsible for a large slice of official statistics as well as a coordination function in relation to statistical systems.</p>

Annex 4: Mission - Vision - Values Statements

Country	Mission, vision, or values statements
Armenia	The facts speak more than words.
Belarus	Current and relevant official statistical information.
Bosnia-Herzegovina	Providing reliable, quality, comprehensive, timely and internationally comparable statistical information to help meet the data needs of all stakeholders.
Brazil	To portray Brazil by providing the information required to the understanding of its reality and the exercise of citizenship.
Canada	Serving Canada with high-quality statistical information that matters.
Estonia	Providing reliable and objective information about Estonia.
Finland	Facing the future with knowledge.
Hungary	Assisting informed decision making, research and dialogue between all actors of the society by producing and disseminating credible and trusted high-quality official statistics and analyses.
Iceland	In a world awash with information, information quality becomes the most important feature.
India	Strengthen India's national statistical system to provide real-time inputs for policy and stronger dissemination practices for public.
Italy	Knowing the present, planning for the future.
Jamaica	We Collect. We Analyse. We Publish.
Kazakhstan	Who owns the numbers, owns the world.
Kyrgyz Republic	Informative, visibility, accessibility
Mexico	Knowing México.
	INEGI - information for everyone
	INEGI informs.
Netherlands	Facts that matter.
New Zealand	Unleash the power of data to change lives.
Norway	Our statistics are independent, and the policy of equal access is highly emphasized.
Slovenia	We count. Today for tomorrow.
South Africa	To lead and partner in statistical systems for evidence-based decisions.
Suriname	Statistical thinking will one day be as necessary for efficient citizenship as the ability to read and write.

Country	Mission, vision, or values statements
Tajikistan	No statistics - no state.
Thailand	All public society use statistics and information as guiding light for the country development and benefits of the Thai people.
Turkey	Statistics are the key of understanding the past, governing today and planning the future!
United Kingdom	Trusted statistics are essential for making good decisions in society and ONS is the leading provider of these essential data in the UK.
USA - BLS	Accurate, objective, relevant, timely, accessible.
USA - SSL	The value of statistics and research is in informed decision-making.

Annex 5: Why Share Microdata? – A View from ODW

[Open Data Watch](#) (ODW) is an international, non-profit organization working at the intersection of open data and official statistics. Open Data Watch is working to support NSOs to release their microdata by evaluating dissemination practices and the obstacles to the beneficial use of microdata.

Without microdata, we cannot keep the promise of the Sustainable Development Goals that no one will be left behind. However, to harness the full potential of microdata, they must be open and accessible.

Out of 3348 censuses and surveys recorded by the [International Household Survey Network](#) (IHSN) between 2009 and 2018, only 1320 – 40 per cent – make their data available online. The datasets that are available are often out of date. The reasons for withholding access are numerous: lack of capacity to prepare data for publication; a desire to obtain royalties or other payments for their use; and concern about the release of confidential information that could be used to identify individuals or establishments. Even where microdata is nominally available, unstated restrictions and cumbersome procedures may effectively limit access ([Woolfrey, 2012](#)).

Like other data, microdata is a public good: virtually costless to disseminate once they have been collected and not diminished by use. As a public good, they can be used and reused many times, each time increasing the social and economic benefits from new products and services created or, more indirectly, from efficiency gains and the reduction of transaction costs ([European Commission, 2015](#)). To maximize the efficient use of a public good, data should be available to all users at little or no cost and with few, if any, restrictions on their use. This is particularly true of data that have been created at public expense, by governments through taxpayers or organizations supported through public funds. Disseminating microdata can benefit national statistical offices (NSOs) by enhancing their credibility; improving the reliability and relevance of data; reducing the cost of data dissemination; and leveraging funding for statistics ([Dupriez and Boyko, 2010](#)).

Considering the high value of microdata for solving some of the world's most pressing challenges, there are good reasons for NSOs to expand their efforts to make their microdata available. With the agreement of country partners, the DHS Program has published public use files from their Demographic and Health Surveys. These files, which can be downloaded by registered users, have been widely used by academic researchers and bilateral and multilateral development agencies to measure progress on important development goals. Along with censuses and administrative data, they provide the basis for the Multidimensional Poverty Index developed by Alkire and Foster ([Alkire, Foster, et al., 2015](#)).

Administrative data systems also contain important information about the status and welfare of people, especially when they can be linked. Working with de-identified, linked individual-level information from the Norwegian Population Register, the National Registry for Personal Taxpayers, the Cause of Death Registry, and the National Education Database, [Kinge, Modalsi, and Overland](#) (2019) find a strong association between wealth and life expectancy in Norway.

And when surveys are well documented, it is possible to undertake large scale, cross-country analyses, as demonstrated by [Boudet, Buitrago, and others](#) (2018). Utilizing household surveys from 89 countries, they examined gender differences in poverty and household composition.

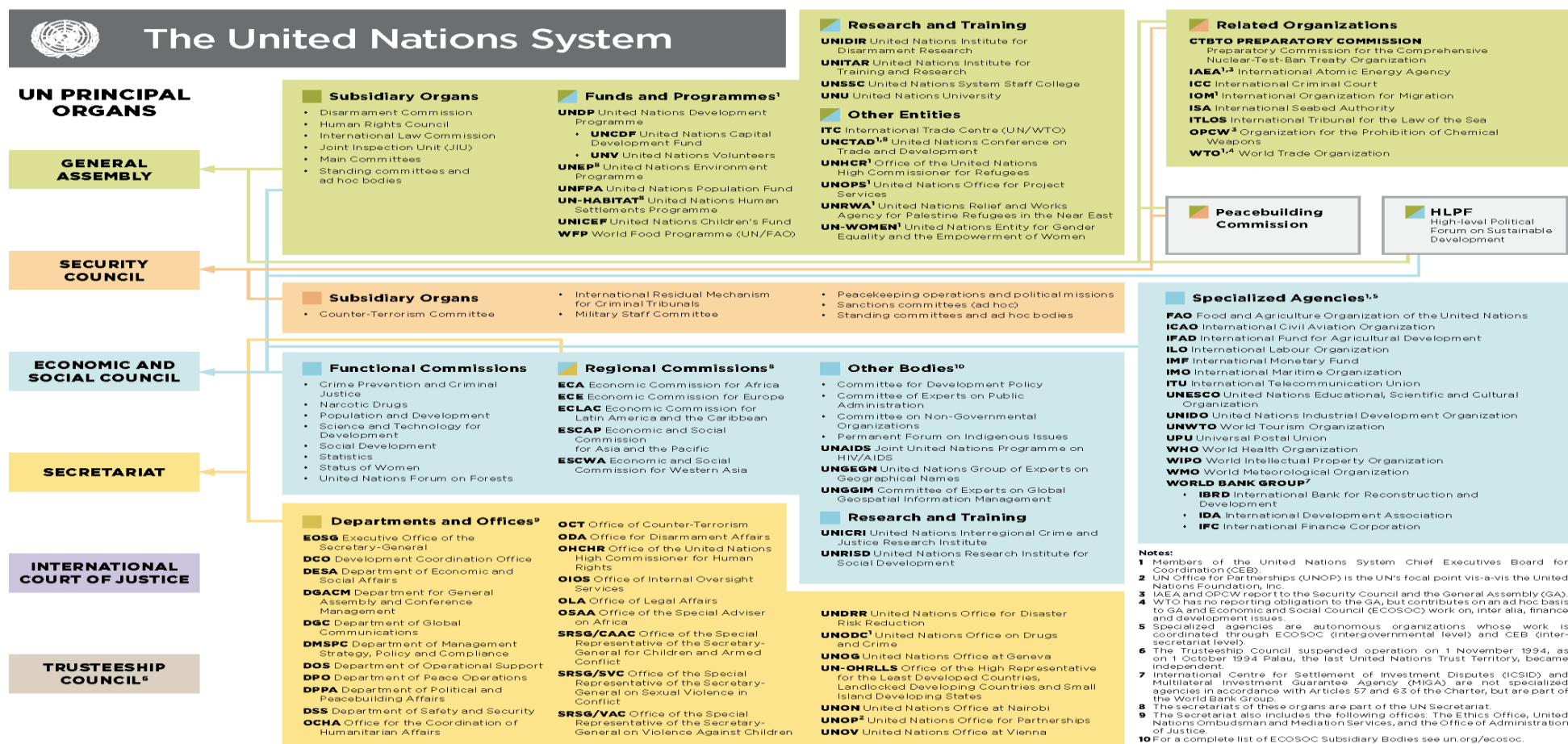
The case for open microdata has been widely supported by many international agencies, including the OECD, citing open microdata as a crucial element in open government and democratic societies and as a driver of economic and social benefits through innovation and new uses of data (OECD, 2014). The International Household Survey Network (IHSN) echoes these sentiments, adding enhanced credibility of national statistical offices and increased funding opportunities as other potential outcomes of open microdata (IHSN, n.d.; Durpriez and Boyko, 2010). Although there are privacy, funding, and legal challenges to opening microdata, there are also resources and frameworks to ease the burden on countries wishing to make their microdata available. (See links in the guidelines below).

Open Data Watch work with NSOs started with the Bridging the Gap: Mapping Gender Data Availability in Africa report with Data2X ([ODW, 2019](#)) and now with the Access to Microdata (ATM) project. The ATM project will request downloads of microdata to test consistency with published rules and to examine the characteristics of datasets in different access categories. The results of this study will provide insight into how countries are disseminating microdata, implementing standards, and protecting the privacy of individuals in their datasets. This project is expected to deliver results to the international community by spring of 2020.

Links to guidelines, best practices, and examples:

- [Bridging the Gap: Mapping Gender Data Availability in Africa \(2019\)](#);
- [Dissemination of Microdata Files - Principles, Procedures and Practices \(2010\)](#);
- [Introduction to Statistical Disclosure Control \(SDC\) \(2014\)](#);
- [Leveraging data in African countries: Curating government microdata for research \(2013\)](#);
- [Managing Statistical Confidentiality and Microdata Access \(2007\)](#).

Annex 6: The United Nations System



Annex 7: International Statistical System and Links to Cards

United Nations System – Secretariat (including UN Regional Commissions)
Department of Economic and Social Affairs (DESA) Statistics Division (UNSD)
Department of Economic and Social Affairs (DESA) United Nations Population Division (UNPD)
Economic Commission for Africa (UNECA) African Centre for Statistics (ACS)
Economic Commission for Europe (UNECE) Statistical Division
Economic Commission for Latin America and the Caribbean (ECLAC) Division of Statistics and Economic Projections
Economic and Social Commission for Asia and the Pacific (ESCAP) Statistics Division
Economic and Social Commission for Western Asia (ESCWA) Statistics Division
United Nations Office for the Coordination of Humanitarian Affairs (OCHA)
Office of the United Nations High Commissioner for Human Rights (OHCHR) Human Rights Indicators and Data Unit
United Nations Conference on Trade and Development (UNCTAD) Development Statistics and Information Branch
United Nations Environment Programme (UNEP) SDG and Environment Statistics Unit
United Nations Human Settlements Programme (UN-Habitat) Global Urban Observatory Section
United Nations Office on Drugs and Crime (UNODC) Research and Trend Analysis Branch

United Nations System – Funds / Programmes / Other Entities
United Nations Development Programme (UNDP) Human Development Report Office
United Nations Population Fund (UNFPA) Technical Division
United Nations Children's Fund (UNICEF) Data and Analytics Section
United Nations Entity for Gender Equality and the Empowerment of Women (UN-Women) Research and Data Section
International Trade Centre (ITC) Trade and Market Intelligence Section
Office of the United Nations High Commissioner for Refugees (UNHCR) Field Information and Coordination Section

United Nations System – Specialized Agencies
United Nations Food and Agriculture Organization (FAO) Office of the chief statistician
International Civil Aviation Organization (ICAO) Aviation Data and Analysis
International Labour Organization (ILO) Department of Statistics
International Telecommunication Union (ITU) ICT Data and Analytics Division
United Nations Educational, Scientific and Cultural Organization (UNESCO) Institute for Statistics
United Nations Industrial Development Organization (UNIDO) Statistics Unit
World Tourism Organization (UNWTO) Statistics Division

United Nations System – Specialized Agencies
Universal Postal Union (UPU) Research and Strategy Programme
World Health Organization (WHO) Department of Health Statistics and Information Systems
World Intellectual Property Organization (WIPO) IP Statistics, Department for Economics and Data Analytics
World Meteorological Organization (WMO) Data Management Applications
United Nations System – Related Organizations
International Organization for Migration (IOM) Global Migration Data Analysis Centre
International Atomic Energy Agency (IAEA) Planning and Economic Studies Section
World Trade Organization (WTO) Economic Research and Statistics Division
Regional Multilateral Development Banks, Bretton Woods Institutions, and other Financial Organizations
World Bank (WB) Development Data Group
African Development Bank (AfDB) Statistics Department
Asian Development Bank (ADB) Statistics and Data Innovation Unit
Caribbean Development Bank (CDB) Economics Department
Inter-American Development Bank (IaDB) Statistics Group, Institutional Capacity of the State Division

Regional Multilateral Development Banks, Bretton Woods Institutions, and other Financial Organizations
Islamic Development Bank (IsDB) Economic Policy and Statistics Department
European Central Bank (ECB) Statistics Directorate
Eastern Caribbean Central Bank (ECCB) Statistics Department
International Monetary Fund (IMF) ⁵⁶ Statistics Department
Bank for International Settlements (BIS) Statistics and Research Support

Regional and Sub-regional Organizations – Africa
African Union Commission (AUC) Statistics Division (AUSTAT)
Economic and Statistical Observatory of Sub-Saharan Africa (AFRISAT)
Common Market for Eastern and Southern Africa (COMESA) Statistics Division
East African Community (EAC) Planning
Economic Committee of Central African States (ECCAS) Statistics and Economic Forecasts Directorate
Economic Community of West African States (ECOWAS) Statistics Division [card not received]
Intergovernmental Authority on Development in Eastern Africa (IGAD) Statistics Unit at Planning, Coordination and Partnership Division

⁵⁶ The IMF and the WB are also UN Specialized Agencies

Regional and Sub-regional Organizations – Africa

Southern African Development Community (SADC)

[Statistics Division](#)**Regional and Sub-regional Organizations – Americas**

Andean Community (CAN)

[Statistical Unit](#)

Caribbean Community (CARICOM)

[Regional Statistics](#)

Southern Common Market (Mercosur)

[card not received]

Organization of Eastern Caribbean States (OECS)

[Statistical Services Unit](#)

Central American Integration System (SICA)

Statistical Commission ([CENTROESTAD](#))**Regional and Sub-regional Organizations - Asia and the Pacific (including Arab Region but without Eurasian Organizations)**Arab Institute for Training and Research in Statistics ([AITRS](#))

Association of Southeast Asian Nations (ASEAN)

[ASEANstats](#)

Economic Cooperation Organization (ECO)

[Project & Economic Research & Statistics](#)

Gulf Cooperation Council (GCC)

Statistical Centre ([GCC-Stat](#))

Organization of Islamic Cooperation (OIC)

Statistical, Economic and Social Research and Training Centre for Islamic Countries (SESRIC) / [Statistics and Information Department](#)United Nations Statistical Institute for Asia and the Pacific ([SIAP-ESCAP](#))

Pacific Community (SPC)

[Statistics for Development Division](#)

Regional and Sub-regional Organizations – Europe and Other Countries (including Eurasian Organizations)
Commonwealth of Independent States (CIS) Interstate Statistical Committee (CISSTAT)
Eurasian Economic Commission (EEC) Statistics Department
European Free Trade Association (EFTA) Statistical Office
Statistical Office of the European Union (Eurostat)
Organization for Economic Co-operation and Development (OECD) Statistics Directorate

International Partnerships, Foundations and other Non-Governmental Organizations
Partnership in Statistics for Development in the 21st Century (PARIS21 Secretariat)
Open Data Watch (ODW)
Global Partnership for Sustainable Development Data (GPSDD)
Sustainable Development Solutions Network, (SDSN) Thematic Research Network on Data and Statistics (TReNDS) Data2X
Development Initiatives (DI)
Global Open Data for Agriculture and Nutrition (GODAN) [card not received]
International Statistical Institute (ISI)
International Association for Official Statistics (IAOS)
International Association for Research in Income and Wealth (IARIW)
Inter-American Statistical Institute (IASI)

Annex 8: Statistical Applications and Models

Object	Abbreviation/ Acronym	Description	Explanatory notes
Advance Data Planning Tool	ADAPT	The Advanced Data Planning Tool (ADAPT) is a free cloud-based tool developed by PARIS21 for NSOs and other data producers that can be used to adapt their data production according to the data needs of policymakers and to adjust their existing data plans to any changes in priorities.	https://paris21.org/advanced-data-planning-tool-adapt
Analytica	Analytica	A particular visual software package for creating, analysing and communicating quantitative decision models. It combines hierarchical influence diagrams for visual creation and view of models, intelligent arrays for working with multidimensional data, Monte Carlo simulation for analysing risk and uncertainty, and optimization, including linear and nonlinear programming.	Analytica (https://lumina.com/)
Argus	μ-ARGUS	μ-ARGUS is a software program designed to create safe micro-data files. The CASC-project took a previous version of μ-ARGUS, developed a.o. during the SDC-project and prototypes before that, as a starting point. At the end of the CASC-project version 4.0 was available.	http://research.cbs.nl/casc/mu.htm

Object	Abbreviation/ Acronym	Description	Explanatory notes
Argus	τ -ARGUS	τ -ARGUS is a software program designed to protect statistical tables. The CASC-project took a previous version of τ -ARGUS, as developed during the SDC-project, as a starting point.	https://www.researchgate.net/publication/304536452_tau-ARGUS_user%27s_manual_version_15
ARIMA Model	ARIMA	The Autoregressive Integrated Moving Average (ARIMA) model is a generalization of an Autoregressive Moving Average (ARMA) model.	These models are fitted to time series data either to better understand the data or to predict future points in the series (forecasting).
BLAISE		A particular software system developed by Statistics Netherlands used for statistical and scientific research. It is used for creating and processing computer-assisted surveys of varying size and complexity and supports questionnaire design and all types of computer-assisted data collection.	https://blaise.com/
Common Statistical Data Architecture	CSDA	Rules put in place for the collection and storage of data in an organization.	The Common Statistical Data Architecture (CSDA) project was set up to define a reference architecture and guidance for the modernisation of statistical processes and Systems.

Object	Abbreviation/ Acronym	Description	Explanatory notes
Common Statistical Data Architecture Project	CSDA Project	Data architecture consists of the rules put in place for the collection and storage of data in an organization. The Common Statistical Data Architecture (CSDA) project has been set up to define a reference architecture and guidance for the modernisation of statistical processes and Systems. <i>Source: UNECE</i>	
Common Statistical Production Architecture	CSPA	Framework for developing statistical processing components that are reusable across projects, platforms and organizations.	CSPA has been developed in recent years by the international statistical community under the auspices of the High-Level Group for the Modernisation of Official Statistics. It is often referred to as ‘plug and play’.
CSPro	CSPro	A particular public domain data processing software package. The main purpose of this software framework is to design application for data collection and processing.	https://www.census.gov/data/software/cspro.html
Data Documentation Initiative	DDI	International standard for describing metadata from surveys, questionnaires, statistical data files, and social sciences study-level information.	DDI focuses on microdata and tabulation of aggregates/indicators.
EUSurvey		A particular open-source online survey management system developed by the European Union for creating questionnaires and other forms and using them to collect data through the Internet.	https://ec.europa.eu/eusurvey/home/

Object	Abbreviation/ Acronym	Description	Explanatory notes
Eviews		A particular statistical package used mainly for time-series oriented econometric analysis. It can be used for general statistical analysis and econometric analyses, such as cross-section and panel data analysis and time series estimation and forecasting.	https://www.eviews.com/
FAME		A particular database designed for economic time series analysis. It offers database management facilities for storing time-series data, analytical tools used by Central Banks and Statistical agencies.	
Generic Activity Model for Statistical Organizations (GAMSO)	GAMSO	Standard covering activities at the highest level of a <i>statistical organization</i> . It describes and defines the activities that take place within a typical organization that produces official statistics.	The GAMSO covers four broad areas of activity within an NSO: production; strategy and leadership; capability management and corporate support. It provides a common vocabulary for these activities and a framework to support international collaboration activities, particularly in the field of modernisation and can be used as a basis for resource planning within an NSO.
Generic Longitudinal Business Process Model	GLBPM	Generic model that can serve as the basis for informing discussions across organizations conducting longitudinal data collections and other data collections repeated across time.	https://ddialliance.org/sites/default/files/GenericLongitudinalBusinessProcessModel.pdf

Object	Abbreviation/ Acronym	Description	Explanatory notes
GRASS-GIS		Software suite used for geospatial data management and analysis, image processing, graphics and maps production, spatial modelling, and visualisation.	https://grass.osgeo.org/
Generic Statistical Business Process Model	GSBPM	Statistical model that provides a standard terminology for describing the different steps involved in the production of official statistics.	GSBPM can be considered the "production" part of GAMSO. Since its launch in 2009 GSBPM has become widely adopted in national statistical offices and other statistical organizations. GSBPM allows an NSO to define, describe and map statistical processes in a coherent way, thereby making it easier to share expertise.
Generic Statistical Information Model	GSIM	Model that describes the information objects and flows within a statistical business process. It provides a set of standardized information objects, inputs and outputs in the design and production of statistics, regardless of subject matter.	GSIM is a conceptual model. It is complementary to GSBPM. It enables descriptions of the definition, management and use of data and metadata throughout the statistical information process. The information objects are grouped into four broad categories: business; production; structures; and concepts.
Google Forms		A particular free software tool that can support an unlimited number of surveys, each with an unlimited number of respondents. It allows addition of custom logos, images and videos.	https://www.google.com/forms/about/

Object	Abbreviation/ Acronym	Description	Explanatory notes
Integrated Land and Water Information System	ILWIS	A geographic information system and remote sensing software for both vector and raster processing. Its features include digitising, editing, analysis and display of data, and production of maps.	https://gisgeography.com/ilwis-integrated-land-and-water-information-management/
Jdemetra+		A seasonal adjustment software package that combines X-12 ARIMA and TRAMO-SEATS, developed by the Department of Statistics, in the National Bank of Belgium for the ESS Seasonal Adjustment Group.	https://ec.europa.eu/eurostat/cros/content/software-jdemetra_en
MapWindow		A set of programmable mapping components for analysis and modelling.	https://www.mapwindow.org/
Matrix Laboratory	MATLAB	A particular programming language that allows matrix manipulations, plotting of functions and data, implementation of algorithms, creation of user interfaces, and interfacing with programs written in other languages.	https://www.mathworks.com/products/matlab.html
Minitab		A particular statistics package developed at Pennsylvania State University. It is a general-purpose statistical software package used as a primary tool for analysing research data.	Minitab (https://www.minitab.com)
OPENJUMP		An open-source GIS that can read and write map files. It can also read from spatial databases and can be used as a GIS data viewer.	http://www.openjump.org/

Object	Abbreviation/ Acronym	Description	Explanatory notes
QGIS		A cross-platform desktop geographic information system application that supports viewing, editing, and analysis of geospatial data.	https://qgis.org/en/site/
R		A particular open-source programming language and free software environment for statistical computing and graphics. The R language is widely used among statisticians and data miners for developing statistical software and data analysis.	https://www.r-project.org/
SAGA		A geographic information system used to edit spatial data.	http://www.saga-gis.org/
SAS		A particular software suite that can mine, alter, manage and retrieve data from a variety of sources and perform statistical analysis on it.	https://www.sas.com/
SPSS		A particular program for statistical analysis in social science.	https://www.ibm.com/analytics/spss-statistics-software
Stata		A particular general-purpose statistical software package whose capabilities include data management, statistical analysis, graphics, simulations, regression, and custom programming.	https://www.stata.com/
StaTact		The StaTact tool was developed by UNITAR in partnership with the UN Statistics Division to enable countries to address measurement gaps that impede monitoring national policies and help resolve problems tactically.	https://statact.unitar.org/

Object	Abbreviation/ Acronym	Description	Explanatory notes
Statistical Data and Metadata Exchange	SDMX	Standard for both content and technology that standardises statistical data and metadata content and structure.	SDMX facilitates data and metadata exchange between an NSO and international organizations – and also within a national statistical system. https://sdmx.org/
Survey Monkey		A particular software tool that supports any kind of online survey. The free version supports only a very small number of respondents.	SurveyMonkey (https://www.surveymonkey.co.uk/)
Survey Solutions		A particular free software package developed by the World Bank. It supports questionnaire design with a full range of standard questions, nesting, cascading and linked questions.	Survey Solutions (https://mysurvey.solutions/)
TRAMO-SEATS		TRAMO ("Time Series Regression with ARIMA Noise, Missing Observations and Outliers") is a program for estimation, forecasting, and interpolation of regression models with missing values and ARIMA errors.	https://ec.europa.eu/eurostat/documents/4578629/4579724/PALATE.pdf
Wolfram Mathematica		A particular system whose programming language and capabilities cover neural networks, machine learning, image processing, geometry, data science, visualizations, and others.	https://www.wolfram.com/mathematica/
X-12 ARIMA		U.S. Census Bureau's software package for seasonal adjustment.	https://ec.europa.eu/eurostat/cache/metadata/Annexes/lci_esqrs_uk_an1.pdf

Object	Abbreviation/ Acronym	Description	Explanatory notes
X-13 ARIMA- SEATS		Seasonal adjustment software package that combines X-12 ARIMA and TRAMO-SEATS, developed and supported by the US Census Bureau.	https://www.census.gov/srd/www/winx13/