

STRATEGIC FORESIGHT

CRITICAL THINKING

BASELINE ANALYSIS

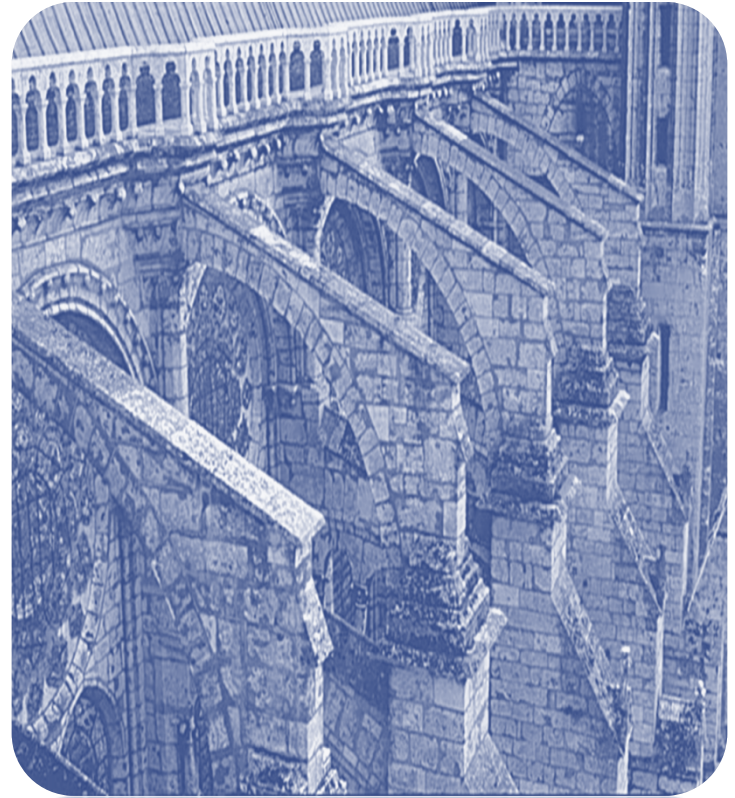
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Futures Studies
University of Houston

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IWEPS, Mills Beez, Namur BE
4 December 2012





UNCERTAINTY IN FORECASTING



THE LANGUAGE OF PREDICTABILITY

Indicative

Will

Must

Should

Doubt is an unpleasant state, but
certainty is a ridiculous one.

-- Voltaire, from Richards Heuer,
The Psychology of Intelligence Analysis

Past

Present

Future

THE LANGUAGE OF ~~PREDICTABILITY~~ PLAUSIBILITY

Indicative

~~Will~~

~~Must~~

~~Should~~

Subjunctive

May

Might

Could

Past

Present

Future



SOURCES OF UNCERTAINTY

- Insufficient or incorrect **information**
 - Insufficient or incorrect **understanding**
-
- Inherently **chaotic**, unpredictable systems
 - Inherently **critical** systems
 - Inherently **complex**, novel, emergent, self-organizing systems
 - Human **choice**



MAKING THE CALL

Assumptions resolve uncertainty...
....but resolving uncertainty may not be the right thing
to do.

Resolve as much uncertainty as you can, but no more.



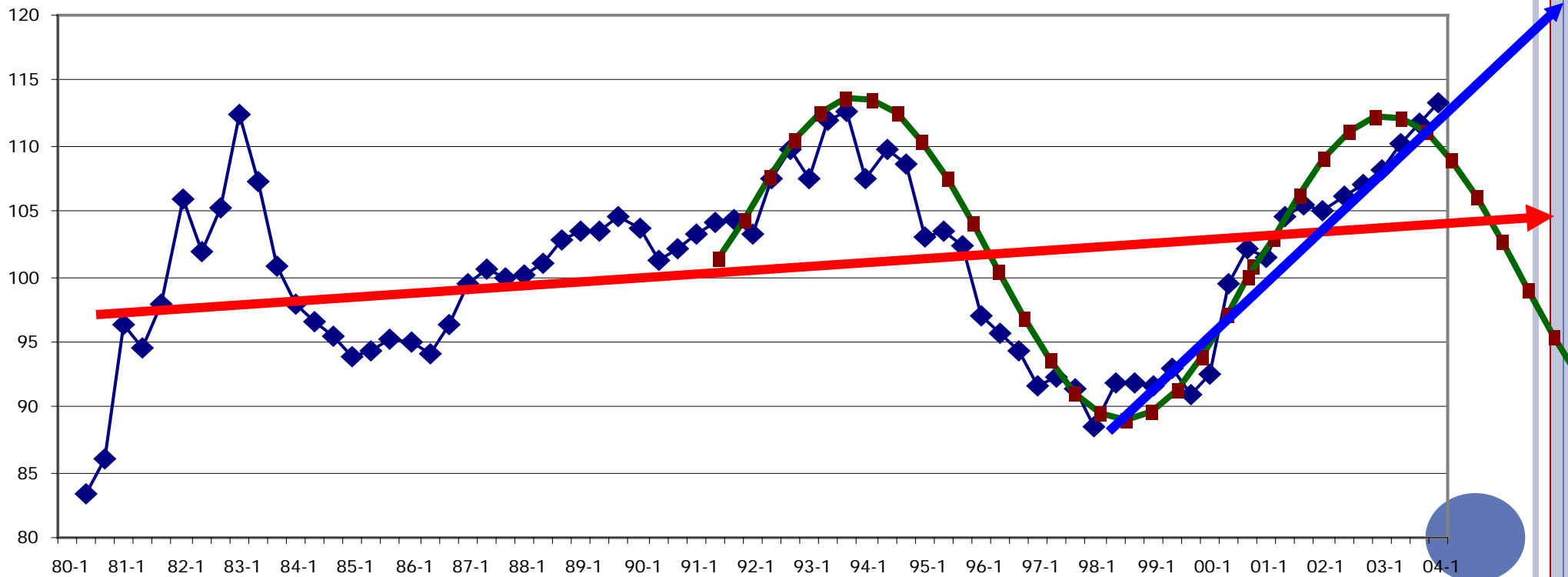
Katrina

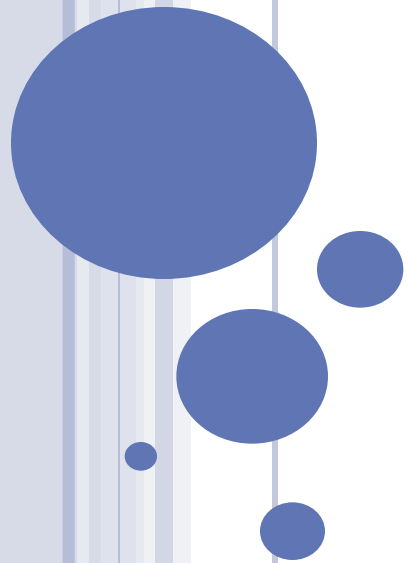
Rita



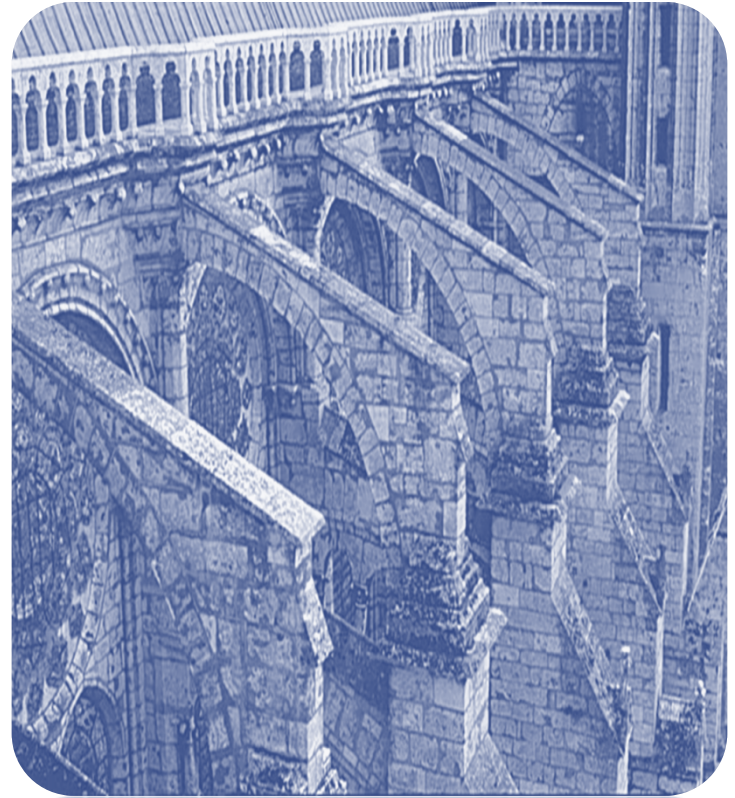
ASSUMPTIONS IN TREND EXTRAPOLATION

Business School Enrollment, UH-Clear Lake
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CRITICAL THINKING



OBJECTIVES

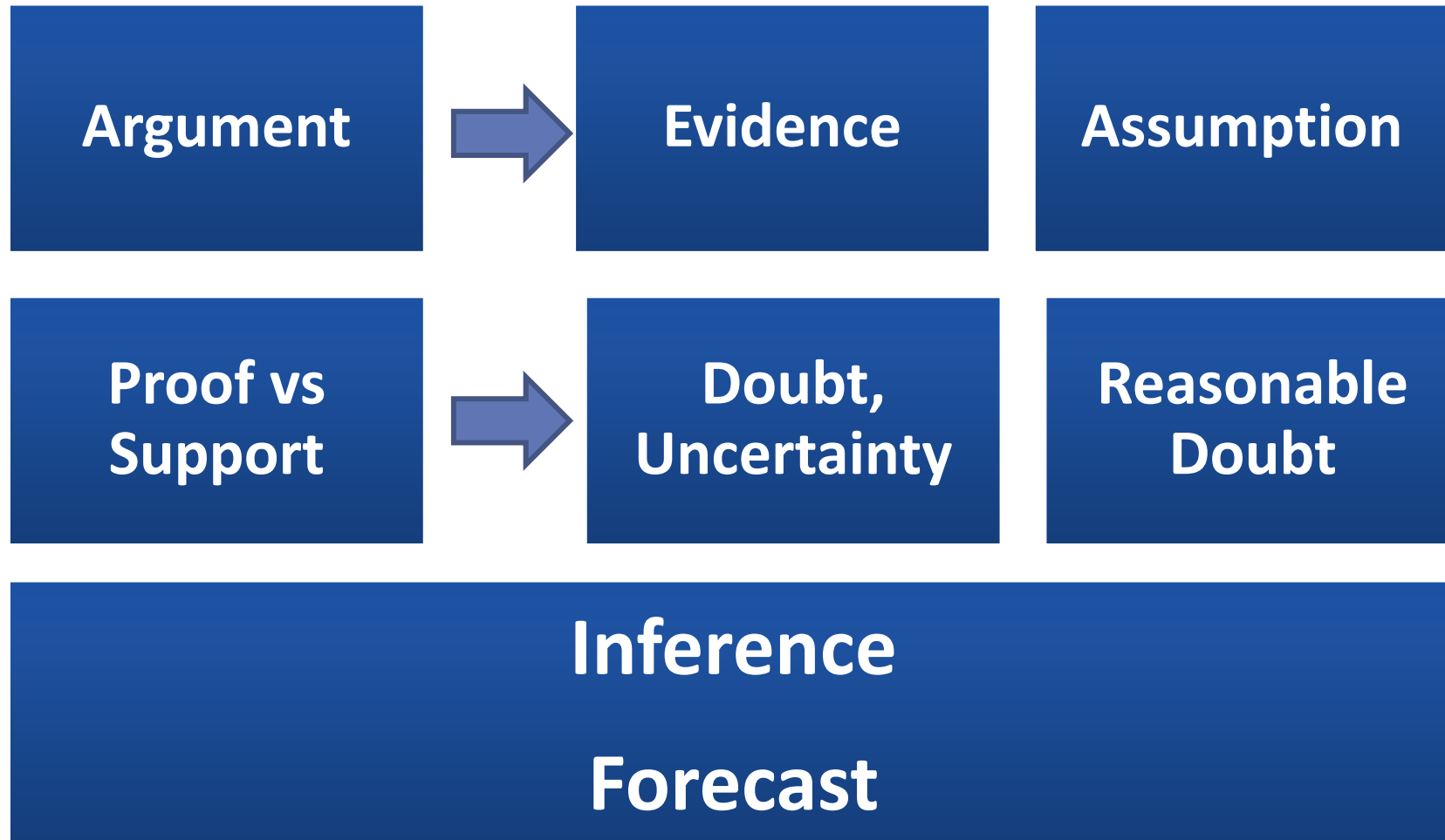
- **Construct & communicate support for inferences** (forecasts) so that quality of the support is evident & discussable.
- **Evaluate quality of support for inferences by proposing** alternative evidence or by evaluating the quality of assumptions in light of reasons or evidence in favor of their alternatives.
- **Develop a method for more rigorously grounding** alternative future scenarios based on the assumptions required to support inferences about the expected future.



TERMS OF REFERENCE

Supporting a Forecast

a process of providing evidence and reasons in support of a forecast



ILLUSTRATIONS

Deduction

Socrates is a man

All men are mortal

Socrates is mortal

Induction

Every time I flipped the switch, the light came on.

Nothing about the light has changed since the last time I turned it on.

Therefore, the next time I flip the switch,
the light will come on.

Evidence
Assumptions

Conclusion

DEFINITIONS



Evidence

- A **fact** that isn't disputed as true or relevant

Assumption

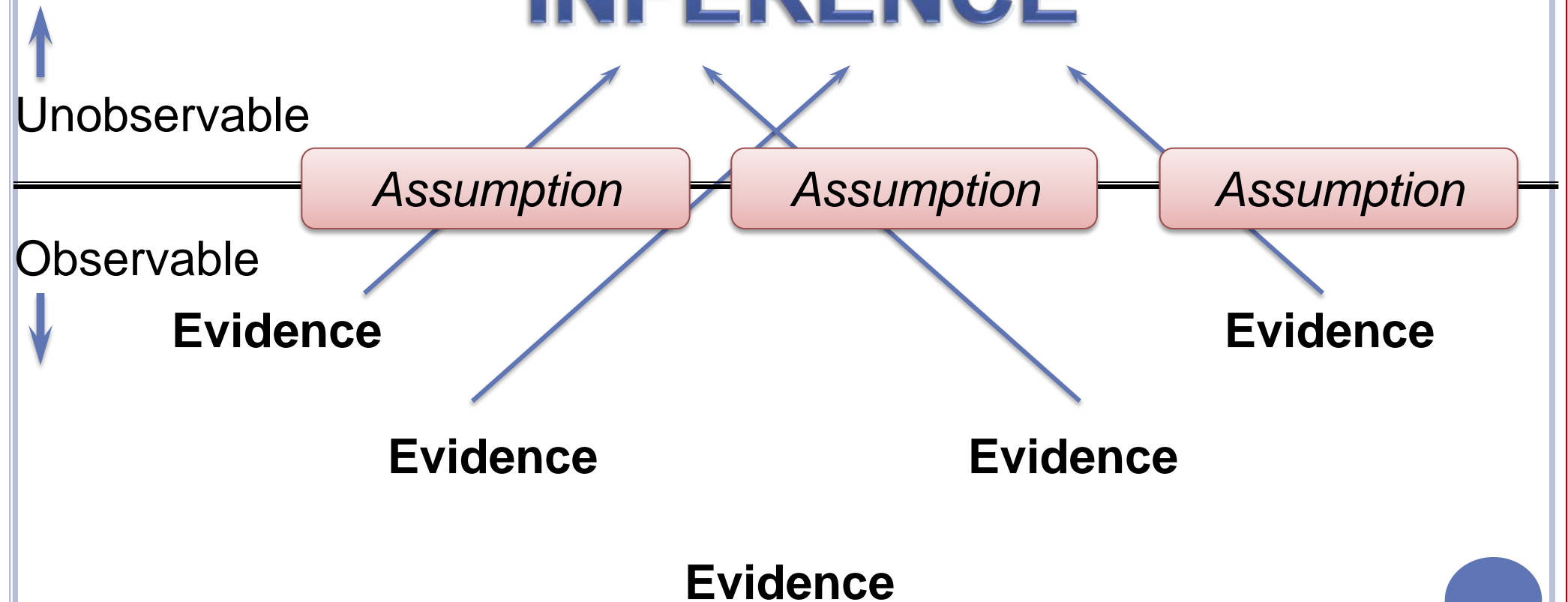
- A **belief** that is required to use evidence in support of an inference

Inference

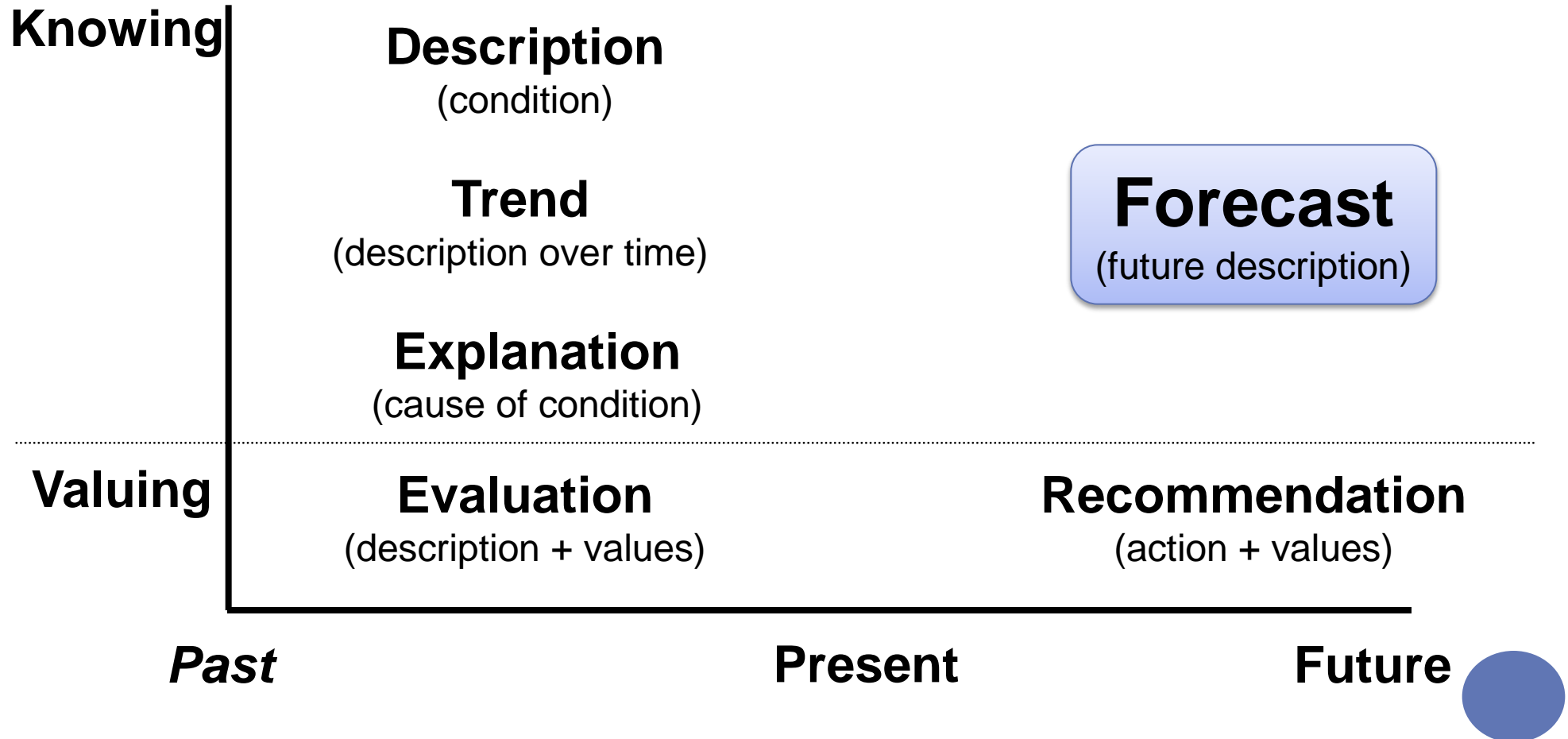
- A **claim** that isn't immediately evident so that it requires support before it is accepted

INFERENCE MODEL

INFERENCE



INFERENCES



The Evaluation of Evidence

Evidence is a fact that is not disputed as true or as relevant by anyone involved.

- Is it true? → If not, justify or dismiss.
- Is it relevant? → If not, show connection or dismiss.
- Is it sufficient? → If not, look for more evidence or dismiss.

THE ROLE OF ASSUMPTIONS

An assumption is a belief (or value) that is required in order to use the evidence in support of the inference (a warrant).

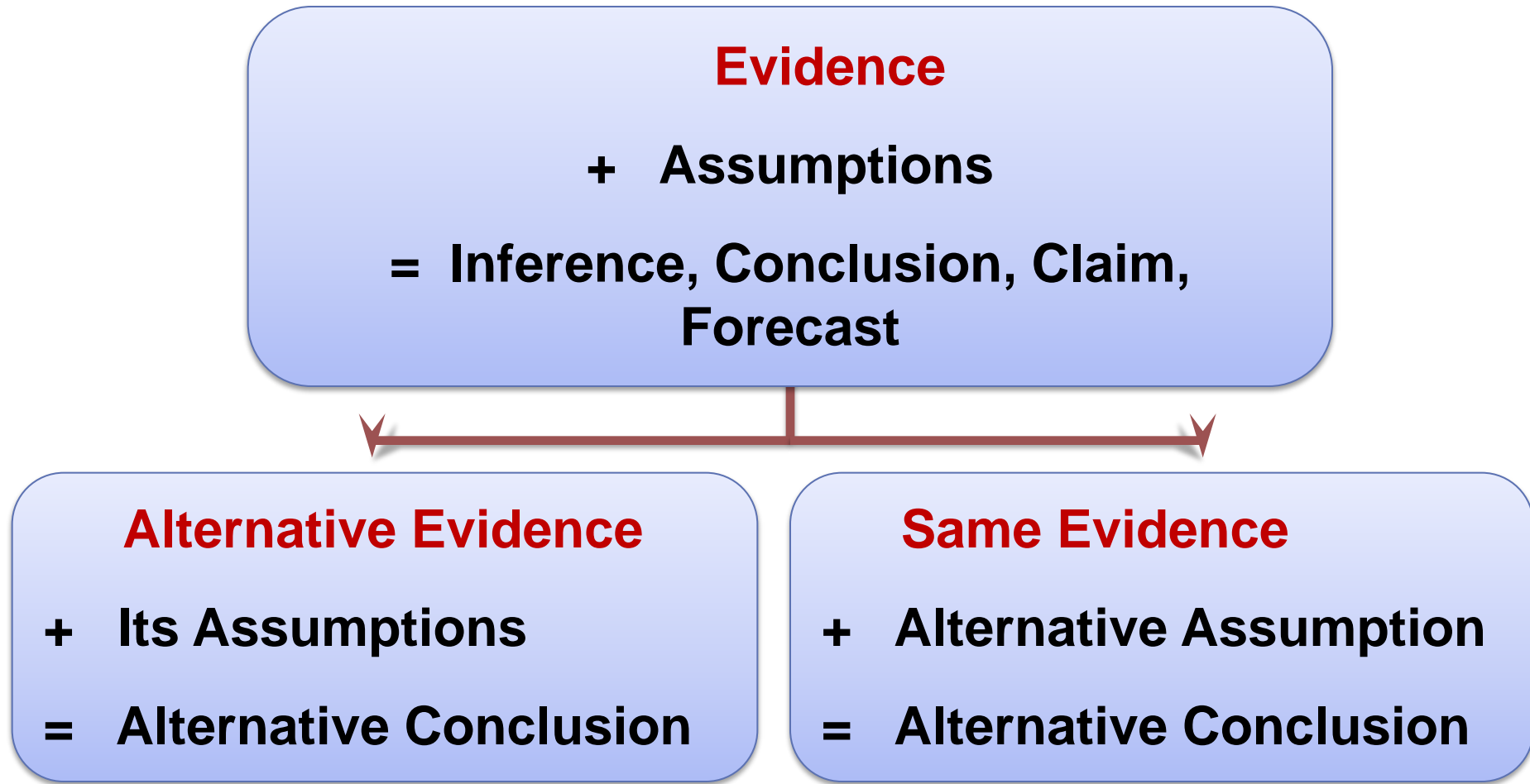
No piece of evidence automatically and without doubt supports an inference--i.e., data does not interpret itself.

All evidence has at least one assumption that introduces uncertainty to the support of the inference.

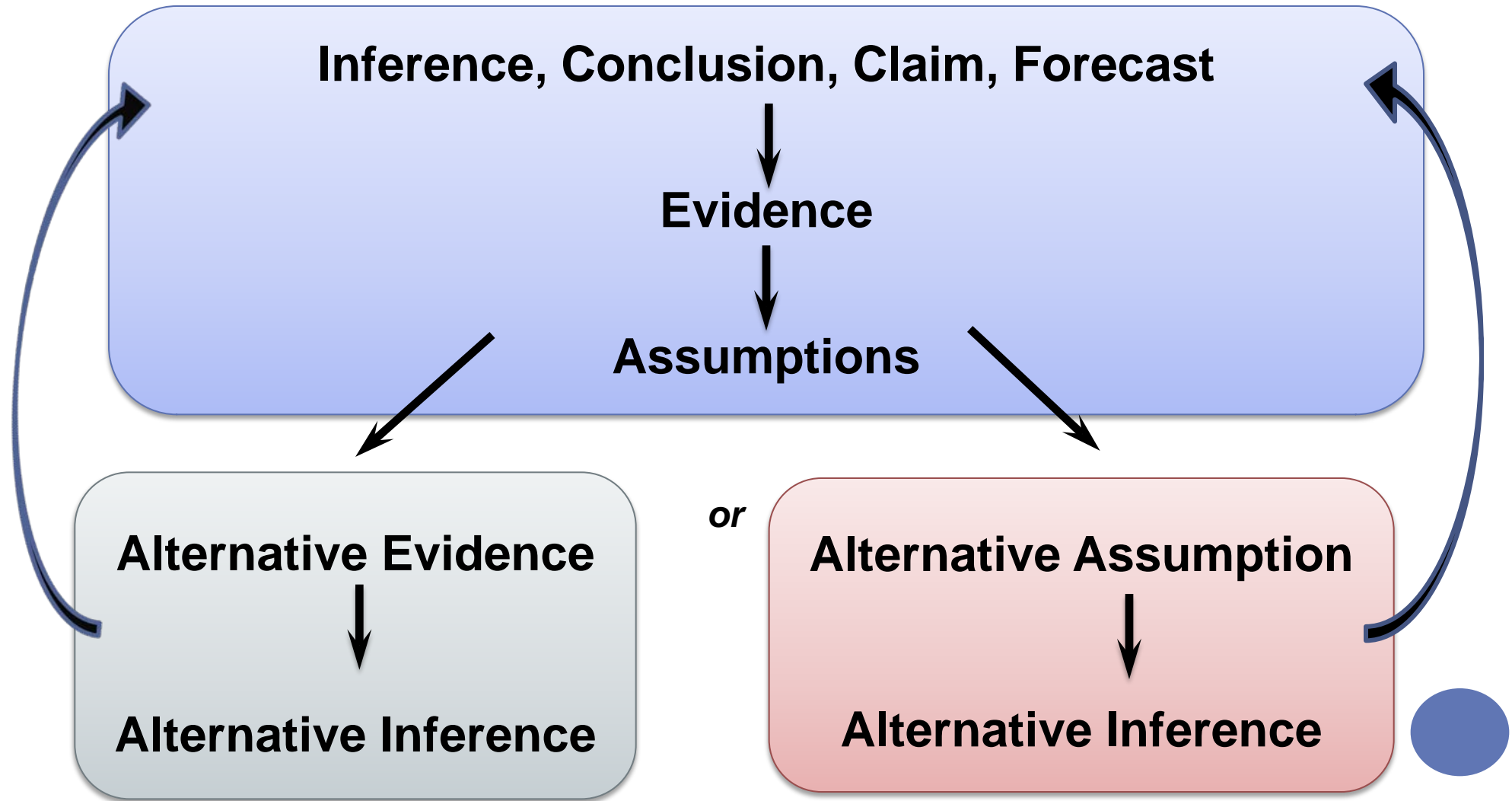
A high quality assumption is one for which there is little reason to believe its opposite – i.e., there is little reason to challenge its assumptions.

The use of the evidence and eventually the quality of the argument rests on the quality of the assumptions.

CRITICAL THINKING



CRITICAL THINKING



THE TAKE-AWAYS

Supporting inferences always requires evidence and assumptions

- Evidence are facts that are not disputed as true or as relevant.
- Assumptions are beliefs required to use the evidence in support of the inference

Assumptions are always uncertain to some degree

- Every assumption has an alternative (its opposite).
- The quality of an argument rests on the amount of evidence with few, if any, reasonable alternative assumptions

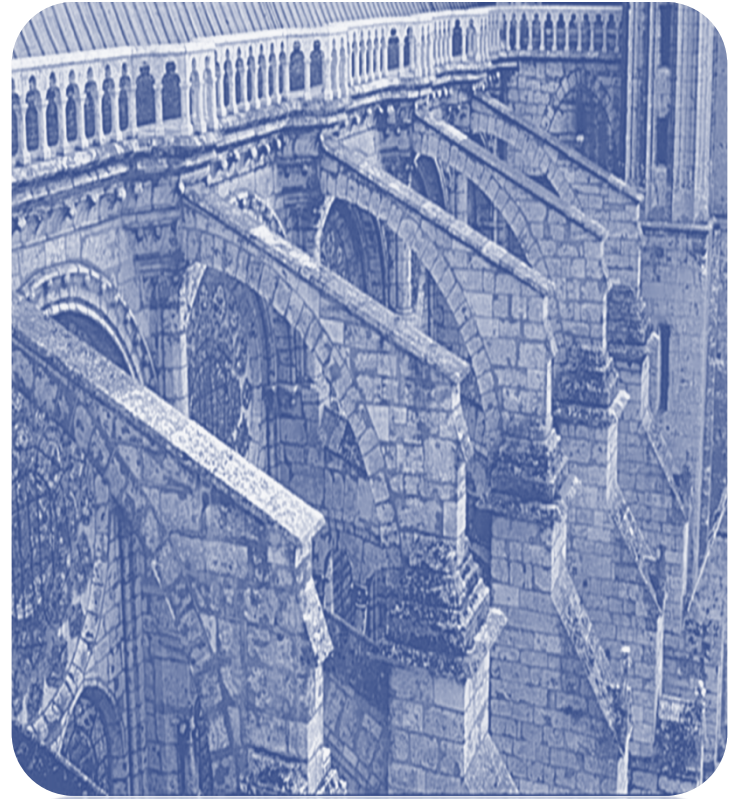
Critical Thinking...

- ...is a process for testing the support for inferences by examining the evidence and the assumptions required to use the evidence.

Disputing evidence or challenging assumptions...

- ...requires additional evidence and/or compelling reasons that support the alternatives.





SUPPORT FOR SCENARIO STATEMENTS

THE SCENARIO PROBLEM

We know how to support statements of fact (declarative mood), of which predictions are statements about the future.

But futurists deal in statements of possibility/plausibility (subjunctive mood).

How to support statements of plausibility, statements within scenarios, such as U.S. war with China, double-dip recession, or global warming?

- We can line up evidence for and against; if decent evidence for both, then there are two alternative futures
 - But only good for yes/no, true/false, happens/does not happen
 - Can we support more substantive and interesting scenarios, scenarios that state alternative futures rather than just the negation of predictions?
-

At stake is the credibility of strategic foresight as a professional discipline



BASELINE ANALYSIS

Is it possible to support statements of plausibility (scenarios) in the same way that one can support statements of fact?

Not directly, but indirectly – as plausible alternative inferences to statements of fact. In other words, as alternative scenarios to factual predictions.

Therefore, the support for statements of plausibility (scenarios)...

1. ...begins with the support for the corresponding statement of fact (prediction, expected future)
 2. ...discovers plausible alternative assumptions required for that support (critical thinking)
 3. ...uses those plausible alternative assumptions as the basis for alternative forecasts (scenarios)
-

Provided that the original inference has some support, which it usually does, the complete set of scenarios includes that inference and all the plausible alternatives.



WORDS FOR PROBABILITIES

Term...	Means...
Impossible	= 0%
Possible	> 0%
Plausible	>> 0%
Probable, likely	> 50%
Certain	= 100%
Most certain	= ~0% or ~100%
Most likely (expected, surprise-free, official, baseline)	= more likely than any other, but is usually << 50%
Most uncertain	= ~50%
Wildcard	= ~0%, but with high impact if it does occur

WORDS FOR PROBABILITIES

Impossible

Certain

Possible

Other
Plausible

Probable

Wildcard

Most
likely

*Most
uncertain*

0%

50%

100%

Probability



A TOY EXAMPLE

Prediction

- There will be an actual military conflict (some type of war) between the U.S. and China within the next 20 years.

Evidence

- Major powers often engage each other in war, particularly between incumbent and emerging powers.
- China has been building up its military over the last decade.
- China has stated that it intends to bring Taiwan under mainland control

ANALYSIS OF ASSUMPTIONS

Evidence	Assumption	Alternative assumption	Reasons for the alternative
A. Historical wars among major powers	Present is like the past.	Present is not like the past.	Economies are more integrated than in the past.
B. Recent build-up of Chinese military	China believes that it has the strength to challenge the U.S. military sometime in next 20 years.	China does not believe that.	China chooses not to spend as much on military as the U.S. has; sees that level of military buildup as irrelevant; money is more important in an economically integrated world.
C. China's stated intention to re-integrate Taiwan	Integration is seen as the best or the only way to benefit from Taiwan.	Strong trade relations might be better than integration.	War would destroy much of the country; economic vs political goals.

STATEMENT OF SCENARIOS

An actual military conflict (some type of war) between the U.S. and China within the next 20 years. (Prediction, Expected future)

China only interested in regional, not global hegemony with the U.S. allowing China hegemony in East Asia. (Based on alternative assumptions A and B)

***De facto* economic integration with a politically independent Taiwan. China rates economic benefits more important than political ones. (Based on alternative assumption C)**



BASELINE ANALYSIS

An expected change in the baseline future:	
Evidence for the change:	
1. Assumption required to use the evidence:	
1.1 Alternative (opposite) assumption:	
Reason for the alternative:	
Reason for the alternative:	
2. Assumption required to use the evidence:	
2.1 Alternative (opposite) assumption:	
Reason for the alternative:	
Reason for the alternative:	



BENEFITS

Provides a way to develop scenarios through the discovery of alternative assumptions in the support for an original prediction

Provides support for each scenario in the reasons for the alternative assumptions

Opens a discussion about assumptions that can be critically evaluated by others

Allows interested parties to study and monitor the reasons for the alternative assumptions as indicators that each scenario is becoming more or less plausible

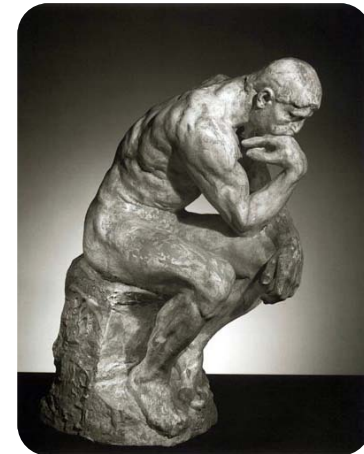
Ultimately rests the scenarios and their support on a transparent process that is based on evidence and judgment, more than just creativity and intuition



RESOURCES

- “Forecasting”, in P. Bishop and A. Hines, *Teaching about the Future*, Ch 7, pp 194-222.
- “Analyzing Arguments using Stephen Toulmin’s Scheme,” Grinnell College Writing Lab

http://www.grinnell.edu/files/downloads/Analyzing_arguments_using_Stephen_Toulmins_scheme.pdf.



FOR ADDITIONAL INFORMATION

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