

Classifications of Uncertainty

Classification of Types of Uncertainty (Economic Language)

- *Risk*: Unique probabilities describing the uncertainty
 - Objective
 - Subjective
- *Ambiguity/Knightian uncertainty/deep uncertainty*: Possible outcomes are known, but corresponding probabilities cannot be uniquely assessed
- *Unforeseen contingencies*: Don't even foresee possible consequences

- *Exogenous risk*:
The possible outcomes and their probabilities are given by nature
- *Endogenous risk*:
We have some control over the probabilities we will face

Risk and uncertainty

The Unknown.

As we know,

There are known knowns.

There are things we know we know.

We also know

There are known unknowns.

That is to say

We know there are some things

We do not know.

But there are also unknown unknowns,

The ones we don't know

We don't know.

D.H.Rumsfeld—Feb. 12, 2002, Department of Defense news briefing, slightly adapted, see also

<http://www.youtube.com/watch?v=RpSv3HjpEw>

Uncertainty in the IPCC (Types of Uncertainty, IPCC language)

Source: Guidance Notes for Lead Authors of the IPCC Fourth Assessment Report on Addressing Uncertainties

Table 1. A simple typology of uncertainties

Type	Indicative examples of sources	Typical approaches or considerations
Unpredictability	Projections of human behaviour not easily amenable to prediction (e.g. evolution of political systems). Chaotic components of complex systems.	Use of scenarios spanning a plausible range, clearly stating assumptions, limits considered, and subjective judgments. Ranges from ensembles of model runs.
Structural uncertainty	Inadequate models, incomplete or competing conceptual frameworks, lack of agreement on model structure, ambiguous system boundaries or definitions, significant processes or relationships wrongly specified or not considered.	Specify assumptions and system definitions clearly, compare models with observations for a range of conditions, assess maturity of the underlying science and degree to which understanding is based on fundamental concepts tested in other areas.
Value uncertainty	Missing, inaccurate or non-representative data, inappropriate spatial or temporal resolution, poorly known or changing model parameters.	Analysis of statistical properties of sets of values (observations, model ensemble results, etc); bootstrap and hierarchical statistical tests; comparison of models with observations.

Uncertainty in the IPCC - Confidence

- “Table 3, can be used to characterize uncertainty that is based on *expert judgment* as to the correctness of a model, an analysis or a statement.”

Table 3. Quantitatively calibrated levels of confidence.

Terminology	Degree of confidence in being correct
<i>Very High confidence</i>	At least 9 out of 10 chance of being correct
<i>High confidence</i>	About 8 out of 10 chance
<i>Medium confidence</i>	About 5 out of 10 chance
<i>Low confidence</i>	About 2 out of 10 chance
<i>Very low confidence</i>	Less than 1 out of 10 chance

Uncertainty in the IPCC - Likelihood

- If enough evidence prevails, IPCC uses “*Likelihood*”
- “It refers to a *probabilistic assessment* of some well defined outcome having occurred or occurring in the future. The categories defined in this table should be considered as having ‘*fuzzy*’ boundaries.

Table 4. Likelihood Scale.

Terminology	Likelihood of the occurrence/ outcome
<i>Virtually certain</i>	> 99% probability of occurrence
<i>Very likely</i>	> 90% probability
<i>Likely</i>	> 66% probability
<i>About as likely as not</i>	33 to 66% probability
<i>Unlikely</i>	< 33% probability
<i>Very unlikely</i>	< 10% probability
<i>Exceptionally unlikely</i>	< 1% probability