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Uncertainty and risk – terminology and concepts

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Abstract

Uncertainty and associated terms such as risk are defined and interpreted differently by different authors, see Walker et al. (2003) for a review. The different definitions reflect the underlying scientific philosophical way of thinking and therefore typically vary among different scientific disciplines. In addition they vary depending on their purpose. Some are rather generic, while others apply more to e.g. modelling process or to management processes.

The presentation will illustrate the differences in terminology by some examples. Furthermore, a terminology that has emerged after discussions between social scientists and natural scientists will be presented (Refsgaard et al., 2007, 2010; van der Keur et al., 2008). By doing so we adopt a subjective interpretation of uncertainty in which the *degree of confidence* that a decision maker has about possible outcomes and/or probabilities of these outcomes is the central focus. Thus according to our definition *a person is uncertain if s/he lacks confidence about the specific outcomes of an event. Reasons for this lack of confidence might include a judgement of the information as incomplete, blurred, inaccurate, unreliable, inconclusive, or potentially false.* Similarly, a person is certain if s/he is confident about the outcome of an event. It is possible that a person feels certain but has misjudged the information (i.e. his/her judgement is wrong).

Similarly, the term risk has different meanings in different disciplines. In some disciplines risk is defined as being equivalent to probability, while in others it is defined as damage multiplied by probability. Our definition is compatible with the latter (but not the first) of these.

The presentation will discuss the different types of uncertainty (statistical uncertainty, scenario uncertainty, qualitative uncertainty, recognised ignorance and total ignorance) as well as the nature of uncertainy (epistemic and onthological uncertainty). Finally, the presentation will briefly introduce different types of methodologies for uncertainty characterisation and assessment.

References:

Walker WE, Harremoës P, Rotmans J, Van der Sluijs JP, Van Asselt MBA, Janssen P and Krayer von Krauss MP (2003) Defining Uncertainty A Conceptual Basis for Uncertainty Management in Model-Based Decision Support, Integrated Assessment, 4(1), 5-17.

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