Risk communication and perception challenges in electricity distribution maintenance and reinvestment management

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Plan for the presentation

- Background – The purpose of the paper
- Risk communication as part of risk management
- Risk – *a terminology challenge*
- Risk – *a psychological challenge*
- Risk communication and perception within electricity distribution
- Concluding remarks

Background

- Increased importance of maintenance activities, due to focus on extending component lifetimes and postponing new investments
- An increasing trend among distribution companies on developing maintenance strategies where different aspects of risk are included in a holistic way.
- The principles of risk management is widely recognised as intuitively right when making decisions concerning maintenance and reinvestments
- Challenges related to assessing as well as communicating and perceiving risk:
  - Choosing methods for modelling and analysis
  - Estimating parameters to be used in the models
  - Understanding the risk analysis and it's results, including it's uncertainties
  - Presenting results to various stakeholders
  - Understanding responses from various stakeholders
- Several of these challenges are related to risk communication and perception, and will typically involve multiple stakeholders - both inside and outside the distribution companies.

The purpose of the paper

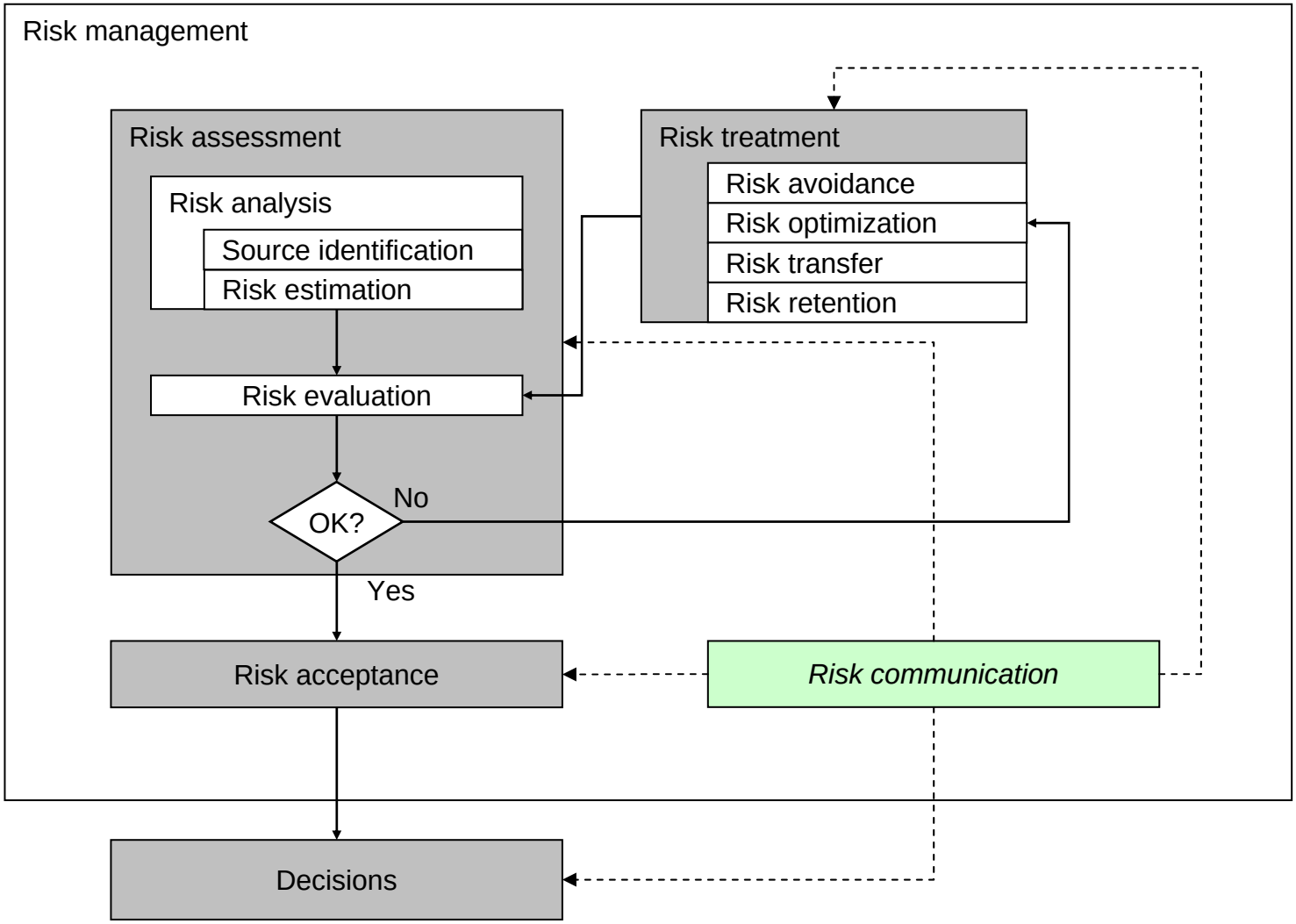
- The paper describes some general characteristics of risk communication and risk perception to illustrate why this is a non-trivial task.

- It further points out how this can be relevant and applicable to the setting of electricity distribution companies, and shows a list for illustrating some relevant cases applicable to electricity distribution.

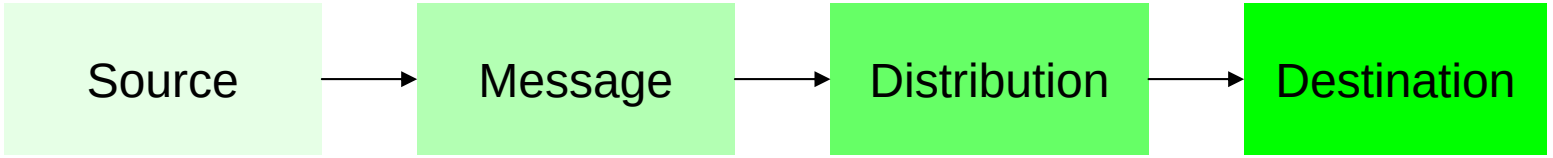
Risk communication as part of risk management

- Risk communication :
  - *exchange or sharing of information about risk between the decision-maker and other stakeholders*.
  - ISO/IEC, "Risk management - Vocabulary - Guidelines for use in standards," I SO / IEC, 2002.

Risk communication as part of risk management



Risk communication



- Getting the message through to the receiver as intended by the sender.
- The sender and the receiver will typically be different stakeholders in a risk related situation.
- There are some specific points which are of interest when looking into risk communication, and in the following two of these challenges are elaborated:
  - The terminology challenge of risk, and
  - The psychological challenge of risk perception.

Risk – a terminology challenge

Risk (usage / definition)	Description / Example of usage
1: An unwanted event which may or may not occur.	'Lung cancer is one of the major risks that affect smokers.'
2: The cause of an unwanted event which may or may not occur	'Smoking is by far the most important health risk in industrialized countries.' (The unwanted event implicitly referred to here is a disease caused by smoking.).
3: The probability of an unwanted event which may or may not occur	"The risk that a smoker's life is shortened by a smoking-related disease is about 50%."
4: The statistical expectation value of an unwanted event which may or may not occur.	The expected value of a possible negative event is the product of its probability and some measure of its severity. Today this is the standard technical meaning of the term "risk" in many disciplines (first introduced by the Reactor Safety Study, WASH-1400 in 1975).
5: The fact that a decision is made under conditions of known probabilities	"Decision under risk" as opposed to "Decision under uncertainty" – which refers to decisions made under conditions of unknown probabilities.

- *Based on S. O. Hansson, "Risk," Stanford Encyclopedia of Philosphy, Metaphysisc Research Lab, CSLI, Stanford University, 2007.*

Risk - a terminology challenge

- It is important to be explicit about what understanding of risk is used when performing and documenting risk assessment, and one should also be aware of the possible different interpretations of the term when presenting results from risk analyses.

- The terminology challenge will presumably be most relevant when communicating risk and risk analysis results to receivers who do not have a technical background, but even when sending the message to engineers one should be cautious to specify what is meant by the term.

Risk – a psychological challenge

- *Risk perception* is the judgment that stakeholders make about the characteristics and severity of a given risk.
- Their perception of risk will further influence on the way they act upon risk information.
- The acceptability of a given risk lies in the “eyes of the beholder” – and is hence stakeholder-dependant.

Some aspects which affects risk perception

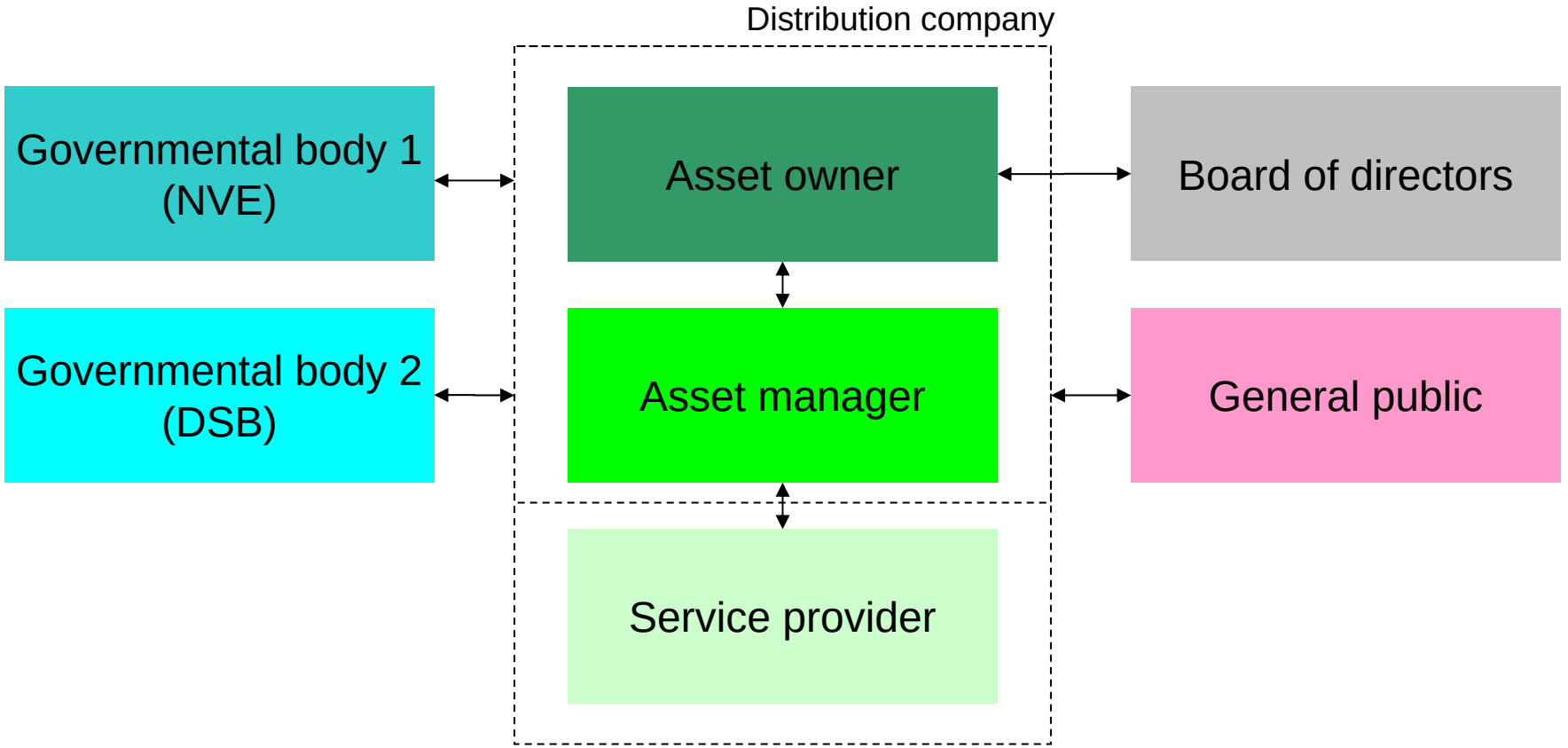
- **Voluntariness**
  - Risks from activities considered to be involuntary or imposed (e.g., exposure to chemicals from a industrial facility) are judged to be greater, and are therefore less readily accepted, than risks from activities that are seen to be voluntary (e.g., smoking or sunbathing)
- **Controllability**
  - Risks from activities viewed as under the control of others (e.g., releases of toxic chemicals by industrial facilities) are judged to be greater, and are less readily accepted, than those from activities that appear to be under the control of the individual (e.g., driving a car).
- **Familiarity**
  - Risks from activities viewed as unfamiliar (e.g. chemicals or radiation from waste disposal sites) are judged to be greater than risks from activities viewed as familiar (such as household work).
- **Fairness**
  - Risks from activities believed to be unfair or to involve unfair processes (e.g., inequities related to the siting of industrial facilities) are judged to be greater than risks from fair activities (e.g., vaccinations).
- **Benefits**
  - Risks from activities that seem to have unclear, questionable, or diffused personal or economic benefits (e.g., waste disposal facilities) are judged to be greater than risks from activities that have clear benefits (jobs, monetary benefits, automobile driving).
- **Catastrophic potential**
  - Risks from activities viewed as having the potential to cause a significant number of deaths and injuries grouped in time and space (e.g., airplane accidents) are judged to be greater than risks from activities that cause deaths and injuries scattered or random in time and space (e.g., automobile accidents).
- **Understanding**
  - Poorly understood risks (such as the health effects of long-term exposure to low doses of toxic chemicals or radiation) are judged to be greater than risks that are well understood or self-explanatory (such as pedestrian accidents or slipping on ice).
- **And more..**

Risk communication and perception within electricity distribution

- The electricity distribution business involves the interaction between different stakeholders with different roles to play. There are therefore multiple stakeholder interfaces where risk communication aspects are of interest.

- The stakeholders hold roles both inside and outside the distribution companies.

Mapping of internal and external stakeholders interfaces



Two examples of risk communication challenges (*exerpts from table 4 in the paper*)

- Distribution company vs. general public
  - Electro-magnetic fields near power system components
    - Electromagnetic fields themselves are invisible
    - Children are believed to be more vulnerable to the risk
    - Uncertainty about risk, but severe consequences (fearing increased chance of leukemia among children being exposed to high levels of electromagnetic fields)

- Distribution Company vs. governmental bodies
  - Providing common understanding regarding risk assessment and management
    - Regulations for the distribution business have changed, emphasizing the use of risk assessment as input to decisions
    - Changing the way of thinking and acting from a black-and-white rule regulation to a risk informed shades-of-gray application, is a challenge partly still unsolved

Concluding remarks

- Risk communication and perception have many aspects which go beyond the technical risk analysis.
- Risk management is about tackling uncertainties related to future outcomes – and it is imperative to understand the nature of risk and risk analysis, with its possibilities and limitations.
- Risk analyses will not provide the “correct objective answer”, but will rather contribute to a better understanding of the risk problem.
- Incorporating risk communication as part of the decision making process is a key feature for further work, with the aim to provide the distribution companies with tools for making better decisions.