

## Theory Formations related to the “Risk Society”

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### Introduction

Since Ulrich Beck published the book *“Risikogesellschaft: Auf dem Weg in eine andere Moderne”* in 1986 a lot have happened which can be attributed to the contents of the phenomena he describes as the “risk society”, e.g. the globalisation of the world economy, the ICT revolution, cyber war, gene technology, climate changes, Al Qaida, the mad cow disease, SARS, etc. The risks have become more global. New risks are continuously revealed and linked to changes in technology, biology, social tensions and politics.

A main difference from traditional risks is that they are independent of the place where you live or work. Radiation is spread by wind, toxic materials are spread by rivers and ocean currents, IT viruses are spread by global networks, epidemic diseases are spread by airplane travellers, hate by fanatic groups in Asia results in terrorist attacks in New York, etc. Some people have died from SARS, terrorism has killed some thousand people and both threats have a great impact on the world economy. Therefore the risks are real, but also in a way unreal and unintelligible. The main focus of risk perception and opinion is the possibility of future threats and disasters associated with the risks. The modern risk awareness is not about our own experiences or the current statistical risk picture of deaths and injuries, but about an *uncertain future*. Fear and anxiety of these threats which we are uncertain or ignorant about, are a great challenge for risk management even though the probabilities for such events may be microscopic. The frightening is that we don’t know, and are out of control. We feel like victims. The well known, every day risks related to dangerous driving behaviour, deadly doses from smoking, falling from a ladder, etc., may worry us less than decision dilemmas on travelling abroad due to terrorism or SARS.

### Background

In a comment on the earthquake in Lisbon in 1755 the French philosopher Jean Jacques Rousseau attributed the responsibility of more than 100 000 fatalities to human decision-making, by asking: *“Why have we accumulated 20 000 houses with six to seven floors in a notably seismic location?”* The question gave birth to a philosophical basis of a science of risk, a shift from a religious and fatalistic risk attribution to expectations on rational actions in risk handling.

In dealing with risk and vulnerability issues we can even go back to citing Aristotle: *“It is probable that the improbable will happen”*, or the Roman historian Pinty the elder: *“SOLUM CERTUM, NIHIL ESSE CERTI”*; and continue with more

modern quotations such as "*Great events have small beginnings*" (Perrow, 1984) and the so-called "Murphy's Law" which can be phrased as follows: "*Everything which can go wrong, will go wrong, - and at the worst possible point in time*". At the micro level, in everyday life, I will assume that everyone have experienced some support for that "Law".

The first part of the industrial era was driven by a laissez fair profit making without any ethical considerations of human life and suffering except for the voice of some philanthropic organisations. The last hundred years have been a fight for increased societal safety, health and environmental regulations and control of industrial capitalism lead by the labour movement regarding occupational safety and health and the growth of environmentalist organisations since the publishing of «The Silent Spring» by Rachel Carson in 1962. Gradually the high-risk industries in Western countries became "tamed" by rather effective safety control regimes. The last 10-15 years have brought us back to the features of "laissez-faire" regimes and the «law of the jungle» regarding safety management. Both the industries and the risks have become internationalised combined with a deregulation and privatisation of regulations and control regimes (Hovden, 1998).

Social scientists, e.g. Beck (1986; 1997), Perrow (1984), Sagan (1993) and Klinke & Renn (2001) look at risk issues and uncertainties regarding the current development of technologies and societies as a transition period to a new modernity, a post-industrial era named «the risk society» by U. Beck. According to Beck the successes of industrial capitalism supported by the fast progress in science and technology have undermined its own preconditions.

However, I have no evidence for claiming that the risks have increased lately. Life in the industrial society could be dangerous, but we had some understanding of the risks' sources and causes, magnitude and local effects. The new technological risks, nuclear, chemical, ecological, genetic, etc. and the political and social risks, such as terrorism, are difficult to separate and survey in time and space, to explain by rules of causality, to define guilt and punishment, to compensate or to insure, i.e. they represent «produced uncertainties» in the terminology of U. Beck. The new patterns in managing these «produced uncertainties» in terms of buzz words like "Value chains", "Just in time" (JIT), "virtual organisations", downsizing, outsourcing, etc. are driven by cost cutting and short-term profit-making, generate systems lacking or distributing liability for the ethics of decisions and activities. These transitions are followed by an increased debate about the social responsibility of business and ethics of business. To improve the *image* of the business actors in the global economy they have introduced the management concepts "Corporate Social Responsibility".

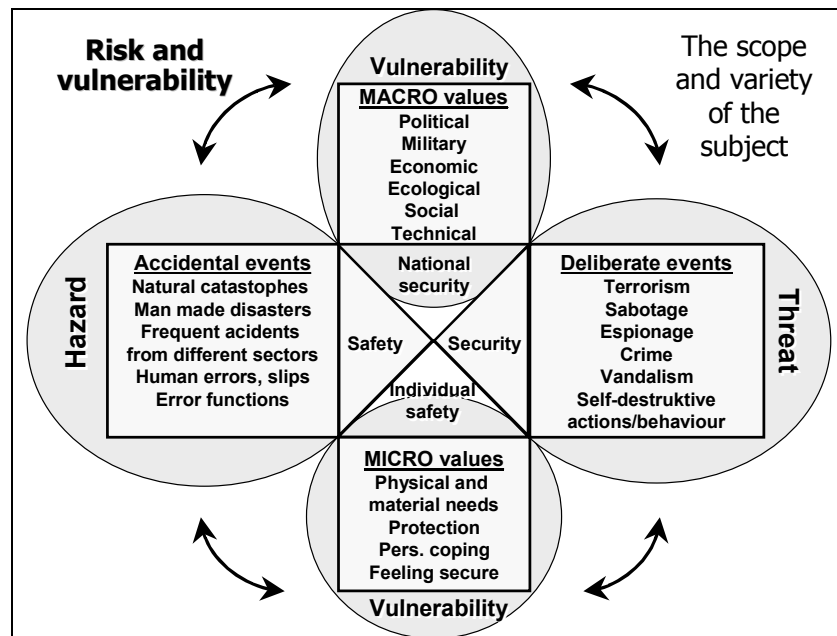
The last century, and in particular the last decades, have brought about accelerating, dramatic changes in the living conditions. *We are far safer than our ancestors in most areas*. Still, in many ways we are living in "the age of uncertainty" (Galbraith 1977) and approaching the "risk society" (Beck, 1992). The uncertainty is tied to the rate of change. Our value systems, social institutions like the core family, political institutions like parliaments and political parties, public administration, education systems based on subjects and professions etc. were formed a century ago, based on the needs of that period. This is an important part of the "interlocking crisis" discussed in "Our common future" by the Brundtland Commission (1987). The wish for social and economic development may not correspond with the need for social stability and predictable risks, which we know how to handle or we are used to deal with.

In many cases the introduction of new technology has created more efficient and reliable, but also more vulnerable socio-technical systems. This may be described in what Perrow (1984) calls "system accidents". System accidents imply an unforeseen interaction of multiple faults in complex high hazard system. If the consequence potential is fatal, and the system properties are such that one is left with a remaining risk of the kind "little strokes fell great oaks", then it may be better to stick to Murphy's law and precautionary principles instead of probability assessments as a basis for risk management.

### Scope of risk and vulnerability research

Figure 1 illustrates the scope and variety of the subject. The vertical axis should give some associations to the model of socio-technical systems involved in risk management by Rasmussen (1997), i.e. the links between the global, international, national, regional, local and individual stressors and those actors at different levels dealing with the risks.

The horizontal axis tells that the field covers everything from "acts of God" type events and man-made, including technology caused disasters, to the intended, ill-natured acts against others and even self-destructive behaviour. At the level of managing societal vulnerabilities the frequent events of road traffic accidents, occupational accidents and traditional, everyday crime are normally excluded. Societies have to a large extent accepted or tolerate these types of risks, and have means and functions for dealing with them, i.e. an ability to absorb those problems. Societal vulnerability is usually addressing problems related to the survival and recovery of vital societal functions, i.e. threats to infrastructure related to energy supply and ICT, etc. (Hovden, 2001).



**Figure 1:** The vertical macro-micro perspective on risk management combined with types of hazards/threats and events (Hovden, 1998).

To make the picture more complete a third axis, a time dimension, could be added to figure 1. Some events, typically accidents, have a rather short time horizon, whereas other threats to health, property and environment are evolving over longer time span.

## Epistemological approaches to risk

### *The meaning of risk.*

Luhman (1993) claims that the concept of “risk” appeared in German references (as *risiko*) in the sixteenth century and in English hundred years later. However, the Latin term *riscum* had been used much longer. The pre-modern use of the word was attributed to maritime ventures and natural disastrous events, an objective danger, an act of God, a force majeure, excluding the idea of human or societal responsibility and influence. The Enlightenment in the seventeenth century and industrialisation demanded more objective knowledge, rational thinking, and a search for predictability and control (Giddens, 1991). The development of a science of probability theory and statistics gave a basis for modern risk analysis. The modernist concept of risk represented a new way of viewing the world and its chaotic manifestations (Lupton, 1999). Risks could be predicted, prevented and controlled by human action and technology, and thereby replacing earlier concepts of fate or fortune (Giddens, 1990). The probability estimates of an event and its consequences rely upon the knowledge regarding modelling and data to fit into a risk analysis.

A basic critique of shortcomings of the risk analysis methodology and reductionist risk evaluations in dealing with modern complex, non-linear socio-technical systems, was given by Perrow (1984). On the issue of nuclear power we got science against people, and a lack of confidence and trust in experts and institutions. In general, the new *uncertainties* created by the fast developments in science and technology combined with the features of globalisation produce an attribution of risks and a feeling of helplessness with some similarities to the Middle Ages.

The distrust of risk assessments of science and technological disciplines, opened for social science based risk research revealing that people perceive and assess risks in a different and richer way than the two dimensions of probabilities and consequences calculated by the risk analysts (Klinke & Renn, 2001).

Individuals are forced to deal with risks on an everyday basis. For Beck (1992, 1997) risk is another word for hazard or danger. Risks of modernizations are irreversible threats to the life of plants, animals and human beings. There is a difference between a risk itself and public perception of it. Beck integrates the two approaches into a sociological perspective. Risks can be regarded as social constructs, and there are two major approaches in interpreting risk:

- *Natural-scientific objectivism*: Uses observation, measurement and calculation. The problem is that scientific facts are situated and interpreted in cultural and political context.
- *Cultural relativism about hazards/threats*: What concerns one social group in one historical era may not worry another. This approach may fail to recognize the special nature of real contemporary hazards.

Klinke & Renn (2001) present a broad, inclusive and comprehensive definition of risk, starting with the following reasoning: The term “risk” is often associated with the possibility that an undesired state of reality (adverse effects) may occur as a result

of natural events or human activities. However, in economic theory both gains and losses need to be subsumed under “risk”. And for example in sport activities people search for experiencing a special thrill. The definition includes both negative and positive outcome: “*Risk refers to the possibility that human actions or events lead to consequences that affect aspects of what humans values*“. To be in line with mainstream definitions in risk analysis, I would rephrase the definition as follows: Risk refers to a function of possibilities and consequences.

*Epistemological positions to risk in science / social sciences revisited.*

The dichotomy above between natural-scientific objectivism and cultural relativism can be detailed and paraphrased as follows (partly based on Lupton, 1999):

- *Rationalist* – risks as real world phenomena to be measured, and estimated by statistics, prioritised by normative decision theory and controlled by “scientific management”.
- *Realist* – risks are objective hazards or threats that exists and can be estimated independently of social and cultural processes, but may be distorted or biased through social and cultural frameworks of interpretation.
- *Constructionist* – nothing is a risk in itself – what we understand to be a “risk” is a product of historically, socially and politically contingent “ways of seeing”.
- *Middle positions* between realist and constructivist – risk is an objective hazard or threat that is inevitably mediated through social and cultural processes and can never be known in isolation from these processes.

To simplify: in risk research most sociologists are in the middle position, psychologists in the realist position, and anthropologists in the constructionist position. The middle positions dominate in theories related to the “risk society”, not just Beck, but also in the publications of Giddons, Renn, Shrader-Frechette, Perrow, and others in their risk studies. The needs for cross-disciplinary approaches in risk research revealed by Rasmussen (1997) and his model of convergence of scientific paradigms, are in line with a middle position regarding epistemology.

For a more in-depth review of scientific positions and theoretical approaches in risk research I will recommend Jaeger, Renn, Rosa & Webler (2001) “*Risk, Uncertainty, and Rational Action*”. They discuss the Rational Actor Paradigm (RAP) – as a general theory dominating modern societies since the Enlightenment and the industrial revolution, making “the invisible hand” of markets and utility theory the base for global economics. Traditional risk analysis and risk management are parts of this scientific rationality (RAP), and they reveal a fundamental tension between sociology and RAP. They present some challenges and alternatives to RAP in the study of risk, e.g.<sup>1</sup>:

- Cooperative discourse about a risk problem
- Risk and organisations
- Social amplification of risk and risk communication
- The arena metaphor and social drama of risk debates
- Cultural theory of risk
- Critical theory

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<sup>1</sup> Alternative epistemological positions and theoretical frameworks are also reviewed in Krinsky & Golding (eds), 1992; Adams, 1995; Turner & Pidgeon, 1997, Lupton, 1999.

- Reflexivity

These alternatives to RAP do not represent a consistent "grand" theory, just elements of alternative understanding and practice, and features of sociological arguments against RAP. Nevertheless, most social scientists dealing with risk subjects are looking for going beyond the incompatible ways of thinking and reasoning in the communities of risk research seeking cross-disciplinary collaboration and even integration through a common language in modern systems theory (Luhmann,1993), and/or ideas inspired by Habermas (1990), such as cooperative discourse, reflexivity, and arena metaphors. Shrader-Frechette (1991) states that risk evaluation is both scientific and democratic. She suggests a path between the two worlds of objectivism and relativism by what she calls "scientific proceduralism". The concept rests on three ideas:

- Explanatory and predictive power is a universal criterion
- Naturalistic and situation specific criteria should be added
- Scientific "objectivity", in the sense of proceduralism, is best achieved by exposing risk evaluations and decisions to intelligent debate, criticism, and amendment by the scientific community and lay people likely to be affected by the risk.

Her proposal has much in common with the combined risk management strategies suggested by Klinke & Renn (2001) and discussed later in this paper.

### **Risk Society revisited**

Although Ulrich Beck and Anthony Giddens initially developed their theories of risk and late modernity largely separately, their writings have much in common, e.g. concepts like "produced uncertainty", "individualisation", reflexivity" and "globalisation" as corner stones of the "risk society". Instead of a "risk society", Giddens writes about a "risk culture". However, the contents have great similarities.

The industrial society is becoming a risk society. The main features of "risk society" are described by statements as follows: The central problem today is not production and distribution of goods, but the minimization of risk. Social groups single out certain risks as important while others are ignored. All societies in all epochs in human history have been subject to threats to life and health. The risks in the risk society cannot be delimited spatially, temporally or socially. Risks in early modernity were possible to calculate and were products of social choice. Today, this risk logic is suspended. Many of the risks today escape perception and the monitoring of our senses. Expert knowledge contradicts each other, and this tends to paralyse action. Scientists have lost their authority on relation to risk assessments. Uncertainties today are a result of human knowledge. Nature is striking back i.e. epidemic of bacterial infections.

In the paper "*Risk Society Revisited – Theory, Politics, Critiques and Research Program*" Beck (1997) summarise main aspects of the "risk society" in the following statements<sup>2</sup>:

- Produced uncertainty and organised irresponsibility
- From a distribution of benefits to the distribution of risks
- Environmental risks are global, and the effects are democratic

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<sup>2</sup> The bullets are extracted from the text by me

- The society has become a laboratory, but no one is responsible for the results. Researchers can not make mistakes any more, e.g. learn by doing, - gene technology
- Politics: if something goes wrong, the political institutions are blamed for decisions they did not make, and for consequences and threats they don't know.
- Risks which could be assessed in the industrial society, are now incalculable
- Dangers and threats are produced by industry, externalised by economists, individualised by law, legitimised by science, and trivialised by politicians.

In the paper Beck disproves the criticisms of the pessimism of his “risk society” book. He says that he is optimistic about the possibilities of succeeding. He is looking for a model of understanding our time, and looks at the risk society as a stage in a radicalised, reflexive modern. The decisions in business and industry, scientific programs, and the use of new technologies will be politicised in a new institutionalised framework for democratic legitimisation.

The terms “reflexivity” and “individualisation” are two keywords in understanding “risk society”, and may need an explanation.

The term “*reflexivity*” is used in sociological literature to denote the response of modern people to risk and/or to conditions that arise fear or anxiety. Reflexivity involves a continual monitoring of action and its contents (Giddens, 1990). It involves critical assessment of actors and stakeholders, including the professional risk experts. The production of wealth is accompanied by production of risks as an outcome of modernisation.

Debates and conflicts over risks have begun to dominate all arenas. Lay people have become sceptical about science. People must deal with constant insecurity and uncertainty. Some social groups are more affected due to lack of resources, while wealthy people can purchase safety and freedom from risk. Former colonies serve as waste disposal. On the other hand, many risks affect both wealthy and the poor in similar ways (radiation, nuclear warfare) are widespread and invisible. The privileged has enough knowledge to know about and become anxious about risk but have not enough knowledge to reduce risk.

Individuals must produce their own biography in the absence of fixed, obligatory and traditional norms. Freeing of accepted social roles. Traditional structuring institutions have been substituted by formation of personal identity. *Individualisation* means being responsible for yourself and dependent on conditions you do not manage. The destiny was pre-structured in pre-modern society. Family and marriage helped in coping with anxiety and insecurity.

According to Giddens (1990) trust is important. Today we must trust experts we do not know and it is easier to lose trust to experts we do not know. Trust presupposes awareness of risk. Trust; is a means of dealing psychologically with risks. Everyday routines are also vital to deal with dangers and fears.

### **Risk and uncertainty management strategies**

The theory formations related to the “risk society” have mainly a basis in strict academic macro sociological tradition, with little attention on specific practical implications for risk management practice. However, a proposal by Shrader-Frechette

has been mentioned above, and Ortwin Renn and his colleagues at Center of Technology Assessment in Baden-Württemberg have given a valuable contribution regarding risk management strategies. A brief review of their proposals is presented below.

The dominant methods for risk assessment as decision support in risk management are (Klinke & Renn, 2001):

- *Actuarial analysis*: extrapolation from past experience
- *Health risks assessment*: determining the pathways from emission to effects using models of dispersion, dose-response-relationships, and consequence analysis
- *Probabilistic risk assessment (PRA)*: synthesizing failure rates through fault and event trees

Common features and delimitations of these methods for risk assessment of importance for risk management, are described by Klinke (2002) as follows: They rely on relative frequencies, statistical data, as means to express probabilities. The undesired effects are confined to physical harm to humans and the ecosystems, thus excluding social and cultural impacts. Only rough estimates for socially induced risks such as sabotage, terrorism, and human errors are part of the modelling. Probabilities and the magnitude of adverse effects are normally multiplied, i.e. an expected value approach. Some challenges for risk assessment are revealed: 1) Enlarging the domain of effects (such as social impacts). 2) Using better tools to assess socially induced risks. 3) Placing more weight on catastrophic potential and their secondary impacts. 4) Using better models for incorporating system interactions (geographic; functional; systemic) 5) Taking account of long time durations. 6) Providing better rationales for balancing risks, benefits and perceptions.

An attempt to respond to these risk assessment challenges is the proposed *risk classification* by the Global Change Council of the EU Commission (Klinke, 2002):

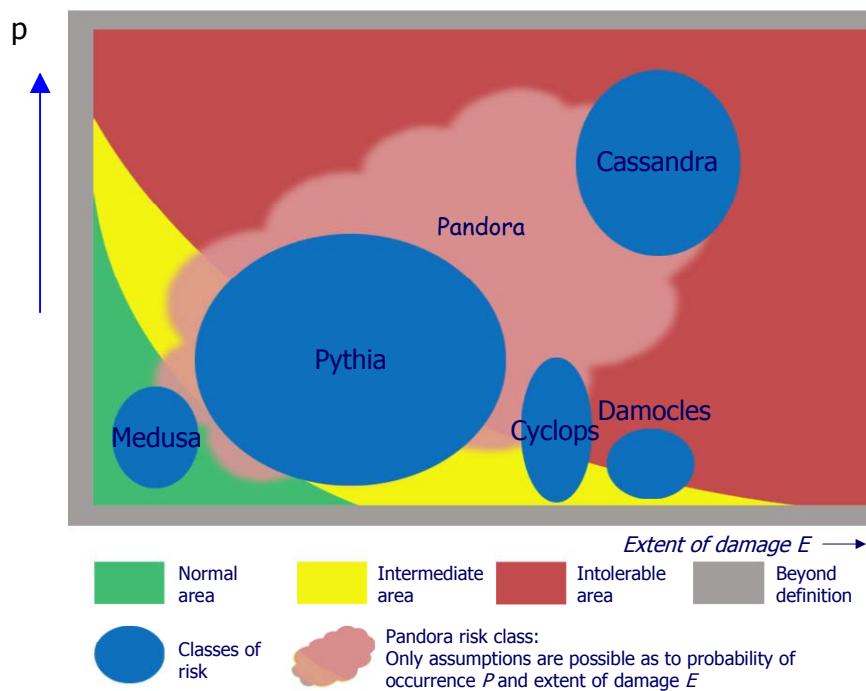
- Probability
- Potential for harm
- Uncertainty (variability, statistical, genuine, ignorance)
- Ubiquity,
- Persistence
- Delayed Effects
- Equity Violations
- Potential for Social Mobilization

Combining these dimensions of the risk concept Klinke and Renn (2001) developed six main types of risks determining the choice of risk management strategy. These risk types, named after metaphors from Greek mythology, are comprised by the following characterization of risks:

- *Damocles*: high catastrophic potential, probabilities (widely) known
- *Cyclops*: no reliable estimate on probabilities, high catastrophic potential at stake
- *Pythia*: causal connection confirmed, damage potential and probabilities unknown or indeterminable
- *Pandora*: causal connection unclear or challenged, high persistency and ubiquity (bioaccumulation)
- *Cassandra*: intolerable risk of high probability and great damage, but long

- delay between causal stimulus and negative effect
- *Medusa*: perception of high risk among individuals and large potential for social mobilization without clear scientific evidence for serious harm

Frequent accident risks with relatively low consequences, e.g. road traffic accidents and occupational accidents, are not included in the typology, i.e. the accident risk type which are dominant in killing and injuring people. When these six risk types are presented in a risk diagram, see figure 2, we get an visual impression of the *uncertainties* related to the different risk types, i.e. the areas covered by the actual risks.



**Figure 2.** Risk classes. Source: WBGU, German Advisory Council on Global Change. The figure is copied from a presentation by Renn (2002).

As practiced in most risk evaluation processes, figure 2 also distinguishes three categories of risk: the normal, the intermediate and the intolerable area. As most other social scientists they avoid the terms acceptable/ALARP region/unacceptable due to possible moral implications. The terms “tolerable/intolerable” are not so emotional or sensitive for ethical considerations. In practice, in decision-making the meaning is almost the same.

To deal with the important features for the six risk types, Klinke & Renn (2001) propose three alternative, - or combined risk management strategies:

- Risk based or risk informed management strategies (Damocles and Cyclops)
  - Sufficient knowledge of key parameters
- Precautionary or resilience based strategies (Pythia and Pandora)
  - High uncertainty or ignorance
- Discursive management strategies (Cassandra and Medusa)
  - High ambiguity

Risk-Based Management is characterised by emphasising scientific assessment, reduction of exposure and/or probabilities, risk management according to expected values on risks and benefits, and reliance on inspections, auditing and routine controls. Examples are: industrial plants, large dams, bridges and highways, LNG Terminals, transportation (road, railway, shipping and aviation), classic infectious diseases, deterministic health risks (threshold).

Resilience-Based Management is characterized by emphasising trans-disciplinary, research and investigations, containment of application (in time and space), constant monitoring, redundancy and diversity in safety design, (strict) liability, and no tolerance policy for risk control, - in extreme cases: prohibition. Examples are: biotechnology, Internet sabotage, new epidemics (new mutations), BSE, and extreme weather events due to global climate change.

Discourse-Based Management is characterized by emphasising reaching political consensus or agreement, importance of procedure and transparency, establishment of trust-generating institutions, investment in risk communication, involvement of stakeholders, including industry and governmental organisations, plus public participation. Examples are: genetic engineering, “industrial” food production, biochips for human implementation, electromagnetic fields, and consumers’ way of life risks.

The main conclusion in Klinke & Renn’s article is that risk management strategies need to be tailored according to the main characteristics of the risk source in question. This is in line with Rasmussen’s views on applying a variety of risk management strategies based on the domain characteristics of the risk sources (hazard/threat) (Rasmussen, 1997). The main difference is that while Rasmussen discuss within a framework of accident risks from the frequent small scale accidents to major accidents and large scale accidents, Klinke & Renn include also all types of health and environmental risks in their scope.

## **Concluding remarks**

The research on the risk society focuses on what Klinke & Renn (2001) call “problematic risks”, i.e. that the traditional risks of the modern industrial society are ignored in this literature. The risk society literature deals mainly with the uncertainty aspect of the risk concept. This literature is not occupied with the statistics of fatalities and injuries related to dangerous phenomena, activities and arenas.

The risk research tradition dominating the NoFS conferences has been empirical approaches to accident risks related to well known hazards at work, in road traffic and home and leisure activities. We have gained a lot of knowledge about these accident risks. The main challenge is on practical preventive measures and effective management systems linking levels and layers. However, the theory formations related to the risk society are of increasing relevance for major accident problems in industry, in transportation and in relation to ICT vulnerabilities, as these domains are stressed in their coping with safety problems by a number of external forces and counter forces related to globalisation and fast pace of technological change.

Why are we so obsessed by “risks”? Luhman (1993) asserts that risk awareness is characterised by a fascination about extremely improbable circumstances with grave outcomes. The explanation, he claims, is that today the decisions of individuals or organisations can be identified as root causes of disasters, cf. Rousseau

comment on the Lisbon earthquake, and therefore it can be demanded that their decisions should be based on risk prevention and precaution.

People have always been more worried about major hazards and disasters than all the frequent small-scale accidents dominating the statistical risks. As mentioned in the introduction, the modern risk awareness is not about our own experiences or the current statistical risk picture of deaths and injuries, but about an *uncertain future*. It is also well documented that groups and communities can develop tolerance for living with high-risks. We also have a greater tolerance for risks we feel that we can sense, control and relate to. This may look irrational. But to quote Bertrand Russell: "*What man desire is not knowledge but certainty*". We are exposed to the rare major accidents, disasters and global risks of terror, epidemics and dangerous substances every day through mass media news. These are the risks of risk society, i.e. risks which we cannot control and cope with as individuals or from local communities. Risk research and risk management cannot remove uncertainty from this world and its future, but it may help to improve our skills to cope with uncertain events and their undesirable consequences.

Finally, three questions which could be interesting to discuss at this NoFS conference:

- Do those of you working with "unproblematic" risks have something to learn from those working with the "problematic" risks?
- How to develop the "proceduralism" (Shrader-Frecette) and risk management strategies (Klinke & Renn) to practical and more specific approaches to risk handling at different levels?
- Beck is optimistic about reflexivity and cooperative discourse about risk problems; - *but*, what about the current dilemmas of democracy in coping with terrorism?

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