severity of the potential consequences. However, this way of putting risk into models could induce important biases in risk management for two reasons. First because the complexity of accidental situations are reduced inappropriately and second because the decisional model based on the calculation of probabilities are adapted to decision taken in so-called « risky universe » and thus inappropriate with the concept of « major accident » but even more inappropriate with the management of unconceivable events ore very rare one (risks known as emergent).

It became then necessary to propose diagnostic tools in order to distinguish the situations where the probabilistic approaches of risk management remain suitable from the situations where they generate a "risk" on the decisions themselves. These tools will aim at taking into account the adequacy between methods and decisional contexts.

The risk prevention process in France will be analyzed using theses epistemological thoughts.

MO-IV-5
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Monte Carlo methods in natural hazards analyses.
In facing the results from risk analyses, politicians and regulators must take decisions with direct impacts on lives of their citizens. Unfortunately, the risk assessment is not an "exact science" but there is an intrinsic "uncertainty" associated with the term "risk".

Its characterization is crucial in order to produce more transparent results and, consequently, to allow politicians to take more aware and justified decisions.

The Environmental Protection Agency classifies risk analysis uncertainty into scenario, model and parameters uncertainty. The first kind of uncertainty arises from the problem interpretation by different experts. The second is linked to the inability of a model to exactly reproduce the reality that is the key phenomena and their connections. Finally, the latter depends on both the lack of data (or knowledge) in regard to the specific parameters of interest and their intrinsic natural heterogeneity. Currently, a specific procedure for a quantitative analysis of scenario or model uncertainty is not available in literature but, regarding parameter uncertainty, both guidelines from various governmental agencies and many studies identify in Monte Carlo analysis the more powerful tool for dealing with uncertainty. Nevertheless, even if Monte Carlo analysis is quite common in ecological and health researches, few studies have been carried out in the natural hazard field. This study is then a first attempt to use Monte Carlo methods in natural risk assessment, in order to characterize parameters uncertainty. The research pointed out that Monte Carlo methods allow to manage not only hazard parameter uncertainty (as more traditional methods do) but also vulnerability parameter uncertainty, that represents a further added value. The method has been validated for the seismic risk but it can be used also for different kinds of hazards, especially when there is a lack of structured data.

TU-VI-8
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A quantitative risk assessment for the ingestion of Cryptosporidium parvum oocysts following indirect contact with beef cattle.

Cryptosporidium parvum is a protozoan parasite of humans that can be transmitted through low doses of environmentally-resistant, infective oocysts via faecal-oral spread. One potential source of oocysts in the environment is the faeces of cattle. We have developed a quantitative risk assessment model to determine the risk of infection from C. parvum oocysts following a 1-day camping event on pasture previously grazed by infected cattle following a structure previously described by Strachan et al. (2002) [Strachan, N.J.C., Dunn, G.M. and Ogden, I.D. 2002. International Journal of Food Microbiology 75, 39-51]. We model the prevalence of C. parvum in the herd, and the build-up of oocysts on the pasture caused by faecal shedding during grazing, using data from a long-term study on a lowland mixed farm in England. The model then calculates the survival of oocysts in topsoil prior to the visit using published decimal reduction times (D-values) for C. parvum in soil. It is assumed that oocysts are mixed throughout the soil and that, by consuming soil, campers inadvertently ingest oocysts. Soil ingestion by campers is modelled using a lognormal distribution previously developed for risk assessment purposes. The probability of infection is then calculated using an exponential dose-response model.

Three sub-models were developed, for cows, calves and a suckler herd containing cows and calves. The model was developed in @Risk. For each model, the mean risk of infection is approximately 0.001 (with 5th and 95th percentiles in the range of 0.0002 and 0.003 respectively). Sensitivity analysis using rank order correlation indicates that the mass of soil ingested is the most important factor affecting the risk of infection. Scenario analysis suggested that a significant reduction in risk can be achieved by delaying any camping event until 2-3 weeks after the end of the grazing of the field.

TU-V-6
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The meaning of geo-information about safety issues in the land allocation process.
The growing availability of GIS based models and systems contribute to our insight in external sources that are causing safety risks. The central question discussed in the paper is: how do decision makers in spatial planning processes give meaning to geo-information related to safety risks in their actions and policies related to spatial developments? This question is explored by an analysis of a land allocation process of an industrial area in Arnhem, The Netherlands. Within this land allocation process, geo-information technology has been used to calculate risk chances and magnitudes related to the storage, use, and transport of hazardous materials. These chances and magnitudes have been presented as risk contours on a map. In the land allocation process, decision makers gave meaning to this information by the inclusion of several safety measures and instructions in the land allocation plan to mitigate risk consequences. In addition to 'traditional' mitigation measures, such as safety distances around hazardous installations, measures have been taken to improve possibilities for crisis response such as the implementation of an additional access road. The geo-information itself as well as the legal rules and procedures, which highly shaped the meaning that was given to this geo-information, represent a natural scientific risk approach. A critique to this approach is that it neglects social values, such as the acceptability of hazardous activities. Because this natural scientific risk approach plays such a dominant role in the way decision makers give meaning to safety issues, it seems reasonable to reconsider the role of social values in the decision making process. When there is much ambiguity amongst groups in society about the conceptualization and interpretation of safety issues, it seems reasonable to reorganize the process in which meaning is given to the geo-

information in a more deliberative way in which multiple conceptualizations and interpretations of safety issues are included.

MO-VI-7

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Risk management in the WTO – The role of scientific evidence and provisional measures.

From the EC-Hormones dispute to the EC-Biotech disputes, the rules of SPS Agreement concerning scientific evidence and risk management have become a hot topic in the WTO free trade regime. This paper examines the roles of scientific evidence and provisional measures in the mechanism of risk management in the SPS Agreement. Two major issues in particular will be addressed: one is how scientific evidence and the mechanism of risk management can be applied so as to balance the needs of Members to adopt the measures necessary for the protection of human, animal or plant life or health, and to minimize their negative effects on trade. The other is the importance of the provisional approach to Article 5.7 in addressing risks, in cases where relevant scientific evidence is insufficient. By examining the EC-Hormones and EC-Biotech cases, this paper shows that Article 5.7 is not only feasible in the WTO, but also, being similar to the precautionary principle, can be applied as a model for policy makers to initiate precautionary measures in environmental and health fields alike.

TU-VI-6

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Cost-effective management of remediation projects.

Contaminated soil and groundwater is a problem of increasing concern and is today a major issue in land use planning and management, real estate assessment and property selling. Investigation and remediation of contaminated areas are often associated with high costs. As an example the Swedish EPA estimates that there are about 80000 contaminated sites in Sweden and provides annually 25-50 million Euro of governmental resources to the Swedish county authorities for investigation and remediation of contaminated areas where no responsible part can be found. The cost for the 1500 most contaminated sites estimates to 5 billion Euro. Similar, or even more severe, situations are present throughout Europe and North America. This contribution discusses a rather common situation in which the potentially contaminated site is divided into Remediation Units of equal size. Typically, all RUs are investigated (sampled) and t he contaminated ones are remediated. It is shown that if one is willing to accept a specified small risk of either leaving contaminated RUs unremediated, or remediating non-contaminated RUs, the total budget for remediation can be used more cost-efficiently. The main idea is to sample (i.e, investigate) RUs sequentially until this no longer is cost-effective. Note that sampling is regarded cost-effective if the pre-posterior data value is higher than the sampling cost. Also, the pre-posterior value of sampling the next RU, depends on prior soft and/or hard data as well as the numbers of contaminated and non-contaminated RUs found so far.

MO-VI-5

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The influences of situation-oriented and goal-oriented decision-making on health risk behavior.

The purpose of this study is to examine the decision-making process of health risk behavior. We hypothesized the dual processes involved in health risk behavior; a goal-oriented process that involves reasoned decisions that inhibit health risk behavior, and a situation-oriented process that involves social reactive decisions that promote health risk behavior. Our model assumed that health risk behavior may be inhibited or promoted depending upon which influence is more salient among goal-oriented process and situation-oriented process. Moreover, we presumed that the self-efficacy, i.e. the ability of behavior control, may promote the goal-oriented process and inhibit the situation-oriented process. Surveys about unhealthy food-eating behaviors (i.e. fast food, sugary food, and snack food) were carried out for students in the Netherlands and Japan. Overall, our results indicated that low self-efficacy individuals eat more unhealthy foods than high self-efficacy individuals. The goal-oriented process is more salient in high self-efficacy individuals, on the other hand, the situation-oriented process is more salient in low self-efficacy individuals. Therefore, this study revealed that self-efficacy has an important function that moderates the influences of both goal-oriented and situation-oriented process on health risk behavior. We also discussed the potential of the dual process model as a framework of intervention.

MO-V-5

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The "white male effect": From risk perceptions to economic priorities.

Earlier research has shown that particularly women with foreign background perceive risks as more serious than other groups and that 'white males' have comparably the lowest risk perceptions. The reason for this, it is claimed, is found in differences in economic and social resources, perceived control and earlier experiences. This finding is known under the name of "The White Male Effect" (WME). However, the results have not been related to how different groups prioritize risk management on the societal level. The aim of this study was therefore to: 1) investigate if the WME exists in Sweden, 2) see if such possible differences in risk perceptions mean that there are differences between e.g. white males and women with foreign background in how they prioritize societal risk management in comparison to other welfare services. The empirical analyses are based on a national survey (n=1480) about risk perceptions conducted in Sweden 2005/06. The results show that there are differences between people with foreign background and people born in Sweden in risk perceptions. The former group is more worried about different risks than the latter. The differences between men and women are not big, but when there are differences women are more worried than men are. The pattern is similar when it comes to economic priorities but inversely: People born in Sweden prioritize societal risk management higher than people with foreign background. Gender has low or no significant effect on these relations, but when it has men prioritize risk management higher than women do. The tentative conclusion is that people with foreign background worry more about different kinds of risk but at the same time are more inclined to prioritize e.g. education before risk management because of lower socio-economic standard, less control and negative earlier experiences.