The following organizations have sponsored the SRA-Europe 2007 Conference:

Dutch Ministry of the Interior and Kingdom Relations

Department of Psychology & Communication of Health & Risk

City and the Mayor of The Hague

Society for Risk Analysis (SRA) Europe

What is the Society for Risk Analysis?
The Society for Risk Analysis (SRA), founded in 1981, represents the leading platform for interdisciplinary academic risk research. It operates world-wide, with International Sections in North America, Europe and Japan.

SRA encourages those who are interested in all aspects of risk analysis to share experiences, exchange ideas and to build co-operation in research and mutual support. It provides a fruitful opportunity for inter-generational and multinational exchange as well as for communication with stake-holders in industry, politics and society.

Why a European Section?

The Society for Risk Analysis Europe (SRA-E) was founded in 1987 as a section of SRA international to develop a special focus on risk related issues in Europe. When joining SRA, members with a European residency routinely become members of SRA-Europe.

SRA-E aims to bring together European individuals and organisations with an academic interest in risk assessment, risk management and risk communication. SRA-E emphasises the European dimension in the promotion of interdisciplinary approaches of risk analysis in science. Our activities are highly relevant to practical application in industry and governance. The SRA-E 's charter can be found on our website at (see www.sraeurope.org).

To foster strong and healthy relations between SRA-Europe and SRA-International the "Memorandum of Understanding" describes key principles of good practice and support (see www.sraeurope.org).

What are the activities of SRA-Europe?

The SRA-E encourages and facilitates the communication among experts in all risk domains via general conferences and target focus meetings. The annual conference of SRA-E offers academics, policy makers, and industry representatives an opportunity to discuss 'state of the art' theory, research and policy relating to risk. We also discuss future directions and challenges in risk analysis and risk management. The annual conference take place in various countries in Europe in order to enhance the access to SRA-E for members and risk interested people all over Europe. These yearly conferences provide a forum for researchers, academics, students, people from businesses, industry, and others.

Additional meetings and workshops focus on specific risk topics of SRA-E interest – building links with other associations or institutions helps to communicate, collaborate and develop new methodologies for risk analysis and risk management. In the past we have addressed issues such as Natural Hazard, Risk Communication & Electromagnetic Fields, Risk Regulations & the Precautionary Principle etc.

Further, SRA-Europe provides its members with risk related information with regard to activities & initiatives on scientific, political and industrial level. SRA-E offers also the platform for working groups on particular risk issues which needs to be developed and enhanced. A good example is here the launch of a working group on harmonization of risk terminology. More about this and other initiatives can be found at www.sraeurope.org.

How is SRA-E organized?

The functioning of SRA-E is ensured by an Executive Committee comprising eight members who are elected by the Society members. For certain tasks (e.g. conference host) co-opted members join the committee. A permanent secretariat is established to strengthen the liaison between members and the organization.

More information about the committee, its policies, and organization are laid out in the charter, which can be found at www.sraeurope.org.

Why to become a member? What are the benefits?

Membership of SRA-Europe carries automatic membership of the international Society for Risk Analysis, founded in 1981, with over 2000 members world wide. SRA-Europe includes about 300-400 members.
To be a member of SRA-Europe offers multiple benefits. Members are part of the scientific community and get in touch with the latest news in research and practice in risk analysis. Members will also receive news of events and conferences world wide. SRA-E helps members to become familiar with national and international policies on risk analysis. Further SRA-E encourages members to network and exchange ideas with other professionals working on different areas of risk research.

The quarterly Newsletter of SRA informs all members four times a year about what's going on in the Society. In addition, SRA-Europe regularly provides Europe specific risk related information to its members. All members receive the journal *Risk Analysis* as part of their membership privileges and also the opportunity to subscribe at a reduced rate to the *Journal of Risk Research,* the official journal of SRA-E and SRA-Japan.

How can members become active in the society?

SRA-E welcomes new ideas and initiatives from members. Active members are the basis of the Society and of its future. If you have views or suggestions for improving SRA-E then please do get in touch. You could also become involved by standing for election to the SRA-E or helping us with organizing a conference. You can contact the committee members directly – their email addresses are on the website: www.sraeurope.org.

Where to get more information? or How can I join?

To find out more about the SRA-Europe please visit our web-site www.sraeurope.org.

SRA
EUROPE

SRA Europe Executive Committee

President, Councilor:	Olivier Salvi
Past President:	Scira Menoni
Secretary:	Andrea Thalmann
President Elect, Treasurer:	Roberto Bubbico
Committee Members:	Alberto Alemanno
	Julie Barnett
	Myriam Merad
	Ann Enander
	Jan M. Gutteling
	Branko Kontic
Secretariat:	Raffaella Cozza

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Preface to the 16th SRA Europe conference

Being a member of the Society for Risk Analysis (SRA) for a very long time, I wondered how I could make a contribution to the professional research on Risk Analysis in Europe. Serving in the SRA council did not give quite that satisfactory feeling that I was looking for, so, one day I decided to volunteer for the organisation of the European SRA conference.
At present we can look back at a very interesting time of getting this organizational process under control. I have learned now that nothing worthwhile would have happened without the help, support and dedication of the home team, that is the people whose names you can see in the box to the right. Others have helped also, but unfortunately their effort is less visible to the outside world. So, this preface must start with a big thank you to all those involved in this process.
Some names need extra mentioning. Without Margot's eye for detail and her dedication in managing the scientific program, the conference program would not have been so interesting and of high quality. The Dutch colleagues from all parts of the country who served in the Technical program committee helped in guarding the quality of the contributions. Lisette did a very fine job in collecting all the information that is incorporated in this book of abstracts and managing the package that you received on registration. Raffaella managed all the financial aspects of the registration process and the communication with prospective conference delegates. The colleagues in the SRA Europe council need to be thanked for their comments, suggestions and support that helped to keep the right focus.

Without the financial support of the Dutch Ministry of the Interior and Kingdom Relations, the Department of Psychology & Communication of Health & Risk and the City and the Mayor of The Hague this conference could not have been organised. The Dutch Ministry will present the Dutch National Risk Assessment in a special symposium on Tuesday.

It's now up to all participants of the SRA Europe 2007 conference, to make the event a success.

Jan M. Gutteling

(chair Local Organisation Committee)

Local Organising Committee (LOC)

Dr. Jan M. Gutteling (chair)

Dr. Margôt Kuttschreuter (chair TPC)

Dr. Zamira Gurabardhi

Teun Terpstra, MSc.

Renske Pin, MSc.

Anne Dijkstra, MSc.

Ellen Ter Huurne, MSc.

Lisette Gudde (local administrative support)

Conference Secretariat
SRA-Europe 2007 conference
c/o Raffaella Cozza

www.sraeurope2007.eu

(e) sraeurope2007@gw.utwente.nl

During the conference you can contact us between 08:00 and 23:00 at the following number:

31 (0)6 330 274 37

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The conference language is English.

All events of the SRA Europe 2007 conference are non-smoking.

Meeting highlights

Conference program
Posters will be on display on Monday, between 11.00 and 16.00 hours at the Summit Foyer. The posters abstracts can be found on page 77.

The Monday plenary session is in Amazon from 8.45 – 10.30 hours. It's title is "Crossing Bridges". More info on page 8.

On Tuesday the plenary session is in Amazon from 8.30 – 10.00 hours.
The session title is “Relation between science and practice: good science, bad practice?” and more information is available on page 8.

The SRA Europe 2007 conference is glad to host 20 Special Symposia and Round Tables (see page 24 for an overview).

Furthermore, we can offer you a choice from 12 sessions with individual paper presentations on Monday, and 12 of those sessions on Tuesday (see page 9 for an overview).

On Tuesday the Summit Foyer is transformed into a workshop area where conference delegates can get acquainted with the work of the Expertise Center for Risk and Crisis Communication of the Ministry of the Interior and Kingdom Relations.

Assistance
The conference secretariat is located next to the Amazon plenary room. Don't hesitate to come to us with your questions. We will be glad to help you where we can.

Conference dinner
When you have registered for the Monday evening conference dinner, we ask you kindly to be present in the World Forum Central Lobby between 18.00 and 18.15 hours. Dinner guests will be transported by coach to the dinner location (this takes approx. 10 minutes).

The conference dinner starts with a reception where conference delegates will be welcomed by the Mayor of the City of The Hague.

Between 22.30 and 23.00 hours dinner guests will be returned to the World Forum location. When you need to leave at an earlier time we suggest that you order a taxi.

This is the end...
All things must come to an end, and that is true for this conference as well. To give you some time to discuss with other delegates, or just to say goodbye, we invite you to our farewell reception on Tuesday, starting at 17.30.

General program

Monday June 18, 2007			
Time	**Activity & location**	**Special symposia & round tables**	**Paper presentations & posters**
8.00	**Mo-I: Registration *(--Registration Desk--)***		
8.30 – 8.45	**Mo-II: Welcoming session *(--Amazon--)*** Jan M. Gutteling (Chair Local Organising Committee) Hubert W.A.M. Coonen (Dean University of Twente) Jonathan Wiener (President-elect Society for Risk Analysis)		
8.45 – 10.30	**Mo-III: Monday Plenary Session *(--Amazon--)*** **"Crossing Bridges"** Arie Rip (session chair & forum discussion)		
10.30 – 11.00	**Coffee / tea break *(--Catering area--)***		❖ Posters (--Summit Foyer--)
11.00 – 12.30	**Mo-IV: Breakout session *(--Breakout rooms--)***	▪ Integrated risk management ▪ Emotions and EMF ▪ Disaster & media in Europe: a quantitative approach	▪ Risk communication & perception ▪ Assessment of natural hazards ▪ Risk management ▪ GMO
12.30 – 14.00	**Buffet luncheon *(--Catering area--)***		❖ Posters (--Summit Foyer--)
14.00 – 15.30	**Mo-V: Breakout session *(--Breakout rooms--)***	▪ Nanotechnologies: emerging risks and societal responses I ▪ Individualisation and risk perception and communication ▪ Citizen engagement as a policy tool in the management of risk I	▪ Perception & communication of flood risks ▪ Risk perception ▪ Assessment ▪ Risk Stakeholders & organisations
15.30 – 16.00	**Coffee / tea break *(--Catering area--)***		❖ Posters (--Summit Foyer--)
16.00 – 17.48	**Mo-VI: Breakout session *(--Breakout rooms--)***	▪ Nanotechnologies: emerging risks and societal responses II ▪ Promoting food safety through a new integrated risk analysis approach for foods (SAFE FOODS) ▪ Citizen engagement as a policy tool in the management of risk II	▪ Affect and cognitions in risk communication ▪ Health & risk ▪ Management issues ▪ Precautionary principle
18.00 – 18.15	Organised transportation to **Social Event / Conference dinner** (Dinner participants gather at the Word Forum Central Lobby)		
18.30 – 19.30	Reception by the Mayor of the City of The Hague		
20.15	Start buffet diner		
22.30 – 23.00	Transportation to World Forum location		

Tuesday June 19, 2007

Time	Activity & location	Special symposia & round tables	Paper presentations & workshops
8.00	**Tu-I: Registration *(--Registration Desk--)***		
8.30 – 10.00	**Tu-II: Tuesday Plenary Session *(--Amazon--)*** **"Relation between science and practice: good science, bad practice?"** Erwin Seydel (session chair & forum discussion)		
10.00 – 10.30	**Tu-III: SRA Europe Business Meeting *(--Amazon--)*** Olivier Salvi (chair SRA Europe) Jonathan Wiener (president-elect SRA)		
10.30 – 11.00	**Coffee / tea break *(--Catering area--)***		
11.00 – 12.30	**Tu-IV: Breakout session *(--Breakout rooms--)***	▪ National Risk Assessment program ▪ Nanobiotechnology: preparing for the likely public and policy issues ▪ Emergent phenomena after a disaster ▪ Transatlantic regulatory reform and risk regulation	▪ Qualitative research in risk perception ▪ Issues in natural hazards research ▪ Genomics and nutrition ❖ Workshop ERC (--Summit Foyer--)
12.30 – 14.00	**Buffet luncheon *(--Catering area--)***		
14.00 – 15.30	**Tu-V: Breakout session *(--Breakout rooms--)***	▪ Dealing with flood risks in the Netherlands ▪ Strategies for improved exposure assessment for future human health risk assessments I ▪ Methodological developments in risk perception and communication ▪ Natural-technological events (Na-techs): lessons and challenges	▪ Risk perceptions and communication ▪ Risk and land use planning ▪ Assessment and engineering issues ▪ Issues in natural and societal hazards ❖ Workshop ERC (--Summit Foyer--)
15.30 – 16.00	**Coffee / tea break *(--Catering area--)***		
16.00 – 17.30	**Tu-VI: Breakout session *(--Breakout rooms--)***	▪ Strategies for improved exposure assessment for future human health risk assessments II ▪ The risk story model and risk perception – insight from experimental studies	▪ Food risk communication & management ▪ Comparative issues ▪ Management of crises ▪ Cost benefit analysis in policy making ▪ Risk regulation & management ▪ Assessment issues ❖ Workshop ERC (--Summit Foyer--)
17.30 – 19.00	Farewell (wine & cheese) reception		

Plenary sessions

Monday June 18

“Crossing Bridges”

The Monday plenary session focuses on the interaction between scientists of various disciplines. Are multidisciplinary and transdisciplinary researchers building bridges in risk analysis research? Moderator of this session is Arie Rip (University of Twente, the Netherlands). Arie Rip is em. Professor of Philosophy of Science and Technology in the School of Management and Governance of the University of Twente and is the leader of the new program on Technology Assessment and Societal Aspects of Nanotechnology (part of the Dutch national consortium NanoNed).

Keynote speakers on the Monday plenary session include:

- Nick Pidgeon (School of Psychology, Cardiff University) on "From bio to nano to nuclear: integration and public policy in social science risk research"
- Ortwin Renn (Professor at Stuttgart University, Institute of Social Sciences, and managing director of Dialogik)
- Josee van Eijndhoven (Professor of Sustainability Management, Erasmus University of Rotterdam) on "Risk research in the real world"
- Marc Sprenger (Director-General of the Dutch National Institute for Public Health and the Environment, RIVM)

Tuesday June 19

“Relation between science and practice: good science, bad practice?”

The Tuesday plenary session focuses on the interaction between scientists and other risk stakeholders like policy makers. How can we incorporate risk analysis research in risk policy and management? How can risk researchers address questions of policy makers? What risk management questions can policy makers ask? What about mutual expectations? Moderator of this session is Erwin Seydel (University of Twente, the Netherlands). Erwin Seydel is Professor of Social-psychological aspects of organizational and health problems at the Faculty of Behavioral Sciences of the University of Twente.

Keynote speakers on the Tuesday plenary session include:

- Dick Schoof (Director-General Safety of the Ministry of the Interior and Kingdom Relations)
- Anita Wouters (Director Water of the Ministry of Transport, Public Works and Water Management)
- Maria Jepsen (Head of Research at the European Trade Union Institute for Research, Education, Health and Safety)
- Jan Staman on "Keep Distance" (Jan Staman is director of the Dutch Rathenau Institute which carries out research into the development of science and technology)

Breakout sessions

Monday June 18, 2007, 11:00 – 12:30

--Amazon--	--Yangtze I--	--Yangtze II--
MO-IV-1: Integration track **Special symposium*:** **Integrated risk management**	**MO-IV-2: Social track** **Special symposium*:** **Emotions and EMF**	**MO-IV-3: Social track** **Special symposium*:** **Disaster & Media in Europe:** **A quantitative approach**
Chair: Olivier Salvi	Chair: Andrea Thalmann	Chair: Dominique Dolisy-Bonnetaud
11.00 – 12.30 Participants and their presentations: • Olivier Salvi, INERIS, France: "Convergence towards integrated risk management: Results of the SHAPE-RISK Project." • Jaehyun Kim, KOSHA, Korea Integrated Management of SHE&Q: "Contribution to the preparation of an OECD guidance." • Ortwin Renn, Dialogik, Germany & IRGC, Switzerland: "Risk Governance: An application of analytic-deliberative policy making." • Aleksandar Jovanovic, EU-VRi, Germany: "Vision of the newly created European Virtual Institute for Integrated Risk Management: The basis for a new safety paradigm in Europe."	**11.00-12.30** Participants and their presentations: • Andrea T. Thalmann, T-Mobile Germany: "How to deal with emotional issues in EMF risk communication." • Peter M. Wiedemann, Research Center Jülich: "Emotions in hearings: How to respond adequately to complaints, accusations, and attacks: Experiences from Germany" • Ray Kemp, Ray Kemp Consulting Ltd. UK & Australian Centre for Radiofrequency Bio-effects Research (ACRBR): "Behaving reasonably: recent experience in understanding and responding to emotional concerns about EMF in Australia." • Fred Woudenberg, Municipal Health Services Amsterdam: "Why risk communication does(n't) work?" • Gregor Dürrenberger, Swiss Research Foundation on Mobile Communication c/o Swiss Federal Institute of Technology (ETH): "EMF Risk Communication: Addressing Facts and Emotions."	**11.00-12.30** Participants and their presentations: • Anne Lalo, Université de Nice: "Media-coverage of the AZF-disaster: Number of articles and mayor players in the field." • Anne Lalo, Université de Nice: "Impact of disaster and disaster reporting on public opinion" • Maureen de Hond, University of Twente: "Framing in news on the Fireworks Disaster." • Margôt Kuttschreuter, University of Twente: "Fireworks disaster, portrayal of governmental authorities & risk communication policy" • Frank Havik, former journalist, currently attached to government center for crisis and risk communication:" Reflections on Disaster and Media in Europe."

* Order of the presentations in the symposium is at the discretion of the chair

Monday June 18, 2007, 11:00 – 12:30

--Everest II--	--Everest I--	--Kilimanjaro I--	--Kilimanjaro II--
MO-IV-4: Risk perception & communication	**MO-IV-5: Assessment of natural hazards**	**MO-IV-6: Risk management**	**MO-IV-7: GMO**
Chair: Ric van Poll	Chair: Teun Terpstra	Chair: Lars Hulzebos	Chair: Thijs F.M. Etty
11.00-11.18 *Robert de Hoog, Lieke Asma, Jose Kooken. Faculty of Behavioral Science, University of Twente.* Do the costs of not knowing exceed the costs of finding out?	**11.00-11.18** *Cornelia Kozmutza, Yolanda Pico. Physics Institute, Budapest University of Technology and Economics.* The study of pesticides by analytical chemistry and computational physics methods.	**11.00-11.18** *Kevin J. Foster. Edith Cowan University.* Unstable risk management systems: The evolution of an intelligent building in Singapore.	**11.00-11.18** *Zamira Gurabardhi. Psychology & Communication of Health & Risk, University of Twente.* Perceptions, attitudes and acceptance of GT apples by Dutch public and apple growers compared.
11.18-11.36 *Timo Rusanen, Maria Rusanen. University of Joensuu, Finland.* Indigenous knowledge on the effects of climate change in north westernmost Europe.	**11.18-11.36** *Massimiliano Pistucci, A. Garcia Agreda, E. Salzano, C. Gargiulo, A. Galderisi. Istituto di Ricerche sulla Combustione.* Na-Tech oriented mitigation and prevention land use planning: an interdisciplinary approach to na-tech event scenarios set up.	**11.18-11.36** *Calvin Burns, Lisa Norrington, John Quigley, Kevin Quigley, Robert van der Meer. University of Strathclyde.* Policy changes in high seas search and rescue operations: Why Gilligan may never get off that island.	**11.18-11.36** *Joop de Boer. Institute for Environmental Studies, VU Amsterdam.* Psychological essentialism as a cause of opposition towards genetically modified foods, plants and soil life.
11.36-11.54 *Regina Schöll, Claudia R. Binder. Social and Industrial Ecology, Department of Geography, University of Zurich.* System perspectives of experts and farmers regarding the role of livelihood assets: Results from a structured mental models approach.	**11.36-11.54** *Paul Raschky. alpS-Centre for Natural Hazard Management.* An institutional comparison of risk transfer mechanisms against floods between Europe and USA: A dynamic panel data approach.	**11.36-11.54** *David Zaruk. Vesalius College, Vrije Universiteit Brussel.* Alternatives exist! ALARA in chemical risk issue management.	**11.36-11.54** *Julia Quartz, Wiebe E. Bijker, Marjolein B.A. van Asselt. Faculty of Arts and Social Sciences, Department of Technology and Society Studies, Maastricht University)* Certainty impossible: Vulnerable technological cotton cultures in India.
11.54-12.12 *Elisa Barilli, Lucia Savadori, Stefania Pighin, Laura Cremonesi, Augusto Ferrari, Maurizio Ferrari. University of Trento, DISCOF.* Ratio bias in clinical risk perception: when 1 in 200 is riskier than 5 in 1000.	**11.54-12.12** *Sven Fuchs. University of Natural Resources and Applied Life Sciences, Institute of Mountain Risk Engineering.* Natural hazard risk – variability of damage potential and implications for risk management.	**11.54-12.12** *José Manuel Oliveira Mendes. Faculty of Economics - University of Coimbra.* Social vulnerability indexes as planning tools: Beyond the preparedness paradigm.	**11.54-12.12** *Sabry Shehata, Linda J. Cox, William Steiner. Agricultural Economics, University of Hawaii.* Consumer attitude toward risk of consuming genetically modified papaya fruit.
12.12-12.30 *Ric van Poll, Vivianne Visschers. RIVM-MGO.* Perceptions of soil pollution among a sample of the Dutch population.	**12.12-12.30** *Daniela Molinari, Scira Menoni. Politecnico di Milano - Department of Architecture and Planning.* Monte Carlo methods in natural hazards analyses.	**12.12-12.30** *Lars Hulzebos, Willie van den Broek, Hans Marvin, Joop van der Roest, Birgit de Vos, Marnix Poelman. Wageningen UR / AFSG.* A four layer approach in detecting emerging risks in food chains.	**12.12-12.30** *Thijs F.M. Etty. Institute for Environmental Studies (IVM), VU Amsterdam (Department of Environmental Policy Analysis (EPA).* Regulating the coexistence of GM and non-GM farming: The missing link in the EU regulatory regime for agricultural biotechnology.

Monday June 18, 2007, 14.00 – 15.30

--Amazon--	--Yangtze I--	--Yangtze II--
MO-V-1: Special symposium*: Nanotechnologies: Emerging Risks and Societal Responses I	**MO-V-2: Special symposium*: Individualisation and Risk Perception and Communication**	**MO-V-3: Special symposium*: Citizen engagement as a policy tool in the management of risk: Options, difficulties and practicalities I**
Chair: Nick Pidgeon & Barbara Harthorn	Chair: Jens Zinn	Chair: Julie Barnett & Tom Horlick-Jones
14.00 – 15.30 Participants and their presentations: • Ortwin Renn, Dialogik, Germany: "Two Frames for Viewing Nanotechnology Risks." • Barbara Harthorn, Karl Bryant, NSF Center for Nanotechnology in Society at the University of California at Santa Barbara, USA: "Nanoscale Scientists and Risk Attenuation: The Triumph of Hope over Experience?" • Terre Satterfield, Milind Kandlikar, University of British Columbia: "Expert Judgments of Public Perceptions: How Well Do They Know their Audience?" • Emma Hughes, Jenny Kitzinger, Cardiff University: "Framing Nanotech: How the Press Cover Emerging Risks."	**14.00 – 15.30** Participants and their presentations: • Jens Zinn, University of Kent: "Overview of Individualisation and Risk." • Jane Lewis, LSE, UK: "Risk and New Forms of Family Life." • Andreas Cebulla, NatCen, UK: "Risk in the Life-Course." • Peter Lunt, Brunel University, UK: "Risk and Difference." • David Abbott, University of Bristol: "Innovations in the Regulation of Risk."	**14.00 – 15.30** Participants and their presentations: • Ana Prades Lopez, Christian Oltra, CIEMAT, Barcelona, Spain: "The social perception of nuclear fusion: multiple modes of understanding, and implications for future communication and engagement initiatives." • Tom Horlick-Jones, Cardiff School of Social Sciences, Cardiff University, Wales, UK: "Bricolage in action: learning about, making sense of, and discussing issues about genetically modified crops and food." • Ann Enander, Swedish National Defence College: "Engaging with lay publics in planning emergency management."

* Order of the presentations in the symposium is at the discretion of the chair

Monday June 18, 2007, 14.00 – 15.30

--Everest II--	--Everest I--	--Kilimanjaro I--	--Kilimanjaro II--
MO-V-4: Theme session: Perception & communication of flood risks and climate change	**MO-V-5: Risk perception**	**MO-V-6: Assessment**	**MO-V-7: Risk stakeholders & organisations**
Chair: Ruud Zaalberg	Chair: Gisela Böhm	Chair: Olivier Salvi	Chair: Josee van Eijndhoven
14.00-14.18 *Franziska U. Börner, Janet Yang, Robert J. Griffin. Forschungszentrum Jülich.* Anger, efficacy and behavioral intentions in regard to river flooding.	**14.00-14.18** *Marie-Eve Cousin, Michael Siegrist. Department of Psychology, University of Zurich.* Why do people fear mobile phone base stations? A mental model approach.	**14.00-14.18** *Frantisek Bozek, Josef Navratil, Josef Kellner, Milos Bozek. University of Defence, Brno.* Safety and risk at the firing ranges.	**14.00-14.18** *Michael Vincent, Janek Ratnatunga. Department of Accounting and Finance, Monash University.* The valuation and reporting of reputation risk management capability.
14.18-14.36 *Vanessa Daniel, Raymond J.G.M. Florax, Piet Rietveld. VU Amsterdam.* Investigating the announcement effects in flood risk management: using the designation of emergency inundation areas as a quasi-experiment.	**14.18-14.36** *Sarah Condry, William K. Hallman. Rutgers, the State University of New Jersey.* Decomposing dread: Refining the nature of dread in the psychometric paradigm.	**14.18-14.36** *Paolo A. Bragatto, M.G. Gnoni, Adriano Landoni, F.A. Sciancalepore. ISPESL National Institute for Health & Safety at Work.* Comparison of methods for societal risk appraisal at industrial sites.	**14.18-14.36** *Hans Kastenholz, Asgeir Helland, Michael Siegrist. Empa.* Industry and risk assessment of nanomaterials.
14.36-14.54 *Parnali Dhar Chowdhury, C. Emdad Haque. University of Manitoba.* Risk communication on human health risk due to climate change induced heat wave.	**14.36-14.54** *Anna Oloffson, Saman Rashid. Mid Sweden University.* The "white male effect": From risk perceptions to economic priorities.	**14.36-14.54** *Alessandra Colli, Peter Burgherr, Ben J.M. Ale. EC DG Joint Research Centre, Institute for Energy.* Communication and ranking of risk expressions for energy systems.	**14.36-14.54** *Kristina Blennow. Southern Swedish Forest Research Centre, Swedish University of Agricultural Sciences.* Climate change: Perceptions and adaptation among Swedish private forest owners.
14.54-15.12 *Ric van Poll, Vivianne Visschers, Annemiek van Overveld*. RIVM-MGO. Risk perception of environmental risks: Air pollution, flooding and air traffic.	**14.54-15.12** *Siriwan Anantho. School of Communication Arts, Sukhothai Thammathirat Open University.* The perception of risk society in Thailand.	**14.54-15.12** *Marko Gerbec, Branko Kontic. Jozef Stefan Institute.* Licensing policy in the case of cross-border impacts associated with two LNG terminals in the Gulf of Trieste.	**14.54-15.12** *Nadja Železnik. Agency for radwaste management.* Lay people perception of radioactivity and radioactive waste: a mental models approach.
15.12-15.30 *Ruud Zaalberg, Cees J.H. Midden, L.T. McCalley, A.L. Meijnders. Eindhoven University of Technology.* Flooding experiences in the Netherlands: An empirical test of protection motivation theory.	**15.12-15.30** *Gisela Böhm. University of Bergen.* Mental Models about global change events.	**15.12-15.30** *Olivier Salvi, Christophe Bolvin, Régis Farret. Ineris, France.* Convergence Towards Integrated Risk Management. Results from the European SHAPE-RISK Project and other Initiatives.	

Monday June 18, 2007, 16:00 – 17:30

--Amazon--	--Yangtze I--	--Yangtze II--
MO-VI-1: Special symposium*: Nanotechnologies: Emerging Risks and Societal Responses II	**MO-VI-2: Special symposium*: Promoting Food Safety through a New Integrated Risk Analysis Approach for Foods (SAFE FOODS)**	**MO-VI-3: Special symposium*: Citizen engagement as a policy tool in the management of risk: Options, difficulties and practicalities II**
Chair: Nick Pidgeon & Barbara Harthorn	Chair: Hans Marvin	Chair: Julie Barnett & Tom Horlick-Jones
16.00-17.30 Participants and their presentations: • Sharon Friedman, Brenda Egolf, Lehigh University, USA: "Reporting the Risks of Nanotechnology in the Media from 2000-2005." • Tee Rogers-Hayden, Nick Pidgeon, Cardiff University School of Psychology, Wales, UK: "Opening up Nanotechnology Dialogue with the Publics: Risk Communication or 'Upstream Engagement'?" • Arie Rip, Marloes van Amerom, University of Twente, the Netherlands: "The Emerging Landscape of Nanotechnology Risk Governance."	**16.00-17.30** Participants and their presentations: • Hans Marvin, RIKILT - Institute of Food Safety: "Developing tools for improved risk assessment in foods and early identification of emerging risks." • Lynn Frewer, Wageningen University: "A Delphi approach for stakeholder assessment of the new risk analysis framework." • Ortwin Renn, DIALOGIK: "Institutional re-arrangements in European food safety governance - A comparative analysis." • Harry Kuiper, RIKILT - Institute of Food Safety: "A new Risk Analysis Framework for Foods."	**16.00-17.30** Participants and their presentations: • Tom Horlick-Jones, Cardiff School of Social Sciences, Cardiff University, Wales, UK: "Citizen engagement processes as information systems: the role of knowledge and the concept of translation quality." • Gene Rowe, Institute of Food Research, Norwich UK: "Difficulties in evaluating public engagement initiatives." • Julie Barnett, Psychology Dept., University of Surrey, Guildford, Surrey: "Engagement with stakeholders and publics: evidence for policy?"

* Order of the presentations in the symposium is at the discretion of the chair

Monday June 18, 2007, 16:00 – 17:48

--Everest II--	--Everest I--	--Kilimanjaro I--	--Kilimanjaro II--
MO-VI-4: Theme session: Affect and cognitions in risk communication	**MO-VI-5: Health & Risk**	**MO-VI-6: Management issues**	**MO-VI-7: Theme session: Precautionary principle**
Chair: Reint Jan Renes	Chair: William Leiss	Chair: Jerry Busby	Chair: Alberto Alemanno
16.00-16.18 *Sarah Dunleavy, Gary McKeown, Ian Sneddon. Queen's University, Belfast.* Perceived risk and recall for risk information in induced emotional states.	**16.00-16.18** *H.-J. Urban, R. Weitkunat, G. Kallischnigg, E. Sanders, Hugh Browne, Philip Morris Products SA.* A risk assessment approach for Chronic Obstructive Pulmonary Disease.	**16.00-16.18** *Irena Kopac, Maria Neus Ayuso-Gabella, Miquel Salgot. Institut for Ecological Engineering, Ltd.* Risk Model in wastewater reclamation and reuse application to groundwater recharge.	**16.00-16.18** *Marko Ahteensuu. Institutions and Social Mechanisms Consortium, University of Turku.* Ethical foundation of the precautionary principle.
16.18-16.36 *Stacey Conchie, Calvin Burns. School of Psychology, The University of Liverpool.* Risk communication and behaviour change within High-Risk Organisations: The importance of a trusted information source.	**16.18-16.36** *T. Paterson. Entelos, Inc.* Application of a predictive biosimulation model for cardiovascular disease in combination with a "virtual patient" approach, for risk assessment of consumer products.	**16.18-16.36** *Andreas Lindhe, Lars Rosén, Tommy Norberg, Thomas Pettersson, Johan Åström, Mia Bondelind. Chalmers University.* Integrated risk analysis of a drinking water system – a fault tree analysis.	**16.18-16.36** *Huei-Chih Niu, Chien Wen Hung. Institute of Law for Science and Technology, National Tsing Hua University.* Risk management in the WTO – The role of scientific evidence and provisional measures.
16.36-16.54 *Danielle Timmermans, Karen Vermey, Lidewij Henneman. VU University Medical Center.* Presenting health risk information in different formats: The effects on participant's cognitive and emotional evaluation.	**16.36-16.54** *Franziska U. Börner. Forschungszentrum Jülich.* Avian Flu: an investigation into people's perception of risk and motivation to seek Avian Flu related information.	**16.36-16.54** *John Ross, Jeffrey Driver, Gary Mihlan, Curt Lunchick, Bryce Landenberger, George Hazelton. infoscientific.com, Inc.* Single layer clothing penetration factors for pesticide operators.	**16.36-16.54** *Karsten Klint Jensen. CEBRA, Institute of Food and Resource Economics.* Acceptable risk and democracy: Some normative reflections.
16.54-17.12 *Motoko Kosugi. Central Research Institute of Electric Power Company.* Effects of information provision strategies as trust generator in dyad with inequality in information.	**16.54-17.12** *Shoji Ohtomo, Y. Hirose, Cees J.H. Midden. Tohoku University.* The influences of situation-oriented and goal-oriented decision-making on health risk behavior.	**16.54-17.12** *Daniela Leonte. University of New South Wales.* A method to explicitly account for the spatial variability of soil chemical concentrations in probabilistic risk assessments.	**16.54-17.12** *Elen Stokes. Law School, University of Manchester.* Charting the proceduralisation of precaution: Assessing the impact of deference and limited judicial review.
17.12-17.30 *Calvin Burns, Stacey Conchie. Strathclyde Business School, University of Strathclyde.* Trust and risk communication in High-Risk Organisations: A test of the negativity and confirmatory biases.	**17.12-17.30** *Tony Cox. Cox Associates.* Hierarchical, knowledge-based, and approximate models can aid prediction, assessment and communication of the lung cancer risks associated with smoking.	**17.12-17.30** *Jerry Busby. Lancaster University Management School.* Analysing complicity in risk.	**17.12-17.30** *Alberto Alemanno. European Court of First Instance, Bocconi University.* The shaping of the precautionary principle in the EC and the WTO.
17:30-17.48 *Reint Jan Renes, Wendy van Rijswijk. Wageningen University (Communication Science)* How personal relevance and credibility affects the use of risk-related food label information.	**17:30-17.48** *William Leiss, University of Ottawa, McLaughlin Center for population health risk assessment.* A New National Risk Management Framework for Major Risk Issues with International Dimensions.		

Tuesday June 19, 2007, 11:00 – 12:30

--Amazon--	--Yangtze I--	--Yangtze II--
TU-IV-1: Special symposium*: National Risk Assessment in the Netherlands	**TU-IV-2: Round Table*: Nanobiotechnology: Preparing for the likely public and policy issues**	**TU-IV-3: Round Table*: Emergent Phenomena after a disaster**
Chair: Leon Janssen	Chair: David Bennett	Chair: Ariëlle M. de Ruijter
11.00-12.30 Participants and their presentations: • Anja van Dam, Netherlands Programme for National Security: "The Dutch policy program on national security." • Diederik Wijnmalen, TNO: "National Risk Assessment, elaboration of the methodology." • Erik Pruyt, University of Technology Delft: "An application of the methodology (Case study, Multi criteria analysis sensitivity analysis)." • Leon Janssen, RIVM – MNP and Netherlands Programme for National Security: "Discussion and research questions."	**11.00-12.30** Participants and their presentations: • Julian Kinderlerer • David Rickerby, Institute for Environment and Sustainability, European Commission Joint Research Centre: "Nanotechnology Health, Environmental, Ethical and Societal Concerns." • Vinod Subramaniam, Biophysical Engineering Group, University of Twente: "Nanobiotechnology. Key issues." • Donald Bruce (Edinethics) "Martin Luther's blog, Risky Foods and Improved Humans: some future issues in nanobiotechnology."	**11.00-12.30** Participants and their presentations: • Magda W. Rooze & Ariëlle M. de Ruijter, Impact, Dutch knowledge and advice-centre for post-disaster psychosocial care: "Citizens and Resilience, the balance between awareness and fear." • Nancy Oberijé, Netherlands Institute for Safety, Nibra: "Civil participation in response to disasters." • Hans P. van de Sande, University of Groningen: "Organizing the aftermath: a question of communication."

* Order of the presentations in the symposium is at the discretion of the chair

Tuesday June 19, 2007, 11:00 – 12:30

--Everest II--	--Everest I--	--Kilimanjaro I--	--Kilimanjaro II--
TU-IV-4: Special symposium*: Transatlantic regulatory reform and risk regulation	**TU-IV-5: Qualitative research in risk perception**	**TU-IV-6: Issues in natural hazards research**	**TU-IV-7: Theme session: Genomics & nutrition**
Chair: Alberto Alemanno	Chair: Angela Cassidy	Chair: Isabel Estrela Rego	Chair: Anne Dijkstra
11.00-12.30 Participants and their presentations: • Lorenzo Allio, King's College: "Recent developments of the European Commission Impact Assessment: A critical review." • Alberto Alemanno, Bocconi University, Milan: "The Impact Assessment Board: Towards an Effective Regulatory Oversight Body in Europe?" • Jonathan Wiener, Duke University: "Better Regulation in Europe and America." • Kees van Luijk, M. van der Plas. National Institute for Public Health and the Environment. "The truth behind the dikes: Are the differences in risk policy and the divergent risk standards in the Netherlands reasonable?"	**11.00-11.18** *Chris Bennett. Kings Centre for Risk Management.* Responding to multiple, qualitatively different hazards: exploring how perceptions of risk mediate response and influence priorities for action.	**11.00-11.18** *Cathérine Gamper. alpS Centre for Natural Hazard Management, Innsbruck and Faculty of Economics and Statistics, University of Innsbruck.* The political economy of public participation in natural hazard decisions – a case study of Austria.	**11.00-11.18** *Laura Bouwman, Hedwig te Molder. Wageningen University, sub-department of Communication Science.* Stakeholders perspectives about innovations in personalized nutrition: About evidence, roles and responsibilities.
	11.18-11.36 *Gillian Hawkes, Julie Houghton, Gene Rowe. Institute of Food Research.* Diaries as a tool in risk perception research: A comparative and empirical study.	**11.18-11.36** *Rainer Bell, Marco Danscheid, Thomas Glade, Jürgen Pohl. Department of Geography, University of Bonn.* New concept of a cooperative landslide risk management.	**11.18-11.36** *Renske Pin, Psychology & Communication of Health & Risk, University of Twente.* Genomics and the public risk perception: Red versus Green, a systematic review of the research literature.
	11.36-11.54 *Gaspar Mairal. University of Zaragoza, Department of Psycology and Sociology.* A narrative model of the communication of risk.	**11.36-11.54** *Thomas Glade, Margreth Keiler, Rainer Bell. Department of Geography and Regional Science, University of Vienna.* Natural risk approaches: comparisons and applications within global change.	**11.36-11.54** *Amber Ronteltap, Reint Jan Renes, Hans van Trijp. Marketing and Consumer Behaviour Group, Wageningen University and Research Centre.* Nutrigenomics: which future do consumers prefer?
	11.54-12.12 *Karen Parkhill, Karen Henwood, Nick Pidgeon, Dan Venebles. Cardiff University.* Exploring the gender and risk effect: A qualitative approach.	**11.54-12.12** *Hsin-Chi Li, Jo-Fan McVeigh, Tu-Hsiu Huang, Shuyeu Lin. National science & technology Center for Disaster Reduction.* Modeling debris flow loss – an empirical study in Taiwan.	**11.54-12.12** *Anne Dijkstra, Erwin R. Seydel. Psychology & Communication of Health & Risk, University of Twente.* Involvement and trust in genomics research: Public's perception compared to perceptions of patients and experts.
	12.12-12.30 *Angela Cassidy, John Maule. Leeds University Business School.* A visual methodology for researching stakeholder risk knowledge: Supporting the discussion of complex issues in qualitative research.	**11.54-12.12** *Shuyeu Lin, Jo-Fan McVeigh, Hui-Hsuan Yang. National Science and Technology Center for Disaster Reduction.* Risk perception, social vulnerability and hazard mitigation among debris flow victims and the general public.	

* Order of the presentations in the symposium is at the discretion of the chair

Tuesday June 19, 2007, 14:00 – 15:30

--Amazon--	--Yangtze I--	--Yangtze II--	--Everest II--
TU-V-1: Special symposium*: Dealing with flood risks in the Netherlands	**TU-V-2: Special symposium*: Strategies for Improved Exposure Assessment for Future Human Health Risk Assessments I**	**TU-V-3: Special symposium*: Methodological Developments in Risk Perception and Communication**	**TU-V-4: Special symposium*: Natural-technological events (NATECHs): Lessons and challenges for mitigation and response**
Chair: Herman van der Most	Chair: Halûk Özkaynak	Chair: Peter Taylor-Gooby	Chair: Bastien Affeltranger & Laura Steinberg
14.00 – 15.30 Participants and their presentations: • Herman van der Most (WL | Delft Hydraulics), Sten de Wit (TNO-Bouw en ondergrond): "The Meaning And Value Of Technical Information In Dealing With Flood Risk." • Anne van der Veen, University of Twente, Faculty of Management and Policy: "Flood Risk Perceptions And Spatial Multi-Criteria Analysis: A New Approach." • Teun Terpstra, Psychology & Communication of Health & Risk, University of Twente: "Public Perceptions Of Flood Risk In The Netherlands: The Factors Guiding People's Behavioural Intentions To Prepare For Flood Disaster." • Bas Kolen, HKV Lijn in water, Lelystad: "Evacuation And The Threat Of Flooding, Learning By Doing."	**14.00 – 15.30** Participants and their presentations: • Matti Jantunen, KTL, Finland: "Exposure Analysis Approaches for Assessment of Human Health Risks." • Peter P. Egeghy, US Environmental Protection Agency, National Exposure Research Laboratory, RTP, NC USA: "Exposure Factors Data to Support Health Risk Assessments for Children and Adults." • Halûk Özkaynak, US Environmental Protection Agency, Office of Research and Development, National Exposure Research Laboratory, RTP, NC USA: "Probabilistic Modeling for Advanced Human Exposure Assessment."	**14.00 – 15.30** Participants and their presentations: • Peter Taylor-Gooby, University of Kent: "Overview of methodological issues." • Gwenda Simons, University of Oxford: "Interpersonal Communication and Risk." • Emma Hughes, University of Cardiff: "Risk and the Media." • Karen Henwood, Nick Pidgeon, University of Cardiff: "Narrative Approaches to Risk." • Judith Mehta, University of East Anglia: "Risk in Context."	**14.00 – 15.30** Participants and their presentations: • Bastien Affeltranger (Institut National de l'Environnement Industriel et des Risques (INERIS)), Laura Steinberg, (Environmental and Civil Engineering, Southern Methodist University (SMU)): Learning Lessons from NATECH Incidents: Methodological Challenges." • Ana-Maria Cruz, Elisabeth Krausmann, EJCRC, Italy: "Damage to offshore oil and natural gas industry from Hurricanes Katrina and Rita." • Valerio Cozzani, Italy: "Structural response and damage scenarios" • Ernesto Salzano, Italy: "Early warning system and simplified tools for na-tech risks". • Mathieu Reimeringer, INERIS, France: "Earthquakes Risk Analysis and structural modeling. French approach."

* Order of the presentations in the symposium is at the discretion of the chair

Tuesday June 19, 2007, 14:00 – 15:30

--Everest I--	--Kilimanjaro I--	--Kilimanjaro II--	--Antarctica--
TU-V-5: Risk perception & communication track	**TU-V-6: Risk and land use planning**	**TU-V-7: Assessment & engineering issues**	**TU-V-8: Round Table: Harmonization of Risk Terminology**
Chair: Myriam Merad	Chair: Kees van Luijk	Chair: Christoph Maria Ravesloot	Chair: Roberto Bubbico
14.00-14.18 *Ruth Alcock, Jerry Busby. Lancaster University.* Risk Migration – where next?	**14.00-14.18** *Jeroen Neuvel. Wageningen University, Land Use Planning.* The meaning of geo-information about safety issues in the land allocation process.	**14.00-14.18** *Stephen MacKenzie, D. Moore, T. Kilpatrick, C. Hardcastle. Buro Happold.* Attribute based hierarchy assessment and mapping for fire risk in existing educational occupancies buildings.	No presentations envisaged.
14.18-14.36 *Janneke de Jonge, Hans van Trijp, Ellen Goddard, Lynn J. Frewer. Marketing and Consumer Behaviour Group, Wageningen University.* Consumer confidence in the safety of food in Canada and the Netherlands: the validation of a generic framework.	**14.18-14.36** *Marko Polic, Drago Kos, Nadja Železnik. Department of Psychology, Faculty of Arts, University of Ljubljana.* Search for radioactive waste repository location: between stigma and rationality.	**14.18-14.36** *Armand J.P Verweij. Grontmij Nederland B.V. & Vectragroup.* Proof of safety at the start of exploitation: A result of communication failures/successes, misjudgement or bad luck during the design/construction?	
14.36-14.54 *Helena Radbo, Inge Svedung, Ragnar Andersson. Div. of Public Health Sciences, Dep. of Health and Environmental Sciences, Karlstad University.* A qualitative in-depth study of railway suicides.	**14.36-14.54** *Jean Francois David. Compagnie nationale des experts judiciaires en environnement.* From risk assessment to risk management: using environmental impact assessment and its health effects chapter to manage risk – Example in rendering plant industry.	**14.36-14.54** *Dan Serbanescu, Christian Kirchsteiger. DG-JRC Institute of Energy.* On some issues related to paradoxes in modelling risk in complex systems.	
14.54-15.12 *Arnout Fischer, Lynn J. Frewer. Marketing and Consumer Behaviour, Wageningen University.* Familiarity with food products and the perception of risk and benefit.	**14.54-15.12** *Paul Uijt de Haag, L. Gooijer. RIVM, Centre for External Safety.* Risk calculation for land use decisions: The need and consequences of unification.	**14.54-15.12** *Hana Gavendova, Josef Navratil, Marketa Michalikova, Vladimir Adamec. University of Defence.* Health risk assessment of chosen polyaromatic hydrocarbons emitted from transport.	
15.12-15.30 *Myriam Merad, Chabane Mazri. INERIS.* Is there uncertainty in the risks or risks in uncertainty: which came first, the chicken or the egg?	**15.12-15.30** *Hans Boot, Tineke Wiersma. TNO Department of Industrial and External Safety.* Societal risk on a map: an area specific approach to societal risks.	**15.12-15.30** *Christoph Maria Ravesloot. University of Technology, Faculty of Civil Engineering and Geosciences, Delft.* Risk definition in ProjectStartUp: A case study from the building industry in The Netherlands.	

Tuesday June 19, 2007, 16:00 – 18:00

--Amazon--	--Yangtze I--	--Yangtze II--
TU-VI-1: Theme session: Food risk communication & management	**TU-VI-2: Special symposium*: Strategies for Improved Exposure Assessment for Future Human Health Risk Assessments II**	**TU-VI-3: Special symposium*: The risk story model and risk perception – insights from experimental studies**
Chair: Lynn Frewer	Chair: Halûk Özkaynak	Chair: Peter M. Wiedemann
16.00-16.18 *Heleen van Dijk, Lynn Frewer, Julie Houghton, Ellen van Kleef, Ivo van der Lans, Gene Rowe, George Chryssochoidis, Thanassis Krystallis, Uwe Pfenning, Øydis Ueland. Marketing & Consumer Behaviour Group, Wageningen University.* Consumer responses to communication about food risk management.	**16.00-18.00** Participants and their presentations: • Halûk Özkaynak, US Environmental Protection Agency, Office of Research and Development, National Exposure Research Laboratory, RTP, NC USA • Dana Barr, National Center for Environmental Health Centers for Disease Control and Prevention, Atlanta, GA USA: "The role of Biomonitoring in Future Exposure and Risk Assessments." • H. Christopher Frey, Department of Civil, Construction, and Environmental Engineering, North Carolina State University, Raleigh, NC USA: "Methodologies for Characterizing Variability and Uncertainty in Exposure and Risk Analysis."	**16.00-18.00** Participants and their presentations: • Peter M. Wiedemann, Research Center Jülich, Germany • Holger Schütz, MUT INB, Research Center Jülich, Germany • Albena Spangenberg, MUT INB, Research Center Jülich, Germany • Claudia Eitzinger, AlpS , Innsbruck • Martin Clauberg, University of Tennessee • Sonja Altstetter. Research Center Jülich, Germany: "Approach towards a comprehensive risk identification."
16.18-16.36 *Ellen van Kleef, Julie Houghton, Athanasios Krystallis, Uwe Pfenning, Gene Rowe, Gregory Theodoridis, Øydis Ueland, Lynn Frewer, George Chryssochoidis, Hilde Mortvedt, Britt Signe Granli. Marketing & Consumer Behaviour Group, Wageningen University.* Food risk management quality: Consumer evaluations of past and emerging food safety incidents.		
16.36-16.54 *Mario Veen, Hedwig te Molder, Bart Gremmen, Cees van Woerkum. META, Wageningen University.* Coping with the default risk of gluten intake: An analysis of online talk between celiac disease patients.		
16.54-17.12 *Mary McCarthy, Mary Brennan, Christopher Ritson. University College Cork.* Food risk communication: Some of the problems and issues faced by communicators on the Island of Ireland.		
17.12-17.30 *Martina Petkov, Richard Shepherd. University of Surrey.* How can the format of information presented affect the risks we take? A closer look into food risks and consumer behaviour.		
17.30-17.48 *Irene van Geest-Jacobs. University of Twente.* Cooperation with co-actors: Risk communication on EU level.		

* Order of the presentations in the symposium is at the discretion of the chair

Tuesday June 19, 2007, 16:00 – 17:48

--Everest II--	--Everest I--	--Kilimanjaro I--	
TU-VI-4: Comparative issues in perception & communication	**TU-VI-5: Management of Crisis**	**TU-VI-6: Theme session: Cost benefit analysis in policy making on (environmental) risks**	
Chair: Wouter Poortinga	Chair: Kasper van Zuilekom	Chair: Leendert van Bree & Annemarie van Wezel	
16.00-16.18 *Ellen ter Huurne, Robert J. Griffin. Psychology & Communication of Health & Risk, University of Twente.* Seeking information about industrial risks: A cross-cultural test of the model of risk information seeking and processing.	**16.00-16.18** *Susanne Hede, Ann Enander. National Defence College.* Balancing the requirements of law and established practice against the demands of crises.	**16.00-16.18** *Leendert van Bree, Ruben Jongejan, Melchert Reudink, Arthur Petersen, Corjan Brink, Dick Nagelhout, Ric van Poll. Netherlands Environmental Assessment Agency*. Dealing sensibly with human health risks – risk management options for policy making.	**16.54-17.12** *Steven Broekx, Leo de Nocker, Inge Liekens, Dirk Bulckaen, Steven Smets, Johan Gauderis. VITO.* Using a cost-benefit analysis to select the optimal flood protection measures for the Scheldt basin.
16.18-16.36 *Vivianne Visschers, Ree M. Meertens. Maastricht University, Department of Health Education and Promotion.* Gut feeling versus common sense: Associative and cognitive processes in risk perception and communication.	**16.18-16.36** *Anna Johansson, Inge Svedung. Div. of Public Health Sciences, Dep. of Health and Environmental Sciences, Karlstad University.* Cross-sectorial risk management approaches in Swedish local action programs for civil protection against accidents.	*Christoph Rheinberger, Michael Bründl. Swiss Federal Institute for Snow and Avalanche Research SLF/WSL.* Risk/cost functions and their use in natural hazard management.	**17.12-17.30** *Tommy Norberg, Lars Rosén. Department of Mathematical Sciences.* Cost-effective management of remediation projects.
16.36-16.54 *Joan Costa Font, Elias Mossialos, Caroline Rudisill. LSE Health, London School of Economics.* Risk attitudes or risk perceptions?	**16.36-16.54** *Sandra Brás Duarte, Isabel Estrela Rego. University of the Azores.* How safe is it to travel by plane? A study of risk perception on civil aviation in the Azores.	**16.18-16.36** *Michael Bründl, Nicole Bischof, Hans Romang. WSL - Swiss Federal Institute for Snow and Avalanche Research SLF.* RIKO – a guideline for a risk based planning of counter measures against natural hazards.	**17.30-17.48** *Annemarie van Wezel, Ron Franken, Eric Drissen, Kees Versluijs, Reinier van den Berg. Netherlands Environmental Assessment Agency.* Societal cost benefit analysis for soil remediation operations in the Netherlands.
16.54-17.12 *Angela Cassidy, John Maule, Philip Wickham, Rob Marshall, Ron Meris, Tom Mazzola, Elizabeth McLaughlin. Leeds University Business School.* A multi-stakeholder workshop investigating the communication of uncertainty during a chemical release incident.	**16.54-17.12** *K.M van Zuilekom, B.I. Thonus, B. Kolen. Centre for Transport Studies, University of Twente.* Development of a support tool for practicing authorities in execution an evacuation plan.	**16.36-16.54** *Marija Bockarjova. University of Twente/ VU Amsterdam.* A VOSL constituent of flood risk management in the Netherlands.	
Wouter Poortinga, Nick Pidgeon. Welsh School of Architecture, Cardiff University. Public perceptions of nuclear power, climate change and energy options in Britain.			

Tuesday June 19, 2007, 16:00 – 18:00

--Kilimanjaro II--	--Antarctica--
TU-VI-7: Risk regulation & management	**TU-VI-8: Risk Assessment**
Chair: Frans Janssens	Chair: Roberto Bubbico
16.00-16.18 *Peter Roeters, Else Sneller. Netherlands' Water Management Inspectorate.* Risk analysis for system supervision of water management authorities in the Netherlands and its value for policy making.	**16.00-16.18** *Kristien Stassen, Rudi Torfs, Ulrike Maris, Roger Dijkmans. VITO - Flemish Institute of Technological Research.* DALY's versus WTP for environmental health priority setting based on data of air pollution and noise in Flanders (Belgium).
16.18-16.36 *Johan Borsten. Transport and Water Management Inspectorate.* Risk management for regulators.	**16.18-16.36** *Cyrille Bronner, A. Dandrieux, G. Dusserre, J. Chapelain, F. Fontaine. INERIS.* The use of inverse methods for chemical accident source assessment.
16.36-16.54 *Gilles Deleuze, Helene Bertin. Electricite de France R&D.* A risk mapping experiment to understand the risk representation of a professional group.	**16.36-16.54** *Dan Serbanescu, Christian Kirchsteiger. DG-JRC Institute of Energy.* Some methodological aspects related to the risk informed support for decisions on specific complex systems objectives.
16.54-17.12 *Regina W. Schröder. Witten/Herdecke University.* Incentives ensuring truthful risk disclosure within organisations.	**16.54-17.12** *Padraig Nally, Andrew Hill, Michaela Giles. Centre for Epidemiology and Risk Analysis, Veterinary Laboratories Agency.* A quantitative risk assessment for the ingestion of Cryptosporidium parvum oocysts following indirect contact with beef cattle.
17.12-17.30 *Frans Janssens, Inge de Wolf. University of Twente/ Netherlands Education Inspectorate.* Risk based inspections: an example of risk management by the Netherlands education inspectorate.	**17.12-17.30** *Roberto Bubbico, Ernesto Salzano. Department of Chemical Engineering - "Sapienza" University of Rome.* Safety distances for physical explosions of LNG releases on water.

Poster session

Posters will be on display Monday 10.30 – 16.00 --Summit Foyer--			
MO-P-1 *Elisa Barilli, Lucia Savadori, Stefania Pighin, Michael Siegrist, Tadeusz Tyszka, Etienne Mullet. Institute DISCOF (Department of Cognitive Sciences and Education) at UNITN (Università degli Studi di Trento).* How to communicate risk to patients? A web-based learning tool for physicians.	**MO-P-2** *Claudia R. Binder, Regina Schöll. Social and Industrial Ecology, Department of Geography, University of Zurich.* Structured mental model approach for agricultural systems: Theoretical backgrounds and operationalization.	**MO-P-3** *Chad Briggs. Environmental Initiative, Lehigh University.* National security and environmental health risk: Vulnerabilities and responses.	**MO-P-4** *Jos Brils, Thomas Track, Philippe Negrel, Werner Brack, Dietmar Müller, Damia Barcelo, Winfried Blum, Wim Salomons, Joop Vegter, Vala Ragnarsdottir, Cathy Eccles. TNO Build Environment and Geosciences.* EC FP6 Coordination action (CA) on risk-based management of water-sediment-soil system at the River Basin scale (RISKBASE).
MO-P-5 *Marion Damm. United Nations University - Institute for Environment and Human Security.* Quantification and visualisation of environmental flood risk in Germany.	**MO-P-6** *Eugene Sitek, Iwona Gorzen-Mitka. Czestochowa University of Technology.* Influence of political factors on country investment risk.	**MO-P-7** *Tom Horlick-Jones. Cardiff School of Social Sciences, Cardiff University.* On the signature of new technologies: materiality, sociality, and practical reasoning.	**MO-P-8** *Te-Hsiu Huang, Jo-Fan McVeigh, Hsin-Chi Li, Shuyeu Lin. National Science and Technology Center for Disaster Reduction.* Social vulnerable factors in flood-prone areas in Taiwan.
MO-P-9 *Fred Jonker. Kennisnetwerk RISNET.* IRIS, the practical integration of risk management.	**MO-P-10** *Jaehyun Kim, Hyuck Myun Kwon, Chun Seok Yoon. KOSHA (Korea Occupational Safety & Health Agency).* QRA & Emergency plan based on IRMS.	**MO-P-11** *Stephen MacKenzie, D. Moore, T. Kilpatrick, C. Hardcastle. Buro Happold.* Implementation barriers to a fully risk informed UK fire safety regime.	**MO-P-12** *Stephen MacKenzie, K. Taylor, D. Moore. Buro Happold.* UK research, educational & guidance needs in response to stakeholders' perceptions of fire risk.
MO-P-13 *Stephen MacKenzie, K. Taylor, D. Moore. Buro Happold.* Scottish fire 'Risk' research – foundations and futures.	**MO-P-14** *Ulrike Maris, Kristien Stassen, Rudi Torfs, Roger Dijkmans. VITO - Flemish Institute for Technological Research.* SCoPE: An integrated assessment frame as science policy interface for decisions on environmental health related risks.	**MO-P-15** *Agne Sandberg, Charlotte Larsgården. Swedish Rescue Services Agency.* Research for a safer society.	**MO-P-16** *David Sauri, Antonio Rico, Anna Ribas, Jorge Olcina, Maria Hernandez, Lluis Ribera. Departament de Geografia, Universitat Autonoma de Barcelona.* Floods and urbanization in Mediterranean Spain: Is vulnerability increasing?
MO-P-17 *Seoyong Kim, Sunhee Kim. Ajou University.* Cultural Construction of What? Stakeholders' cultural bias and its effect on accepting the new public information system.	**MO-P-18** *Jaap van der Vlies. TNO.* RISKBRIDGE.	**MO-P-19** *Mark Stalmans, David Zaruk. Procter & Gamble.* On-line stakeholder and public dialogue via science-in-the-box.	**MO-P-20** *Isabel Estrela Rego, Ana Moura Arroz, Ana Cristina Palos. University of the Azores.* Seismic and volcanic risk perception. A critical review of literature in the field.
MO-P-21 *Ana Cristina Palos, Ana Moura Arroz, Isabel Estrela Rego, Paulo Borges. University of the Azores.* Framing plagues: Media influence and public understanding.			

Workshops:
Expertise center for Risk and Crisis communication (ERC)

“In the days that follow, look at our airports, look at our seaports and look at our railway stations ... you will see that people from the rest of Britain, people from around the world, will arrive in London to become Londoners, to fulfill their dream and achieve their potential… whatever you do, however many you kill, you will fail.” Ken Livingstone’s comments immediately after the London bombings (July 2005) shows the importance of an adequate response of authorities in times of crisis.

Who are we and what do we do?

The Dutch Government must provide information about risks that could trigger a crisis. The public is entitled to this information. Proper risk communication provides adequate information, encourages self-reliance and keeps the public from getting anxious unnecessarily. Proper crisis communication will ensure the circulation of right, consistent, timely and understandable information.

The ERC (the Expertise Centre for Risk and Crisis communication) can help other authorities and business communities prepare for crisis situations in the domain for which they are responsible. The ERC is part of the Department for Crisis Management, Directorate-general for Safety of the Ministry of the Interior and Kingdom Relations, and has three core tasks:

- generating and sharing knowledge and expertise in risk and crisis communication;
- developing policies and giving advice on risk and crisis communication;
- facilitating, coordinating and implementing government communication in case of events that have the potential of developing into a crisis, and during actual crises. The ERC works for the entire government, both on the national, regional and local level.

To support the above-mentioned tasks, the ERC can offer several products and services during a cold situation (for instance giving advice, workshops, training and practice drills) or in time of crisis (for instance call center, national website and extra manpower).

Workshops during SRA Conference

Members of the ERC will give three workshops on Tuesday 19th at the Summit Foyer. You are invited to participate in one of these workshops, between 11.00 – 12.30, 14.00 – 15.30 or 16.00 – 17.30 hours.

Our workshop is an interactive session during which you will be informed about our work, products and services as well.

We hope to see you in one of our sessions!

Overview special symposia and round tables

- MO-IV-1: Special symposium
  Integrated risk management

- MO-IV-2: Special symposium
  Emotions and EMF

- MO-IV-3: Special symposium
  Disaster & Media in Europe: A quantitative approach

- MO-V-1: Special symposium
  Nanotechnologies: Emerging Risks and Societal Responses I

- MO-V-2: Special symposium
  Individualisation and Risk Perception and Communication

- MO-V-3: Special symposium
  Citizen engagement as a policy tool in the management of risk: Options, difficulties and practicalities I

- MO-VI-1: Special symposium
  Nanotechnologies: Emerging Risks and Societal Responses II

- MO-VI-2: Special symposium
  Promoting Food Safety through a New Integrated Risk Analysis Approach for Foods (SAFE FOODS)

- MO-VI-3: Special symposium
  Citizen engagement as a policy tool in the management of risk: Options, difficulties and practicalities II

- TU-IV-1: Special symposium
  National Risk Assessment in the Netherlands

- TU-IV-2: Round Table
  Nanobiotechnology: Preparing for the likely public and policy issues

- TU-IV-3: Round Table
  Emergent Phenomena after a disaster

- TU-IV-4: Special symposium
  Transatlantic regulatory reform and risk regulation

- TU-V-1: Special symposium
  Dealing with flood risks in the Netherlands

- TU-V-2: Special symposium
  Strategies for Improved Exposure Assessment for Future Human Health Risk Assessments I

- TU-V-3: Special symposium
  Methodological Developments in Risk Perception and Communication

- TU-V-4: Special symposium
  Natural-technological events (NATECHs): Lessons and challenges for mitigation and response

- TU-V-8: Round Table
  Harmonization of Risk Terminology

- TU-VI-2: Special symposium
  Strategies for Improved Exposure Assessment for Future Human Health Risk Assessments II

- TU-VI-3: Special symposium
  The risk story model and risk perception – insights from experimental studies

Special symposia and round tables

MO-IV-1: Special symposium:
Integrated risk management.
Chair: Olivier Salvi

It is foreseen that the Symposium will help in the definition of a common framework for early recognition, monitoring and integrated management of emerging, new technology related, risks in industrial systems.
The Symposium addresses the problems arising from the fact that production activities today relate to a value chain and are carried out in plants, industrial parks and networks which are becoming more and more complex, with steadily growing interrelations and interdependencies. In particular, the production activities increasingly involve new technologies and materials that introduce new ("emerging") risks. This complexity, combined with increasing multifunctional use of space and increasing population densities, creates greater risks to society while at the same time social acceptance of these risks is decreasing. The shift to a new safety paradigm and a supporting implementation framework is therefore required and it might be provided by several initiatives that will be presented during the symposium. The development of new approaches is based on systemic approaches, as well as on cost-effectiveness in order to weigh the impact of risks (e.g. environmental impact, economic factors, workers well being) and then identify balanced solutions. The integration of risk aspects in an integrated risk management framework addresses technical, human (ergonomics), organizational, societal and cultural aspects. New tools are being developed as well, to support such integrated approaches: e.g. on-line risk assessment to allow continuous monitoring of interactions in industrial systems throughout their life cycle: design, material development, manufacturing/construction, operation, maintenance, dismantling/ decommissioning.

Presentations:

Olivier Salvi (INERIS, France)
Convergence towards integrated risk management: Results of the SHAPE-RISK Project.
This paper presents SHAPE-RISK results and points out some issues related to integrated risk assessment and management, for all kinds of technical risks – namely risks for man and for environment, on-site and off-site risks, accidental risks and continuous or long-terms risks. The interactions and overlaps between the present European regulatory framework clearly suggests an improvement through more integrated regulations and standards, and reinforces the interest of Industry in using more efficient integrated tools, both for risk assessment and risk management.
"SHAPE-RISK" is the acronym for "SHAring exPErience on RISK management to Design future Industrial Systems". SHAPE-RISK is a co-ordination action co-financed by the European Commission within the 6th Framework programme.
This 3-years European project meets 19 organisations. The co-ordinator is INERIS (France), a national expert at the service of environmental safety.
SHAPE-RISK aims at optimising the efficiency of integrated risk management in the context of the sustainable development of the European process industry. SHAPE-RISK understands risk management as covering the fields of following European framework directives: SEVESO, IPPC, Safety and Health of Workers (89/391) and ATEX.
The innovation brought by SHAPE-RISK is to have a consolidated collection of knowledge, data, methods and tools related to all the above-listed dimensions of risk management. This was achieved through the construction of national networks in 12 European countries.
SHAPE-RISK has harvested exciting results most of which have been elaborated with and endorsed by the Industry. Projects conducted at national level have also confirmed SHAPE-RISK conclusions.
The key recommendation issued by the SHAPE-RISK project is to move towards an integrated Risk Management in the European process industry. In particular, SHAPE-RISK provides:
- Recommendations about the regulation in order to avoid overlaps and conflicts between directives, and in order to harmonise risks based inspections by authorities;
- Recommendations about technical tools used for example to assess the risks not separately but in a common approach;
- Recommendations for the monitoring of the performance of the management process;
- Recommendations about human and organisational aspects.

Some of these results could be implemented in a near future while the most innovative ones might require radical adaptations.

Jaehyun Kim (KOSHA, Korea Integrated Management of SHE&Q)
Contribution to the preparation of an OECD guidance.
Much of the effort has been given to reduce the scale and probability of hazards in chemical plants. However, accidents such as fire and explosion by flammable liquids and gases, and toxic chemical release still happen because of design error, mechanical failure, human error and etc. The company which has hazardous installations or hazardous materials has to conduct quantified hazard assessment (QRA) and prepare emergency planning and response, according to the requirement of "Industrial Safety and Health Law". Well established emergency planning and response which reflects the result of QRA is the primary activity to reduce the probability of serious loss following fire, explosion and toxic chemical release. Therefore, QRA and emergency planning and response based "Integrated Risk Management System(IRMS)" is necessary. This paper introduces brief structure of IRMS and application output of IRMS in the NCC plant, i.e, results of QRA and emergency plan and etc.

Ortwin Renn (Dialogik, Germany & IRGC, Switzerland)
Risk Governance: An application of analytic-deliberative policy making.
The paper introduces an integrated analytic framework for risk governance which provides guidance for the development of comprehensive assessment and management strategies to cope with risks, in particular at the global level. The framework integrates scientific, economic, social and cultural aspects and includes the effective engagement of stakeholders. The concept of risk governance comprises a broad picture of risk: not only does it include what has been termed 'risk management' or 'risk analysis, it also looks at how risk-related decision-making unfolds when a range of actors is involved, requiring co-ordination and possibly reconciliation between a profusion of roles, perspectives, goals and activities. The framework's risk process breaks down into three main phases: 'pre-assessment', 'appraisal', and 'management'. A further phase, comprising the 'characterisation' and 'evaluation' of risk, is placed between the appraisal and management phases and, depending on whether those

charged with the assessment or those responsible for management are better equipped to perform the associated tasks, can be assigned to either of them – thus concluding the appraisal phase or marking the start of the management phase. The risk process has 'communication' as a companion to all phases of addressing and handling risk and is itself of a cyclical nature. However, the clear sequence of phases and steps offered by this process is primarily a logical and functional one and will not always correspond to reality. The paper will address in particular the role of public participation and stakeholder involvement.

Aleksandar Jovanovic (EU-VRi, Germany)
Vision of the newly created European Virtual Institute for Integrated Risk Management: The basis for a new safety paradigm in Europe.

The contribution provides an overview of the idea an the work of the European Virtual Institute for Integrated Risk Management (EU-VRi) created in the year 2006 and incorporated as a European Economic Interest Grouping (EEIG) with a seat in Stuttgart, Germany. Its Founding Members are University of Stuttgart - ZIRN, Germany, Steinbeis, Germany, INERIS, France, BZF, Hungary and Technologica, Belgium, whereas a number of companies and organizations (TÜV, Germany, VTT, Finland, Risoe, Denmark, BAM, Germany, CONPRICI, Italy, SWISSI, Switzerland, …) have joined as Associate Members.
The main goal of the Grouping is to improve the business opportunities of the members through integration of the available resources of the Grouping in the areas of (a) integrated risk management, (b) "emerging risk" and (c) related activities. Further objectives of the Grouping comprise, but are not limited to:

- providing services to industry, EU, public community, public authorities and/or other interested parties
- collaboration in and coordination of the research activities of its members and other parties – the Grouping acting as a "R&D broker" in the main area of activities of the Grouping
- developing of products and services in the main area of activities of the Grouping, e.g.,
  - e-services: e-learning, on-line modelling, data bases, tools…
  - consulting & other members' services: e.g. risk assessment, education and training, analyses of risks for and impacts on health, safety and environment (HSE), major accident hazards (SEVESO directive), analyses according to other EU directives (e.g. ATEX, machinery), HAZOP…
  - tools and decision-support (guidelines, frames of reference, databases…) for areas such as chronic risks, accidental risks, risk of new technologies, etc.
  - identification of research and development needs and knowledge and technology gaps in the main area of activities of the Grouping and help creating the means to address them, in particular for the EU R&D
  - establishing and documenting the state-of-the-art in the main area of activities of the Grouping, as well as the dissemination of the related information

In the first year of its existence (since November 2006) EU-VRi has performed/started a number (a) industrial and (b) EU projects with contracted or proposed value of up to several dozen million €. Most of the projects deal with establishing the integrated risk management solutions in petroleum industry, bio-fuel production, nanotechnologies, use of advanced materials and similar, all having the topic of "emerging" technology-related risks as a common denominator. EU-VRi "materializes" the new European safety paradigm based on integrated approach to risk management, targeting the integration of approaches of different EU Members states, approaches of different stakeholders group, different approaches across application areas and branches, different disciplines and methods, etc.

MO-IV-2: Special symposium:
How to deal with emotional issues in EMF risk communication.
Chair: Andrea T. Thalmann (T-Mobile Germany)

During the last decade, a considerable amount of social science research about how to communicate EMF risks has taken place. The main purposes were to rationalize the discussion by bringing the emotionalized debate back to the facts and thereby to promote informed risk decisions. However, the debate about possible health risks from EMF is still highly emotionalized, especially regarding the high frequency bands. People express fears, anger, or feelings of dissatisfaction about not being taken serious by key players in public discussions. If these emotions are not adequately addressed, even the most sophisticated risk communication remains pointless. It may even make the situation worse by being perceived as a means to silence critical debate. Consequently, a mishandled debate will amplify emotions, and risk perception.
The relevant sciences suggest that a necessary requirement for constructive EMF risk management is to adequately address the factor "emotions" in EMF risk communication. Recent research confirms the importance of emotions in risk perception. But it offers only limited theoretical and empirical insights about how to deal with emotions in risk communication.
The aim of this symposium is to reflect critically the current state of the art in research with regard to how to deal with emotions in EMF risk communication research, as well as to identify opportunities for future research. The main focus will be on the impact of emotions on risk perception, the role of the media, different types of adequate reaction in emotionalized public events, and practical recommendations for risk communication. These topics will be discussed from both, the theoretical and practical point of view.

Presentations:

Peter M. Wiedemann (Research Center Jülich)
Emotions in hearings: How to respond adequately to complaints, accusations, and attacks: Experiences from Germany.
Hearings and public information events are opportunities for concerned people and citizen initiatives to indicate their attitudes and beliefs and to express their emotions. Often they are verbalized as complaints, accusations or attacks. It is a challenge for risk communicators to respond adequately to those acts. The need of helpful and accurate and attentive strategies is obvious.
This paper describes the authors' observations and his experience with critical moments in hearings and public information events. It will reflect critically the current state of the art in risk communication research with regard to recommendations on how to deal with complaints, accusations, and attacks. The appropriateness and practicability of such recommendations for risk communicators in their practical work will be discussed.

Ray Kemp (Ray Kemp Consulting Ltd. UK & Australian Centre for Radiofrequency Bio-effects Research (ACRBR))

Behaving reasonably: recent experience in understanding and responding to emotional concerns about EMF in Australia.

In 2006, a number of factors tended to affect emotions over EMF exposure from mobile phone operators' radio base stations in Australia. These included the intensification of network deployment for 3 G services (UMTS) by mobile phone operators, media responses to alleged brain tumour clusters, and the health risk advice on EMF provided by national and international commentators and regulators.

This paper describes recent experience in Australia in understanding and responding to emotional concerns about EMF exposure. It will argue that understanding what different stakeholders judge to be reasonable behaviour in relation to perceived health risks from EMF is essential for effective risk communication. However, judgments about what is reasonable will differ according to the context and circumstances surrounding the communication arena and further research topics will be identified.

Fred Woudenberg (Municipal Health Services Amsterdam)

Why risk communication does(n't) work?

In The Netherlands, as anywhere else, there is widespread opposition against sources of radio frequency (RF) fields, especially those of GMS and UMTS. There is less concern about the health effects of extremely low frequency electromagnetic (ELF-EM) fields caused by the widespread electricity network. From a health point of view this is surprising, since the indications for health effects in the epidemiological literature are much stronger for ELF-EM than for RF. In Amsterdam, widespread concern developed in a school next to a large distribution centre of energy provider Continuon. The cause of the concern were several cases of acute leukaemia. The municipal health service applied the advisory limit value of 0,4 microtesla to this (and other) situation to protect against the increased risk of acute leukaemia. Measures were successfully taken in the distribution centre next to the school to decrease the magnetic field. Concern among a group of parents remained high however. Using principles of risk communication as described in a recent guideline of municipal health services in The Netherlands, trust was restored and the situation came to a rest. Almost at the same time that the ELF-EM controversy was resolved, extreme concern about a UMTS transmitter on top of a school elsewhere in Amsterdam arose. Also here, health effects were the trigger, in this case several children with brain tumours. Probably, no principle of risk communication could have made a difference here. The only solution for the concerned parents was the removal of the antenna. The antenna was removed, despite measurements showing low levels of RF fields and despite lack of evidence in the epidemiological literature for a relation between RF fields and brain tumours. In the presentation, causes for success and failure of risk communication principles are discussed and illustrated with experiences in the two cases described.

Gregor Dürrenberger (Swiss Research Foundation on Mobile Communication c/o Swiss Federal Institute of Technology (ETH))

EMF Risk Communication: Addressing Facts and Emotions.

Disputed situations are often characterised by both factual disagreements and emotional tensions. Cognitive disagreements refer to either scientific, or evaluative, procedural or interest-oriented incongruencies between the involved parties. If not adequately addressed, such disagreements are likely to trigger or increase emotions and mistrust. Consequently, risk communicators should identify and address the cognitive disagreements that shape a specific situation in order to ease emotional tensions.

This paper focuses on emotionalized events in the EMF controversy. It will describe factors which trigger emotions. It will reflect the role of cognitive disagreements when dealing with emotions in EMF risk communication.

MO-IV-3: Special symposium:

Disaster & Media in Europe: A quantitative approach.

Chair: Dominique Dolisy-Bonnetaud (Institut Européen des Risques)

In recent years a number of accidents have taken place in Europe which led to the loss of lives. This symposium addresses the question of the impact of two such incidents – the explosion in 2001 of the AZF-factory in Toulouse (France) and the explosion in 2000 in a fireworks warehouse in Enschede (Netherlands) – on news media, policy makers and public. Empirical research on this question is scarce. This symposium aims at filling in part of this gap by presenting empirical data on some aspects of this question.

The objective of the symposium is to bring together researchers working in this field and to determine in which manner this line of research can be expanded. This may result in the creation of a consortium of researchers and in attempts to attract European funding for more elaborate research. The Enschede- and Toulouse-case may function as pilot studies for such a more elaborate approach.

Building on the Social Amplification of Risk model, specifically focusing on the role of the news media, the symposium starts with the identification of a number of relevant aspects of the impact of a disaster on society. The relevance of these aspects will be illustrated by the presentation of empirical data on the media-reporting of the AZF-disaster in Toulouse (Fr) and the Fireworks disaster in Enschede (NL.) and its impact on public opinion and risk communication policy. Topics to be addressed in the presentations are number of articles on the disaster over time (FR/NL), frames used in the articles (NL), portrayal of specific players in the field (FR/ NL), impact of the context of the disaster on news reporting (FR), impact of the disaster on public opinion (FR), impact of disaster and disaster reporting on governmental risk and risk communication policy (NL). These contributions will form the starting point for a discussion on the future agenda of this type of research, initiated by comments made by a expert in journalism and risk communication. The discussion will focus on the prioritizing of research questions, the manner in which such research can be carried out, the participants in such research and the possibility to attract funding.

Presentations:

Anne Lalo (Université de Nice)

Media-coverage of the AZF-disaster: Number of articles and mayor players in the field.

The study consists of a content analysis of the AZF-disaster and analysed the number of articles and the mayor players in the newspaper coverage.

Method: The 11.267 articles on the disaster that were published in local, regional and national newspapers in the year following the disaster were coded with respect to the mentioning of specific spokesmen.

Results: There was a steady decline in the number of articles on the disaster. Four group of players were distinguished: economic actors, governmental actors, opposition parties and anonymous people.

Representatives of AZF were most often quoted. The hit parade showed that representatives of other industries as well as governmental authorities were also often referred to.

Anne Lalo (Université de Nice)
Impact of disaster and disaster reporting on public opinion.
The study compared the views on the causes of the explosion at AZF among local inhabitants, key institutions and the press on 2 aspects: attack versus accident, and - in the latter case - caused by human error versus caused by technological error.
Method: Two survey studies were carried out. The survey on local residents consisted of a cross-sectional survey carried out among 1000 local residents, six months after the disaster. The inquiry on key organizations was carried out amongst 3.723 members of key institutions involved in the AZF- tragedy, either as victims, risk generators, risk managers or as opposition forces and vectors of opinion.
Results: The majority of the press favours the theory of an accident caused by human error. The people living near the facilities also favour the theory of an accident. Contrary to the press, their interpretation of the facts tends to underline the technical aspects and the decision process, rather than human error. Key institutions, however, believe that an attack is quite plausible. Like the local inhabitants, they blame the dilapidated state of the installations and the lack of investment in security

Maureen de Hond (University of Twente)
Framing in news on the Fireworks Disaster.
The study analyses the media coverage of the Fireworks disaster from the perspective of news selection and news framing over a three-year period.
Method: 4.928 articles published in 4 daily newspapers (2 national, 1 local and 1 directed at a Seveso-area) were selected and their contents coded
Results: The total number of articles declined over the years and, in all periods, the local newspaper published more articles on the disaster. The newspapers used a responsibility frame most often (64%), followed by a conflict-frame (52%), human-interestframe (36%), economic-consequences frame (31%) and morality frame (20%). The use of specific frames depended on the newspaper, and on events that took place during the three-period following the disaster, such as the publication of the outcomes of an extensive investigation performed by an independent committee (Commissie Oosting).

Margôt Kuttschreuter (University of Twente)
Fireworks disaster, portrayal of governmental authorities & risk communication policy.
The study relates the disaster and its coverage in the media to developments in risk communication policy.
Method: Content analyses was performed on the articles in the mass media which covered the role of governmental authorities (n=2.974). Additionally, in-depth interviews were carried out among members of key institutions involved in risk communication policy.
Results: Tone-of-voice in the media related to governmental authorities was neutral to slightly negative; the local newspaper proved to be the least critical. Articles on governmental authorities were more often framed from a responsibility or conflict point of view as opposed to articles which did not cover governmental authorities. Preliminary results on the interviews among risk communication policy makers indicated that the disaster and its media coverage played a significant role in the development of the digital risk map.

Frank Havik (former journalist, currently attached to government center for crisis and risk communication)
Reflections on Disaster and Media in Europe.

MO-V-1, MO-VI-1: Special symposium:
Nanotechnologies: Emerging Risks and Societal Responses.
Chair: Nick Pidgeon, Barbara Harthorn

There has been growing attention to the question of nanotechnology risks in the regulatory arena. Nanotechnology involves the fabrication, manipulation and control of materials at the atomic level. Scientists and engineers have become interested in nanotechnologies because at sizes below 100nm the fundamental chemical or electrical properties of materials can change. Such property changes have led many to predict a range of fundamental new advances in chemistry and physics over the next 10-50 years, in the domains of new materials, the environment, in medicine and in information technology. Alongside the hopes for such advances, recent reports from the UK Royal Society (2004) and the International Risk Governance Council (Renn and Roco, 2006), point out that nanotechnologies also raise a range of potential risks — many surrounded by considerable uncertainty. If common elements exhibit different chemical properties when fabricated at the nanoscale, they might also lead to unanticipated health or environmental hazards. In addition to the more direct human and environmental toxicology issues, some commentators have also suggested that nanotechnologies' will in the longer-term raise extensive social, ethical and governance issues around a range of risk questions of the sorts already seen for example with nuclear energy or biotechnologies.

Research on the emerging societal responses to nanotechnology risks (public perceptions, media frames, governance structures) is in its formative stages. In this symposium we bring together leading specialists working on these questions from Europe, the USA and Canada to offer a multidisciplinary session addressing different facets of the risk issues and corresponding societal responses to nanotechnologies. Collectively they represent several disciplines: risk perception, communication and media studies, environmental studies, anthropology, and science and technology studies.

Presentations:

Ortwin Renn (Dialogik, Germany)
Two Frames for Viewing Nanotechnology Risks.
In the opening paper, Renn (Dialogik, Stuttgart) discusses the outcomes of the recent International Risk Governance Council study on nanotechnology risks. He argues that novel attributes of nanotechnology demand different routes for risk-benefit assessment and risk management and at present nanotechnology innovation proceeds ahead of the policy and regulatory environment. In the shorter term, the governance gap is significant for passive nanostructures that are currently in production and have high exposure rates. They can be assessed with conventional methods and constitute Frame 1. More challenging are 'active' nanoscale structures and nanosystems, which we can expect to be on the market in the near future. Active nanoscale structures and nanosystems have the potential to affect not only human health and the environment but also aspects of social lifestyle, human identity and

cultural values. A different set of risk management and evaluation instruments are needed to manage and regulate Frame 2 applications of nanotechnologies.

Barbara Harthorn, Karl Bryant (NSF Center for Nanotechnology in Society at the University of California at Santa Barbara, USA)
Nanoscale Scientists and Risk Attenuation: The Triumph of Hope over Experience?
An important consideration shaping the ways in which nanotechnology risks will become framed in public discourses will be the ways nanotechnology experts view these issues. The second and third papers address this from an empirical standpoint. Harthorn and Bryant (University of California at Santa Barbara) report findings of an expert interview study of the views of academic nanoscale scientists and engineers in the US and Canada. They explore beliefs about the personal and societal risks and benefits of nanomaterials and the technologies that will result from their use, and the factors which currently appear to be leading to risk attenuation amongst this expert community.

Terre Satterfield, Milind Kandlikar (University of British Columbia)
Expert Judgments of Public Perceptions: How Well Do They Know their Audience?
Satterfield and Kandlikar (University of British Columbia) also report interview-based material obtained from nano-scientists and toxicologists. They critically examine the perceptions of their experts regarding public response to nanotechnology risks, and their assumptions about public technical literacy, risk communication, ethics and human behaviour in response to new technologies (such things as studies of judgment, perception, trust, and the distribution of power and decision making in social life).

Emma Hughes, Jenny Kitzinger (Cardiff University)
Framing Nanotech: How the Press Cover Emerging Risks.
The fourth and fifth papers explore the role of media reporting on both sides of the Atlantic, something which is likely to be key to the ways public perceptions of nanotechnologies ultimately do develop. Hughes and Kitzinger (Cardiff University, Wales) look at how the UK press have framed the risks associated with nanotechnology. In particular, they consider how the media draws on fiction and historical templates to talk about these risks, and also consider some of the images used in the press to visualise this new technology.

Sharon Friedman, Brenda Egolf (Lehigh University, USA)
Reporting the Risks of Nanotechnology in the Media from 2000-2005.
Egolf (Lehigh University) reports the results of a comparative analysis of media reporting during 2000-2005 of nanotechnology risks in the mainstream press of both the USA and the United Kingdom, a period when nanotechnology has begun to appear regularly in such media.

Tee Rogers-Hayden, Nick Pidgeon (Cardiff University School of Psychology, Wales, UK)
Opening up Nanotechnology Dialogue with the Publics: Risk Communication or 'Upstream Engagement'?
The sixth and seventh papers address the issue of public participation with nanotechnologies, and also return to the key theme of risk governance. A number of authors and institutions have recently argued for early (or 'upstream') public engagement with nanotechnologies. Conceptually this concept has its roots in the notions of analytic-deliberative processes for risk decision-making, as well as in the sociology of participatory technology assessment. Rogers-Hayden and Pidgeon (Cardiff University) argue that because many nanotechnologies are early in the research and development cycle, and public perceptions and knowledge have yet to form to any great extent, such engagement is appropriate but also raises new dilemmas and challenges for risk communication and participation methodologies adopted by practitioners.

Arie Rip, Marloes van Amerom (University of Twente, The Netherlands)
The Emerging Landscape of Nanotechnology Risk Governance.
In the final paper of the session Arie Rip and Marloes van Amerom (University of Twente, The Netherlands) use the case of nano-particles to discuss how debates about risks of nanotechnologies, emerging regulation, and de-facto governance (including responses of industrial and other actors) are part of an evolving 'landscape' of actions and interactions. They argue that this is what will shape eventual governance outcomes for these risks.

MO-V-2: Special symposium:
Individualisation and Risk Perception and Communication.
Chair: Jens Zinn

Presentations:

Jens Zinn (University of Kent)
Overview of Individualisation and Risk.
An important theme in discussion of social change and people's perceptions of risk in the modern world is individualisation: the assumption is that as a result of the greater flexibility and fluidity of working and family lives, the declining capacity of nation states to control their own economies and the diminishing authority of other institutions, such as trade unions, experts or professional bodies, people think about risks and expect to deal with them as individuals. Public policy supports this approach in the expansion of markets and encouragement of private services in a range of areas. This raises the question of how far research on risk needs to take social factors into account and how far it can operate at an individual level. These papers, all drawing on current large-scale research projects, analyse this issue across a number of important areas and demonstrate that social factors remain significant.

Jane Lewis (LSE, UK)
Risk and New Forms of Family Life.
This research, using qualitative and quantitative methods, shows that people live more fluid and independent lives, but are not simply retreating to a selfish individualism in their personal relationships. Rather they work to maintain mutual and caring relationships. Different stages in the development of relationships may be understood as reflecting the process of building and testing inter-personal trust.

Andreas Cebulla (NatCen, UK)
Risk in the Life-Course.
This project uses a major national survey (N=1200) and 58 follow up qualitative interviews with members of selected families to analyse inter-generational factors shaping responses to risk. It shows that individuals express a high level of concern about the risks they face during the course of their lives, varying between social groups, with age, class, gender and values being important. However, in areas like entry into paid work, the processes that people follow

do not appear to be more individualised than in previous generations, and family relationships remain important.

Peter Lunt (Brunel University, UK)
Risk and Difference.
Much discussion of social change and public policy assumes that people consider and respond to risk very much as individuals. This research, drawing on 20 stake-holder interviews and over 80 qualitative interviews with members of the public shows that people recognise individualised responsibility but the divisions of social difference, like faith, sexuality, disability and ethnicity still exert considerable influence on responses to everyday life risks.

David Abbott (University of Bristol)
Innovations in the Regulation of Risk.
Public policies in a number of areas treat people as individualised consumers and seek them to empower them so that consumer choice will achieve the objectives previously advanced by centralised regulation. This often leads to confusion and uncertainty about the limits of state responsibility. This project, drawing on 40 stake-holder interviews, analysis of the policies of new regulatory bodies in telecommunications and financial services in the UK and 15 focus groups with members of the general public, shows that the demands placed on regulators are often contradictory. On the one hand, they are expected to support the public as autonomous and well-informed consumers, capable of making choices in a free market, and, on the other, to provide strict day-to-day regulation of the material to which the public is exposed. The public indicate corresponding confusion in their expectations of government. Policies intended to produce more individualised consumerist regulation regimes have not been entirely successful.

MO-V-3, MO-VI-3: Special symposium:
Citizen engagement as a policy tool in the management of risk: Options, difficulties and practicalities.
Chair: Julie Barnett, Tom Horlick-Jones

The notion of citizen engagement has become a central motif in public policy discourse within many democratic countries. It has come to be regarded as an important component of good governance, and is seen as addressing a number of perceived, potentially problematic sources of crisis faced by contemporary governments: deficits of knowledge, trust, and legitimacy. However, this 'deliberative turn' poses important questions about decision-making in risk-related areas like innovation and technology management; and in particular in cases where the decisions in question are associated with some degree of controversy. In such cases, how is expert knowledge to be reconciled with lay perspectives? In what circumstances can lay views become admissible evidence for policy-making? What constitutes an engagement process of high quality? Much has been written about such questions which address these issues in conceptual and theoretical terms. Valuable work has been done in developing the practicalities of citizen engagement. However, the extensive evaluation of the recent large-scale British government-sponsored exercise in engagement about genetically modified crops (the GM Nation? public debate in 2002-03) demonstrated the urgent need to develop a coherent body of practical design knowledge to support such initiatives. This symposium will address a number of these outstanding questions, focussing especially on the practicalities of engagement.

Presentations:

Ana Prades Lopez, Christian Oltra (CIEMAT, Barcelona, Spain)
The social perception of nuclear fusion: multiple modes of understanding, and implications for future communication and engagement initiatives.
This paper considers the empirical evidence on the social perception of nuclear fusion. Our findings point to the multiple distinct modes by which different social groups, in specific circumstances, come to understand, and make sense of, fusion. The resulting model is very different from traditional perspectives that view public understanding and public opinion purely in terms of the possession or otherwise of technical knowledge. This recognition has important implications for the efficacy of future attempts by the fusion community to communicate and engage with lay publics.

Tom Horlick-Jones (Cardiff School of Social Sciences, Cardiff University, Wales, UK)
Bricolage in action: learning about, making sense of, and discussing issues about genetically modified crops and food.
Making sense of new technologies and their associated risks entails lay people in utilising various modes of reasoning, and making use of a range of interpretative resources at hand to interrogate evidence. Such sense-making is accomplished collectively in ways that are sometimes playfully inventive, and which have regard to ideas of accountability and morally acceptability. In practice, such bricolage-like processes appear to have certain similarities with the work of everyday scientific investigation. This paper examines these processes of lay practical reasoning by adopting an analytic stance that is concerned with examining the fine detail of what people demonstrably do in accomplishing such work. It draws on data generated by number of reconvened discussion groups, which formed a component part of the recent public debate in Britain about the possible commercialisation of genetically modified crops.

Ann Enander (Swedish National Defence College)
Engaging with lay publics in planning emergency management.
This paper will consider the opportunities and potential difficulties posed by citizen engagement in seeking to enrich the quality of emergency management planning. It will draw upon extensive experience in supporting the work of emergency rescue services in Sweden and elsewhere, and research which has sought to capture lay people's reasoning processes about, and behaviour in, crisis situations.

Tom Horlick-Jones (Cardiff School of Social Sciences, Cardiff University, Wales, UK)
Citizen engagement processes as information systems: the role of knowledge and the concept of translation quality.
An important direction in recent thinking about public understanding of science and technology is embodied in the international trend within many democratic countries towards the promotion of citizen engagement. These developments entail the participation and deliberative involvement by lay publics in planning, decision-making and policy-making situations. In this paper we argue that citizen engagement exercises can usefully be understood as information systems. This characterisation leads us to propose that the effectiveness by which such exercises utilise sources of knowledge – what we term their

translation quality – should be adopted as a new criterion for their evaluation. We illustrate the applicability of this proposal by analysing the GM Nation? public debate, a government-sponsored citizen engagement exercise that took place in Britain in 2002-03.

Gene Rowe (Institute of Food Research, Norwich UK)
Difficulties in evaluating public engagement initiatives.
The much-vaunted benefits of citizen engagement are difficult to establish without thorough evaluation of specific engagement processes. Unfortunately, rigorous evaluation is difficult, and, perhaps for this reason, it has rarely been undertaken. This paper highlights a number of these difficulties in the light of the experience of evaluating the GM Nation? public debate.

Julie Barnett (Psychology Dept., University of Surrey, Guildford, Surrey)
Engagement with stakeholders and publics: evidence for policy?
This paper will explore ways in which processes of policy development present challenges to academic conceptualizations of stakeholder and public engagement. Specifically, it is argued that in order to assist the development of effective policy, greater consideration is needed of how engagement constitutes evidence, and how the policy context (both in terms of the qualities of the substantive domain and the stage of the policy process) should direct the choice of engagement methods.

MO-VI-2: Special symposium:
Promoting Food Safety through a New Integrated Risk Analysis Approach for Foods (SAFE FOODS).
Chair: Hans Marvin

The governance of food safety has long been regarded as the domain of "experts" and professional risk managers, with minimal input from other interested parties, such as consumers. However, a number of food safety incidents in Europe (GMOs, BSE, dioxins,…) have severely damaged public trust in food safety regulation and management and exposed the need for improvements in the current approach to food risk analysis. The EU project SAFE FOODS (2004-2008) aims to contribute to the restoration of consumer trust in the food chain through the development of a new integrated risk analysis approach for foods. Combining the skills of over 100 natural and social scientists, coming from 37 institutions in 21 countries, SAFE FOODS is integrating a broad range of disciplines to refine risk analysis practice for food safety. The new approach integrates risk-benefit assessment of human health, consumer preferences and values, as well as impact analysis of socio-economical aspects. Compared to current frameworks, a lot of attention is given to active stakeholder participation, increased transparency in decision-making, improved interaction between risk assessors and risk managers and more effective communication throughout the risk analysis process. The interdisciplinary nature of the theme of food safety risk analysis is well reflected by the diversity in SAFE FOODS research activities that will be presented in this seminar.

Presentations:

Hans Marvin (RIKILT - Institute of Food Safety)
Developing tools for improved risk assessment in foods and early identification of emerging risks.
An important part of the research is focusing on the evaluation of new methods for risk assessment of food safety and nutrition issues: o Comparative Safety Evaluation of Breeding Approaches and Production Practices Using highly sensitive profiling methods, a unique large-scale comparative safety analysis study has been carried out to identify possible inherent risks associated with high-input or organic agricultural practices, or specific breeding approaches (such as genetic modification). The overall aim of this work is also to examine how useful the current "omics" technologies are as tools for risk assessment practices. o Integrated probabilistic risk assessment SAFE FOODS is also developing tools for improved risk assessment regarding food contaminants. A method is proposed for integrated probabilistic risk assessment where exposure assessment and hazard characterization are both included in a probabilistic way (van der Voet and Slob, 2007). Furthermore, for the first time, an electronic platform containing harmonised EU food consumption databases has been developed, which allows for Pan-European exposure modelling. o Early identification of emerging chemical or microbial risks SAFE FOODS has developed a system for the early identification of emerging food-borne risks that allows a more preventive food safety approach. To do so, experts in SAFE FOODS have analysed existent early warning systems from all over the world, including predictive models for mycotoxin contamination. Furthermore, based on a comprehensive review on emerging chemical and microbial risks, recommendations are formulated for improved methods to identify the emergence of these hazards in an early stage.

Lynn Frewer (Wageningen University)
A Delphi approach for stakeholder assessment of the new risk analysis framework.
A large Delphi survey has been used to test the feasibility and acceptability of the proposed framework. This consultation has been conducted via a web-based questionnaire among professionals who are representatives for potential end-users. The collected information has been summarised, interpreted and provided useful feedback for the further optimisation of the SAFE FOODS model.

Ortwin Renn (DIALOGIK)
Institutional re-arrangements in European food safety governance - A comparative analysis.
In the EU and many Member States there have been major efforts to re-examine food safety policy and to re-structure institutional risk regulation since the turning point of the BSE crisis. SAFE FOODS has reviewed existing national and European governance practices that deal with the multiple challenges that might be associated with food risks. In particular, recent changes in regulatory procedures and structures have been analysed. The results of this empirical study on institutional reforms have also been compiled in a book (Vos and Wendler, 2007).

Harry Kuiper (RIKILT - Institute of Food Safety)
A new Risk Analysis Framework for Foods.
The results and outcomes of these different research activities have been incorporated into the new risk analysis framework, representing a substantial part of the input in the model.

The new risk analysis approach for food safety management integrates scientific principles, societal aspects and effective public participation. This has implications for the development and implementation of new risk management policies and risk communication.

TU-IV-1: Special symposium:
National Risk Assessment in the Netherlands
Chair: Leon Janssen

Threats to our security are changing and are becoming increasingly more entwined. Relatively simple threats can lead to social upheaval due to increasing dependencies. Consequently it will be increasingly less likely that just one department or organisation will be able to formulate and implement the answer to existing and new threats. This requires an approach which guarantees integrality and coherence, which looks beyond the threats: specific (known) threats must no longer form the basis of planning and policy, but rather the degree in which national security is or can be threatened must be taken as the basis. To address this, a strategy for national security was written. National security is under threat when vital interests of the Netherlands state and/or society are threatened to such extent that there is – potential – social upheaval. The following vital interests have been defined: territorial security (in danger when the borders of our territory have been breached), economic security (undisrupted commerce), ecological security (living environment), physical security (public health) and social and political stability (e.g. respect for core values such as freedom of expression).
Part of the national strategy is the national risk assessment (NRA), an assessment of the threats in terms of risks in relation to the vital interests and positioning these risks vis-à-vis each other. The results serve to decide which risks will have priority in deciding what the government must be capable of and if, and if so, where and how to national security can be reinforced.
For the national risk assessment a multi criteria analysis method is used. During the symposium this method is explained and discussed. Special attention is paid to the choice of criteria, assessing the impact of potential hazards and threats and how criteria are weighted.

Presentations:

Anja van Dam (Netherlands Programme for National Security)
The Dutch policy program on national security.

Diederik Wijnmalen (TNO)
National Risk Assessment, elaboration of the methodology.

Erik Pruyt (University of Technology Delft)
An application of the methodology (Case study, Multi criteria analysis sensitivity analysis).

Leon Janssen (RIVM – MNP and Netherlands Programme for National Security)
Discussion and research questions.

TU-IV-2: Round Table:
Nanobiotechnology: Preparing for the likely public and policy issues.

Chair: David Bennett (European Federation of Biotechnology Task Group on Public Perceptions of Biotechnology)

The proposed round table session is based on the European Commission-funded “Nanobio-RAISE” project aimed to anticipate the societal and ethical issues likely to arise as nanobiotechnologies develop and to use the lessons from the GM debate to respond to the public, media and political concerns. It brings together the key European and North American players: nanobiotechnologists, ethicists, social scientists, communication specialists, and companies using nanobiotechnology. The aim is to horizon-scan for the scientific and commercial developments likely to cause public and political concern, clarify the ethical issues involved or as they arise, and recommend and carry out strategies for public communication to address the emerging questions. Following a relatively short phase of research and development a number of new nanotechnology-based products have already been launched including cosmetics, sunscreen lotions, medical diagnostic devices, diesel additives and water-repellent and self-cleaning coatings. It is possible, but yet unproven, that materials involved, while not normally toxic to humans or the environment, may be so as nano-sized particles. Hence a quite different approach to detection of possible hazard, risk assessment and regulatory control is required. Concerns arise because of the potential nanotoxicity or pollution associated with certain nanomaterials and the likely widespread presence of nanoproducts in the near future across industry sectors, companies and countries throughout the world. Current awareness of nanotechnology by the public is very low. In the European Commission’s Eurobarometer 64.3 survey: "Europeans and Biotechnology in 2005: Patterns and Trends”, over 40% of the sample answered ‘don’t know’ when asked whether they thought that nanotechnologies would improve their way of life over the next 20 years or make it worse. While still unfamiliar to many, more are optimistic about nanotechnology in 2005 than in 2002. The 2006 National Science Foundation-funded survey in the USA of public perceptions of nanotechnology products found that US consumers are willing to use specific nano-containing products even if there are health and safety risks when the potential benefits are high. However the very low awareness of nanotechnology by the public worldwide, and the very high percentage of "don't knows" in the European survey compared with other technologies provides the opportunity for improving public understanding and initiating a balanced public dialogue from the outset. Public engagement on issues in nanotechnology is clearly necessary to prevent leaving a perception 'vacuum' to be occupied by activist NGOs as happened with GM food and agriculture. As the NSF study concluded “Transmitting the latest information about both risks and benefits, in a timely, thorough and transparent way, will minimise the likelihood of a polarised public debate that turns on rumour and supposition.” This round table would feature a panel of leading experts from the Nanobio-RAISE project in the sciences, risk assessment, ethics and public communication making short presentations from their various viewpoints about these issues leading into a highly interactive discussion session with the audience.

Presentations:

Julian Kinderlerer

David Rickerby (Institute for Environment and Sustainability, European Commission Joint Research Centre)
Nanotechnology Health, Environmental, Ethical and Societal Concerns.

Vinod Subramaniam (Biophysical Engineering Group, University of Twente)
Nanobiotechnology. Key issues.

Donald Bruce (Edinethics)
Martin Luther's blog, Risky Foods and Improved Humans: some future issues in nanobiotechnology.

TU-IV-3: Round table:
Emergent Phenomena after a disaster.
Chair: Ariëlle M. de Ruijter

Traditionally, a lot of victim- and disaster research has focused on vulnerability and pathology. More recently, there is growing attention for resilience, self-efficacy and coping by citizens themselves as a more common outcome of adversity. These are important and promising concepts when dealing with risk- and crisis communication.
In disaster relief en civil protection there is a huge effort to be prepared on governmental, policy and operational level. All this is necessary, but all too often the possibility of involving the general public as a partner is overlooked
The leading question for this round table is: What can governments and professionals do in risk- and crisis communication to enhance resilience and to facilitate civil participation?
In this Round Table the concepts of resilience and civil participation will be introduced in two short presentations and in the third we will make them work for experts in the field of risk perception and risk- and crisis communication. In our analysis we will make use of Weick's theory of organizing.
After these presentations we will discuss the presentations with the audience for further addressing and synthesizing risk- and crisis communication with resilience and civil participation.

Presentations:

Magda W. Rooze, Ariëlle M. de Ruijter (Impact, Dutch knowledge and advice-centre for post-disaster psychosocial care)
Citizens and Resilience, the balance between awareness and fear.
Etymologically, the word 'resilience' comes from the Latin 'salire' (to spring, spring up) and 'resilire' (spring back). This means that resilience can be regarded as the capacity to recover or spring back (Davidson et al., 2005). There are considerable variations in the way in which resilience is defined in the literature (Wolkow, Ferguson, 2001). This makes it difficult to interpret the research into resilience. Moreover, research into resilience often employs a wide range of measuring tools that are only partly connected with resilience. This causes problems in assessing and comparing the results (Friborg et al., 2005).
Research into resilience:
Recently the subject of resilience has attracted more interest than was previously the case. Of all the articles that have been published on the subject, four in five have appeared in the last ten years (Friborg et al., 2005).
Various approaches have been adopted in researching resilience, including that of developmental psychology and research into the effects of traumatic events on the psyche. The research based on developmental psychology addresses resilience in children. Most of this research has been conducted with children growing up in 'unfavourable' circumstances (poverty, parental (mental) illness). The research into the effects of traumatic events deals with resilience as a recovery process following a traumatic event.
Publicity campaign:
In disaster relief en civil protection there is a huge effort to be prepared on governmental, policy and operational level. All this is necessary, but all too often the possibility of involving the general public as a partner is overlooked. Security also rests with people themselves; the resilience of citizens needs to be increased. In conjunction with the QuA marketing agency Impact, the Dutch Knowledge and Advice Centre for post-disaster psychosocial support has developed an international symbol for resilience.

Nancy Oberijé (Netherlands Institute for Safety, Nibra)
Civil participation in response to disasters.
For the last decades the responsibility for safety in the Netherlands has increasingly become a governmental one. Emergency response has become more and more the concerning of professionals and the use of volunteers in emergency response seems to be decreasing. Lately there has been some discussion about this responsibility for safety in the Netherlands. Citizens should be aware of the fact that the government can't guarantee permanent safety and that they have their own responsibility for safety. The question is how far this responsibility reaches. Can we for instance expect citizens to participate in disaster response? And if this can indeed be expected, can the government stimulate civil participation in disaster response?
In order to answer these questions the Netherlands Institute for Safety has conducted an international literature review. The results of the international literature review are compared to studies of four Dutch disasters: the Bijlmer disaster (plane flew into an apartment complex in Amsterdam), the Volendam disaster (pub in Volendam burnt down), the flooding of the river in the province of Gelderland, the fireworks disaster in Enschede (explosion of stored fireworks).
Results: In the literature review it is shown that citizens massively participate in response to disasters. This is confirmed for the Dutch situation in the four Dutch disaster studies. Stimulation of participation in the phase of actual disaster response therefore is hardly necessary. However it is also shown that professional emergency responders do not know how to deal with this great amount of volunteers that show up and want to help at the disaster scene. Myths of panic, looting and apathy appear to dominate the attitude of professional disaster responders towards civilians. Preparedness plans do not take into account the use of civilians and are more focussed on measures to keep them away from the disaster scene. Training and education programs in the Netherlands are still based on the previously mentioned myths. Recommendations are made to change these matters.

Hans P. van de Sande (University of Groningen)
Organizing the aftermath: a question of communication.
Disasters and their aftermath are characterized by a large degree of equivocality, or chaos, in which often an enormous amount of work has to be done to restore the normal situation. In our modern world this kind of work tends to be more and more professionalized, thus excluding more and more lay participation. People tend to become classified in just two categories: either as helpers or as victims, and this duality is strengthened by several kinds of communicational processes inherent to the endeavour to organise the chaos. The implications of these tendencies will and must be explored as there is a limit to the amount of professional helpers and of course not by far every victim is utterly helpless. In our analysis we will make use of Weick's theory of organizing.

TU-IV-4: Special symposium:
Transatlantic regulatory reform and risk regulation.
Chair: Alberto Alemanno

At a time where the EU is increasingly looking at the other side of the Atlantic to borrow ideas in order to shape its regulatory reform, known under the name of Better Regulation, the organisation of a Symposium on Transatlantic Regulatory Reform and Risk Regulation is particularly timely.
The aim of the Symposium is to bring together researchers interested in exploring current trends in regulatory policies in the EU and in the US. Special attention will be devoted to Impact Assessment methodologies and risk regulation models as developed on both systems. The Symposium seeks to contribute to improve cross-fertilisation and to develop a common language between the two sides of the Atlantic, thereby serving as a unique platform for a strengthened transatlantic dialogue on these issues.

Presentations:

Lorenzo Allio (King's College)
Recent developments of the European Commission Impact Assessment: A critical review.
After the initial years of designing and introducing the European Commission's integrated Impact Assessment (IA) system, 2005 and 2006 were the years of refinement of the methodology and its general implementation. Overall, remarkable progress has been made. Especially in terms of the number of the IAs completed, Commission services have continuously improved their record. One particular improvement is the now rooted understanding that IA does not only refer to the final document but also to the process underpinning it. That process needs to be structured, rigorous, and accountable. Compared to their predecessors, the Guidelines on IA issued in 2005 and revised in March 2006 are more comprehensive, reader- and user-friendlier, and give a sharper focus on the types of impacts that ought to be addressed.
However, the Guidelines still suffer from a number of weaknesses that, if not addressed, keep the Commission's IA process from meeting the quality standards indicated by OECD best practice. My contribution will review the main paradigms related to both the design of IA and its underlying process, as developed in the Guidelines, outlining their main features and their gaps. The analysis will address the Guidelines' operational principles (such as coverage and application), their methodology (e.g. problem identification, proportionality, quantification, and multiple risk analysis), as well as the institutional setting that characterises the current system. Finally, a number of recommendations will be made that may help further strengthen the Commission's efforts towards an increasingly robust evidence-based decision-making.

Alberto Alemanno (Bocconi University, Milan)
The Impact Assessment Board: Towards an Effective Regulatory Oversight Body in Europe?
A wave of regulatory reform measures known as "Better Regulation" has been sweeping across Europe during the last years. Through an interesting process of legal borrowing, the EU is increasingly looking at the US approach to regulation by introducing into its legal environment a set of innovative regulatory tools, such as systematic regulatory impact analysis of proposed legislation, consultation procedures on draft proposals, simplification and ex post evaluation of existent legislation.
While most of the academic attention is currently focusing on the goals pursued by the BR's initiative and on the merits of each of its regulatory components, this paper looks at the most immediate legal implications stemming from the introduction of these regulatory mechanisms. It starts from the assumption that as the BR's package boils down into a set of regulatory requirements, an enforcement issue will inevitably arise.
Lacking a regulatory review gatekeeper similar to the US OIRA, it is foreseeable that this issue will invest the EU judiciary sooner or later. Although the absence of legal binding nature of the BR strategy - due to its soft law character - may appear an insurmountable obstacle to any form of judicial review of regulatory requirements, it will be shown how Courts may however be called to indirectly appraise EC institutions' compliance with the BR's requirements while reviewing the legitimacy of EC regulations. In the meanwhile, the Commission has established an Impact Assessment Board in charge of reviewing the impact assessment reports conducted by the Commission services.
This paper argues that this last initiative must be applauded to the extent judicial oversight cannot provide a satisfactory regulatory review. Finally, the paper examines the US regulatory reform experience by assessing to what extent the OIRA regulatory review might offer a valid model transposable to the EU legal order.

Jonathan Wiener (Duke University)
Better Regulation in Europe and America.
Over the last several years, European Union institutions and member states have constructed the Better Regulation initiative. This presentation compares the current European initiative to the American experience with regulatory reform and oversight since the 1970s. Key issues include the role of the executive in reviewing regulatory proposals, the role of the judiciary, the use of analytic methods such as benefit-cost and risk-risk analysis, the attention to reducing administrative costs, the use of ex post as well as ex ante analysis, and the influence of these analyses on decision making. The presentation argues that America and Europe may usefully borrow Better Regulation ideas from each other (in both directions), but that the different structures of EU and US institutions also invite some differences in the optimal approaches to regulatory oversight on each side of the Atlantic, and that the European Better Regulation initiative offers valuable opportunities for creative improvement and learning beyond the American experience.

Kees van Luijk, M. van der Plas (National Institute for Public Health and the Environment)
The truth behind the dikes: Are the differences in risk policy and the divergent risk standards in the Netherlands reasonable?
Risk is the key factor in safety issues and safety policy. We are not only dealing with the *calculated* risk (probability times effect, QRA) but also with the *perceived* risk. For government safety policy both are important. These two however do not yet explain the differences in safety policy and standards. In the Netherlands, the requirements and standards for external safety (dangerous substances in industry and transport) are very different from the standards for flooding. For traffic safety there are no clear standards while there seems to be a zero risk standard for drinking water: not the slightest risk is accepted. This seems to be the result of incoherent rather than careful and balanced policy making.
The Dutch RIVM investigated whether these differences are reasonable and explainable or not. This study was carried out for the Dutch Ministries of Transport and of Housing, Spatial Planning and the Environment. In this study, different government safety standards for a

range of risk sources are analyzed and compared. By means of interviews, also the policy paradigms are identified. Combining these results leads to a view on coherence in safety policy instead of unexplainable differences. It turns out that, in addition to the quantitative risk and risk perception, also the responsibility for safety is taken into account.
The study presents a model for risk regulations in which economical dimensions, risk perception, QRA's and the responsibility of actors are taken into account. As such, the model explains differences and similarities in safety policy.

TU-V-1: Special symposium:
Dealing with flood risks in the Netherlands.
Chair: Herman van der Most

Until the high water events of the mid 1990's in the Dutch river area, flood risk management in the Netherlands was primarily focussed on flood prevention by maintaining dike heights, i.e., on managing the probability of flooding. Since then, there has been a growing attention among scientists and policymakers for the consequences of flooding, making the flood risk analysis process more complex. This complexity results from difficulties in technical analyses, but also from the interpretation of the outcomes and the implications for other stakeholder groups.
To promote a well-informed interpretation of the outcomes of risk analyses in the decision-making process relating to flood risks it is necessary to pay explicit attention to the value and meaning of this information to all stakeholders involved. Traditionally, in the Netherlands engineers and policymakers dominated the process of flood risk management. However, in the light of societal changes, the notion that also other stakeholders are relevant to this process is gaining importance. In terms of flood management policy this may result in a shift in attention of risk management from solely risk prevention (e.g. building strong dikes) to a risk management strategy in which also stakeholders as the public and companies are involved. This involvement may take shape in emphasizing the importance of public preparation for evacuation, in increasing public flood risk awareness, or in increasing the acceptance of risk mitigating activities. To gain a better understanding of the determinants and dynamics of this process, it is important to take into account different perspectives such as risk perception, risk communication and institutional setting. Such analysis will be carried out in 2007 and 2008 within the framework of two research projects that cover the complete flood risk management cycle. The projects are sponsored by the Dutch knowledge impuls program 'Living with water'. In this symposium research is presented from the PROmO-project that aims at the integration of the assessment and perception of flood risk, and the project "from threatening high water to evacuation".
The symposium Dealing with Flood Risk includes researchers from various disciplines and backgrounds. In the symposium 4 presentations from the interdisciplinary research program will be presented.

Presentations:

Herman van der Most (WL | Delft Hydraulics), Sten de Wit (TNO-Bouw en ondergrond)
The Meaning And Value Of Technical Information In Dealing With Flood Risk.
As in many other countries, natural scientists and engineers in The Netherlands provide information on flood risks to policy makers in terms of probability and consequences of flooding. This information is used in the decision-making process to establish the required level and mode of flood protection.
Experience shows that engineers and policy makers do not generally share a common view on the meaning and value of flood risk assessments. This is most apparent for the probability component, especially if probabilities are small. Moreover, a full appreciation of the assessments of flooding consequences is impeded by the many dimensions: the types of consequences (casualties, health effects, economic damage, social disruption, etc.), the regional differences in the consequences, the dependence on flood conditions, etc.). The fact that probability and consequences are related - in general the larger the consequences, the smaller the probability – makes the interpretation of the estimated flood risk even more complex. On top of this complexity, the significant uncertainties in flood risk assessments are drivers for debate.
As a result of this controversy it is felt that the knowledge of flood risks available in the engineering community, is not used to its full potential. It is expected that the controversy will grow as a result of current changes in policy, which aim to more actively involve citizens and other stakeholders in the decision making process. This development will further increase the diversity of viewpoints and perspectives on flood risks. To produce technical information on flood risks, which is relevant to the policy debate in this setting, a proper insight is required in the meaning, value and comprehensibility of this information, to all stakeholders involved. Special attention is required to the uncertainties inherent in this information.
The presentation focuses on a study in the PROmO-project. The study aims to significantly increase clarity as to how the production and communication of technical knowledge, in cohesion with knowledge from other, non-technical domains, can optimally contribute to flood risk policy making in a multi actor setting.

Anne van der Veen (University of Twente, Faculty of Management and Policy)
Flood Risk Perceptions And Spatial Multi-Criteria Analysis: A New Approach.
In the literature of Integrated Assessment uncertainty now plays an important role. The classical approach to risk analysis (risk is a product of probability and consequences) does not allow for a pluralistic approach including the various risk perceptions of stakeholders or lay people within a given system. On the other hand, a quantitative risk analysis including individual perceptions appears to be problematic, and is difficult to apply to decision-making processes. In this article we propose a methodology that combines the virtues of three different methods: the quantifiable classic approach to risk, the taxonomic analysis of perceived risk and the analytical framework of a spatial multi-criteria analysis. The combination of methods is applied to a Spanish case study 'Ebro Delta', a flood prone area vulnerable to sea level rise. Risk perception information has been collected with help of a brief on-site survey. The result was a significant worry and awareness of risk with an increasing demand for preparedness. Risk perception enters our multi-criteria analysis as complimentary weights for the criteria risk and benefit. The results of the survey are applied to a set of scenarios representing both sea level rise and land subsidence for a time span of fifty years. Land use alternatives have been presented to stakeholders and evaluated. This way the regional decision maker is confronted with an overview of preferences for handling risk. Even with limited resources a characteristic 'risk profile' could be drawn that enables the decision maker to outline a suitable land use policy or at least to find a basis for further social learning processes.

Teun Terpstra (University of Twente, Faculty of Behavioral Sciences)
Public Perceptions Of Flood Risk In The Netherlands: The Factors Guiding People's Behavioural Intentions To Prepare For Flood Disaster.
In the Netherlands, flood risk can be typified as a "low-probability but high-consequence risk". About two-third of the country would be flooded in case there were no flood defences. Therefore, flood defences have been designed on high standards. Unfortunately however, actual flooding can never be ruled out. Although this is not a new insight, there is increasing attention for the question how society can prepare for flood disaster. Our investigation focuses on people's perceptions of flood risk and how these relate to attitudes to prepare for flood disaster or to take measures mitigating damage.
This presentation will focus on the results of a survey (n = ±650) in the province of Fryslân, which is a coastal province adjacent to the tidal Wadden Sea. We measured a range of variables among which risk perception, attitudes towards public authorities (trust), attitudes towards disaster preparedness and mitigation, and behavioural intentions. These variables will be used to design a Structural Equation Model (SEM) showing how they are interrelated.
Public authorities benefit from the results of this research which enables them to improve setting up risk communication programs.

Bas Kolen (HKV Lijn in water, Lelystad)
Evacuation And The Threat Of Flooding, Learning By Doing.
Although the flood protection level in The Netherlands is high compared with international standards, flooding is still possible. Several studies show the risk of flooding in the Netherlands. The effects of hurricane Katrina in New Orleans showed us the need for emergency planning and preparation.
Last year several flooding scenarios were developed in the Netherlands for the threat from rivers and the sea. Both local (Safety Regions and Water boards) and central authorities are preparing themselves, based on these scenario's, by emergency planning, which combines evacuation to higher and safer areas and evacuation to shelters.
To reduce the number of casualties, people have to evacuate to safe areas outside the flooded area. The available time depends on the source of the flood and is limited, from 12 hours in coastal areas up to several days in other areas. Where the available time is too short, people have to evacuate to (prepared) safe zones and shelters in the flooding zone. In some cases it may be better to stay at home. The best option depends on the local circumstances as the local water depth, continuity of power, surface level and the availability of shelter, cars and infrastructure (if not flooded).
As all authorities and civilians have a responsibility to cooperate for the most successful result, preparation is necessary. In the project we work together with central and local authorities, water board, provinces and universities. Central themes in the project are:

- Developing a simulation instrument to practice the decision making process, logistic, cooperation between all partners and crisis communication during an evacuation.
- Crisis communication. We develop a guideline for local authorities how to communicate during an evacuation with several parties such as farmers, elderly people, people who need medical care etc.
- Aftercare. We do research after the time needed for restore the safety and remove the floodwater, the time and cooperation needed between parties during reconstruction and cleaning and the psychological aftercare. We develop checklist for emergency teams to start up the aftercare.
- Implementing the result in two crisis management exercises in the province of South Holland and Utrecht.

TU-V-2, TU VI- 2: Special symposium:
Strategies for Improved Exposure Assessment for Future Human Health Risk Assessments.
Chair: Halûk Özkaynak

Human exposures to environmental pollutants of concern vary depending on the characteristics of indoor or outdoor emission sources and resulting concentrations in different microenvironments where individuals may come in contact with these pollutants. Pollutants released outdoors may also penetrate indoors, and thus, indoor microenvironments may be a significant locus of exposure for both outdoor and indoor pollutants generated by human activities and other sources. Understanding the potential health risks from exposures to either indoor or outdoor generated pollutants requires knowledge of many factors. Critical factors that influence personal exposures to pollutants of concern include: physical and chemical factors that determine micro environmental pollution concentrations, time-activity patterns, and various exposure factors by age, gender and life style attributes. Exposure is a critical element of human health risk assessments. However, each component of the source-concentration-exposure-dose-effects human health risk paradigm has inherent variability and uncertainty due to complexity of pollutant emissions and the underlying environmental and biological systems. Strategies for addressing these technical challenges in conducting enhanced exposure or risk assessments often rely upon probabilistic methods for quantifying the sources and impacts of different variability and uncertainty in the critical assessment inputs. This symposium elaborates further on these exposure assessment issues in the context of advanced air pollution and multimedia exposure and risk assessments, applicable to different population groups. This symposium on Strategies for Improved Exposure Assessment for Future Human Health Risk Assessments begins with a brief introduction by the Chair on the key concepts and issues pertinent to most current and anticipated future environmental human exposure and risk assessments.
Each presenter will provide their insights into the strengths and weaknesses of current methods and underlying information used in assessing human exposures and risks to various environmental toxicants. The symposium will end with a 30 minute panel discussion involving both the presenters and the symposium attendees for further addressing and synthesizing some of the topics of concern, in order to improve the current science of exposure assessment in support of future human health risk assessments.

Presentations:

Matti Jantunen (KTL, Finland)
Exposure Analysis Approaches for Assessment of Human Health Risks.
Exposure analysis is a critical ingredient in human health risk assessment. It provides information about the source, pathway and fate of pollutants, social behavioral characteristics of individuals that can influence the nature and extent of exposure, and makes it possible to ascertain the likelihood hazards may pose unreasonable risks to individuals. A variety of direct and indirect methods have been developed to estimate pollutant exposure to humans. These range from measurement of industrial emissions and dietary contaminants that can be used to estimate pollutant exposures to personal exposure monitoring and modeling that permits the ability to characterize population segments by age, location, and activities with consideration for socioeconomic status and cultural characteristics. Biological monitoring can

be used to provide evidence of exposure episodes that can be related to specific sources with additional time activity information. However, the inherent complexity of chemical exposures in the environment brings with it considerable variability and uncertainty in many instances. Here too methods have been developed to characterize and quantify variability and uncertainty and to identify the key factors responsible for it. Ultimately, risk reductions are often achieved through either control of source emissions or exposure mitigation. Thus, prediction of human exposures to environmental agents, along with its uncertainties, is essential to both for reliably characterizing the human health risks and for determining targeted risk management strategies. This presentation will cover the basic methodologies used for assessing human exposures to environmental pollutants, and some of the scientific challenges involved in being able to provide more accurate exposure information to risk assessors and decision makers.

Peter P. Egeghy (US Environmental Protection Agency, National Exposure Research Laboratory, RTP, NC USA)
Exposure Factors Data to Support Health Risk Assessments for Children and Adults.
Meaningful assessment of human exposure to environmental contaminants relies on adequate measurement data, an understanding of relevant exposure pathways, and some knowledge of influential exposure factors. Nearly a decade ago, the U.S. EPA's National Exposure Research Laboratory (NERL) developed a framework for systematically identifying the most important sources, routes, and pathways of children's exposure to pesticides. An exhaustive review of available data on children's exposures and activities identified specific areas in which additional data were needed to replace default assumptions in quantitative health risk assessments. Several targeted studies were conducted under a children's exposure research program to address these critical data gaps. Areas of particular uncertainty included pesticide use patterns, spatial and temporal distributions of pesticide concentrations following residential applications, and approaches for estimating dermal and non-dietary ingestion exposure. Recently, data from thirteen focused studies were assembled and analyzed across compounds and datasets to identify and evaluate important factors affecting children's exposure along the most relevant pathways. Examples of the results, to be published in a forthcoming EPA Report, include the following: pesticide usage varies by climate with little influence by socio-demographic factors; inventories and self-reported usage are not effective predictors of measured concentrations; variability in surface loadings is substantial with extensive migration to non-application surfaces; household cleaning activities and ventilation strongly affect both air and surface concentrations; the marketplace shift to less volatile pesticides points to increased importance of indirect ingestion; and seemingly minor modifications of surface measurement methods may have drastic effects on exposure estimates. A more recent focus of attention has been on exposure factors for older adults, and current efforts in this area will also be presented. The US EPA continually strives to improve health risk assessment for children and adults through its series of Exposure Factors Handbooks, with NERL research providing important contributions to this effort.
(Disclaimer: Although this work was reviewed by EPA and approved for publication, it may not necessarily reflect official Agency policy.)

Halûk Özkaynak, US Environmental Protection Agency, Office of Research and Development, National Exposure Research Laboratory, RTP, NC USA
Probabilistic Modeling for Advanced Human Exposure Assessment.
Human exposures to environmental pollutants widely vary depending on the emission patterns that result in microenvironmental pollutant concentrations, as well as behavioral factors that determine the extent of an individual's contact with these pollutants. Probabilistic human exposure models provide an analytic structure for combining these various types data generated from disparate studies in a manner that may make more complete use of the existing information related to exposures to a particular contaminant than is possible by direct study methods. Validated models can then be used to investigate the efficacy of various strategies for managing public health risks associated with exposures due to environmental contaminants of concern. However, each component of the source-concentration-exposure-dose-effects human health risk paradigm has inherent variability and uncertainty due to complexity of the underlying environmental and biological systems. Consequently, probabilistic human exposure methods are used during the course of human health risk assessments to explicitly quantify the variability and uncertainty in the prediction endpoints and to identify the key factors that contribute to these variations or uncertainties. This presentation describes the probabilistic exposure modeling methods used in air pollution and multimedia human exposure assessments, along with specific examples and case-studies demonstrating the application of these tools for characterizing the variability and uncertainty in the predicted population exposure distributions.
(Disclaimer: Although this work was reviewed by EPA and approved for publication, it may not necessarily reflect official Agency policy.)

Dana Barr (National Center for Environmental Health Centers for Disease Control and Prevention, Atlanta, GA USA)
The role of Biomonitoring in Future Exposure and Risk Assessments.
Increasing amounts of biomonitoring data have been generated as analytical instrumentation has improved over the last decade. Currently, the National Health and Nutrition Survey releases biomonitoring data on over 110 chemicals measured in a representative sample of the U.S. population. Other studies are also releasing increasing volumes of biomonitoring data including cross-sectional and longitudinal data. However, the ability to generate biomonitoring data has far surpassed our ability to interpret the data and use them in practical applications such as risk assessment. For some chemicals such as persistent bioaccumulative chemicals, their use in risk assessment and exposure assessment are more straightforward. However, for chemicals that do not persist in the environment or in the body, supplementary information such as pharmacokinetic data and uptake information are necessary to appropriately and accurately use the data for these purposes. As a part of the ILSI/HESI's technical committee for establishing the utility of biomonitoring data in risk assessment, we have begun to establish an algorithm that will incorporate the necessary supplemental data with biomonitoring data to reduce the uncertainty, or at least quantify the uncertainty, involved with using biomonitoring data for several selected purposes such as exposure assessment, evaluation of regulatory actions and risk assessment. Biomonitoring provide useful data for exposure assessment and risk assessment as long as we can identify and generate supplementary information to put the data into context. These methods for using biomonitoring data in selected applications will be discussed.

H. Christopher Frey (Department of Civil, Construction, and Environmental Engineering, North Carolina State University, Raleigh, NC USA)
Methodologies for Characterizing Variability and Uncertainty in Exposure and Risk Analysis.
Estimation of human exposure to chemicals in the environment and the associated risks involves challenges and choices regarding quantification and assessment of inter-individual variability (aleatory uncertainty) and uncertainty due to lack of knowledge of the true values of

constants and distributions (epistemic uncertainty). While much attention has been given to quantification of variability and uncertainty using empirically-based or subjective probability distribution functions, depending on whether a frequentist or Bayesian approach is adopted, there remain key challenges regarding structural uncertainties in an assessment. Examples of the latter include defining assessment scenarios, developing conceptual modeling approaches, and implementing the modeling approach into an analytical or computational model. Key components of an integrated assessment of risk include the pollutant source (e.g., emissions), transport and fate, exposure, dose estimation, response estimation, and risk characterization. Scenario and model development involve structural choices regarding what to include and what not to include in the assessment, as well as the level of detail of, resolution of, and interaction among major components. This paper will provide an overview of a comprehensive taxonomy of structural and parameter uncertainties, and inter-individual variability, in the context of the source-to-risk continuum, illustrated with conceptual examples based on vehicle emissions and near-roadside exposures. Recommendations regarding key needs for ongoing development of methodology and its application to practical problems facing research and regulatory agencies will be discussed.

TU-V-3: Special symposium:
Methodological Developments in Risk Perception and Communication.
Chair: Peter Taylor-Gooby

Assessment of how people perceive and respond to risks often rests on data from structured social surveys that are designed on the assumptions that people's responses to risky choices are based on their individual assessment of the options; that they are able to handle the kind of probabilistic assessments used in standard statistical approaches and that their assessments are not greatly complicated. These papers, all based on large recent empirical projects, use innovatory methods to show that the assumptions may be misleading. They develop understanding of risk responses and of the methods used in research in this field. This session will include contributions from the projects below and discuss methodological development in this field.

Presentations:

Gwenda Simons (University of Oxford)
Interpersonal Communication and Risk.
Understanding how people arrive at choices where risk is involved often focuses on the individual in isolation. This research considers how people may take into account the (emotional) responses of another person in developing their decision and the ways in which the views and feelings of those involved may be communicated. The research project uses two very different innovative methods: (a) Diary studies during using handheld Palm computers. For example, a recent diary study sampled 41 participants' decisions involving other people made over a 3-week period. The resulting dataset contained 349 decisions and can be analysed using hierarchical linear modelling; and (b) Experiments in which the facial expressions of an advisor are communicated to a decision-maker via a video link to allow more controlled assessment of the impact of another person's nonverbal signals on appraisal of risk. Preliminary findings show that interpersonal communication of emotion exerts an influence on decision making; but that visual access to another person's facial expression does not seem to improve the quality of decisions for all people under all circumstances.

Emma Hughes (University of Cardiff)
Risk and the Media.
The imagery and framing contained in media presentations exerts a strong influence on the way perceive risky issues. The framing of risk is often a contested terrain. Stake-holders seek to influence framing in order to achieve particular outcomes. Drawing on detailed interviews with 40 prominent stake-holders, analysis of an extensive archive of media material collected over 12 months and 12 focus groups with members of the public, this research examines how power is exercised through framing in the fields of GM food, nanotechnology and stem cell research. It emphasizes the importance of a thorough analysis of media framing in understanding perceptions of and responses to risk.

Karen Henwood, Nick Pidgeon (University of Cardiff)
Narrative Approaches to Risk.
Assessment of what people think about risk sometimes takes the responses they give to pre-structured questions in a sample survey at face value. However, the assumptions and values that underlie what people say are often complex and sometime contradictory. This paper presents a detailed in-depth study of the values and narratives of people living close to nuclear power stations and shows that their life-course experiences influence their everyday perception and responses to risk. Initial responses indicating a normalisation of continuing threats in everyday life may be associated with very real concerns which continue to influence how those interviewed think about and manage their experience. These findings are highly relevant to studies designed to assess public responses to innovation risks.

Judith Mehta (University of East Anglia)
Risk in Context.
Much analysis of how people respond to risks, particularly in relation to public policy issues (for example, committing resources to health innovations or road-building) typically assume that individuals can make sensible rational probabilistic assessments of risk. This project is innovative in the way it asks people to evaluate risks not in isolation, but in the context of other risks, and in the way it examines how successful people are at dealing with probabilities. The findings of two large sample population surveys (total N=514) examining people ability to discuss and compare the probabilities of different kinds of everyday life risks and uncertainties cast doubt on the methods typically used in evaluating peoples' preferences for different policy options.

TU-V-4: Special symposium:
Natural-technological events (NATECHs): Lessons and challenges for mitigation and response.
Chair: Bastien Affeltranger, Laura Steinberg

Natural-technological accidents, or NATECHs, reveal a particular vulnerability of industrial facilities to extreme, intense or localised natural hazards. This has been confirmed, in a recent past, by events such as the 1999 Izmit earthquake, the 2002 floods in Southeast France, and the 2004 hurricane Katrina in the U.S. In a way, NATECHs can be considered as an invitation to revisit expertise in risk analysis and assessment, management and emergency response – and from a multi-disciplinary perspective.

Despite a growing body of regulation for design and operation of industrial activities in areas prone to natural hazards, NATECHs remain a threat. This is, for instance, particularly the case in small- and medium-sized companies (SMEs). These are often located in densely populated areas, where they might release high quantities of hazardous material. Analysis and assessment of NATECH risks is not conducted systematically in SMEs, as skills and/or resources to do so might not be available. Likewise, SMEs are not always in a position to draw lessons from past NATECH events – and modify their process or safety features in order to reduce their vulnerability. Last but not least, expected changes in climate and weather patterns – no matter how unclear these changes are – are a signal that industrial activities are likely to be exposed to increasingly intense incentive hydrometeorological hazards. Industry located in coastal areas and deltas is a priority target to that kind of events.

- This session on NATECHs aims at the following goals:
- Discuss a typology of SMEs' vulnerabilities to natural hazards, and identify challenges for risk analysis and assessment
- Discuss the possibility of, and terms of reference for a magnitude scale for NATECH risks, hazards and events
- Discuss state of the art in NATECH mitigation and disseminate research results from Europe and the US
- Discuss specific NATECH features, such as performance assessment for safety barriers (technical and human/organisational); methodologies for post-accident investigation etc.

Presentations:

Bastien Affeltranger (Institut National de l'Environnement Industriel et des Risques (INERIS)), Laura Steinberg, (Environmental and Civil Engineering, Southern Methodist University (SMU))

Learning Lessons from NATECH Incidents: Methodological Challenges.

Considering lessons-learning as a useful approach for continuous improvement of industrial safety, this contribution discusses how this might be done in practice – including those challenges, if any, posed to successful lessons learned efforts in the field of NATECHs. In other words: understanding the features and causes of past NATECH incidents/disasters (or past equipment/system failures) is considered as a major resource in order to improve the resistance and/or resilience of industrial systems to natural hazards. What should be the approach, for learning from past NATECH incidents, failures or events?

It is reasonable to say that NATECH industrial incidents share many features with both natural and technological accidents and disasters. Those include:

Interaction of "natural" (e.g. physical and chemical; environmental) processes and systems with social (e.g. human; organisational) processes and systems.

Multi-scalar impact: on local (e.g.: individual; workplace), meso- (e.g. factory; community) and broader levels (e.g. impact of hazmat release in a river basin; systemic failure of urban system etc.).

Often similar stakeholders mobilised for data collection and information-seeking during lessons learned process.

Risk-generating interactions that are often systemic, or complex.

Raising similar questions land-use planning and exposure of assets (human, technical) to natural and technological hazards.

This paper advocates that conducting a lessons-learned analysis a the micro-level (equipment level) or meso-level (industrial facility) only is not sufficient for a sustainable NATECH risk reduction – neither in industrial facilities or plants, nor at community level. Learning lessons from past NATECH incidents does require contribution from, and information exchange with other stakeholders, at other levels of analysis, or scales (from micro level, worker and workplace, to community/territory level). Those contributors – most of which unconventional to classical approaches to industrial safety and risk analysis – include: natural hazards experts; land-use planners and geographers; local authorities; social science experts (e.g. psychology; sociology etc.).

Ana-Maria Cruz, Elisabeth Krausmann (EJCRC, Italy)

Damage to offshore oil and natural gas industry from Hurricanes Katrina and Rita.

Hurricane Katrina and Rita impacted the offshore oil and gas industry in the Gulf of Mexico in August and September 2005, wreaking unprecedented havoc both offshore and onshore. The Gulf of Mexico constitutes one of the United States' largest sources of oil and gas production; supplying 30% of U.S. oil and 20% of its natural gas. This paper is concerned with two effects from the hurricanes: damage to the offshore oil and gas industry, and the secondary effects such as the resulting oil spills and hazardous-materials releases ensued.

The hurricanes completely destroyed 113 platforms and 5 rigs; and damaged 53 platforms and 19 rigs. Furthermore, there were more than 400 hazardous materials releases reported from offshore platforms and rigs and connected pipelines directly attributed to the storms. The paper analyzes these data, and identifies lessons learned for future loss prevention and preparedness of the offshore industry for major storm events. This is of particular importance in view of a trend towards more frequent and more intense hurricanes along the U.S. Gulf coast.

Valerio Cozzani (Italy)

Structural response and damage scenarios.

The impact of natural events as earthquakes and floods on industrial installations may cause accidental scenarios involving the release of relevant quantities of hazardous substances. Fires, explosion, toxic releases, water pollution were reported as the consequence of natural events impacting in industrial areas.

The disruption of communication lines may as well cause important delays in the response to these emergencies, that may in turn enhance the severity of hazards for the population living around the industrial site. In spite of the growing concern that the issues cited above are receiving by public opinion also due to climate changes, the development of technical tools for the assessment of hazards coming from NaTech events has received scarce attention so far. No well accepted or widely used methodologies exist to identify the possible major accidents triggered by external events on the basis of a systematic analysis of the plant lay-out. Indeed, at the state of the art, this assessment is not carried out, or, alternatively, is based on the use of generic and invalidated threshold values.

In this framework, the development of a unified approach to the risk assessment of NaTech accidents, based on equipment vulnerability models is of utmost importance. The present contribution is concerned with the development of a specific methodology for NaTech risk assessment. Tools were developed for the quantitative analysis of vulnerability and of LOC scenarios following the impact of natural events on industrial installations. Specific vulnerability models and vulnerability thresholds were obtained for different natural events. A specific software package was added to a GIS-based tool for risk recomposition in order to allow the assessment of the contribution of external events to industrial risk.

The procedure allowed the estimation of the expected impact areas of accidental scenarios triggered by natural events impacting on industrial installations and, in the case of earthquakes, the assessment of the quantitative contribution of these events to the industrial

risk calculated for the site. The methodology was applied to several case-studies derived from actual plant lay-outs.

Ernesto Salzano (Italy)
Early warning system and simplified tools for na-tech risks.
Risk analysts should concern of seismic vulnerability of industrial components and of the related effects. To this aim, simplified methodologies for the evaluation of structural damage (fragility analysis) and loss of containment for any industrial equipment are needed. Furthermore, these methodologies may be crossed with the outcomes of Probabilistic Seismic
Hazard Analysis (PSHA), following the well-known, sound methodology of Cornell (1968), which produce a quantitative measure of seismic intensity probabilities. PSHA and fragilities can be easily implemented within any risk analysis code. Indeed, for any equipment at any given location, the results of PSHA and fragility correlations for structural damage and loss of containment allow the definition of the type and the intensity of accidental industrial scenarios triggered by earthquakes (consequence analysis).
With specific reference to the prevention and mitigation of earthquakes, Early Warning System (EWS), i.e. a set of actions that can be taken from the moment when a seismic event is triggered with a significant reliability to the moment the earthquake strikes in a given location, seems to be a very valuable tool. More specifically, EWS can activate any preventing countermeasure aimed at limiting the probability of occurrence of catastrophic accidental scenarios, which in turns are triggered by the release of relevant amount of gas or liquid flammable or toxic substances from damaged equipment. The EWS has been assessed in terms of a specific index which depends on: i) the characteristic time for the seismic wave to travel from the fault to the installation; ii) the intensity of earthquake expressed in terms of peak ground acceleration (PGA) and the related probability of occurrence; iii) the ability of structures (equipment) to resist to any PGA; and iv) the ability of safety system (e.g. safety interlock systems) to prevent and mitigate the release of substances.
Seismic intensity threshold values in terms of PGA for the structural damage and industrial accidental scenario are also defined and discussed in order to identify cry-wolf issues.

Mathieu Reimeringer (INERIS, France)
Earthquakes Risk Analysis and structural modeling. French approach.
Earthquakes pose a direct threat to the industrial environment: Seismic shocks have the potential to damage hazardous material tanks, pipes, control devices and warning/monitoring systems. Such damage can lead to industrial accidents. Ensuring industrial safety for chemical plants requires this important threat to be assessed. In France, a regulatory procedure and document called " study of industrial threats " (étude de danger) synthesises all related information. INERIS has developed a methodology based on the content of this document and its structural resources for seismic risk assessment.
Considering seismic hazard, INERIS method is really efficient and compatible to French environmental laws. It can be developed in five steps:

- select a reference seism according to the French law as an acceleration spectrum ;
- screen all the facilities in order to find major hazardous scenarios and non considered in INERIS risk analysis approach. Most of them are related to a failure of an equipment due to the seism. Engineering tools for that can be found into "SEPTEN guide";
- screen all the bow ties already selected by INERIS risk analysis approach event after event. If one event (represented by a case in this approach) can not occur the whole branch is not considered.
- Connect all the new scenarios of step 2 to the bow ties generated by step 3. Some disappeared branch may reappear;
- Screen all the remaining barriers : if one ore more of these barriers resist to the seism and can prevent the unwanted dangerous phenomenon the study is stopped. Otherwise new barriers must be designed in order to prevent the unwanted dangerous phenomenon.

Even if this method is easy to use and efficient, it could be ameliorated. Reference seism selected has its own "probability" integrated. The best way should be to use this probability in order to put unwanted events related to seismic hazard in the risk matrix. This method is also well adapted to French legislation on industrial safety but can be extended to SEVESO II European context connected to ARAMIS method.

TU-V-8: Round Table:
Harmonization of Risk Terminology
Chair: Roberto Bubbico

Addtitional information will be handed out during the conference.

TU-VI-3: Special symposium:
The risk story model and risk perception – insights from experimental studies.
Chair: Peter M. Wiedemann

The symposium will consist of the presentation of five interlinked experimental studies conducted to elaborate the story model that was introduced by Wiedemann, Schütz and Clauberg (2003). This model refers to common everyday-life patterns for interpreting events, which are also heavily used by the media, such as scandal stories, investigative exposés, tragedies, and disaster reports. Such interpretive patterns include (1) describing involved characters, i.e. casting the implicated persons in particular roles - preferably those of victim and perpetrator, hero or villain, etc. (2) ascribing objectives and motives (intentions), (3) exploring the conflict leading up to the event (dramatization), (4) attributing a logic to the event, describing the consequences (harm done), and (4) formulating a conclusion or lesson to be drawn (moral of the story), citing other "examples" which make the occurrence of the event or the moral of the story particularly clear. In this way, the stories which are used to portray a risk will effect risk perceptions.

Presentations:

Peter M. Wiedemann (Research Center Jülich, Germany)
Peter Wiedemann will give an overview of the story model and the state of art of narratives as an core concept in risk research. Based on the research on framing, narratives and stigma (see for instance Palmlund 1992, Heath 1997, Wiedemann et. al 2003, Finucance & Satterfield 2005) this paper outlines various approaches to research narratives and its use in qualitative as well quantitative research. One common aim of these studies is to examine the

circumstances under which risks or damages come to be understood and acted upon by people in the contexts of their everyday experiences.

Holger Schütz (MUT INB, Research Center Jülich, Germany)
Holger Schütz will report an experiment that aims at the influence of separate versus joint risk appraisal following the seminal work of Hsee (1996). In a mixed between / within subject design he analyses whether the evaluability hypotheses of Hsee helps to explain story effects on risk perception. The results of his experiment suggest that the story effects remain stable under both conditions, i.e. the separate as well as the joint risk appraisal.

Albena Spangenberg (MUT INB, Research Center Jülich, Germany)
Then Albena Spangenberg will report the results of a cross cultural experimental study which investigates whether the story effect on risk perception is stable across different cultures, comparing a German and a Bulgarian sample. The results of her studies show that leniency and anger inducing stories effect risk perception in the same way in both cultures: A leniency story attenuates and an anger story amplifies risk perception.

Claudia Eitzinger (AlpS , Innsbruck)
Claudia Eitzinger seeks to analyze the risk story model with respect to damage perception by conducting an experimental study. Besides her interest in how anger inducing stories impact damage perception she analyses how safety expectancies and safety promises will alter the perception of loss-incurring events. Results give empirical evidence for story effects in damage perception. Furthermore, study findings prove that in case of high safety expectancies a negative event is seen to be less excusable, trust in safety and people feel more threatened. Finally, when strong safety promises are given, again the perceived threat to be higher.

Martin Clauberg (University of Tennessee)
Martin Clauberg will report about an experiment that tested how the peripheral versus central information processing will alter story effects on risk perception. He found that under both conditions the story effects are the same: The leniency story decrease and the outrage story increase risk perception. Furthermore, the outrage story produces a greater effect as the leniency story compared with the “neutral” story as a benchmark.

Sonja Altstetter (Research Center Jülich, Germany)
Approach towards a comprehensive risk identification.
As we know from previous studies and literature, corporate risks having external and soft features, tend to be overlooked in the process of risk identification - hence, there is evidence of a managerial tendency to neglect the "unusual suspects". But a comprehensive and complete identification of all risks is crucial for every enterprise - not least because of a statutory reglementation as it exists in Germany (KontraG, 1998). The study presented aims at identifying an approach to allow a comprehensive risk identification. A 2x2 experiment using the risk story approach was conducted. The experiment examined four groups of corporate risks altering in the extent of their identifiability (from high to low degree of identification). According to the risk story model, four different stories were designed. They varied concerning the personal perspective (external consultant vs. head of department) on the one hand and the time perspective (backcasting vs. forecasting) on the other. Risk identification was expected to differ depending on the variation in the perspective of the person and the time perspective. Preliminary results of this study will be presented and discussed.

Abstracts oral presentations (alphabetical by author)

MO-VI-7
Ahteensuu, Marko (Institutions and Social Mechanisms Consortium, University of Turku)
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Ethical foundation of the precautionary principle.
The precautionary principle – if in doubt, decide in favour of the environment – plays a significant role in the current environmental (and health) law and policy. At the same time, the principle is a subject of intense debate and academic scrutiny. Scholars, decision-makers, representatives of NGOs and laymen continuously argue over it. Notwithstanding this, normative underpinnings of the precautionary principle have received surprisingly exiguous attention. Although the importance of the ethical discussion has been underlined in several occasions, there are only a few published papers on the issue. In policymaking, the precautionary principle has been invoked to justify a wide range of policies – often without an explicitly stated normative framework.
The application of the precautionary principle is fundamentally a normative choice. The degree to which we are prepared to take precautions is related to the values which we attach to the nature, human well-being and social equality. Indeed, taking precautions seems to be instinctive for human beings, and it is in accordance with common sense. Nonetheless, the influential role of the precautionary principle in environmental law and policy cannot be based only upon whatsoever hunches or gut feelings, but upon the fact that the taken precautions are consistent with certain values shared in a society. When the principle is invoked in societal risk decision-making, evaluative and normative underpinnings should be taken into account, explicated and justified. Exactly this is the subject of my paper. Specifically, I will introduce a framework which both illuminates different normative commitments and choices related to the invocation of the principle, and enables ethical evaluation of specific formulations of the principle found in official documents. Second, I shall evaluate general and specific (ethical) justifications for precaution within this framework.

TU-V-5
Alcock, Ruth; Busby, Jerry (Lancaster University)
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Risk Migration – where next?
It is a common experience that attempts to mitigate one risk lead to new risks, and that risks formerly thought to be of one kind become another kind, as scientific and technological knowledge evolves. This phenomenon of risk migration suggests we should be taking processes over time, rather than specific risks or specific technologies, as a unit of analysis. An exploratory analysis of risk migration processes using brominated flame retardants (Alcock and Busby 2006) suggested migration processes lead naturally to the exchange of risks that are understood, in which risk bearers have at least some agency, for risks that are poorly understood and typically beyond the influence of risk bearers. The pilot study also illustrated how various social groups can exploit this effect, and indicated more generally how migration makes precautionary action problematic. The paucity of work on migration processes themselves, which seem central to our experience of risk, suggest that we need to look at what forms they take, what drives them, and what consequences and by-products they produce. The unit of analysis needs to be a connected process over time, rather than a specific risk as it appears at one point in time, or a single technology isolated from the other technologies with which it is related. We are therefore conducting a full-scale longitudinal investigation to characterize risk migration processes so that we can better understand how scientific knowledge co-evolves with industrial decision making and societal response over time. The historical nature of the study over periods of decades has suggested that the process of chemical substitution for supposedly safer alternatives has in retrospect been relatively linear. However, a legacy of 'loose ends' appears to have been left in which chemical regulation based on decades of risk assessment studies at the European scale is now being questioned by some Member States. Looking forward it is difficult to see how issues will migrate in the future and where and who the risk bearers will be.

MO-VI-7
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The shaping of the precautionary principle in the EC and the WTO.
The invocation of the ill-defined Precautionary Principle by States in order to limit import of goods from other countries is one of the most challenging legal issues currently facing the world trade system. In this paper I will concisely summarise the current state of play in the European Community and in the WTO. As it will be shown, this exercise is particularly interesting in view of the recently released Biotech panel report by the WTO. In particular this paper illustrates the case law developed by the EC Courts and the WTO judicial bodies in shaping the controversial precautionary principle allowing the adoption of protective measures in situations of scientific uncertainty. On the one hand, EC Courts did not simply lay the ground for the recognition of the principle in the EC legal order, by turning a mere state of mind into a general principle of Community law, but they also defined its procedural requirements of application. On the other hand, WTO judicial bodies, although more reluctant in getting enmeshed with the principle, are also contributing to shape its scope and conditions of application.

MO-V-5
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The perception of risk society in Thailand.
Thailand is now facing many challenges including social, economic and political problems. During the administration of Prime Minister Thaksin Shinawatra, a number Thai people enjoyed his populist policy changes in the fields of public health, education, anti-drug, and social welfare. At the same time however, Thaksin's government has also been frequently accused of corruption, criticized for its engagement in projects creating conflicts of interest, and violation of human rights. After Prime Minister Thaksin announced a House dissolution on February 24, 2006, Thailand's political impasse accelerated to a crisis. The research was conducted during the climate of political uncertainty in Thailand (March – September 2006). The research objectives were:
1) To examine the perception of risk society among Thai people during the recent modernization era under Thaksin's administration;
2) To explore media influence on risk perception among Thai people;
3) To define "safe society" in Thai social context.
The research adopted a qualitative approach using focus group interviews. The sample comprised 312 people in four main rural regions. The data were collected through purposive sampling.
The research found that the perception of risk society among Thai people varied according to their socioeconomic and cultural backgrounds, with distinctive differences among the four

groups of samples. The top ten social risks mentioned by the samples were those associated with: health, economics, food, education, family, crime, housing, employment, moral, media and technology. The research results showed that, in the midst of modernity, Thai people are still at risk with various social problems. Significant research results were:
1.) The Perception of Risk Society among Thai People. Characteristics of risk perceived by Thai people are largely external risks or manufactured risks such as risks of food, health, economy, employment, drugs, and technology. However most people gave priority to risks at a micro level rather than macro. Micro level risks having direct effect to their lives and families were, for example, food, health, education, housing, employment, drug and crime, and technology. However different types of risks affect different people in different ways.
Risk perception among participants can be explained by both Psychometric Approach and Cultural Theory. According to Psychometric Approach, most participants used availability heuristic to evaluate risks. On the other hand, cultural theory also plays and important role in explaining risk perception in this study.
2.) The Influence of Media on Risk Perception. The research found that participants received information about risk from the mass media, as well as interpersonal communication. Television and newspaper were major sources of risk information.
3.) The Definition of "Safe Society" in Thai Social Context. The researchers concluded that Thai people perceived "safe society" as: "The society where its members can live their daily lives without fear of lacking/instability in food security, family, housing, communities, and environments. The people were provided equal opportunities and extensive means to access health and education services. They had secured employment and adequate income in order to live their lives on the "sufficiency economy" concept. Their perception of a safe society should be risk- free from natural disasters, accidents, violence, drug and crime. The people should be offered/ provided with media literacy and protected equally by law and political rights. Society should be magnanimous, its members upholding high morale and values, appreciative of religion, and noble-minded.

MO-IV-4

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Ratio bias in clinical risk perception: When 1 in 200 is riskier than 5 in 1000.

Several studies investigated individuals' perception of the same probability communicated using ratios with different numerators and denominators. A well-known finding is the ratio-bias phenomenon (see Miller, Turnbull, & McFarland, 1989; Denes-Raj, Epstein & Cole, 1995; Epstein & Pacini, 1999): individuals tend to perceive greater the probability of a given event when presented in the form of larger (e.g., 10 in 100) than smaller (e.g., 1 in 10) ratios. In traditional ratio-bias experiments participants are asked to make a choice (e.g. deciding from which jar out of two to withdraw a ball), the probability associated with each option is p = .01 or larger and it is conveyed using small denominators (e.g. 10 and 100). The present study, instead, used a single option evaluation task, a much smaller probability (p = .005) and larger denominators (i.e., 200 and 1000). These differences in design aimed both at increasing ecological validity and at generalizing results to the physician-patient communication domain. We conducted three experiments using different samples (N = 164 pregnant women, N = 127 normal population, and N = 58 clinicians). Participants were asked to report their perceived level of the probability of contracting malaria [or hepatitis A] during a trip in Kenya in an hypothetical scenario. Probability was communicated to half of the sample using a small ratio (1 in 200) while to the other half using a large ratio (5 in 1000). Results revealed an inverse ratio-bias phenomenon: probability was judged as significantly higher when conveyed in the form of "1 in 200" than in that of "5 in 1000". The bias was present both in pregnant woman and in normal population, but not in clinicians. Since lay people are better at understanding (picturing) probabilities expressed with smaller than larger ratios, we suppose they could consequently judge them as larger.

TU-IV-6

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New concept of a cooperative landslide risk management.

Landslides cause severe economic damage and fatalities in many parts of the world. The consequences of single events could be significantly minimised if the development of a risky situation would be known in advance. Unfortunately, landslide early warning systems are only available either as expensive technical systems for single slopes or as regional systems giving information that a landslide in a region will occur. The latter does not provide information which slope will be affected. Thus, effective counter measures are limited.
Due to these limitations in existing early warning systems, a new concept of a cooperative landslide risk management is developed. Since large landslides in most cases show some indications that a catastrophic failure will occur (e.g. opening of cracks), the approach is based on gathering such specific information, so that effective counter measures can be organised. The concept involves local people who regularly visit potential landslide areas for other reasons and if trained could recognise changes like the opening of cracks in time (e.g. foresters, road administration, railway companies, building authorities, hiking clubs, residents, etc.). A cooperative system ensures that information is collected by local experts, checked on its reliability and forwarded to the Geological Survey who in risky situations can investigate the slope in detail and implement necessary risk reduction measures in cooperation with local and regional authorities.
The applicability of the developed concept is partly supported by the results of qualitative interviews. The concept has the potential to be transferred to other risky and local phenomena.

TU-IV-5

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Responding to multiple, qualitatively different hazards: exploring how perceptions of risk mediate response and influence priorities for action.

In 2004/5, 970,000 adverse events involving hospital patients were recorded in the UK. This paper presents some findings from the pilot for a PhD study of NHS staff which examines their perceptions of risk in relation to patient safety, and how they make decisions about relative importance and urgency.
The organisational focus for this research is an NHS acute hospital. Qualitative case study methods include observation on 10 randomly selected wards, in-depth recorded interviews with medical, nursing and managerial staff (around 100 respondents), and examination of historical and contemporary documentary material.
The data suggest that at any particular time individual staff can identify a number of actual or potential hazards to patients. However, they simultaneously perceive a number of other threats with salience for themselves, other staff, or the organisation. Whether threats to patients are given priority for action appears not to depend solely on the perceived magnitude

and urgency of the risks posed by these hazards, but also on many factors unrelated to patient welfare. These factors may include:
- differences between individuals in ethical attitudes to patient care
- organisational and personal pressures to complete tasks
- reluctance to risk displeasure by confronting colleagues with bad practice
- failure to apply knowledge of hazards to specific real-life situations
- variations in the salience of particular hazards to patients because of media pressure and public concern

Response to a particular hazard may thus be modified by other perceived threats in the environment. The challenge for management is to determine ways of ensuring that patient safety is appropriately prioritised.

MO-V-7

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Climate change: Perceptions and adaptation among Swedish private forest owners.

There has been a widespread debate on climate changes during recent years. Predicted climate changes for Sweden are of a magnitude to affect the forests and to provide new opportunities as well as enhanced risk to forest owners. About half of the Swedish productive forest land is owned by non-industrial private forest (NIPF) owners. Their motivations for owning a forest estate are often multiple and divers, such as monetary and the forest as a social space. Consequently, several values may be at risk. This study seeks to improve the understanding of Swedish NIPF owner perceptions of climate changes and if, how or why they have not adapted their forest management. The study was based on the responses to an enquiry made among 1950 NIPF owners in Sweden in 2004. Preliminary results indicated that 76% of all respondents believed that the climate was changing to an extant that would affect the forest. A majority of these saw climate changes as mainly negative from a financial perspective. Nineteen percent had taken measure to adapt their forest management. The fraction of NIPF owners who had taken measure was larger in southern than in northern Sweden. Among those who had not taken measure to adapt, 10% believed that the climate was not changing, 23% had not thought about climate change in relation to their own forest management, and the remaining 67% motivated having not adapted by uncertainty in different ways. The splitting of respondents into groups made it possible to discuss the results with respect to differences in life contexts and experiences. The results were discussed with respect to useful decision support to Swedish NIPF owners, and the value of information on the adaptation process.

TU-VI-6

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A VOSL constituent of flood risk management in the Netherlands.

In this paper, we shall address the concept of value of statistical life (VOSL). As the expression of personal or societal valuation of the marginal increase in safety or decrease in risk exposure to a particular negative event, is one of the issues tha has been addressed in a number of fields, like transport safety (for example De Blaey et al., 2003), where reliable evaluations have been obtained. Yet, VOSL is not extensively studied in the field of natural hazards. Here, reflecting immaterial damages, it can take a place among other damage categories in flood risk assessment and management in the Netherlands.The unique position of the Netherlands with regard to water management and flood protection has a number of implications (or, possibly, complications) for our inquiry of VOSL. The challenges that we are facing are related, first, to flood protection being a public good, which means that there is ample potential for a free-rider problem; second, to the determination of probability of a fatality due to flooding. With respect to the latter, uncertainties exist, inter alia, in determination of the probability of a flooding event and the probability of fatality if a flood takes place, together with possibilities for flood warning and evacuation, all of which are in fact location- and event-specific. Besides, high (yet, changing) protection levels safeguarded by the state for dacades, have created a general feeling of 'perfect safety' among the Dutch population, which may lead to a number of biases in a stated preference (SP) study that we are aiming at. This implies that novel way of designing an SP study has to be found.

MO-IV-7

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Psychological essentialism as a cause of opposition towards genetically modified foods, plants and soil life.

New developments in ecological genomics (ecogenomics) provide people with new ways in which they can learn to understand and appreciate their natural environment. Also, based on this advanced technology, innovators may create more natural devices for the measurement and treatment of soil, which can be applied to problems as land rehabilitation or sustainable agriculture. However, given the many objections against the unnaturalness of genetically modified organisms, it is important to gain more insight into the conditions that shape people's judgments on the naturalness of ecological genomics. The hypothesis explored in this paper is that many people have a particular problem with the unnatural character of genetically modified organisms as a result of psychological essentialism, i.e. the tendency to essentialize biological kinds, such as "worms", as if they have an underlying reality that is uniquely responsible for the typical characteristics of the kind. Psychological essentialism starts at young age, is not easily abandoned and may limit a person's ability to understand the dynamic and open-ended trajectories of nature. If essentialism is activated and is not being overruled by second thoughts, people may impulsively adopt positive attitudes towards the naturalness of organic food and negative attitudes towards the unnaturalness of genetically modified organisms. Using a survey among Dutch citizens (n= 939), I examined people's responses to a number of biotechnological innovations. In addition, I put these data in the perspective of responses in other Western European countries by including multinational data from Eurobarometer 63.1. The multinational and national data showed that cultural and psychological conditions that activate psychological essentialism resulted in stronger negative judgments about biotechnological innovations at the level of food, plants and soil life. Also, innovations meant to restore something that humans had destroyed in the past were rejected less often than innovations pretended to improve nature. These results are in agreement with the hypothesis and contribute to our understanding of risk communication in the context of the many innovation cycles that flow from developments in the life sciences.

MO-V-5

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Mental models about global change events.

The present paper investigates lay mental models about global environmental risks. It is assumed that such models are structured according to five causally connected levels: attitudes, behaviours, pollution, environmental changes, and negative consequences. The present study pursued four aims: (a) describe lay causal mental models of global environmental risks, (b) compare lay models with an expert model, (c) test whether lay models are structured according to our hypothesised causal levels, and (c) relate mental models to risk judgments. Mental models were elicited by a cognitive mapping technique in which participants indicated which causal links they perceive between 25 provided causal terms. Network analysis reveals that lay models tend to be simple and unconnected. They are significantly less complex than an expert model derived from the climate change literature. A cluster analysis shows that the postulated causal levels constitute structurally equivalent causal terms in lay mental models. Furthermore, overall risk judgments can be predicted from structural properties of mental risk models. The results generally support a model of the risk perception process that assumes risk judgments to be based upon causal mental models about the causes and consequences of risk events.

MO-VI-5
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Avian Flu: An investigation into peoples' perception of risk and motivation to seek Avian Flu related information.
We are living in a risk perception society where what is important is not whether the number or nature of risks have increased in their seriousness, but that people believe that this is so and act accordingly. The study is conceptualized at a time when outbreaks of Avian Flu flared in parts of the world infecting millions of chickens with the H5N1 (Avian Flu) virus, infecting humans and considerably disrupting social and economic life in these outbreak regions. Given the potential pandemic character and the danger Avian Flu is presenting to individuals, individuals need to inform themselves about the nature and potential risk of Avian Flu during the various risk stages in order to maintain and protect their health. The study assesses the Avian Flu risk by focusing in an audience-based approach on the more subjective factors which appear to come into play in individuals' perception of risk and motivation for their subsequent information needs. In a timely effort to understand what motivates people to attend and actively seek information about Avian Flu, this study applies the Risk Information Seeking and Processing model (RISP) to explore how international students perceive the Avian Flu risk for themselves and others, what promotes their needs for information, and how this relates to their information seeking behavior. A sample of 138 subjects completed the self-administered online questionnaire. Multiple regression analysis confirmed that information needs promotes intentions to seek additional information. Affect, in particular worry about themselves or family and friends in potential outbreak areas was associated with active information seeking and processing, as well as with salience. Lower self-efficacy and levels of trust in institutions as well as peoples' feeling of seriousness were found to increase the perceived desire for information. The amount of current knowledge and risk perception, however, showed no significant relationship to the need for additional Avian Flu related information.

MO-V-4
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Anger, efficacy and behavioral intentions in regard to river flooding.
Large scale natural disasters such as the flooding damage inflicted by Hurricane Katrina or the Tsunami catastrophe in 2005 can command the international spotlight. In their wake, media attention often focuses on what could have been done to limit the damage and loss of life, what should be done to limit the risk of harm from similar events in the future, and which individuals or agencies are responsible and perhaps blameworthy. Even people not personally affected by the disaster can direct anger at public officials and agencies seen as being at fault for bad outcomes that could have been prevented. Based on data from a two-wave, panel-design, sample survey, this study explores how local residents reacted to damaging flooding in the Menomonee River region of the greater Milwaukee area in Wisconsin, United States. In an effort to understand what motivates people to take various actions in the public sphere in response to the flood risk, the study correlated measures of efficacy and anger with respondents' intentions to take various actions. Consistent with Weiner's (2000) assertion that anger leads to social activism, the study found that anger correlates positively with intentions to give time or money to a citizen's organization concerned about the flooding, contact government officials about the matter, attend a public meeting about it, and even vote for flood control legislation. Efficacy correlates positively with all of these measures except the last.

TU-V-6
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Societal risk on a map: an area specific approach to societal risks.
Dutch legislation on societal risk and land use planning In the Netherlands the "societal risk" is an important criterion in the evaluation of external safety in the Land use planning process. The concept of societal risk is however difficult to comprehend by authorities and land use planners. This can, at least in part, be attributed to the fact that the societal risk is not a single figure that can be displayed as a contour on a map, but rather, is shown as a xy-graph without any geographical (area) information. The VROM-Council and the Advisory Council for Transport, Public Works and Water Management therefore identified the need for a cumulative, area-specific societal risk or some other way of measuring the risk of social disruption. Area specific approach TNO developed a concept for an area-specific approach to societal risks. This approach considers the risks from the perspective of the risk receivers. From the perspective of the risk-recipient it is considered to which risks one is exposed and what the extent of the risks is. Results can be visualised on a map. The area-specific approach proposed by TNO uses two kinds of maps: the societal risk map and a map with high-risk hot spots. Conclusions The method was applied to some example situations and case studies and tested in several workshops with potential users. The results of these workshops were very promising. The visualisation on a map provides a supplementary view on the problem and is compatible with the methods used by spatial planners. The area-specific approach to societal risk makes it possible to determine the cumulative societal risk in an area and may disarm the criticism that it is unjustified to use the same guide value for a major establishment and for an LPG filling station.

TU-VI-7
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Risk management for regulators.
At the end of last century, a few catastrophes shocked The Netherlands. A fireworks factory exploded and a fire in pub killed 14 young adults, 180 were seriously wounded. Conclusion:

lack of control. Society bid for more enforcement. During a few years governmental regulators could grow in importance, but they continued in doing more of the same. Only a few years later, political interest gave a backfire: the Parliament asked the Regulators to give evidence of the effectiveness of their work. They could not convince. More over, due to an economic recession, companies complained that they suffered from unnecessary supervision and contradictory rules. The Government promised to cut down the administrative costs with 25 % and to lower the inconvenience of controls by Regulators. The Government developed an overall policy for national regulators. They have to be selective, decisive, cooperative, transparent, professional and independent. Smart IT-solutions have to be used. A lot of initiatives started, most of them are still in process. Regulators developed guidelines for risk based inspection and started to create front offices for companies in the same supervisory domain. The Transport and Water Management Inspectorate developed instruments to make their work more effective. One of them is risk analysis. In May this year a plan for risk-based inspection in 2008 will be presented to the Minister of Transport, Public Works and Water Management. The presentation for SRA will put focus on the characteristics of inspectorates (e.g. the Transport and Water Management Inspectorate) in making risk analysis. Examples will be given on air-transport, sea-transport, road-transport (busses or goods): fault-trees, major hazards, LOC's. Problem will be placed in political and societal context. Bridges will be built between: · Inspectorate and its supervisory domain · (inter-) national inspectorates: experiences with front offices and sharing data between sister-inspectorates in Europe.

TU-IV-7

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Stakeholders perspectives about innovations in personalized nutrition: About evidence, roles and responsibilities.

In this paper we draw on discourse analytic methods to analyse how Dutch stakeholders in health education, health care, science and industry make sense of innovations in the field of personalized nutrition, and their own role and significance in an early stage of technology development. Collaborative efforts are known to be beneficial for the integration of innovations in society. Research has focused on a range of success and hindering factors relating to collaboration between stakeholders, and to the development, management and implementation of joint programs. However, no attention has been paid to how potential participating stakeholders of joint programs themselves handle issues of responsibility and initiative in relation to early technology development, and the goal(s) of collaborative interactions.

This paper draws on semi-structured interviews to highlight a set of different interpretative repertoires that Dutch stakeholders use to manage their roles and responsibilities in the innovation process, involving both nutrigenomics applications and ICT. It is shown how participants establish themselves as gatekeepers of innovation by displaying experiential authority on what consumers 'want' and 'can't', and at the same time avoid a pro-active role in collaborative interactions. Uncertainty in scientific knowledge, fixed roles and responsibilities and dependency from incompetent or biased others are drawn upon to account for a wait-and-see policy.

These findings show that uncertainties, flexibility in roles and a coming together of different expertises, which are characteristic of early stage involvement, are treated by stakeholders as threatening their 'Evidence-based' status. When not addressed properly, these accounting practices may create serious barriers to stakeholder involvement in personalized nutrition.

MO-V-6

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Safety and risk at the firing ranges.

In a literal sense any activity involves a certain degree of risk. Military activities are usually by their nature associated with higher risk than civilian ones. Safety templates define an area in which the risk of being injured exceeds that which is acceptable.

Individual risk is the danger to which an individual person is subjected. There is no established standard for acceptable risk in firing rangers. Some armies have stipulated acceptable probabilities for individual risk for the various categories of personnel concerning the storage of ammunition. These apply to serious injuries on an annual basis:

a) persons who are actively participating in the actual activity: $4.10^{-5}.year^{-1}$,

b) persons linked to the institution in which the activity is taking place: $3.10^{-6}.year^{-1}$,

c) all other personnel: $2.10^{-7}.year^{-1}$.

Collective risk is risk seen from a social point of view. It expresses a probability of someone or other being injured due to firing range activities, without regard to how this risk is distributed among the population. In somewhat simple terms it can be defined as the sum of all individual risks firing comprises. If a certain level of individual risk is triggered for large population groups, the collective risk may become unacceptably high.

The American space authorities demand a maximum annual collective risk of 10^{-3} for the civilian population. A corresponding figure for the activities in firing rangers would appear acceptable. The collective risk associated with an individual firing must thus be seen in relation to the annual extent of all activities in the firing rangers. A collective risk per firing exercise of 10^{-5} is the benchmark.

A safety zone can be reduced if it can be show that both the individual and collective risks provide a basis for this. Should the safety zone extend outside the boundaries of the firing range, an assessment must be made of the probability of the people, who are outside of the firing range but within the safety zone being injured. Such an assessment of the individual risk must be based in the following data:

a) Probability p that the ammunition will end up outside ranger's outer boundaries. As a rule such an incident is caused by some form or other of technical failure in the ammunition, e.g. locking of guidance system, loss of communication, etc (equation). An assessment of the p of an incident occurring must be based on a thorough technical assessment of the functional chain, or on data from the manufacturer or supplier: $p = (p_1 + p_2 + p_3) \,.\, p_4$

where p_1 is probability of the ammunition occurrence with technical failure (e.g. with failure of the guidance system), p_2 probability of communication loss, p_3 probability that the wrong target will be aimed and p_4 the probability the area A_X will be hit ($p = A_X \,.\, A_T^{-1}$ and A_T represents the total area of safety zone). It is necessary to state, that equation can differ for various types of ammunition.

b) Area A_X of the territory that extends outside the firing range but is within in safety zone.

c) Ammunition's area of damage A_S. The effect of type of ammunition can be described with the aid of an area of damage (vulnerability). This is the area that the ammunition "destroys" when it hits the target. Examples of areas of damage with respect to standing personnel for various types of ammunition will be presented at the meeting.

The individual risk $R_{(i)}$ can be determined using the following formula: $R_{(i)} = p \,.\, A_S \,.\, (A_X)^{-1}$

The calculation of collective risk is based on individual risk and the size of population within the safety template. The size of population is not necessarily the number of people who live in the area, rather it is the number who are expected to be in the area at the relevant time. The collective risk $R_{(c)}$ can be calculated using the following equation: $R_{(C)} = R_{(i)} \,.\, N$

where N is number of people, who occur within the safety template.
Given that the limits for annual collective risk are going to apply to all activities in the firing range, the value one calculates for an individual exercise shall be regarded as a contribution to the total annual risk.
It is necessary to consider the following environmental conditions in the process of the risk assessment in relation to firing:
a) line of sight, b) wind, c) temperature and air pressure, d) vegetation, e) snow depth, f) height above sea level.

MO-V-6

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Comparison of methods for societal risk appraisal at industrial sites.

Many industrial sites accommodate both hazardous and non hazardous industrial facilities close each other. Hazardous substances produced, transported and stored in the whole area pose risks, which are increased by potential effects propagation. To support decision about land use and new installations, Quantitative Area Risk Analysis QARA should be considered; but it wastes large time resources in finding and harmonizing all required data. For this reason a preliminary screening of the area, by means of simpler and faster methods is recommended.
This paper presents the assessment of individual and group risks in an Italian industrial district, which includes a large oil refinery, a huge steel establishment, a few oil and LPG storage facilities, several non hazardous installations (cement and mechanical), a large industrial and commercial harbour, highways and railways. Furthermore some new hazardous installations have been proposed. Residential districts are far from hazardous installations; but thousands workers are always present, as plants are operated h24.
Analysis has been based on statutory safety reports, provided by establishment operators to comply with Seveso Directive. As a first step, a quick method, based on the “worst cases” method, has been applied. It supplies both a synthetic measure for the area risk level and an evaluation of the area boosting level, defined as the further effects overlapping the ones deriving from each single source.
For the complete assessing of individual and group risks, TNO RISKCURVES has been adopted. The results of the two methods have been integrated: the quick analysis is useful to address land use policy; but the application of the complete method is essential to support decisions about industrial installations and infrastructures. Furthermore RISKCURVES capabilities have been exploited for a basic sensitivity analysis.

TU-VI-6

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Dealing sensibly with human health risks – risk management options for policy making.

Desirability and fairness of (equal) protection of civilians from health risks of environmental exposures is increasingly balanced against efficient use of (limited) public expenditure to reduce these risks. Various aspects play a role in those types of policy assessments, including size and nature of health effects, cost efficiency, cost benefit ratios and public perception and acceptance of risks. In response to and in line with the Agency’s first scoping report on this issue – ‘Dealing sensibly with risks (De Hollander and Hanemaaijer, 2003)’, the Dutch cabinet has recently adopted this new human health risk policy concept and has agreed to apply it to burning issues at all policy domains dealing with human risks. Currently, the Agency is preparing a second report, including a further inventarisation of a large number of (non-)environmental risk factors and a detailed analysis on a triptych of risk evaluation metrics: quantified physical and perceived health risks, and costs of control (risk reduction) measures. Special attention is given to cross-analyses of cost-benefit ratios and of similarity of ranking of risks metrics. Risk and safety examples that are analyzed in detail are: air pollution/PM10, aviation and airports, noise, soil pollution and sanitation, industrial and transport safety, risks of flooding, and substances. The report also includes an analysis of uncertainty issues surrounding dealing sensibly with risks and policy options. The results of all these analyses will be presented. Furthermore, the ‘dealing sensibly with risk’ concept will be considered in a wider perspective of transitions in risk analyses and risk management and decision making.

TU-VI-6

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Using a cost-benefit analysis to select the optimal flood protection measures for the Scheldt basin.

he Scheldt originates from France and flows through Belgium and the Netherlands. The tide creates important flood risks in both Belgium and the Netherlands. The riparian states Belgium and the Netherlands agreed to develop a long-term strategy for a more safe, natural and accessible river, considering sea level rise. For this purpose, Flemish and Dutch governments commissioned a cost-benefit analysis of flood protection measures.
Measures evaluated include storm surge barriers, dike heightening and floodplains with or without the development of wetlands. Some of the measures affect flood risks in both countries. As policies concerning the limitation of flood risks differ significantly between the Netherlands and Belgium, distinctive methodologies were used to estimate the impacts of measures on flood risks.
Policy within the Netherlands stipulates that a minimal protection level along the Scheldt against storms with a recurrence period of 1 in 4000 years is required. It was estimated at which point in time further dyke heightening would be necessary as protection levels are presently decreasing due to sea level rise. Impacts of measures (safety benefits) consist of delays in further dyke heightening.
A minimal protection level is not required in Belgium. A risk based approach was applied by calculating impacts on flood damages at different levels of recurrence and this at the base year (2000) and in case of a sea level rise of 60 cm in 2100.
The results illustrated the importance of sea level rise. Flood risks increased 5-folds when a sea level rise of 60 cm was applied. As current protection levels are much lower in Belgium the large majority of the safety benefits can be reached in this part of the basin. A risk based approach combining dike heightening and 1300 ha of floodplains results in comparable safety benefits as a large storm surge barrier at half the cost. The uncertainty analysis showed that the ranking of flood protection of measures is rather insensitive for variation of the main parameters as discount rate, economic growth scenarios and lifespan of the measures.

TU-VI-8
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The use of inverse methods for chemical accident source assessment.
When a major chemical accident occurs, only uncertain and inaccurate data are available for decision makers, which make difficult the diagnosis of the situation. Moreover, the initial conditions are badly or not completely known, but they are essential to catch a global view of the event and to forecast its evolution. In this study, we propose a source assessment method that consists in associating a genetic algorithm with a physical model in order to calculate the data necessary to assess major accidents consequences such as chemical dispersion, explosion and fire. The accident source assessment from the observation of its consequences is called “inverse problem”, because it consists in using classical models (like dispersion models, explosion models or fire models) in the inverse way they are usually used. Different approaches are used to solve inverse problems, like the models inversion and iterative methods (simulated annealing, gradient method …). In this study, one of the chosen solutions is to use a genetic algorithm associated to a physical model. The method has been developed with the aid of artificial data generated by a stochastic process. Subsequently, the developed method has been applied to solid explosions for which it is necessary to precisely calculate the explosive mass that have detonated. The method has been compared with a reference method that is used by INERIS for accident expertise and it has been validated with previous accidents: the explosion of AZF in 2001 (Toulouse-France) and the accident of Billy-Berclau (France) in 2003.
In terms of precision, the two methods provide us with similar results for the mass calculation. The benefit of our method is its ability to solve problem with more than one unknown parameter, e.g. the explosive mass together with the location of the epicentre of the explosion which could not be possible with methods usually used.

TU-VI-8
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Safety distances for physical explosions of LNG releases on water.
Massive offshore storage of fuel let international community arising questions about the hazards on people and other installations either onshore or on-board. Among the different possible accidental scenarios, when a cryogenic gas such as LNG, is spilled on water at a very fast rate, the phenomenon of Rapid Phase Transition (RPT) may occur. The prevalent theory for RPT is the superheat theory related to direct liquid/liquid (LNG/water) contact. Following this theory, rapid evaporation let available large amount of energy and explosion behaviour is likely. Furthermore, RPTs were also found to increase the distance corresponding to the lower flammability limit (LFL) by as much as 65% due to the increase in the expansion rate [Luketa-Hanlin, 2006]. These two effects are analysed in the present study, and results are compared with the indications given in a recent guidance by Sandia National Laboratory (2004), which assessed that significant impacts to public safety and property from accidental spills may exist within 250 m. Furthermore, as expected, the experimental tests reported in the same guidance clearly indicates that RPT explosive behaviour is linked with spill rate and water temperature. In the present paper, the effect of those two parameters has been investigated by means of acoustic theory at least in the far field. To this regard, special attention must be devoted when applying this theory in the near-field where, due to density differences, deviations from ideal acoustic assumption must be taken into account.

MO-IV-6
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Policy changes in high seas search and rescue operations: Why Gilligan may never get off that island.
This paper takes a multi-disciplinary approach to examining the reasons for policy changes in the UK Maritime and Coastguard Agency’s (MCA) Search and Rescue Operations (SAR). Since 1994, there have been a number of reviews of the effectiveness of SAR operations coordinated by the MCA, culminating in the decision in 1999 to close a number of the Maritime Rescue coordination centres. One of the main justifications given for the proposed closure programme was to provide greater exposure of Watch Keeping personnel to a wider spectrum of incidents. However, a report from the Committee of Public Accounts expressed concern that without remedial action, ‘local knowledge’ would be lost if the closures went ahead. We use an amended version of the Hood, Rothstein and Baldwin (2001) framework to consider the explanatory forces behind the policy changes. We will test three separate (but overlapping) hypotheses to examine what explains risk regulation. The first hypothesis considers the technical nature of the risk; the second considers the role of the media and civil society; and the third considers the role of organised interests. The role that civil society—through fora such as the media—plays in influencing policy decisions in SAR will be examined. Moreover, we will consider the roles the union, management and politicians played in influencing the debate and its eventual outcome. While no one hypothesis provides an authoritative explanation about how risk policy decisions are taken with respect to SAR each provides insight into different constraints and opportunities that shape the debate.

MO-VI-4
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Trust and risk communication in High-Risk Organisations: A test of the negativity and confirmatory biases.
Research on social risk has robustly demonstrated trust asymmetry, whereby information about negative events reduces trust more than positive information increases trust. In contrast to social risk, relatively little research has explored the effect of positive and negative information on trust within high-risk organizations. Despite this, some scholars have suggested that in order to increase organisational trust, managers should communicate openly with workers. However, the findings from social risk studies suggest that open communication might have the reverse effect and lower trust, due to the asymmetrical effects of negative information. To test this, we explored the effects of positive and negative risk information on workers’ trust. Specifically, we were interested in determining whether or not positive and negative risk information had an asymmetrical effect on worker trust. We also wanted to explore whether any such effect was due to a general bias towards negative information (Negativity Bias) or caused through a consistency with existing beliefs (Confirmatory Bias). To our knowledge, this is the first study to apply hypotheses from social risk to risk within organizations.
Data were collected from 393 student nurses using an experimental questionnaire survey. The questionnaire measured participants’ trust beliefs (i.e. perceptions of the hospital

management's trustworthiness) and trust intentions (i.e. future intentions to trust the hospital management) towards a hospital before and after information (positive or negative) about the risk of violence and aggression from the general public – one of the foremost occupational health and safety risks to UK nurses. The results showed that risk information affected nurses' trust in the organization asymmetrically – negative information had a stronger effect on reducing trust than positive information had on increasing trust. Further, these effects were stronger when risk information was consistent with nurses' prior attitudes, and when the focus was on trust beliefs rather than trust intentions. The implications of these findings for social risk management and organizational safety communication are discussed.

MO-VI-6

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Analysing complicity in risk.

We increasingly inhabit a culture in which harm is no longer seen as inevitable (Sjoeberg, 1987), accidents no longer exist (Penning-Rowsell, 1996), and natural dangers are transformed into decision-based risks (Luhman, 1993). This seems bound to produce risk managers whose central concern is risk to their own reputations (Power, 2004) and a public increasingly disenchanted with their efforts.

A potential antidote is to place more emphasis on the way many social groups are often complicit in risks (Beck, 1992). Analysing this complicity should provide a more holistic understanding of the interconnected responsibilities and agencies that tend to be downplayed in current risk assessment processes (Jasanoff 1998). If it is true that risks generate anger not fear (Douglas 1986) then understanding complicity is as important as understanding probability.

This paper describes a framework for analysing complicity. It is based on a broad definition that allows for multiple types and degrees of complicity, and assumes that these can be put on an ordinal scale. They range from strong forms of complicity, such as direct and intentional causal involvement, through to much weaker forms, like implied consent and being a beneficiary. We show how this could inform decision processes, emphasising its use as a formative not a summative tool.

This approach is applied to a case study involving a risk assessment of maritime vessels, selected because there is a moderate amount of agency on the part of risk bearers, and we discuss its benefits and problems. The main benefit ought to be in facilitating reflection among stakeholders over their roles and the requirements they impose on others. Perhaps the most significant problem is that such an analysis could be strongly contested, not least because theories of cultural risk selection indicate that different cultural groups favour different kinds of consent (Schwarz and Thompson, 1990).

TU-IV-5

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A visual methodology for researching stakeholder risk knowledge: Supporting the discussion of complex issues in qualitative research.

In risk communication and management, there is a developing consensus that improvements can be achieved through creating greater partnership and dialogue between experts, policymakers, stakeholders and wider publics. Much work is being done on creating and evaluating participatory processes for risk management, but less attention has been paid to how to implement 'partnership' in risk communication. An exception to this is the Mental Models Approach (MMA), which provides a robust framework for integrating lay knowledge into risk communication. However, the MMA faces some methodological problems, particularly in terms of its asymmetric approach to investigating 'expert' and 'lay' knowledge. We present here an innovative methodology developed to address this concern, allowing participants with very different levels of expertise to discuss the same issue, whilst producing data that is fully comparable. We describe this as the 'fuzzy felt' method which, drawing upon educational research, as well as the use of soft modelling in management science, involves asking a small group of research participants to produce an image of (in this case) the food chain, using pens and movable paper icons representing food chain elements. Once the group has completed the task, they are asked to discuss, and note down upon the image, the main risks associated with different parts of the food chain, as well as potential mitigating actions. We find that this process supports participants' discussions, by allowing them to explore the processes of food production in greater detail than a conventional focus group protocol would allow, while imposing a minimum of structure on the interaction. We discuss our strategy for analysing the outputs of this process, which produces both verbal (transcript) and visual data. We end by presenting some preliminary findings, and exploring the potential use of the 'fuzzy felt' methodology in other research, communication and policy contexts.

TU-VI-4

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A multi-stakeholder workshop investigating the communication of uncertainty during a chemical release incident.

Risk management during a crisis situation crucially involves good communication practice between the different stakeholders involved in the incident, particularly between technical experts assessing the risks, and decision makers who must take overall responsibility for the incident. However, the very nature of a developing crisis is one with extremely high, and constantly changing, levels of uncertainty, which must also be communicated alongside any risk assessments.

We present here a study investigating risk communication in situations where Probabilistic Atmospheric Transport and Dispersion (PATD) models are used to predict the direction, extent and concentration of contaminant 'plumes' during chemical, biological, radiological and nuclear (CBRN) incidents. Using a multi-stakeholder methodology, groups of PATD model users, military and civilian decision makers, were presented with an unfolding hypothetical but realistic scenario involving a chemical release at a naval base. Participants' mental models of the problem, perceived risks, expectations and required actions were recorded as the situation developed. This process allowed differences and similarities between the stakeholder groups' responses to be identified, providing a means of investigating the communication issues that need to be addressed to improve the effectives of PATD models in CBRN incidents. The wider implications of these findings for the communication of uncertainty, and for improving interactions between experts and decision makers in organisations are explored.

MO-V-6

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Communication and ranking of risk expressions for energy systems.

The Joint Research Centre of the European Commission (EC - DG JRC), and specifically its Institute for Energy in Petten / Netherlands (JRC-IE), initiated an activity on developing a web-based communication tool, called the European Energy Risks Monitor (ERMON). The primary goal of ERMON is to provide information on comparative risk/benefit aspects of different energy technologies across their fuel/life cycle steps to a variety of stakeholder groups. Comparative analyses are based on a set of "Risk Characterization Indicators" (RCIs) that consists of 17 indicators to highlight different risk aspects. Furthermore, six additional indicators complement the RCIs by providing relevant background information including issues of risk significance and validity of information among others.
Although RCIs are mainly event-oriented, they can be used in different contexts: (1) analysis of single events, (2) comparison of events with similar characteristics, (3) comparison of different energy technologies based on aggregated values, and (4) use within Multi-Criteria Decision Analysis (MCDA), e.g. the Analytic Hierarchy Process (AHP), which involves the subjectivity of interested users.
The objectives of this paper are threefold. First, a concise overview of the RCIs and the associated ERMON methodology is given. Second, illustrative examples of accidental events are chosen from the database ENSAD (Energy-related Severe Accident Database), which since its establishment in the early 1990s has been continuously maintained and extended by the Paul Scherrer Institut. Based on this selection the applicability and usefulness of the RCIs in regard to different energy technologies is evaluated. Third, the benefits and limits of the methodology are discussed, considering potential future work to establish ERMON as an EU-wide platform to support decisions on energy-related risk aspects.

MO-VI-4
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Risk communication and behaviour change within High-Risk Organisations: The importance of a trusted information source.
To improve safety within the UK construction industry, the UK's Health and Safety Executive (HSE) have developed a number of initiatives (literature and training programmes) to address workers' attitudes and behaviour towards risk. The findings from social risk research suggest that these initiatives are likely to be effective if they are implemented by a trusted source. Of the several trust promoting factors identified within this research, concern, knowledge, honesty and accountability are argued to be amongst the most important in a risk context (Frewer et al., 1996; Jungerman et al., 1996; Peters et al., 1997; Rosati & Saba, 2004). The current study tested the generalizability of these findings to the domain of organizational safety by examining the determinants of trust in different sources of organizational risk information (project manager, safety manager, supervisor, workmate, and the UK HSE) and the relative importance of trust in changing workers' safety behaviour. Consistent with social risk research, questionnaire data from 71 construction workers identified knowledge and honesty as important factors in the development of trust towards sources of organizational risk information. The results also showed the greatest reported change in workers' behaviour following risk information given by the UK HSE – the source most trusted by the current sample. However, despite their reported influence, the HSE emerged as one of the least preferred sources of risk communication. Workers' attributed their relatively weak preference to the HSE's lack of on-site availability to give immediate risk advice. Overall, the results support the finding that risk information is effective if it is communicated by a trusted source. However, to reach optimal success, the trusted source should be in close proximity and in regular contact with its target.

MO-V-5
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Decomposing dread: Refining the nature of dread in the psychometric paradigm.
Beginning with the classic work by Fischhoff et al. (1978), the concept of 'dread' has played an important role in the psychometric measurement of the perceived risk of a broad variety of hazards. Over the last 30 years, researchers have found that dread is positively associated both with perceptions of overall risk and of the acceptability of the risks associated with particular hazards. However, it is unclear whether dread represents a primarily cognitive or affective response to perceived risk. Moreover, the fact that the classical measurement of dread confounds cognitive and affective components makes clarifying this difficult (i.e. "is this a risk that people have learned to live with and think about reasonably calmly, or is it one that people have great dread for- on the level of a gut reaction?" Fischhoff, et al. 1978). In this paper, we use the results from three national surveys conducted with Americans exploring their perceptions of risks related to agro-terrorism, avian influenza, and infectious diseases to decompose the three primary components implicit in the classical measure of dread (learned to live with, think about calmly, and gut reaction). We examine the relationships of the three dread constructs to each other, to overall perceived risk and the acceptability of risk, and to measures of self-reported and objective knowledge, likelihood and affect. Our results suggest that an experiential/ affective measure of dread is strongly associated with measures of affect and moderately predictive of overall perceived risk. However, the other decomposed dread items are only weakly predictive of overall perceived of risk or acceptability of that risk, are dependent on the type of hazard, and are at best, weakly related to each other. We conclude that a more parsimonious measure of dread should be used to more precisely capture the intuitive nature of the dread construct.

TU-VI-4
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Risk attitudes or risk perceptions?
Decomposing Attitudes towards Genetically Modified Food One of the key elements in understanding people's attitudes towards and valuation of technology risks and its cross-cultural variation relies in understanding the connection with underling dimensions of value (or benefits) and uncertainty of undesirable events (risks) with individuals attitudes towards risks or preferences. This paper examines empirically the association of risks perceptions and risks attitudes in the contests of new genetically modified technologies. In particular, we examine whether attitudes to GM food are driven by perceptions of risks once we control for risks attitudes. We undertake multivariate analysis of representative survey from Luxembourg 2005. Our findings indicate that attitudes towards GM food are only partially determined by how people perceive GM food to portray risks and largely by risk attitudes. Therefore, on the basis of this findings we can conclude that there is a limit as to what can be modified by communicating risks to the pubic.

MO-V-5
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Why do people fear mobile phone base stations? A mental model approach.

Setting up new mobile phone base stations has become a difficult task. People are often unwilling to accept base stations in their neighborhoods because they fear serious health consequences. To prevent health effects, the construction of mobile phone networks is strictly regulated and controlled by the government. Nevertheless, people distrust these measures and call for the banning of base stations outside their villages. One key question arises: Why does the risk perception of laypeople differ from that of responsible experts?
Few studies have examined how laypeople perceive the risks associated with cell phones or base stations. These studies provide little insight into the beliefs of laypeople regarding the assumed negative interactions between health and electromagnetic fields (EMF).
To fill this knowledge gap, we used the „Mental Model Approach“ to show how lay mental models differ from those of experts. Focusing on these qualitative aspects opens a pathway to the improvement of communication between laypeople and experts.
The applied methodology included three steps: First, an expert model reflecting experts' understanding of EMF was created by means of a literature review and open-ended interviews with 15 experts. This model was used as the basis for semi-structured interviews with 33 laypeople, which were conduced and evaluated in a second step. A third step used a mail survey with a representative Swiss sample (N = 765) to determined the prevalence of the different beliefs about EMF identified in the interviews. The questionnaire contained general knowledge questions, health beliefs, as well as perception and attitude items concerning mobile communication.
The results of these three steps can be as summarized as follows: The expert model allows important insights into the structure of the complex problem field. Lay interviews and survey results indicate that the general public is familiar with diverse aspects of mobile communication but shows specific knowledge gaps and misconceptions. Lack of trust in some actors and disaffection with base station location processes are often mentioned.
The resulting problems for risk communication can be illustrated with the example of base station construction. The detected knowledge gaps concerning the interaction patterns between base stations and cell phones, as well as laypeople's exposure estimations, could be responsible for the increased risk perception for base stations. Results of a Regression analysis suggest that knowledge only weakly influences risk perception. Affect, perceived benefits, and trust in actors seem to be more important predictors. Further research should address the question of whether providing specific information influences risk perception for mobile communication.

MO-VI-5
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Hierarchical, knowledge-based, and approximate models can aid prediction, assessment and communication of the lung cancer risks associated with smoking.
This presentation will introduce a new biologically-based risk assessment model that incorporates recent findings on key aspects of lung carcinogenesis and associated pre-neoplastic changes. In this example, a computational systems biology model is developed and communicated via a hierarchy of simulation-based models. A graphical user interface facilitates and simplifies risk assessment, comparison, and communication.
This model advances previous models of carcinogenesis by representing the dynamics of the early development of clonal or sub-clonal “patches” within the lung. Initially each patch has self-limited growth. The model incorporates the expansion of patches to form a “field” of further altered pre-neoplastic cells that can expand across patch boundaries (“field cancerization” of the lung); followed by progression of field cells to squamous cell carcinoma in situ and other advanced pre-neoplastic states before the onset of true invasive and metastatic tumorigenesis. We show that predictions of risk from complex simulation models may be approximated by predictions from simpler models that facilitate explanation and interpretation of the results, however models of different complexities may have very different biological implications.

MO-V-4
Daniel, Vanessa; Florax, Raymond J.G.M.; Rietveld, Piet (VU Amsterdam)
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Investigating the announcement effects in flood risk management: using the designation of emergency inundation areas as a quasi-experiment.
The use of emergency inundation areas is one of the tools dedicated to flood risk management. In the Netherlands, zones at risk along rivers are protected by dike rings. The probability of a dike break is set as small as possible and is guaranteed by the commitment to stringent norms. However, even if highly unlikely, the chance that an uncontrolled dike break occurs is real. Designating specific areas where water is allowed to flow over to prevent a dike break down stream may occur is a supplementary tool in flood risk management. The use of emergency inundation areas is meant to keep the situation under control in case of an imminent flood disaster. Discussion about the use of such zones in the Netherlands has been very animated. It was decided in 2003 to consider the use of such zones as an option to face river flood risk, but a few years later the authorities retracted this proposal. We want to investigate the reaction of households by analysing the evolution of property values a few years before proposals on emergency inundation areas had been developed and during the period of uncertainty prior to the final decision. We match similar dwellings inside and outside these areas, and compare systematically their selling prices, making use of propensity scores. We find a significant announcement effect on the average housing transaction price in 2000. It appears that a house located in the zone had a selling price about 17% lower than a similar house in the control zone. Though the final decision not to implement this decision was not taken before 2005, difference in prices then already disappears in 2001.

TU-V-6
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From risk assessment to risk management: using environmental impact assessment and its health effects chapter to manage risk – Example in rendering plant industry.
Since a law of December 29th 1996, in France, environmental impact assessment related to installations classified for environmental purposes must provide inside their application file, a specific analysis of environmental health effects. That analysis relies upon: - identification of substances which may harm human health or environment, - existence of TVR for those substances, - dose effect analysis related with sensitive targets, around the plan - existence of an additional exposure due to plant operation emissions, and if any, ways and means of managing risk. From that main frame, a specific method is currently developed for rendering plant industry where health hazards are both related with toxic substances and with biological risks related with the particular nature of that industrial activity: managing, treating and destroying animal by-products, some of them bearing microbiological pathogens agents. Presentation will describe: method developed, results already obtained and expected, use of those results in risk management inside licensing process, so on the ground of occupational safety and health as on the environmental standpoint for surrounding populations. A specific

part will encompass the way biological risks can be tackled through that method: discrepancies may appear in the way of controlling the two main folds of those risks.

TU-VI-7

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A risk mapping experiment to understand the risk representation of a professional group.

The context is the reorganisation of pressure vessels inspection service in a nuclear power plant. As a consequence of a new European regulation, a new inspection service is in charge of the prevention of the so called “pressure risk”. The inspection job was previously done by external control bodies and on a narrow list of equipments. The problem is to find management strategies that help to motivate co-workers to take account of a new internal inspection service and to understand a new, regulatory formulation of risks that they already experienced, but under other words. To find adapted risk management strategies, we need to understand how the workers understand and experiment the ”pressure risk”, and consider it compared to other risks. Thus, we used a risk mapping techniques integrating techniques or concepts from three authors: -The concept of “risk representation” developed by Perreti Watel, [4] - The typology of risks based on mythological figure, proposed by Ortwin Renn, [3] - A participatory risk mapping based on the aggregation of individual representation, experienced in Africa, by Smith & others, [1][2]. These contributions were combined to improve the risk mapping techniques already used at corporate levels of large companies, for a public accustomed to abstract definitions of risk. The experiment was successful. We eventually built a “subjective” risk map, representing the representation of professional risks and other risks by the group. We found from people explanations risk attributes that permit us to use the Renn typology; risk management options and possible added value for the inspection service were found. Eventually we found interesting observations about the various “heuristics” people used to prioritize risks.

MO-V-4

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Risk communication on human health risk due to climate change induced heat wave.

The 2006 North American heat wave caused the death of at least 225 people. Many scholars concede that recent heat waves are correlated with the global warming of the atmosphere. Concerns about heat wave vulnerability have been accentuated by the current “graying” trend and the marginalization of some socio-economic groups of the urban population of Canada since reaching them through conventional communication means has been quite difficult.

The general purpose of this research is to investigate options for improving risk communication on climate change-induced environmental hazards in urban Manitoba, Canada. Particular emphasis has been placed on heat waves. The specific focus of this research is to examine how well prepared individuals and local communities (City wards) are in urban Winnipeg (Manitoba) to deal with climate change-induced heat wave hazards, especially the elderly population. The literature suggests that recipients of risk-communication messages understand and interpret them and other deliveries differently than how senders intended. A communication gap is thus established. The intention of the research is to minimize these gaps through creating user-friendly messages and a two-way communication route between responsible authorities and community residents.

This research involves the development of a “Knowledge Model” to identify the degree of stress associated with extreme heat wave events on the population as well as to determine how local-level community capacity and individuals’ preparedness can be enhanced. Individual interviews, along with a questionnaire survey, have been conducted to analyze individual characteristics, coping and adapting processes, the levels of awareness, and belief and knowledge concerning heat waves. The findings of this research have revealed that improved risk communication could change the risk perceptions of individuals and influence initiatives to change their behavior.

TU-VI-1

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Consumer responses to communication about food risk management.

With increasing emphasis in policy circles on open and transparent communication with consumers about food risk management decisions and practices, it is important to understand what constitutes best practice in food safety management. Previous research in this area has focused on consumer perceptions of food risks, but not consumer evaluations of food risk management. In the present study, the provision of information about regulatory enforcement, proactive risk management practices, scientific uncertainty and risk variability were manipulated in an experiment that was designed to examine their impact on consumer evaluations of food risk management quality. In order to investigate consumer reactions to specific cases, three food hazards were selected (mycotoxins on organically grown food, pesticide residues, and a genetically modified potato). Participants read a brief description about each food hazard, followed by four statements where the provision of information about risk management practices was varied. Subsequently they responded to a series of questions on food risk management quality. Data were collected from representative samples of consumers in Germany (N=1796), Greece (N=1604), Norway (N=2273) and the UK (N=2279) in the summer of 2006. To assess the impact of country, hazard type, regulatory enforcement, proactive risk management, scientific uncertainty and risk variability information on evaluations of food risk management, scores on the “food risk management” scale were subjected to a multilevel linear regression analysis. The results indicate that there are cross-national differences in consumer reactions to communications about food risk management, and that these are dependent on the type of hazard involved. For example, while information about strict regulatory enforcement had a positive impact when it concerned management of the risks associated with mycotoxins on organically grown food, there was no impact on evaluations when the hazard concerned a genetically modified potato or pesticide residues. Implications for communication about risk management will be discussed.

TU-IV-7

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Involvement and trust in genomics research: Public’s perception compared to perceptions of patients and experts.

The introduction of a new technology, as biotechnology or genomics, requires public acceptance and in this process building trust is needed. Trust is a complex construct which influences publics’ perceptions of science, and is, among others, related to public’s

involvement with the subject. To gain more insight in the way involvement influences public's trust in genomics and how this influences public's perception of genomics we conducted a survey and compared different groups with each other. We expected to find that more involvement in genomics research -work related or illness related- leads to significant different (positive) perceptions of genomics and a greater level of trust in experts.
In the winter of 2006/2007, respondents were recruited via an internet panel, and 1056 Dutch respondents (general public) filled in the questionnaire. Also members of a patient group and a group of experts in genomics research were asked to fill in the questionnaire. The results contribute to the understanding of the relation between involvement to genomics, and the way trust plays a role in the perception of genomics, via interest in, the need for information and the information seeking behaviour.

TU-VI-5
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How safe it is to travel by plane? A study of risk perception on civil aviation in the Azores.
In civil aviation, as in any other area of activity, risk diminishes if it's possible to predict a specific risk situation and if there are appropriate strategies to deal with it.
Recent terrorist's attacks have revealed new risks and have changed people's idea of old risks and the extent of their harmful effects. Civil aviation was one of the most affected sectors by these attacks and that gave place, worldwide, to changes in the legislation, and security and safety norms and procedures. It also contributed to changes in people's perception of aviation related risks.
The present study, carried out in the Azores, an archipelago where the airplane transportation is crucial, aimed at knowing people's feelings about travelling by plane and understanding if there were any changes with respect to September 11th. Other goals of the study were to know: how people perceive risk on different moments of the flight; how confident people feel about aeronautics authorities; in the process of risk analysis, which sources of information people rely on mostly and why; which risks people consider more severe.
Even though the data analysis is still in progress at this moment, it is already possible to bring up some results which appear to follow certain trends. More than 80% of the participants agree that the September 11th attacks brought changes in the civil aviation, increased the number of risks perceived and the feelings of insecurity expressed by people. Regarding safety in the different moments of the flight, results appear to indicate that people feel considerably safe during the entire flight. In line with results from other studies, respondents tend to consider less severe those risks that are closer and more directly related with their history, community and daily lives, like flying, living in a seismic/volcanic area and termites plagues. Other risks, apparently not so present in the Azorean daily live, like climate changes and living near an industrial unit, were considered to be more serious risks. The majority of the study participants considered important the improvement of safety procedures in civil aviation.

MO-VI-4
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Perceived risk and recall for risk information in induced emotional states.
There has been a recent resurgence of interest in the connection between emotion and risk (Slovic, Finucane, Peters & MacGregor, 2004; Fessler, Pillsworth & Flamson 2004). Much of the previous research has focused on a valence based approach to emotion when examining risk (Isen & Patrick, 1983; Johnson & Tversky,1983), the current research adopts a basic emotions approach to explore the role of emotion in risk perception and communication. The first study examined the effect of five different basic emotions on perceived risk, it was hypothesised that specific basic emotions would influence perceived risk. Participants were tested on a group basis and emotion was induced using a short emotive film clip for each emotion (fear, anger, disgust, sadness and amusement). Perception of risk was measured pre- and post-emotion induction using the Domain-specific Risk-attitude Scale (DOSPERT), Weber, Blais and Betz (2002). The emotions of fear, anger and disgust were found to decrease perceived risk. A second study was conducted to understand the effects of fear, anger and disgust on recall of a risk communication. This study involved the same emotion induction technique as the first study. The emotions of fear, anger or disgust were induced, participants were then asked to read a medical risk communication and then to perform a recall task. Preliminary findings suggest that induced fear was found to significantly increase recall for risk communication information when compared to induced disgust. Additional research is underway to further clarify these findings.

MO-IV-7
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Regulating the coexistence of GM and non-GM farming: The missing link in the EU regulatory regime for agricultural biotechnology.
The creation of a comprehensive regulatory regime for agricultural biotechnology in the EU has proven to be a lengthy and arduous affair. Following the disintegration of the initial EU regulatory framework, in the 1990s, a major revision has been undertaken in recent years. By 2004, the European Commission declared the overhaul of the regulatory regime complete, and effectively lifted the longstanding de facto moratorium on authorization of imports of GMOs. Moreover, it has resumed the authorization process for the EU-wide cultivation of GM crops, in the face of unrelenting deep political divide between the Member States. With this re-opening of the floodgates to Europe's internal market to GMO-imports, and with the imminent commercial-scale cultivation of GM-crops on EU soil, the regulatory regime will be put to the test once again. The pressing question which emerges is whether the revised regime will prove complete and adequate, and whether a repeat of events leading to political stalemate in the 1990s can be avoided. This paper will argue that, in fact, the regulatory regime is not yet complete, and that the lack of a consistent, coherent, and integral approach threatens to undermine the effectiveness of, or even render redundant, the legislation that has been put into place.
Serious omissions can be identified in the arsenal of regulatory instruments and the definition of pivotal legal concepts, with the ultimate potential to paralyze the entire framework, once again. The most vital missing link is to be found at the very heart of the regulatory and production cycles of GMO commodities, namely in cultivation stage. Applications of biotechnology span across all stages of the product cycle of agricultural biotechnology commodities, that is, from GM seedling to final (consumer) product. From an EU regulatory perspective, three major stages can be identified in the (simplified) product cycle of such GMO commodities: (i) authorization, (ii) cultivation, and finally, (iii) distribution. It would appear evident that any legal regime with the objective of regulating this technology should

equally span across this entire product cycle. However, an analysis of the past and present laws and policies on agricultural biotechnology demonstrates that the EU regime has, throughout the past two decades, not succeeded in meeting this objective.
It is therefore evident that a regulatory gap has been left in this rather crucial intermediate stage, involving the thorny issue of coexistence of GMO and non-GMO farming. The anomaly created by this regulatory gap is that a regime which allows for the authorization of GMOs for cultivation, and which sets qualitative end-of-cycle targets and requirements for the final cultivated products, but which fails to provide any substantive prescriptions for how the cultivation itself should be operationalized in practice.
This paper will analyze the Commission's strategy to fill this regulatory lacuna, with specific reference to the implications thereof for the environment and health, consumer choice, the EU internal market objectives, as well as the for the viability of the current regulatory regime. Finally, it will make recommendations for an alternative, more consistent and integral, approach to the regulation of coexistence of GM and non-GM agriculture in Europe.

TU-V-5

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Familiarity with food products and the perception of risk and benefit.

Perceptions of risk and benefit have been reported to be negatively correlated, which may imply common cognitive causality. There is some evidence to support the hypothesis that this causality is triggered by an affect toward an event or object (the "affect heuristic"), where positive affect acts to reduce risk, and increase benefit perception, associated with a specific hazard. Prior experience of a potentially risky event or object may activate the affect heuristic. Against this, the "primacy heuristic", the information that is considered by an individual first, may also form the basis of the affective response experienced by an individual. The primacy heuristic is predicted to dominate affect if the object of deliberation is unfamiliar (for example, in the case of consumer products), such that deliberation regarding risk (or benefit) estimates imputes an affective response. This affective response should act as an ad-hoc heuristic for the estimation of subsequent perceptions of benefit (or risk). In a 2 (within: familiar (apple or salmon) – unfamiliar product (starfruit or fugu)) x2 (between: asked for risk judgement first – benefit judgement first) experiment, 105 participants showed a larger negative correlation between risk and benefit judgements for unfamiliar products compared to familiar products. Prior attitude about the products was most influential regarding risk and benefit judgements for familiar products, but not for unfamiliar products. The order of asking for judgements of risk and benefit influenced the complementary judgement for the unfamiliar products but not for the familiar products. The results indicate that both the proposed mechanisms lead to a negative correlation between perceptions of risk and benefit perception. Experience with a specific product determines which mechanism is prominent. Furthermore, the negative correlation between risk and benefit perception can be attributed to prior experience for familiar products, while the order of answering causes a similar effect for unfamiliar products. These results may be of consequence for the interpretation of causal models of risk and benefit perception.

MO-IV-6

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Unstable risk management systems: The evolution of an intelligent building in Singapore.

The research presented in this paper demonstrates that in the management of risks arising from the development of complex socio-technical systems there are four contingent organisational states correlating with four distinct strategies for managing risk: Type 1 - High Reliability, Type 2 - Normal Accidents, Type 3 - Low Reliability, Type 4 - Murphy's Law.
The research shows that negentropy and redundancy are the forces that seek to achieve effective organisational behaviour and lead to a more steady predictable Type 1 state of algorithmic organisational stability and high reliability operations. Negative feedback is important in order to detect incipient errors, threats, vulnerabilities and hazards. Reducing uncertainty is important.
If there is sufficient payoff then some redundancy and reliability will be sacrificed resulting in the acceptance of normal accidents or errors. In Type 2 risk management, exploiting an opportunity is more important than high reliability operations. Reducing complexity and improving efficiency is necessary to optimise payoffs.
Resilience may be more important when decision-making is non-rational, lead times are less than lag times and where economy and positive feedback loops provide a more appropriate fit with the environment. In Type 3 Risk Management, low reliability becomes acceptable and decisions are focused on reducing conflict amongst stakeholders. Strategies are political and risk is managed by manipulating budgets.
Crisis Management is the fourth type of risk management where Murphy's Law reigns. Risk is shared equitably and charismatic leadership is needed to move towards more reliable operations.
This research shows from a case study - an Intelligent Building project in Singapore - that likelihood and consequence of surprises in a complex socio-technical system are contingent upon the causal texture of the environment, the dominant risk culture of the key stakeholders, and the dynamic reliability of the system determined by the ratio of lead to lag times and gain to load. Redundancy and negative feedback are important particularly in rational decision systems. Resilience and positive feedback are important in non-rational decision systems. Instability and surprise can occur in transition from one decision state to another, especially during overload conditions. A decision-paths' schema is developed to show that the Intelligent Building, described in the case study, as originally intended did not eventuate. This paper thus demonstrates the analytic value of contingency theory.

MO-IV-5

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Natural hazard risk – variability of damage potential and implications for risk management.

The assessment of natural hazards in mountain regions of Europe is based on the methodology of risk analysis. In natural hazards research, risk is defined as a mathematical function of (a) the probability of occurrence of a hazardous process, and (2) the assessment of the related extent of damage. The methodology is comparatively reliable in determining the hazard potential and the related probability of occurrence of defined design events, e.g. an

avalanche with a reoccurrence interval of 150 years. So far, little attention has been given to the damage potential affected, particularly concerning temporal changes.
The damage potential, above all the tangible asset, is subject to long-term changes due to the socio-economic development of mountain regions since the outgoing 19th century. These long-term changes lead to variations in the resulting risk, depending on the magnitude and frequency of the individual hazard impact. Due to seasonal and diurnal variability of intangibles, short-term changes of damage potential interfere with those long-term changes. Since intangibles form an essential part of damage potential, significant differences in values at risk could be observed.
In this study, long-term as well as short-term shifts in values at risk are presented for different study areas and on different scales. Consequently, the resulting risk shows remarkable differences depending on both the period of time and the location studied. A conceptual framework for an interdisciplinary consideration of such changes is developed, with a particular focus on the development of risk management strategies for an enhanced future resilience of mountain communities to natural hazards.

TU-IV-6
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The political economy of public participation in natural hazard decisions – a case study of Austria.
It is often argued whether public good decisions with a high degree of uncertainty should be solely left to expert bodies for decision-making. Imperfect knowledge of experts leaves an uncertain level of risk to the public or the affected groups of persons. Direct participation of affected parties in such decisions is believed to be valuable in many ways. On the one hand, it allows final decision makers' choices to be more accepted among stakeholders and on the other hand, knowledge by the experts can be complemented with the one by affected parties. The latter is the case of the present study's application, namely danger zone planning in Austria. It shows that even though experts, contrary to the wide believe that they think of themselves to have perfect knowledge, allow for changes in draft plans after statements of affected parties. From a political economic viewpoint it will be discussed whether this process can be viewed to provide a "better" decision-making process.

TU-V-7
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Health risk assessment of chosen polyaromatic hydrocarbons emitted from transport.
This paper presents human health risks of selected PAHs emitted from transport based on real measurements. This article is focused on the concentration of benzo(a)pyrene, dibenz(a,h)anthracene and chrysene. The Guideline MŽP No. 1138/OER/94 was used for human health risk assessment to assess the possibility of carcinoma occurrence. The barrier of socially assumed point of individual risk for carcinoma occurrence for person was not exceeded for any one of chosen pollutants. The barrier of socially assumed point for carcinoma occurrence for population was exceeded for inhalation of benzo(a)pyrene and dibenz(a,h)anthracene emitted from transport.

TU-VI-1
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Cooperation with co-actors: Risk communication on EU level.
For the implementation of a risk communication strategy the cooperation with internal and external actors is crucial; a change in attitude and in behaviour if often needed for this kind of close cooperation. The development of a risk communication strategy by the European Food Safety Authority (EFSA) is an example of a process in which internal and external actors came to closer cooperation in risk communication. In this process external factors, like criticism of stakeholders and an external evaluation report delivered the need of urgency to change ways of communication, as advised in the risk communication strategy. With the new priorities of the EFSA organisation the risk communication activities are better embedded in the total organisation strategy and joint communication activities with co-actors, internally and externally, are now developed. In a science oriented organisation as EFSA close cooperation between scientists and communication advisors is needed for the development of effective risk communication. Agreement between these two parties on issues as target audiences, content criteria and the need of understandable messages was not easy to get, due to differences in perspective. The need to communicate to stakeholders outside the scientific domain and the fact that these audiences have different interests and information/communication needs, was not always clear to scientific experts involved in the communication process. A complicating factor is the position of the consumer in this process. Although EFSA is meant to contribute to consumer protection, it is difficult to communicate the high abstract level of risk assessment directly to the consumer. Even more difficult due to the differences in perception on food and food safety issues in the EU member states, which are strongly influenced by cultural and dietary habits and (national) history in food safety issues. Intermediaries on national level are needed to bring a more consumer oriented message on risk assessment. But cooperation with these co-actors will only succeed if there is a kind of involvement in the risk assessment process.

MO-V-6
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Licensing policy in the case of cross-border impacts associated with two LNG terminals in the Gulf of Trieste.
A recent case of two LNG terminals planned in the Gulf of Trieste is a subject of involvement of Slovenian Administration in the Italian licensing procedure. The issue rises from the fact that both terminals are planned close to the border and that the involvement of the Slovenian Administration according to Espoo and Aarhus Conventions, as well as SEA Directive, was not initially recognized by the Italian Administration, since no cross-border impact was ascertained in the EIA reports and preliminary Safety Reports. The review of preliminary Safety Reports, was done by Slovenian experts for the purpose of evaluating credibility of "no cross-border impact zones". The review gave the following main conclusions: • National regulation associated to safety reports in both countries is different regarding approaches to hazard identification, accident scenario development, evaluation of the likelihood of incidents, safety criteria applied in the licensing process, competent authority decision-making procedure. In that respect Italian approach was found more prescriptive (and potentially misleading in this case), while Slovenian regulation is rather general, enabling consultation. • The issue of "worst case scenario" (WCS) as a basis for decision-making in siting procedure remains open for two reasons: i) one is uncertainty regarding whether selected WCS is really

the worst one (there is always a possibility that something is overlooked or omitted, e.g. ships' collisions and/or terrorist acts), and ii) lack of consistency in how to consider incident/accident uncertainty in the siting process. • Differences in assessed impact zones were within a factor of 2 to 3 (the same computer code – PHAST was applied by Italian and Slovenian experts). • The exclusion zone of 2000 m around sea terminal covers impact areas of all analyzed accident scenarios. • Cross-border impacts are expected around sea terminal in the zone of about 7 km2 (a variation of around 1 km2 emerges due to unclear borderline between Italy and Slovenia in that region). Based on this, Slovenian Administration obtained a formal role in the Italian licensing procedure. On the other hand cooperation between neighbouring countries is possible on a "common sense and good neighbour policy" rather than clear regulatory basis. Explicit consideration of risk evaluation in strategic environmental assessment for energy and other industrial plans seems to be a necessity.

TU-IV-6

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Natural risk approaches: Comparisons and applications within global change.

In recent years, risk analyses have been developed for specific natural hazards in various regions. Commonly, risk calculations combine the physical processes and the consequences. The processes are expressed as occurrence probability for a given period, region and for a defined process magnitude. Consequences include elements at risks such as persons and assets as well as their vulnerability to a given process magnitude.

It is highlighted, that all these parameters of both physical processes and consequences are subject to continuous change over time, but at different rates. However, it is rather difficult to differentiate between the effects of environmental and social changes. This situation is further complicated by human interventions through protective measures. Structures like snow fence or slope enforcement walls change the total behaviour of the natural system and the processes operating on the land surfaces. Both natural and human induced changes lead to a change of corresponding risk.

The risk assessment of natural hazards is compared for landslides and snow avalanches in two different environmental settings in the European Alps and in Iceland. It is of major importance, to investigate such scenarios in detail to approximate the development of future risks.

MO-IV-7

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Perceptions, attitudes and acceptance of GT apples by Dutch public and apple growers compared.

Whereas most research on acceptance of genetically modified food (GMF) have focused on factors that influence public perceptions, attitudes and intentions towards GMF, this paper examines the potential growers' support of a hypothetical GM food product, and more specifically a GM apple. Understanding of growers' intentions towards GM apple is of very importance for Dutch policy makers in the context of EU regulations about the co-existence of different farming systems, which emphasize the responsibility of each member country in addressing the issue of co-existence. In addition the paper reports findings from a comparison of the growers and public support regarding the use of genetic engineering in apples. The data for the paper were gathered from a sample of 1100 Dutch adults, randomly selected from the general public by a professional research agency, and 172 Dutch apple growers. The data were gathered by means of a mail survey during the year 2006. This paper presents the first results of the survey. The comparison of intentions between the groups is further investigated by exploring how the determinants of support vary by benefits, risk, perception, trust, and the life style and sociodemographic variables. The implications of the results for the policy making are discussed.

TU-IV-5

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Diaries as a tool in risk perception research: A comparative and empirical study.

In a recent structured review of the qualitative risk perception literature (Hawkes and Rowe, submitted), we found that research has tended to focus on a narrow range of samples (e.g. convenience samples of adults in industrialised Western nations), using a limited range of techniques (mainly interviews), looking at immediate perceptions (with little consideration for the formation and development of perceptions over time), and focusing upon a limited range of hazards (i.e. severe technological/manmade hazards). As such, it may be argued that the risk perception 'universe' remains relatively unexplored.

One method relatively unutilised in the risk perception domain is the diary. Diaries are more commonly associated with historical, personal documents, and have only rarely been used in wider social research. Nevertheless, contemporary, solicited diaries can provide us with a different perspective on risk than that acquired through the more traditional route of interviews and focus group discussions. Diaries may allow the elicitation of narratives of risk contextualised within people's everyday lives, as well as allowing consideration of how people's perceptions of risk develop and change over time.

In this presentation we discuss the benefits of diary research, and report results from an ongoing qualitative study about what people are concerned about. We will focus on the comparative nature of the study and will compare the findings from diaries with data attained from interviews and focus groups, highlighting the qualitative and quantitative differences between the methods. Our results emphasize the importance of taking a multi-method approach to understanding risk perception.

TU-VI-5

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Balancing the requirements of law and established practice against the demands of crises.

Principles for the management of risk and crisis situations are formulated in legislation, in formal and informal rules and in organisational practices. Actual crisis events tend however to present problems which have not previously been envisaged. Decision-makers must evaluate the demands of the situation in relation to interpretations of existing principles. In this paper, some dilemmas inherent in this act of balance are exemplified from recent Swedish experiences. The Swedish crisis management system is based on three guiding principles: responsibility, parity and proximity. Strict adherence to the principles of responsibility (whoever is responsible for an activity in normal conditions is also responsible in a crisis) and the principle of parity (organization in a crisis should as far as possible be the same as under normal conditions) can, however, conflict with other values in dealing with a crisis. For

example, in the aftermath of the tsunami in Southeast Asia 2004, where over 500 Swedish citizens were killed, the lack of flexibility and empathy of some government personnel was severely criticized. Two weeks after the tsunami, a major storm with local hurricanes paralysed the southern part of Sweden. In some areas people were without electricity and telecommunications for more than eight weeks. Local crisis management skills were put to a tough test over a long period. In dealing with the consequences, the municipalities differed in how they decided whether or not to follow established routines and regulations. On the basis of a qualitative study among 19 chiefs from three municipalities a model for the factors significantly affecting the reactions and decisions of the leaders was developed. This model and some implications for crisis preparedness are presented and discussed.

MO-IV-4

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Do the costs of not knowing exceed the costs of finding out?

When faced with a risky decision people in organizations often have the opportunity to obtain information in order to reduce the risk. As this information is almost never acquired without incurring some costs, the long standing question is how much money they are willing to spend on information. The theoretical groundwork in this area was laid by Stigler (1961) in his theory of information economics. This theory predicts that information search will continue until the decision maker feels that the benefits of acquiring information outweigh the financial costs associated with the search. In short: the costs associated with taking the wrong decision should be larger than the costs associated with the search. From the perspective of psychological decision theory this entails that people in organizations should be risk neutral when trading off costs associated with risks and costs associated with information search.
The research to be reported investigates this assumption. Three different methods for assessing this trade-off are used: a simple 4 questions questionnaire, a more complex 16-questions questionnaire and a full trade-off approach. The questionnaires are administered in different organizations to assess the possible effects of context on the trade-off.
Overall it was found that people in organizations tend to be risk averse, a substantial number still prefers to search for information if the costs of finding out are higher than the costs of not knowing. There is some effect of organizational context, more in particular the kind of products an organization delivers. Finally, a brief 4-questions questionnaire is sufficient for an initial assessment as the long questionnaire gives the same results as the brief one. The full trade-off approach generally shows less risk averseness than the questionnaires.

MO-IV-6

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A four layer approach in detecting emerging risks in food chains.

We believe that food safety incidents can be prevented when the developing hazard is identified at a very early stage of its development or even before it has developed making a pro-active intervention by the authorities possible. Instead of only looking at specific identified hazards such as present early warning system are doing we show that information from outside the food production chain is used to predict the chance that a hazard or food safety risk may develop within the food production chain.
We developed a “holistic“ prototype of an emerging risk detection system based on a thorough host environment analysis of the salmon feed production chain. We have identified the relevant indicators (for example increase in salmon demand) related to data sources (like FAO). Furthermore we linked the indicator to the development of hazards and risks with chain data and product information in this chain (e.g. ‘Increase in salmon demand’ is related to ‘antibiotic usage’ related to ‘salmon-farms in Chile’). Our system is based on four interrelated defined steps or so called layers. The first layer monitors the indicators, the second maps these indicators on hazards and risks, and the third layer maps the hazards on realistic chain data. The fourth layer visualizes the links between indicator, hazards, chain knowledge and emerging risks in an intuitive way to the system operator. The operator can also carry out scenario studies by manipulating the values of the indicators. The content of the system can be updated by the food safety experts.

TU-VI-4

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Seeking information about industrial risks: A cross-cultural test of the model of risk information seeking and processing.

Many governments are obliged to communicate with citizens about industrial risks. Therefore, serious attention should be given to improving the information made available to the public, based on better understanding of their various needs, risk perceptions, and interests. To better understand what motivates people to seek and use information about risks, this study employed the Model of Risk Information Seeking and Processing (RISP), developed by Griffin et al. (1999), which proposes characteristics of individuals that might predispose them to seek additional risk information. To date, no studies are known which apply the RISP-model to risks from hazardous industrial substances or apply the model internationally to see how well results replicate across cultures. Set in this context, the RISP model formed the theoretical framework for a cross-cultural, mail questionnaire survey comparing random samples of adult U.S. (N=296) and Dutch (N=171) residents. The study was designed to (a) to test causal structure among different predictors of risk information seeking behaviour, based on the RISP model, and (b) to cross-validate the RISP model across two independent samples by performing multiple group analyses via structural equation modelling. Some results indicate that U.S. residents are more likely to seek risk information, report a higher level of risk information needs and experience more negative affective responses (e.g., feeling more worried, tense, or anxious) with respect to industrial risks. Dutch people, however, report higher levels of trust in responsible agencies and more current knowledge. Risk perception did not differ significantly across the two populations. Analysis also tested whether the groups met the assumption that they are equal by examining whether the path coefficients hypothesized in the model are invariant.

TU-VI-7

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Risk based inspections: An example of risk management by the Netherlands education inspectorate.

Risk management through risk based inspections is the central theme of our paper. We show how national governments can reduce risks by inspections based on risk analysis. We do so by presenting the method we developed for the Dutch Educational Inspectorate, a model

based on an international standard on risk management. This model is a statistical model, designed to assesses the risks of low quality primary schools (schools in which children do not reach an adequate level of skills). This model is constructed of a selected number of risk indicators that very well predict whether a school performs below level. The model enables the inspectorate to intensify their supervision on schools-at-risk, thus reducing the chance that schools are at risk for a longer period. It also enables the government to choose adequate levels of supervision, as we show by presenting the trade-off between safe but expensive supervision (overestimating the number of schools at risk) and cheap but risky supervision (underestimating the number of schools at risk). Our paper ends with a discussion on three important risks of risk based inspections. These are the risk of strategic behavior of supervised objects (gaming, indicator fixation), the illusion of reducing societal and political risks by risk based inspections and the risk of technocratic supervision.

MO-VI-7

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Acceptable risk and democracy: Some normative reflections.

Whereas many experts appear to believe that determining the acceptable risk level of risk should be a matter of weighing up risks and benefits, the dominant approach to regulation of risks is a liberal one. According to this approach, everyone is free to engage in risky activities, provided they do not harm others. However, in many areas, governments take on the responsibility and regulate risky activities; typically, such activities can only be allowed if the risk they pose is acceptably low. The acceptability of a given risk thus has to be assessed independently from an assessment of the possible benefits related to the activity in question. This involves balancing the concern for protecting individuals against risk of harm against protecting the individuals' freedom. The Precautionary Principle, i.e. how we should deal with uncertainty about the relevant causal relations, is part of this balancing. From the point of view of efficiency, however, resources for reducing risk should be spent such that the marginal value is the same in all areas. This may conflict with the equal protection of individuals against harm. Thus, societies also need to balance the concern for efficiency against the liberal objective of protecting individuals and their freedom. Since both kinds of balancing remain imprecise, the precise level ought in the last resort to be determined by democracy, possibly through some sort of public deliberation. However, as I shall demonstrate, the way public debates on risk issues typically are framed represent certain obstacles to such a deliberation. The challenge is to create forums for public deliberation capable of overcoming these obstacles.

TU-VI-5

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Cross-sectorial risk management approaches in Swedish local action programs for civil protection against accidents.

According to the Civil Protection Act the Swedish municipalities (n=290) are since 2004 requested to prepare and adopt an action program for civil protection. The program should outline both preventive measures and statements regarding planned emergency responses. This study is a systematic descriptive review of the content in a set of first generation action programs (n=40). It is explorative and intends to generate empirical insights about societal risk management characteristics. The aim is to analyse and discuss present cross-sectorial societal risk management approaches at the Swedish local level and to generate ideas for future risk management theory and practice. The programs have been analyzed using the key principles of content analysis methodology. The N6 software was used as a tool in the analysis process. The analysis was guided by systematic principles, rather than rules, to inductively systematize and validate data (identify, code and categorize). The categories were derived directly from the data in order to allow new insights to emerge. In addition, frequencies of keywords and recurrent words and phrases were counted and compared. The analysis indicates that Sweden on the local level to a very little extent has a cross-sectorial risk management approach. The programs seem to focus on issues that require rescue services emergency responses, instead of applying a wider and preventive-oriented view on risk management work and measures. However, on the whole the programs together mention a range of preventive work and measures. Several of them express the ambition to develop a more multifaceted approach in the next version of programs.

TU-V-5

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Consumer confidence in the safety of food in Canada and the Netherlands: the validation of a generic framework.

A thorough understanding of consumer confidence in the safety of food and the factors by which this is influenced is necessary for the development of adequate and effective risk management and communication regarding food safety issues. As food chains become globalized, risk management and communication are increasingly applied at international levels. As a consequence, cross-culturally valid theoretical models are needed to investigate consumer confidence in the safety of food. In this study, we systematically compared consumer confidence in the safety of food in Canada and the Netherlands. On the basis of two nationally representative samples, we examined to what extent differences in consumer confidence between the two countries resulted from differences in the relative importance of the determinants of confidence, and differences in the latent means of the constructs. No differences between Canada and the Netherlands were found regarding the relative importance of the determinants, which provides support for the generalizability of the framework. However, results indicated that Dutch consumers had a higher level of optimism and a lower level of pessimism regarding the safety of food, which appeared to be mainly related to Dutch consumers' lower level of concern about factors related to production. The results also indicated cross-national differences in consumer recall of food safety issues in the media, which can be considered as an indication of the occurrence of food safety incidents. The number of consumers who indicated to recall food safety incidents and/or associated media attention (43% Canada; 45% The Netherlands), as well as the impact of recall on optimism and pessimism, did not differ between the two countries. However, cross-national differences emerged regarding what people indicated to recall, both with respect to specific product groups and hazard types involved.

MO-V-7

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Industry and risk assessment of nanomaterials.

Industrial risk assessments of nanotechnology materials or applications will be crucial for the realization of technological advances. Therefore, how the industry addresses risks should be

taken into account at an early stage of technology development. This paper presents a study which had the purpose to find out what kind of risk assessments industries are carrying out today. Nanospecific properties call for adaptations in risk assessment methods. There are still many uncertainties regarding properties and environmental fate of nano-particulate materials and a lot of researching this field is still needed. To test whether the industry performs risk assessments, a questionnaire was sent to 138 companies utilizing nanotechnology located in Switzerland or Germany, two key players in the field of nanotechnology. Data were collected between December 2005 and February 2006. The survey shows that companies know a lot about the nanoparticulate materials they work with. They are also very interested in achieving the best available information and in sharing safety information with other companies, universities or governmental institutions. On the other hand the data suggest that a substantial part of the companies, which produce or refine nano-particulate materials, do not perform any risk assessments. These results may not sustain public trust in the nano-industry, and lack of trust may be a key factor for explaining why the public is hesitant to accept some new technologies. In a first step the paper reflects on the current debate of risk assessment and its application to nano-particulate materials. Secondly the study design, as well the research questions are introduced. Finally the main results of the survey will be discussed.

TU-VI-1

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Food risk management quality: Consumer evaluations of past and emerging food safety incidents.

Considerable attention has been paid to understanding consumer perceptions of risk associated with different food hazards, but there is less information about how consumers perceive effective food risk management. SAFE FOODS, a multi-disciplinary cross-European research programme, aims to increase confidence in the safety of food. To enable this, a systematic understanding of what consumers perceive to be best practice in risk management is crucial. Previous research has revealed a variety of factors that determine consumer perceptions of good food risk management, including: 'proactive consumer protection', 'opaque and reactive risk management', 'scepticism in risk assessment and communication practices', 'consumer trust in honesty and expertise of food risk managers'. The aim of the current empirical study is to validate these findings (provide 'proof of principles') against historic and emerging food safety incidents.

In each country, two food safety incidents were selected for evaluation by consumers. Case descriptions were prepared and standardized across countries, evaluated by experts and pre-tested by a convenience sample of 10 participants. Semi-structured interviews with 25 participants per case study were held in Germany (BSE; Nematode worms in fish), Greece (mould in Greek yogurt/carcinogenic honey incident; Avian Influenza), Norway (E-coli O103 in meat; contaminants in Norwegian salmon) and the UK (BSE; contaminants in Scottish salmon). During the interview, participants first read the case description and then responded to a series of questions based on the factors previously identified as important in evaluations of best practice. A harmonized coding scheme, detailed analysis plan and cross-national coding check procedure for the resulting transcripts were developed. This presentation will explore differences and similarities in evaluations across countries and cases in order to provide insights into the viability of a pan-European communication strategy on risk management. The implications of the results and future research requirements will be discussed.

MO-VI-6

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Risk model in wastewater reclamation and reuse application to groundwater recharge.

There is a growing concern regarding the environmental and health consequences of reuse projects in the water sector. Thus, this concern is included as part of E.U. Commission funded project RECLAIM WATER. The project deals with reclaimed water which is reused for groundwater recharge and the aim is to contribute to the development of integrated approaches to water-soil resources management in the context of global climate change. Wastewater reclamation and reuse application to groundwater recharge can imply several hazards, mainly related to the possibility of producing negative impacts on man, soil and groundwater. When quantifying hazards, the risk concept appears and one of the work packages in RECLAIM WATER project is devoted to it. All steps of risk analysis are considered: risk assessment, risk management and risk communication. These three steps are integrated with comparative risk assessment. Regarding the health risk assessment we integrate DALY - disability adjusted life years. The applicability and the shortcomings of DALYs in risk assessment are being evaluated. In the risk management step, we have integrated a widely known tool applying it to the water quality concept: the HACCP, defining critical control points (CCP). Another work package includes six full scale aquifer recharge case studies, with test sites in Sabadell (Spain), Nardò (Italy), Shafdan (Israel), Gaobeidian (China), Adelaide (Australia) and Torrele (Belgium). The generated data on these test sites are used for assessment and validation of the risk model.

MO-VI-4

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Effects of information provision strategies as trust generator in dyad with inequality in information.

Recently in Japan, due to accidents and manipulations in industries and governments of foods, buildings, and chemicals products, society have lost trust in safety management, they are anxious for redemption of trust. Risk managers (organizations) are undertaking actions that focused on interactive communication based on the idea of risk communication, so they recover the public's approval. Previous studies of risk communication generally emphasize that providing negative information as well as positive information constructs a trustful relationship with stakeholders; however, it is difficult to know what kind of negative information providers have for the receiver, especially in complex scenarios. Therefore we focused on the condition that information inequality between provider and receiver, and receiver cannot sure confirm all of information provider have. Our aim is to clarify which strategy of providing information can generate trustworthiness of providers for receivers by using an experiment.

We conducted an experiment in which participants who were less knowledgeable about alternatives had to obtain information from the other participant who was privy to that information. This experiment simulated the information inequality between the experts and the public in the field of Science and Technology. In experiment, "provider" knows all the information and he/she can choose any aspects of the data to offer for 'bartering' with

"receiver", who knows nothing about the amount nor content. Receiver can refuse or accept only one of the offered alternatives. When receiver decides to accept, both provider and receiver get points. The number of points each one gets is pre-determined. If the receiver refuses an offer by the provider, the provider cannot get any points. There are 3 types of information: "Provider's advantage", "Receiver's advantage", and "Equal for both". Participants were assigned a role of a provider or receiver at the beginning of the experiment and they repeated 'bartering' 12 times with fixed role in a fixed pair.
The result showed that the most effective strategy to gain trust of receiver was to provide information including not only "Receiver's advantage", but "Equal", and "Provider's advantage". However, it was difficult to take this strategy for providers who didn't trust their partners (receivers). The next best strategy is to provide neutral information only. The results also showed that offering only advantageous information was often refused by the receiver, because the receiver interpreted the offer as dishonest. In a real situation, experts and spokesmen/women of public and private sectors tend to show good news rather than bad ones. However, our results suggest that this manner of providing information is less effective.

MO-IV-5
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The study of pesticides by analytical chemistry and computational physics methods.
The 'competition' of experimental and theoretical methods is especially sharp since the beginning of the use of computers in scientific work. On one hand, the significantly enhanced potential of computers suggests to some scientists that many problem could be solved simply by calculations. On the other hand, the researchers using experimental technique are often convinced: they do not need to consider the results derived by theory. To explore the properties of molecules, such as pesticides, the electronic structure is to be described to a given accuracy. A similar statement holds for the analytical work, the pesticides are to be determined to a desired accuracy. The occurrence of the pesticides in various samples from Valencian Community (Spain) were investigated by extraction followed by liquid chromatography/mass spectrometry (LC/MS). To establish the nature and the quantities of the metabolites was also the aim of this work. To get information on the properties of molecular structure of the pesticides a method based on the independent particle model was applied. The description of the solvent effect has been perfomed by a new scheme. We discuss the accuracy separately from both experimental (analytical chemistry) and theoretical (computational physics) aspects. The experimental studies to establish the exposure levels and to predict the toxicological risk involved by the intake of a pesticide require many analysis. These analysis have a high economic value and needs much of the analysts' time. Computer modeling can help to predict the risk diminishing the number of analysis required, transform a hard task in a more reliable possibility to prevent the risk. The method has been tested on a pesticide investigated in present contribution.

MO-VI-5
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A New National Risk Management Framework for Major Risk Issues with International Dimensions.
Canada is one of twenty-three countries around the world to have reported cases of BSE in its national herd (nine cases during the period May 2003 – present). Canada has been a large exporter of beef, and the closing of much of its export markets following the discovery of the first case has had devastating consequences, both in economic terms and in social impacts on farm families. The scope of these impacts has been plausibly interpreted as a failure in the risk management approach, reflecting the policies of the federal and provincial governments, that has been in place throughout these events. The federal government created a long-term research effort, the Prion Diseases National Centre of Excellence [www.prionetcanada.ca], to highlight the need for both ongoing scientific research and for the retrospective analysis of risk management policy. This paper will present the first, preliminary results of an attempt to create a new, integrated risk management framework, structured as a response both to intensive case-study research on the history of the BSE episode and to similar challenges in the area of zoonotic diseases, such as pandemic influenza. Preliminary work involves a re-examination of the "models" used by national regulatory agencies to represent the decision-making process required for effective risk management (RM). The work to date shows that there are a number of serious flaws in the existing RM decision-making process, including lack of clear agency accountability for a number of the key dimensions in that process. The new proposed model is designed explicitly to address those flaws as a way of mitigating the consequences of major public health risks that cut across national boundaries.

MO-VI-6
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A method to explicitly account for the spatial variability of soil chemical concentrations in probabilistic risk assessments.
The contaminated site assessment process is significantly influenced by the statistical approach used to analyze location-specific chemical concentration data. The process is usually guided by pre-set criteria, which are specified as chemical-specific threshold concentrations. However, it is not the location-specific threshold exceedances that determine the process outcome, but the site as a whole. Estimating the spatial mean surface of a site is even more challenging in situations where the contamination mechanism is not unique or the contamination is concentrated in hotspots. Further implications arise when the assessment of risks is required for these sites. In this talk we take a Bayesian hierarchical modelling approach and employ a spatial partition model to estimate the mean and variance of chemical concentrations in various sectors of a contaminated site. Specifically, we consider models based on partitioning the contaminated site into cells via a Voronoi tessellation, where the number of cells and the positions of their centres are unknown. Uncertainty about the number of cells and their centres is captured through a Bayesian hierarchical prior distribution. A Markov chain Monte Carlo sampling algorithm is then used to explore the posterior distribution of the partition model space, given observed chemical concentration data. The approach allows us to estimate posterior distributions of spatially averaged chemical concentrations across cells of the highest posterior probability partition model, and to calculate statistics of interest for each cell such as posterior chemical concentration mean and standard deviation. These statistics can, in turn, be used to guide the contamination site assessment process in the presence of pre-set criteria. The estimated posterior distributions can also be incorporated in the probabilistic assessment of site risks. The approach is implemented on a contaminated site data set, to demonstrate its benefits.

TU-IV-6

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Modeling debris flow loss – an empirical study in Taiwan.

Debris flow disasters are usually accompanied by severe loss of properties and human lives. In Taiwan, the disaster caused by typhoon Mindulle and Aere killed 26 people, wounded 347, and left 14 people missing across the island. Although debris disasters can cause enormous medical and financial burdens, there are no standardized models to estimate these damages. In the current study, we propose a debris flow loss model using the data from a survey conducted by the National Center for Disaster Reduction (NCDR) (2005). The sample was focus on debris flow victim list provided by the social welfare department in Taiwan. In total, 241 victims were recruited, all of which were the main financial supporter in their household. A set of standardized questionnaires containing information with regards to demographic background, financial damages, disaster experiences as well as risk perception were filled in by all the participants.

In the proposed model, a set of vulnerability indices for debris flow loss were used. They are the total square measure covered by the debris flow, the height of debris flow coverage, the size of the biggest stone, the experience with the disaster, whether the participants run a business in their household, the number of people per household, and the community readiness. The result of the regression model showed that, all the variables included were statistically significant. The coverage area, the height of debris flow coverage, the size of the biggest stone, the experience times of the disaster and the number of people per household were positively associated with financial loss. Furthermore, the results also showed that higher community readiness may lead to less financial loss and higher total financial loss is observed among participants using their house as a business setting.

TU-IV-6

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Risk perception, social vulnerability and hazard mitigation among debris flow victims and the general public.

Almost annually, natural hazards such as floods and debris flow cause a great deal of financial losses and human sufferings in Taiwan. However, despite their prior experiences with disasters, many residents in hazard-prone are less willing to adopt mitigation measures than the public. The main objective of this study is to assess how victims and the public perceive debris flow, what they believe about debris flow disaster, and whether these perceptions and beliefs make a difference in adopting mitigation measures.

In particular, this paper examines several factors in relation to debris flow mitigation intentions (e.g. willingness to relocate or purchase insurance) and actual adjustment behaviors prior to the disaster (e.g. built constructions to combat debris flow, search for signs of debris flow): social economic status, psychological vulnerability (e.g. fatalism belief and emotional distress), risk perception (such as perceived impact) and social trust. The data reported here was based on two surveys on natural disaster conducted by National Center for Disaster Reduction (NCDR) in 2005. The first was national telephone survey conducted one month after a major debris flow disaster. The participants include the general public (N=1073) as well as residents of impacted area (N=501). The second survey was household interview conducted about 6 months after the disaster. The participants were the debris flow victims (N=261) who had received relief fund from the government.

The main findings include: (1) In comparison with general public, victims are less willing to adopt mitigation measures than the public, even though they perceive larger impact, worry more about the hazard, and pay more attention to hazard information. (2) Social economic status is positively associate with mitigation intentions and prior adjustment behaviors. (3) Risk perception is positively associate with mitigation intention, but negatively associate with prior adjustment behaviors. (4) Psychological variables are stronger predictors for mitigation intentions than that of social economic variables. In light of these findings, the policy implications and intervention strategy are also discussed.

MO-VI-6

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Integrated risk analysis of a drinking water system – a fault tree analysis.

Drinking water systems are vulnerable and subject to a wide range of hazards. To guarantee a safe water quality and a reliable supply, an efficient risk management is of primary importance. The use of a risk based approach in managing drinking water systems is often emphasized, for example in the Bonn Charter document and by the World Health Organisation. The importance of considering the whole supply system, from source to tap, is also pointed out as an essential component of the work. Fault tree analysis is a common methodology for risk analyses. However, it is not commonly applied for integrated probabilistic risk analyses of drinking water systems, from source to tap. A probabilistic fault tree analysis of the drinking water supply was performed for the Göteborg water utility, Sweden, considering the whole supply system from source to tap. The undesired top event was supply failure, which refers to a situation when no water is delivered to the tap of an arbitrary consumer. Primary aims of this study were: (1) to analyse how different ways of describing the uncertainty in probability estimates affects the result; and (2) to find a suitable level of detail for a fault tree analysis comprising the whole drinking water system. Hard data as well as expert opinions were used to estimate probabilities and uncertainties of events. This paper results in: (1) a sensitivity analysis of how the selection of distributions based on available information affects the final result; and (2) recommendations on how to model probability estimations for critical events in drinking water supply. The paper also presents a comparison of the results to politically established goals concerning water supply safety in Göteborg.

TU-V-7

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Attribute based hierarchy assessment and mapping for fire risk in existing educational occupancies buildings.

1997 saw the UK implementation of statutory requirements requiring employers to assess the fire risk associated with their premises and operations. This is in the context of there being no method allowing either the effective assessment of risk or prioritisation of resources within educational occupancies. An Engineering and Physical Science Research Council (EPSRC) funded project on the development of an occupancy specific methodology allowing the assessment and mapping of fire risk in educational premises using an attribute based

hierarchy, is presented. During the concept stage, the researchers conducted interviews with educational occupancy facilities management teams so as to allow identification of the main issues arising from the statutory requirements. In addition, respondents identified several features that should be included in the assessment and mapping methodology: (i) application flexibility across complex property portfolios, (ii) accurate means of recording of physical attributes, occupant profiles and effectiveness of management provisions, (iii) electronically accessible data output for both informed and layperson stakeholders, (iv) allowance for high-level detailed comparison of risk across all contributing factors, elements and sub-elements, whilst allowing the data to be collapsed to enable low-level detailed comparison of rooms, floors, etc., and (v) allowance for carrying out targeted expenditure prioritisations and risk management interventions. The main components of the methodology, which incorporates both building attribute and management systems surveys, with provisions for an operative recall survey as a test of reliability, the survey documents have been piloted extensively and preliminary results are presented with proposals for development.

TU-IV-5

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A narrative model of the communication of risk.

Starting from the premise that risk is a probability that can represented in terms either of a mathematical calculation or of a narrative, this paper proposes model applicable to the narrative theory of risk. The model uses various sources, such as bird flu, oil slicks, mad cow disease, traffic accidents, nuclear power and climate change. These sources may be oral or written and include images and film.

The model is structured in three operational steps, comprising sources, filters and indices. The sources relate to cases identified in fieldwork and documentary surveys. Each case represents a unit for analysis. The operational filters are applied to classify the fragmentary information obtained from the sources into appropriate categories, the combination of which allows the creation of various narrative indices. The final objective is to generate a set of indices allowing the identification of the narrative present in and acting upon each case.

This narrative model may help respond to various questions, key among which is the extent to which narrative is employed in the communication and management of risk.

The case of the Prestige, a tanker which foundered in the North Atlantic off the coast of Spain in 2002 and the oil slick washed up on the beaches of Galicia, provides an example for the application of the theory.

TU-VI-1

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Food risk communication: Some of the problems and issues faced by communicators on the Island of Ireland.

In this paper we consider the findings of a number of interlinked pieces of research, both qualitative and quantitative, that have investigated aspects of food risk communication on the island of Ireland. These findings are set in the context of international risk communication research. The findings from these pieces of research are examined using the three basic elements of a simple communications framework: the message sender; the channel through which the message is communicated and the receiver of the message. The barriers to effective communication are examined and special reference is made to the barriers affecting the communication of food safety and handling risk. Barriers identified include personal, infrastructural and message related factors, such as lack of interest, lack of appropriate facilities and conflicting messages. Based on an evaluation of the views of the scientific community and the public, we make suggestions on how future food safety communications could be tackled to better address the identified barriers. Both long and short term suggestions are considered in the context of a heterogeneous public and scientific community. Short term suggestions provide an opportunity to address the challenges faced by those who are currently exposing themselves to a high level of food safety risk. The long term suggestions reflect on the underlying barriers impacting on those individuals not receiving or acting on the food safety risk information.

MO-IV-6

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Social vulnerability indexes as planning tools: Beyond the preparedness paradigm.

This paper addresses issues pertaining to the use of social vulnerability analysis to develop social technologies of public participation and information that can enable the production of civic epistemologies on the issue of natural and technological hazards.

Many projects and networks have been approved by the European Union relating to natural and technological hazards. In general, less attention has been given to a broader perspective pertaining to social vulnerability analysis as a tool to implement prevention measures and to articulate investment and economic activities with civil protection policies and infrastructures.

This paper draws from the experience of the ongoing drafting of the Regional Land Use Plan of the Central Region of Portugal, and the empirical application of the Social Vulnerability Index proposed by Susan Cutter research team. It consists of a factor analysis of 50 variables and the construction of an index of social vulnerability to natural and technological hazards and to social risks for the seventy eight municipalities of the Central Region of Portugal. Methodologically, it extends the vulnerability analysis to technological hazards and social risks, as a more encompassing view is necessary for the elaboration of prevention and civil protection policies.

The results confirm the interactive nature of social vulnerability, and they also reflect the diffuse urbanisation and industrialisation patterns that characterise Portugal as a semi-peripheral country. The interpenetration of the rural and the urban and the scattered nature of social facilities and security and health infrastructures, there is, the specificity of the territorial layout, pose specific challenges to planners concerning risk prevention and mitigation and the elaboration of effective risk communication strategies adapted to specific hazards and risks in the studied municipalities.

The paper concludes with some reflections on the need to revise established paradigms of disaster analysis and emphasize the importance of pre-event planning and the social cartography of vulnerable populations for effective prevention and security policies that take into account social inequalities and citizenship rights.

TU-V-5

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Is there uncertainty in the risks or risks in uncertainty: Which came first, the chicken or the egg?

Risk management is often dependent of the risk assessment process that often characterize risk as being a combination of two dimensions: probability of accidental phenomena and the

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.

TU-IV-5

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Exploring the gender and risk effect: A qualitative approach.

A long-standing quantitative finding from many surveys of public perceptions of hazardous technologies is that women respondents typically report significantly higher levels of concern about environmental and technological hazards than do men. Such survey-based research has been criticised from a sociological perspective for 'essentializing' concepts such as 'gender'. Equally, much literature fails to offer adequately grounded theoretical explanations for the observed empirical finding on gender and risk. Drawing upon contemporary gender studies, social psychology, and science and technology studies concepts, we report findings from a secondary qualitative analysis of an existing focus group data set (total = 12 group sessions) of women and men talking about risk, technology and science issues (including topics such as agricultural biotechnology, climate change, radioactive waste and human genetic testing). We conclude by presenting a theoretical synthesis, arguing that it may indeed not be gender per se which can account for the observed survey findings. Rather, differences in the men and women's talk may be related to the complex production of discourses about technology and risk and through this participants' positioning in the groups as they compete for and/or claim positions as 'epistemic subjects'.

MO-VI-5

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Application of a predictive biosimulation model for cardiovascular disease in combination with a "virtual patient" approach, for risk assessment of consumer products.

The Entelos® Cardiovascular PhysioLab® platform is a mathematical model of human physiology that supports research in cardiovascular disease. The platform includes the physiology and pathophysiology of cholesterol metabolism, atherosclerosis, and plaque rupture; and comprises four sub-models:

1) Cholesterol metabolism – includes both 'good' and 'bad' cholesterol, high density lipoprotein (HDL) and low density lipoprotein (LDL), and represents the dynamic regulation of lipoprotein particle size, number, and composition, each of which have a significant impact on disease progression and prognosis, as well as their altered synthesis and uptake by the liver.

2) Atherogenesis – represents the mechanisms of lipid retention, modification, uptake, and processing by vascular and inflammatory cells, the regulation of which leads to plaque development and progression.

3) Plaque stability – this integrates changes in plaque composition, size, and geometry by calculating peak stresses in the plaque wall that can lead to unstable plaque and rupture.

4) Cardiovascular risk – employs statistical methods and longitudinal patient data to translate the plaque stability readouts into the likelihood of cardiovascular risk.

Risk factors (such as smoking, diabetes, and hypertension) together with known or hypothesized genetic variants are represented across the sub-models of the platform. A range of "virtual patients" can be generated, tested against existing clinical data, and used for simulations of novel therapies, clinical protocols, or other interventions.

TU-VI-1

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How can the format of information presented affect the risks we take? A closer look into food risks and consumer behaviour.

Gigerenzer (2002) has shown that people understand natural frequencies better than they do percentages. The present studies examined the impact of risk information presented in different formats on attitudes and behaviour and also examined the role of trust and personality. Study 1 involved 80 parents of children aged between 1.5 and 4.5 years recruited through local pre-schools. Parents completed a questionnaire (part 1) focussing on their perception of pesticides and their risks, their knowledge of issues regarding pesticides, trust in information sources, and questions on how they prepare fruits and vegetables for their children. Anxiety, emotional instability (neuroticism), conscientiousness, optimism and agreeableness were also assessed. Following the first questionnaire, participants were provided with a short piece of information regarding pesticide residues on apples and pears before completing the second questionnaire (part 2), which was almost identical to the first. The four conditions of the study were designed to investigate the impact of different ways of presenting statistical information. There were two conditions, one involving percentages and the other natural frequencies. These were split into two further conditions where the number of children eating apples and pears was either made explicit or not. Study 2 involved the same questions, but this time the participants were adults from Surrey and Hampshire answering the questions for themselves instead of with regard to their children. The risk information was kept the same apart from referring to the population at risk as the total population of Surrey and Hampshire who eat apples and pears instead of UK children. The results will be discussed, with particular reference to the role played by personality in influencing attitudes and consumer behaviour and the possible importance of this for risk communication. Also a comparison will be made between the results of study 1 and study 2.

TU-IV-7

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Genomics and the public risk perception: Red versus Green, a systematic review of the research literature.

During the years, genomics has shown to be a increasing field for public (risk) perception research. While the green genomics, with applications in food and agriculture, appears to be the popular topic for risk perception research, red genomics, with applications in the medical field, has been frequently studied as well. The aim of this study is to compare the development of research in de field of public perception of green genomics with red genomics. We systematically analyzed the literature as it is available through scientific journals. In different research areas similar systematic literature reviews have been carried out before (e.g. Gurabardhi, Gutteling, and Kuttschreuter 2004; McComas 2006). A total of 451 peer-reviewed articles, published between 1970 and 2006, and listed in the ISI Web of Science or Scopus databases, were reviewed. Articles were coded to determine the characteristics of the researchers (country, publication year, journals), the type of research presented (quantitative or qualitative and the research design), the common genomics topics covered (green or red genomics), the perspective of the research (risks, ethics or benefits) and research issues (based on keywords). Furthermore, we analysed the data with three research questions in mind: Are there two different "research worlds": different authors,

journals, and time periods? Is the focus on different issues? and Could the public debate in the media or the origin (EU vs US) of the research explain some of the possible differences?

MO-IV-5

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Na-Tech oriented mitigation and prevention Land Use Planning: an interdisciplinary approach to Na-Tech event scenarios set up.

Natural events as earthquakes may affect the integrity of industrial equipment. As a consequence, loss of energy or hazardous materials from containment systems is likely and accidental scenarios such as fires and explosions, which may possibly involve workers within the installation and/or people living in the surrounding urban areas, may occur. Despite these considerations, no sound Na-Tech risk guidelines to drive these specific emergencies or land use planning have been produced. In this framework, our contribution is addressed to the definition of a new approach for Na-Tech prevention and mitigation oriented land use planning which is based on the Probabilistic Seismic Hazard Analysis (PSHA) for the description of the natural event, on simple fragility analysis for the interaction among earthquake, equipments and structures, and on Maximum Credible Accident (MCA) methodology for the definition of industrial accidental scenarios and safety distances. The proposed method provides more realistic information to planners and authorities avoiding complex Quantitative Risk Assessment tools or structural analyses of equipment response to earthquakes. More specifically, the combination of PSHA results and structural fragility analysis for any specific class of equipment, together with cut-off values for the likelihood of natural and industrial accidental events allows the reduction of the total number of analyses. In this way, the complexity of Na-tech events could be decreased in order to develop Na-Tech event, impact and damage scenarios aimed at supporting the definition of land use planning prevention and mitigation strategies (e.g. hazardous equipment re-siting, reduction of exposure and vulnerability, road network improvement) and the development of appropriate tools for addressing post-earthquake emergencies (e.g. definition of shelter location, emergency coping capacity improvement, etc.).

TU-V-6

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Search for radioactive waste repository location: between stigma and rationality.

The siting of the radioactive waste repository, even for the low and intermediate level radioactivity waste (LILW) is not yet solved in Slovenia, due to inadequate approaches at the beginning of 90th and a consequent strong opposition of people living in the vicinity of proposed locations. After the failure of the first “technocratic” approach it became evident that the main problem was not a technical one but socio-psychological, namely the public acceptability of radioactive waste disposal facility. In general people strongly oppose to any kind of such a facility in their vicinity and exhibit a ‘Not in my Backyard’ (NIMBY) attitude even if they are aware of facility necessity in the country. These attitudes have all characteristics of technological stigma, ‘as a mark placed on a person, place, technology, or product, associated with a particular attribute that identifies it as different and deviant, flawed, or undesirable’ (Kasperson, Jhaveri, Kasperson, 2004). In this case nuclear technology, places with nuclear facilities, or radioactive waste are perceived to be unduly dangerous. Persuasive efforts from scientific and technical community are not effective, despite the abundance of rational arguments, mainly because of the lack of trust. As it seems information is not enough, and only informing is not an adequate answer to the problem of location search. Political support for solution of the problem is mainly implicit on the state level, but subject of political quarrels on the local. In this paper we try to present – through media content analysis, public opinion polls analysis, and results of different studies conducted in the process of the repository location search activities – the whole dynamics of the interplay between stigma and rationality on the background of the social (dis)trust. The possible directions of the future development of the location search process in Slovenia are proposed. The whole situation is also compared with the one connected to attitudes toward non-ionizing radiation (e.g. mobile phones aerials), where opposition is of lower intensity, but with similar arguments and in the context of distrust.

MO-IV-4

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Perceptions of soil pollution among a sample of the Dutch population.

Soil pollution caused outrage in the Netherlands in the past due to several cases in which it was found out that new residential areas were built on polluted soil, e.g. Lekkerkerk (1979). In the (internet) survey presented here, we investigated the current perception of soil pollution among a sample of the Dutch population (N=1278). First, we wanted to find out how the respondents perceived soil pollution compared to other environmental risks. Second, we aimed to investigate how they would evaluate different scenarios of soil pollution, by prioritizing them, by rating ten risk characteristics and by ranking the importance of seven risk characteristics. The four scenarios of soil pollution were a residential area, underground water pollution, a nature reserve and a business park. Multi Attribute Utility (MAU) analysis was used to examine the respondents’ evaluation using the ratings and the importance ranking of the risk characteristics. Respondents were much concerned and had little acceptance of soil pollution compared to the other environmental risks. In addition, the respondents appeared to prioritise the scenarios’ treatment according to their proximity to them; they ranked the residential scenario first, then the underground water pollution, the nature reserve, and last the business park scenario. The results of the MAU analysis revealed the same priority. Different risk characteristics appeared to explain the priority of each of the four scenarios. Nevertheless, the respondents indicated overall that the risk characteristics probability estimation and seriousness of the consequences were important to evaluate a risk. This last result was surprising as these two characteristics did not seem to be important in previous studies about the perception of soil pollution.

MO-V-4

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Risk perception of environmental risks: Air pollution, flooding and air traffic.

Environmental risks are becoming more and more a matter of public debate. In these debates, next to the ‘classical ’risk aspects (e.g. probability, severity, and extent) other aspects are addressed, at least in qualitative terms. The overall aim of this (internet) survey was to assess and quantify risk perceptions of the Dutch population of environmental risks, with a particular interest in the risks of air traffic, flooding and air pollution. A sample of the Dutch population (N= 1506) evaluated 14 environmental risks (living near or in an area (with): air pollution, below sea level, below river level, agriculture/bulb grow, approach route airport,

soil pollution, busy street, railway, airport, chemical industry, route dangerous substances, power transmission line, hazardous facility, GSM-base station).Overall concern and acceptance was assessed. Also a relative importance ranking of some of the risks was assessed. In addition, the three risk of particular interest were each evaluated on 14 underlying risk aspects. Respondents appeared to be most concerned with activities of chemical industry (7.0), soil pollution (6.9),and air pollution (6.8) (possible range: 1 – 11 very concerned). Urgent environmental problems (relative ranking) appeared to be: air pollution, soil pollution, and hazardous facilities. GSM-base stations and overhead power transmission lines appeared to be relatively unimportant risks. Acceptance of flooding risks seems to be mostly determined by prior experience, perceived control and number of people exposed. Number of people exposed, severity of health effects, and exposure of vulnerable groups seem to determine air pollution most. Finally the risk of air traffic seems to be determined most by perceived control, trust in government, and fairness. Although the public debate is dominated by (relatively) new risks (e.g. GSM base stations), people appear to be more concerned about the old ones. Different risk characteristics appeared to explain acceptance of different risks.

TU-VI-4

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Public perceptions of nuclear power, climate change and energy options in Britain.

The international community has become increasingly aware that action is needed to address climate change. Against this background the UK is currently witnessing a new form of policy debate around the possible construction of new nuclear energy generation capacity, as one proposed element of the means for delivering on climate change mitigation and energy security goals. However alongside technical feasibility and economic viability, citizen perceptions and views are also likely to be critical to future public acceptance of any energy policy which includes a new nuclear element. In this presentation we will present some results of a quantitative survey, administered by Ipsos-MORI in October and November 2005 in Britain (n=1491). The survey was organized according to three broad topic areas, i.e., (1) general attitudes towards various options for generating electricity, (2) attitudes towards climate change and nuclear power, and (3) respondent's attitudes towards! the adoption of nuclear power and/or renewable energy as potential responses to climate change. The results show that there are high levels of concern about climate change among the British public. And while polls over the past four years have shown a gradual lessening of opposition to replacing nuclear power stations, the new results still show more opposition than support for this type of energy generation. Higher proportions of people are prepared to accept nuclear power if they believe it will contribute to climate change mitigation. However, very few would actively prefer this energy source over renewables or energy efficiency, given the choice.

MO-IV-7

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Certainty impossible: vulnerable technological cotton cultures in India.

Vulnerability is a central issue for future risk research, as it depicts a key feature of our modern technological cultures. Extending analyses of risk society, we will focus on the vulnerability of technological cultures. As innovative technologies are implemented in our societies on an ever-larger scale, technological cultures depend on and benefit from advanced technologies. We live in technological cultures. Vulnerability, we then argue, is related to technology in a double sense: modern technologies are an inevitable source of vulnerability (e.g. climate change, sea level rise), and also the primary means to cope with it (e.g. sustainable energy technologies, dikes). Finally, we will show that it is crucial to recognize a positive aspect of the vulnerability of technological culture too: flexibility, learning, and innovation necessarily imply accepting some degree of vulnerability. Our case study is the introduction of Bt cotton, a genetically modified cotton variety, into India in 2002. In particular, our analysis will focus on the State of Andhra Pradesh, one of India's largest cotton growing regions of India.

Bt cotton cultivation in Andhra Pradesh is a particularly interesting case for vulnerability research because of its ambivalent character: it promises great benefits for agriculture but at the same time exposes farmers and ecosystems to a high degree of uncertain risks. Scientific knowledge about possible risks in Bt cotton farming, such as genetic flow of Bt genes to the ecosystem, is at this moment still highly uncertain. In our study we will investigate how farmers, seed companies, NGOs and governmental agencies cope with the tension between risks and benefits, within a context of uncertainty. We will use the concept of vulnerability of technological culture to analyze the controversies that followed the introduction of Bt Cotton. To that end we will carry out case study research. Our approach involves the study of primary and secondary (scientific) literature, media accounts and fieldwork. The later will be based on an extensive set of semi-structured qualitative in-depth interviews (with researchers from the social and natural sciences, non-governmental organizations, governmental representatives and farmers) and insights we gained from participant observation. For that reason two successive one-month field trips to Andhra Pradesh are scheduled for spring and fall 2007.

TU-V-5

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A qualitative in-depth study of railway suicides.

Background: Suicide committed on railways is a serious problem. Of all deaths in person-train collisions in Sweden, suicides constitute about 75%. The specific objective of this study is to evaluate existing police and rail administration documents on railway suicide incidents from a preventive point of view, and to identify and categorize additional preventive-oriented information on place, behaviour and other circumstances, potentially available from site investigations. Method: Twenty-one cases of railway suicide have been reviewed, based on regular police and rail administration documentation plus observations from complementary site visits. Findings: Neither police nor rail administration documents include sufficient information to guide future safety work. Site visits may add important complementary details on environmental, technical and behavioural issues.

MO-IV-5

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An institutional comparison of risk transfer mechanisms against floods between Europe and USA: A dynamic panel data approach.

An analysis of the effects of natural hazards on society does not solely depend on a region's topographic or climatic exposure to natural processes, but the region's institutional resilience to natural processes that ultimately determines whether natural processes result in a natural

hazard or not. An appropriate method for an international institutional comparison in the field of natural hazard management is still missing. The focus in this paper is on the institutional design of the societal risk transfer mechanisms mitigating the effects disasters. Dynamic panel estimates using growth data from a) 199 European regions (NUTSII) from 1990 to 2004 and b) 3.085 U.S. counties between 1970-2003 reveal a significant negative impact of historical flood events on regional economic development. The application of GIS-data further allows to control for a regions exposure to floods. It also shows that ex ante regulation regarding risk transfer (mandatory insurance in Europe, National Flood Insurance Program (NFIP) in the U.S.) have a mitigating effect that almost absorbs the negative effect of a flood disaster. These results provide an empirical foundation for the proposition that ex ante risk transfer policy is favourable to ex post discretionary decisions.

TU-V-7

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Risk definition in ProjectStartUp: A case study from the building industry in The Netherlands.

ProjectStartUp (PSU) can be used to improve and speed up the design and construct process in building industry. From desk research the commonly used elements for a PSU are known. Also the variable elements for a PSU are known. From interviews and exploring study of literature it became clear that one of the most important assets of a successful PSU is the definition and clearing of the design and construction risks and the illumination of risks in team collaboration.

However, it was not clear if and how the use of a typical PSU would fit into the many kinds of collaboration that are commonly being used in the building industry in The Netherlands. In case studies along the highway A2 from Amsterdam to Utrecht, PSU workshops were tailored to the specific form of contracting in the design and construction process. The principle and the contractor worked together to speed up the process of collaboration and to improve the quality of their efforts. The goal of the PSU in this case is to improve the design and construction processes, the so called hard engineering. It was also a goal to improve the soft engineering, that is the personal collaboration of all engineers and managers involved.

From these case studies it became clear that the common interest of both parties involved was mostly in defining and controlling risks during the contract execution. It was possible to adjust the agenda of the PSU to the context of the building industry and to tailor it to the special form of collaboration between principle and contractor. Subsequently it was possible to improve risk definition as well as other elements in the mutual design and construction process.

MO-VI-4

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How personal relevance and credibility affects the use of risk-related food label information.

Nowadays producers of food products include more and more symbols and logos on their products to inform the public about the possible dangers of the ingredients included. However, the effect of these risk-related logos (e.g. information about food allergens such as peanuts, milk or wheat) on consumers' perceptions of products is not yet sufficiently understood.

We argue, based on Griffin et al.'s (2004) model of risk information seeking and processing (RISP), that a risk signaling cue such as an allergy logo, is only effective when the information is relevant to the consumer (i.e. when people worry about possible allergies). In addition, embroidering on the suggestion that allergy logos are relevant sources of risk information instead of irrelevant peripheral cues, we hypothesize that the usability of the logo in consumer decision making is also affected by the credibility of the logo (e.g. Chaiken and Maheswaran, 1994; Petty and Cacioppo, 1986). A low credible logo compared to a high credible logo, decreases the use of the logo and increases the use of other relevant sources of food information (e.g. list of ingredients).

Three separate studies, manipulating the credibility of the risk-related logo as well as the personal relevance of the logo information (i.e. by means of different scenarios in which people were asked to buy a product for a friend who was - or was not - allergic) confirmed that an allergy-logo indeed affects the choice of consumers, but only when the allergy information is personally relevant. Furthermore, we found repeating evidence for the hypothesis that the credibility of the logo affects the use of the logo as well as the use of other information sources. In addition, consistent with the RISP model of Griffin et al. (2004), participants in the personal relevant condition stated they were less intuitive in making their decision, felt more addressed to read the available information, experienced a higher need for information, and were more concerned about making the wrong choice.

TU-VI-6

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Risk/cost functions and their use in natural hazard management.

Within the last decade, integrated decision-making schemes have taken center stage in natural hazard management. The adoption of these schemes has caused a shift from the mere technical analysis towards a risk-based assessment of natural hazards putting emphasis on the socio-economic evaluation of risks and respective mitigation measures. As in other risk domains one of the key questions in the evaluation task is, how much money should be spent to avert fatalities. To address this question, natural hazard managers commonly rely upon risk/cost functions that trade off the costs implied by risk mitigation measures against their impact on mortality risk. In this contribution, we first show how risk/cost functions are established for mitigation measures against snow avalanches emphasizing on the integration of risk artefacts such as redundancy and uncertainty effects. These artefacts can have significant impact on both, the quantification and the evaluation of risk mitigation measures, and should therefore be explicitly addressed in the assessment of mitigation alternatives. Second, we link the use of risk/cost functions to the standard economic concept of the value of statistical life (VSL). Being the marginal ratio at which people trade off income for a specific risk reduction, the VSL implies the same components as risk/cost functions and may therefore be used as a cost-effectiveness criterion allowing to pinpoint allocatively optimal mitigation measures. We thus discuss the underlying assumptions of using the VSL as a cutoff value in cost-effectiveness analysis.

TU-VI-7

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Risk analysis for system supervision of water management authorities in the Netherlands and its value for policy making.

Manpower and financial means are limiting factors for organisations in doing (all) the required work. Netherlands' governmental organisations are required to select their work/activities/… in a transparent way, both ex ante ('what is going to be done, and why?) and ex post (what has been done, and why?) for reasons of accountability.
The Netherlands' Water Management Inspectorate is supervising the national and regional water management authorities, through 'system supervision', concerning the implementation and enforcement of water legislation and regulations. There is no inspection into individual cases, like industrial installations and their permits for discharging wastewater! Priority setting in actual supervision activities is based on risk analysis.
The current approach for assessing the risks is a bottom up approach with as the first step an inventory of effects (safety, environmental, administrative) and chances of water management authorities not properly doing their required work. The latter is related, amongst other things, to complexity of tasks to be carried out, simple and straightforward agreements in water management (roles, tasks, legislation). Additionally, the percentage of non-compliance with legislation is taken into account. Combining the scores for chances and effects provided for a risk image. This image enables the inspectorate to select (= prioritise) activities of the water management authorities that require in-depth inspection(s).
A second step in risk analysis will include a (more) structured and objective approach in both identifying and analysing risks as a means for further streamlining the supervision strategy.
Results from system supervision are being fed into the policy cycle, thus facilitating the process for policy making (including policy amendments).

TU-IV-7
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Nutrigenomics: which future do consumers prefer?
Unforeseen consumer reactions have played an important role in the failure rate of innovative technologies, as it is the consumer who is the ultimate judge of acceptability of new products and services. For radically new products or services, accurate estimation of consumer acceptability is complicated by the fact that consumers lack a proper mindset against which new offerings can be assessed. Confronting consumers with unfamiliar products is likely to result in estimations with a low predictive validity for actual behaviour, because consumers have little information in memory to base their evaluation on (van Kleef et al., 2005). To increase the predictive value of consumer research, it is necessary to provide consumers with an appropriate context for the product they are to evaluate.
This study aims to develop insight into consumer acceptance of products and services resulting from an emerging science area called nutrigenomics. Nutrigenomics is the scientific study of the way human genes respond to given nutrients, or, the interaction between what we eat with the way our genes function (Cain & Schmid, 2003). We created a future context in which consumers were asked to evaluate nutrigenomics. This context is based on previous research (Ronteltap et al., submitted; Ronteltap et al., in press), in which we identified the most important inhibiting and promoting circumstances for the development of nutrigenomics, referred to as 'critical success and failure factors' (CSFs). Rather than verbal descriptions of the identified CSFs, respondents saw filmed future scenarios for nutrigenomics-based products and services. We recruited a sample of 400 respondents, representative for the Dutch population in terms of residence, age, gender, education and household size, and we measured their preference for several future nutrigenomics scenarios. Results from this experiment are presented with a focus on the relative importance of each of the CSFs for consumer preference and the specific underlying psychological processes.

MO-VI-6
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Single layer clothing penetration factors for pesticide operators.
Operators exposed to pesticides typically wear work clothing consisting of long pants and long-sleeve shirts. While quantitative data on the effectiveness of "protective" clothing have been previously reported, studies investigating reduction of pesticide residue uptake (or penetration) by protective or "normal" clothing differ substantially in design, sample size, and results. Pesticide clothing penetration (or conversely protection) factors for single layer clothing (i.e., long sleeved shirt, long pants) were evaluated using dermal exposure monitoring data (passive dosimetry) included in the Environmental Protection Agency's (EPA) Pesticide Handlers Exposure Database (PHED Version 1.1). For purposes of estimating potential skin exposure from passive dosimetry data, a clothing penetration "factor" can be represented as the fraction of pesticide that crosses the barrier of a single layer of clothing and is available for contact with the skin. Results are presented as fractional penetration determined by the ratio of inner to outer dosimeters (patches or whole body sampling methods) worn by persons engaged in pesticide mixing, loading and/or application tasks. A realistic estimate of clothing penetration has a number of potential uses. It may allow quantitative use of exposure monitoring data when no inner dosimeter data exists, or when all inner dosimeters are non-detects, but there are complete (detectable) outer dosimeter data. An appropriate basis for clothing penetration could also be used to estimate exposure from a monitoring study conducted with shorts and short-sleeve shirts to approximate the effect of wearing work clothing (long pants, long sleeve shirts). Similarly, a realistic estimate of clothing penetration could be used as the basis to mitigate exposure using a second layer of clothing e.g., coveralls over work clothing. Mean clothing penetration was 8-12% for whole body dosimeters and patches, respectively. Clothing penetration was observed to increase as measured deposition on the clothing decreased across 5 orders of magnitude.

MO-IV-4
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Indigenous knowledge on the effects of climate change in north westernmost Europe.
The study analyses the perceived risks and benefits in relation to Climate Change among lay people in the European ultimate north, the Northern parts of Russia, Norway, Sweden and Finland. The study area is special in two aspects. First, it is expected that the effects of the Global Climate Change will be first visible in these vulnerable settings. Second, the lay people in the region may have relevant indigenous knowledge how to cope with climate change due to their experiences on the earlier extreme weather events .
In the paper, there is studied, which factors connected to Climate Change are perceived as risks or benefits to indigenous professions (like agriculture, forestry, reindeer herding), to modern means of living (like tourism and services) and to "life in general" (like sustainability of communities) - and which are the factors interlinked to this development.
As material for the analysis there is used a) focus group interviews among "traditional/indigenous" professionals accustomed with changes in the climate b) the informed mailed survey response on perceived effects of climate change in Norway, Sweden and

Finland in the various northernmost urban and rural settings. In Russia structured face-to-face interviews took place in the cities of Murmansk and Apatity in the Kola Peninsula. The study was targeted to 200 persons in each country.
The differences between the responses on various countries, the influence of trust and attitudes in the results are discussed in details. The results will give possibilities to understand how to mitigate and adapt to the potential climate change in the European setting, if the climate conditions currently occurring only in “the Far North” are more prevalent in various parts of Europe in the future. The study analyses the perceived risks and benefits in relation to Climate Change among lay people in the European ultimate north, the Northern parts of Russia, Norway, Sweden and Finland. The study area is special in two aspects. First, it is expected that the effects of the Global Climate Change will be first visible in these vulnerable settings. Second, the lay people in the region may have relevant indigenous knowledge how to cope with climate change due to their experiences on the earlier extreme weather events .
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MO-V-6

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Convergence Towards Integrated Risk Management. Results from the European SHAPE-RISK Project and other Initiatives.

“SHAPE-RISK” is the acronym for “SHAring exPErience on RISK management to Design future Industrial Systems”. SHAPE-RISK is a co-ordination action co-financed by the European Commission within the 6th Framework programme. This 3-years European project meets 19 organisations. The co-ordinator is INERIS (France), a national expert at the service of environmental safety.
SHAPE-RISK aims at optimising the efficiency of integrated risk management in the context of the sustainable development of the European process industry. SHAPE-RISK understands risk management as covering the fields of following European framework directives: SEVESO, IPPC, Safety and Health of Workers (89/391) and ATEX. The innovation brought by SHAPE-RISK is to have a consolidated collection of knowledge, data, methods and tools related to all the above-listed dimensions of risk management. This was achieved through the construction of national networks in 12 European countries.
SHAPE-RISK has harvested exciting results most of which have been elaborated with and endorsed by the Industry. Projects conducted at national level have also confirmed SHAPE-RISK conclusions.
The key recommendation issued by the SHAPE-RISK project is to move towards an integrated Risk Management in the European process industry. In particular, SHAPE-RISK provides:
1) Recommendations about the regulation in order to avoid overlaps and conflicts between directives, and in order to harmonise risks based inspections by authorities;
2) Recommendations about technical tools used for example to assess the risks not separately but in a common approach;
3) Recommendations for the monitoring of the performance of the management process;
4) Recommendations about human and organisational aspects.
Some of these results could be implemented in a near future while the most innovative ones might require radical adaptations.
This communication will detail results from SHAPE-RISK and illustrate its recommendations with practical examples taken from projects conducted in France.

MO-IV-4

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System perspectives of experts and farmers regarding the role of livelihood assets: Results from a structured mental models approach.

Pesticide application is increasing and despite of extensive educational programs farmers continue to take high health and environmental risk by applying pesticides. The Structured Mental Model Approach (SMMA) is a new method for risk perception analysis. It embeds farmers' risk perception into their livelihood system in the elaboration of the mental Model (MM). Results from its first application will be presented here. the study region is Vereda la Hoya (Colombia) and is characterized by subsistent farming including high use of pesticides and incidence of health problems. our hypothesis was that subsistent farmers were constrained by economic, environmental and socio-cultural factors, which consequently should influence their Mental Models. Ten experts and ten farmers were interviewed and their MMs of the extended pesticide system obtained. The interviews were posed open ended and structured questions in three parts: (i) capitals definition and ranking with respect to their importance for the sustainability of farmers' livelihood; (ii) understanding of the system and its dynamics; (iii) importance of the agents in the farmers' agent network. following this structure, the interviews were analyzed statistically and qualitatively for each part separately. Our analyses showed the Mental Models of farmers and experts differed significantly from each other. Applying the SMMA we were also able to identify reasons for the divergence of experts' and farmers' MMs. Of major importance are the influences of the following factors: i) culture and tradition; (ii) inappropriate conveyance of knowledge; (iii) trust in the source of information and iv) adaptive learning. We concluded that SMMA is a useful tool for understanding risk perception with complex systems, such as farmers' livelihood. Furthermore, through the understanding of the reasons of divergence we are able to design measures to downsize risks of pesticides application including the systemic logic of farmers.

TU-VI-7

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Incentives ensuring truthful risk disclosure within organisations.

Due to governmental regulations on risk reporting, the concept of risk disclosure has lately received remarkable attention in both theory and practice. However, the considerations so far made focussed on the informational needs of the public, the government and shareholders as well as on their settlement. Intra-organisational risk reporting, providing additional information for the corporate management, has yet to be reflected on. This paper seeks to address this gap in the literature and proposes an incentive scheme to ensure truthful risk disclosure within organisations.

As each employee is more familiar with the hazards and chances of the department he works in, he forms an important information source. By establishing a risk reporting policy, this source can be opened up. Hence, agency theoretical considerations enter the picture. Agency theory assumes that not only the principal's and the agent's information differ but also their interests. While the principal aims at fully achieving the objective set, the agent has preferences with respect to the effort expended. Submitting a risk report amplifies his workload. Thus, he has to be granted an additional reward.

This is where incentive systems come to the fore. While a vast variety of such schemes exists, they predominantly focus on targets set on maximisation and are not applicable to targets aimed at realising definite target values. Moreover, these incentive schemes have not been designed regarding for risk reports. Such forms of disclosure set themselves apart from other reports, as they often cannot be proven true or false.

This paper proposes an incentive scheme depending on the objective aimed at, its level of achievement and the truthfulness of the report submitted. It allows for rewards, even if the report is inaccurate, but the reporting employee exerts himself for reaching the primal target. Thus, discouraging effects are ruled out.

TU-V-7

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On some issues related to paradoxes in modelling risk in complex systems.

There is an on going search for new models for complex systems and for evaluation of the defined models performed for some cases like for instance the integration of the risk models for all internal and external events in one single model adding also to this mega-model the impact of the economical and social layers of the systems. However the performance of this tasks is not possible without a serious call to some of the basic assumptions and theoretical backgrounds of the theory of complex systems and risk analyses. Such a quest leads in the meantime to a series of challenges coming from paradoxes generated by those scientific quests, coming for instance from those risk related and general science related myths circulating in the scientific world. On the other side paradoxes in studying complex systems generate situations, when solutions could be probably better found if one looks for the similarly as in the case of other paradoxes, appearing in other sciences. The lessons learnt from the situations when paradoxes appear indicate on some possible algorithms to be used as a generic guidance in solving paradoxes, when they appear in the study of some complex systems. This paper formulates for the paradoxes encountered in some specific cases, presenting which were the guidances used to solve them. The cases mentioned are real ones from previous modelling attempts of complex systems as performed so far. A set of potential pattern guidances for potential use in similar cases is formulated, aside with some future actions to be considered in order to get more confirmation and to check the robustness of those proposals.

TU-VI-8

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Some methodological aspects related to the risk informed support for decisions on specific complex systems objectives.

The use of PSA/PRA is increasing for the support decision making process, as one of the applications of this method. One such case is when PSA is required to support decisions involving also in a high degree social and economical aspects, as for instance in the case of the evaluation of the possible scenarios to be chosen for various sources of energy so that to assure a better confidence on the energy supply security, while having the lowest acceptable impact on risk. Existing results and methods are quite scarce in combining in an integrated manner the models used for the evaluation of risk of various energy sources, aside with the part on integrating them into the specific social or economical environment, while considering various scenarios for a better energy supply. One possible approach is presented in this paper together with some results for pilot calculations. The method consists in using an integrated approach for the evaluation of risks for various energy sources combined with the decision process for the societal and goal setting levels and by the use of existing databases on risk for various energy sources. Preliminary results indicate on the applicability and utility of the method, as well as on the next steps for its benchmarking and full scale use.

MO-IV-7

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Consumer attitude toward risk of consuming genetically modified papaya fruit.

Papaya Ringspot virus negatively affects the production of papayas in Hawaii. GM papaya seeds have been developed which are resistant to the virus.

Issue addressed. Risk assessment of GM fresh fruits. GM papayas have market risk due the consumers' resistance to the consumption of GMOs. Japan is the main market of Hawaiian papayas. The Japanese government has stiff requirements regarding GMOs.

Methodology: Consumers were surveyed to determine their attitude toward GM fruits. Respondents were asked about their opinions on health safety and allergies, willingness to consume, willingness to purchase if genetic modification reduced the amount of pesticides, and willingness to purchase if GM fruits are as nutritious as non-genetically modified fruits.

Results: Respondents are not well informed about GM food. Many are wary of consuming GMOs because they feel they may be unsafe. The lack of knowledge about GMOs has caused misconceptions. A plan is needed plan to educate the consumers about the benefits of GMOs, such as reductions in pesticide use, reductions in post harvesting losses, and improved nutritional value. These benefits are very important market attributes that influence the consumers' decision making.

Educational materials should be developed to explain the risk that GMOs pose to the environment and to human health. This will increase consumer acceptance and minimize misconceptions about GMOs in the food chain. The respondents strongly believe that GM fruits should be labeled. Mandatory labeling of GMOs appears to be an idea whose time has come.

TU-VI-8

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DALY's versus WTP for environmental health priority setting based on data of air pollution and noise in Flanders (Belgium).

Aggregated health metrics, such as disability adjusted life years (DALYs) and willingness to pay (WTP), are useful in environmental health policy to value the changes in public health caused by environmental pollution. Because of the different application areas and methodological approaches - DALYs are based on experts' assessment instead of the citizen's point-of view in WTP - a fixed WTP/DALY ratio does not exist. In this paper, the relationship between these two aggregated environmental health indicators is studied for air pollution and noise in Flanders. The environmental burden of disease methodology without age adjustment or time discounting and the Dutch disability weights have been applied. The external cost values are consistent with those used in the European ExternE and CAFE Programmes. Calculating a euro per DALY, a difference is made between mortality and morbidity due to short-term or chronic exposure. The external cost per DALY due to acute and chronic mortality corresponds respectively to €75,000 and €52,000. In the case of severe morbidity health effects a €82,300/DALY conversion factor was calculated. However, for smaller symptoms, medical experts and citizens do not value at equal. Expert weighting schemes (DALYs) give much lower values compared to the individuals' willingness to pay. It is concluded that nowadays, the individuals' willingness to pay may be a better value for small health effects. After all, the severity weights, traditionally used to disability effects, are not yet sufficient developed for diminished well-being.

MO-VI-7

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Charting the proceduralisation of precaution: Assessing the impact of deference and limited judicial review.

An analysis of the jurisprudence developing from judicial interpretations of the precautionary principle has traditionally hinged on a trans-Atlantic dichotomy. Arguments that the EC endorses a more-precautionary stance than the US are well rehearsed. This paper departs from analyses that cite profound cultural discord as the raison d'être for divergent notions of precaution. It suggests that the position adopted by the EC in WTO litigation can in part be explained through a series of judgments passed down by European Courts. Findings that particular EC measures breached evidential requirements of the SPS Agreement can be attributed to the broad discretion bestowed by the EC regime upon Community institutions in invoking the precautionary principle and determining its scope and nature. A review of the exercise of that discretion is restricted to determining whether a Community institution has made a manifest error or misused its power, precluding any substantive appraisal of the scientific basis of measures adopted in line with the precautionary principle. This discretion has resulted in a 'deferential' approach being taken by the European Courts in which applications of the precautionary principle by EC institutions have consistently been upheld. It might be argued, therefore, that the failure of EC measures to satisfy specific provisions of the SPS Agreement stems from a tradition of limited powers of judicial review in the EC legal order and a reluctance on the part of European Courts to critically evaluate renditions of precaution propounded by the EC Commission, Council and Parliament. This paper charts the progressive development in case law of procedural guidelines to precautionary intervention, and questions whether limited judicial review ultimately prevents EC interpretations from becoming aligned to the WTO requirement that precautionary approaches are be 'based on' scientific risk assessment.

MO-VI-4

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Presenting health risk information in different formats: the effects on participant's cognitive and emotional evaluation.

Purpose: Effective communication of treatment risks is important to enable patients to make informed decisions. This study aimed to determine the effects of different risk formats on participants' evaluation and interpretation of risk information. Methods: Participants (N = 101) were recruited among students of the Vrije Universiteit Amsterdam and were asked to evaluate four cases. They were asked to imagine that a good friend of theirs was at risk for (1) giving birth to a child with Down syndrome; (2) developing cardiovascular disease in the forthcoming 10 years; (3) developing breast cancer; and (4) developing colon cancer when having a positive family history. Risk information was presented in one of three risk formats (percentages, natural frequencies, or icons). Risk format was varied between subjects. Results: Analysis showed that risk information presented in percentages was evaluated as smallest but also easiest to understand compared with risk information presented in other formats ($p<.05$). Risk information presented in icons was evaluated as most serious, most frightening and most worrisome, while risk information presented in percentages was evaluated as least serious, worrisome and frightening ($p<.001$). Mixed results were found on the dimension complexity. An effect was found on decision making, i.e. what they would advise their friend to do, but this was not clear cut. Conclusion, this study showed that different risk formats have different effects on participants' cognitive and emotional evaluation of the information and on their choice. Doctors should therefore be careful in choosing the format in which they present treatment risks.

TU-V-6

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Risk calculation for land use decisions: The need and consequences of unification.

In the Netherlands, Quantitative Risk Assessment (QRA) is used in land use planning around establishments using, handling or storing dangerous substances. To decide on the acceptability of an activity in relation to the surrounding area, the individual risk at a specific location (location specific risk) is used as a measure. Recently, the criteria for the location specific risk have been incorporated in the Dutch regulation, known as the BEVI legislation. Since the criteria for the acceptability of risk are now laid down in legislation, there is strong need for a transparent and robust method to calculate the location specific risk. However, benchmark studies show that different QRA software tools often give different results for the same situation. Therefore, the Dutch government decided to prescribe one specific QRA software tool to do all the QRA calculations required by the competent authorities. This software tool, SAFETI-NL, was selected following a European tender. Furthermore, the Dutch Guideline for Quantitative Risk Assessment was redrafted in order to clarify the existing ambiguities and to be completely in line with the software tool. The combination of the Guideline and the software tool SAFETI-NL should result in a robust method to do QRA calculations. However, eliminating all user flexibility may lead to unrealistic results in a number of situations. There is balance needed between a strict calculation method

guaranteeing robust results and a flexible method guaranteeing valid results in specific situations. Before the new guideline and the QRA software tool SAFETI-NL becomes effective, a study of the consequences in existing land use is needed. Furthermore, procedures are needed to decide on model changes including bug fixes and model improvements. In this paper, an overview is given of the introduction of a prescribed QRA software tool in the Netherlands, highlighting the process of prescribing one QRA tool, the investigation into the consequences and the procedures for good management of model changes.

MO-VI-5

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A risk assessment approach for Chronic Obstructive Pulmonary Disease.

Effectively quantifying and communicating disease risk assessment information to consumers is notoriously difficult. Confusion can be caused by the inherent complexity of the information, and can be compounded by uncertainty, knowledge gaps and a lack of consensus among those experts providing information.

This presentation consolidates current scientific understanding of the progression of Chronic Obstructive Pulmonary disease (COPD) and highlights a novel approach that uses a computational model to explore mechanisms of COPD and facilitates quantification and communication of risk.

This is achieved through provision of a risk estimate, framed within a sound understanding of the associated uncertainties. This is derived by combining a Bayesian risk assessment model with an evaluation of the uncertainty associated with the model's output. The technique combines epidemiological and experimental data in conjunction with disease mechanism models to derive risk metrics. The uncertainty assessment is based on a classification scheme for evaluating the data used for risk assessment. Combination of these elements can allow categorization of products according to their risk profile. An illustrative matrix is proposed to compare products in different risk categories.

The use of model hierarchies and the approximation of complex models by simpler, more interpretable variants will be considered as an aid to stakeholders. Understanding and using biologically-based risk assessment models may potentially allow regulators and consumers to make more informed choices among a range of consumer products with different estimated levels of risk.

TU-VI-6

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RIKO – a guideline for a risk based planning of counter measures against natural hazards.

Risk assessment has been used in many different disciplines like the financial or health sector, engineering and technical issues, biodiversity, nuclear technology or terrorism prevention for many years or even decades. The application of risk assessment to natural hazards has become widespread in the last years because coping with complex systems requires a systematic analysis of scenarios and its consequences, an evaluation of these results and if necessary a risk reduction strategy. The decision making process is a crucial step in dealing with natural hazards and requires a general methodology.

The National Platform for Dealing with Natural Hazards PLANAT in Switzerland has defined the risk concept as the leading guideline for dealing with natural hazards in the future. Following a strategy developed in the years 2000 to 2004 a software and a guideline for risk based planning of countermeasures against snow avalanches, debris flows, flood, rock fall and landslides is developed at present (Project name: RIKO). The basic idea of this guideline is to present a structured procedure for risk assessment and to combine technical, biological, organisational measures and land use planning in a cost-effective way so that defined protection goals, given by the national strategy, are achieved. The target group of the software and the guideline are practitioners in consulting offices which are in charge of planning of countermeasures.

In this paper we present the general setup and the workflow proposed in RIKO. By means of an example we show the results of a typical planning process and the uncertainties which are an inherent part of a risk based planning process.

TU-VI-1

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Coping with the default risk of gluten intake: An analysis of online talk between celiac disease patients.

This is an empirical study of the way in which celiac disease patients manage the risk of gluten intake. The paper examines naturally occurring conversational data in order to study how patients cope with constantly being at their day-to-day living. It is found that celiac disease patients resort to a toolbox of discursive techniques that enables them to justify the diet for themselves and others, and to reduce the risk of diet lapses. They for example construct wish to quit as a recognizable but passing phase in learning to deal with the diet, and formulate quitting itself as action that directly affects the efforts of others. By reformulating quitting into 'cheating', participants assign the a spoilsport to someone who considers gluten intake. Quitting the diet is thus established as an action that undermines the diet's necessity and validity, which has direct negative implications for faithful diet followers. Patients display themselves as dependent upon others for being able to manage the risk effectively, as if in a social dilemma situation, but now the emphasis is on preventing the other from quitting the game rather than waiting for the other start it. Celiac disease patients not only construct themselves as densely interwoven with the gluten free diet but present the diet as a necessarily collective effort to manage the default risk of gluten intake. Any solution that affects current dietary practices, such as genomics-related therapies or products, will have to take this into account.

TU-V-7

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Proof of safety at the start of exploitation: A result of communication failures/successes, misjudgment or bad luck during the design/construction?

At the end of 2006 the Dutch minister of transportation had to announce a further delay of the start of the exploitation of the "Betuwe route". The "Betuwe route" is a dedicated cargo railway line between the port of Rotterdam and the Dutch-German border. The delay was caused by ongoing work on the tunnel technical installations and a discussion regarding the safety of the railway line, the fireman in particular.

Risk assessment: In 2005 Grontmij was asked to analyze the risk of the people of the emergency services in relation to the 25 kV AC catenary system during an accident. Given the tasks they have and being the first to be on site, the firemen is the group of people who are facing the highest risk carrying out their work.
The discussion that rose was focusing on two elements:
1) Lack of proper criteria. There are limits for the risks due to external events risks and the risk that train passengers face making use of the train. However there seem to be no criteria for the risks that are permissible for emergency services. Which level of risk is then acceptable?
2) Human failures. Whenever human failures are part of a risk assessment there is a discussion about the methodology, scope, level of detail, etc.
Historical (and) background: Between May 1994 and November 1996 the Dutch authorities finally decided to build the freight dedicated rail infrastructure between the Port of Rotterdam and the German border.
The line incorporated several tunnels, one with a length of 8 km. Not the longest in the world, but tunnels that size and length bored in soft soils are not build that often. The construction work, tunnel technical installations and rail related work was split up over various contracts. And even though all types of risks were discussed from the start of the project not all discussions were straightforward and the discussions never stopped. This was partly caused by politicians, not all parties were in favor of the Betuweroute nor did all agreed upon the choices made for the HSL. During the project sometimes changes were introduced in order speed up the acceptance but also increasing the costs resulting in more discussions. With these large infrastructural works going on, there was also a lot of interaction between the various organizations and authority levels within the Netherlands, government, province and municipality.
For the fire departments along the routes of the Betuweroute and the HSL, an organization was created (Railplan) which had the task to coordinate the interaction between the Infraprovider and the fire departments. One of the last discussions that took place were about the risks of the emergency services. Somewhere along the design path it was decided to use 25 kV AC as the electric power supply for the Betuweroute and the high speed rail lines, in stead of the “regular” 1500 V DC power supply. Once the whole power supply was already installed a discussion between the fire departments where the 25 kV traces were located and the infrastructure administration resulted in a risk analysis focused on the risk of the emergency services.
Even though that a discussion about safety during emergencies is logical, it is strange that at the end of a project an organization (the fire departments) of the local authorities can prohibit the exploitation of an infrastructure build by a higher level authority. One might expect that the government would have concentrated all required expertise and organizations of all levels, which are needed to realize such a high level project. This however wasn’t the fact; the fire departments of the municipalities were required to provide a final approval for starting exploitation. Even this was sometimes problematic given the fact that for a given construction more then 1 fire department had to provide such a final approval. This given the fact that the local rules from one municipality could vary from the other involved municipalities, this due to the fact that they are derived out of global policy rules. Also there were no requirements regarding the level of risk to which an emergency service could be exposed during accidents. Normally the working environment is governed by the health and safety regulation. But emergencies are not following the health and safety legislation. This means that it is not always possible to generate a “safe working environment” for the emergency services at all time.
Risk analysis: What originally looked to be a “straightforward” type of analysis, turned out to be a discussion regarding the used methodology, scope of the analysis and without a policy regarding the required level of safety.
In order to determine of the level of risk was acceptable the risk was calculated and compared with the historical data from casualties amongst the fire fighters during emergency services tasks.
SE and RAMS 50126: Would a more systematic integral safety approach have resulted in a quicker solution? The use of e.g. EN 50126 or System Engineering may have a positive impact in the approach of risk. However the lack of a tolerable risk level for emergency services is not solved by the use of these tools.

MO-V-7

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The valuation and reporting of reputation risk management capability.

The Financial Statements prepared and audited in today’s economic environment can be traced to the industrial era, when tangible assets such as machinery were the engines of growth. In this era, financial accountants endorsed or invented rules based on the historical cost doctrine that yielded values which had no counterparts in commercial reality – often book valuations were sheer fictions, and thus managing the risk associated with those valuations became a meaningless exercise. This was especially the case when intangible assets such as an organisation’s Brand Equity and Reputation were kept off the Balance Sheet, thus making the valuations even more fictitious. This has resulted today in knowledge-economy companies reporting book values widely divergent of market values. These fictitious financial reports were then audited, and the auditors were paid well by the preparers of the statements to hold that the statements gave a true and fair view of the state of affairs of the company. When some of these companies failed spectacularly due to the mismatch between commercial reality and reported values, the reason for failure was pinpointed to the irreparable damage to the company’s reputation due to the lack of adequate risk management procedures, resulting in a failure traced to an organisation’s products, services, information systems or external auditors. Since the spectacular collapses of Enron and WorldCom in the international stage, many countries have introduced either mandatory or voluntary corporate governance procedures. In the USA, SOX 404 makes mandatory the reporting of all significant risks in a company’s annual reports, albeit outside of the financial statements, as an off-balance sheet item. This paper argues that the overriding reason for governance is ultimately the safeguarding of an organisation’s reputation, and that this requires an integrated approach where the ‘accountees’ (corporations), and its investors and regulators are provided with appropriate information by the ‘accountors’, i.e. the accounting profession. It also argues that although the current professional accounting standards result in financial statements that are not adequate for the proper governance, an integrated approach can be taken where reputation risk can not only be managed and valued; it can also be incorporated in these financial statements. The paper provides a valuation model based on the premise that risk management should not be based on what the organisation has, but instead what the organisation can do, i.e. its capability to manage and enhance its reputation in order to ultimately generate incremental future cash flow. It then suggests an approach that auditors can take to determine its strategic capability of sustaining and generating value via reputation enhancement. Finally, the paper considers the role of the Risk Manager, and how an empowered open-book approach to communicating and financial

reporting can provide significant motivational benefits in risk reduction and reputation enhancement that ultimately result in increased value.

TU-VI-4

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Gut feeling versus common sense: Associative and cognitive processes in risk perception and communication.

In this presentation, we hypothesize that people perceive risks by using both associative and cognitive processes. Associative processes are based on gut feelings, spontaneous associations with risks and prior experience, whereas cognitive processes are relatively more conscious and deliberate. We present an overview of five studies in which we investigated the roles of these two processes in the way people interpret risks and risk communications. We used and adjusted a relatively new method to measure the associative processes, namely the Extrinsic Affective Simon Task (EAST, de Houwer, 2003). This is an indirect test, which is believed to be suitable to reveal people's first, spontaneous association with a risk.

An interview study and survey study are discussed that examined whether and how people use risk associations to perceive unknown risks. In addition, three experiments are presented, in which it was investigated how textual, audiovisual and active risk communication influenced the two risk perception processes.

The findings of these studies showed that associative processes play an important role in people's risk perception. In addition, it appeared difficult to affect the two risk perception processes by risk communication; the associative processes were particularly not easily influenced. Nevertheless, we cautiously give some recommendations for risk communication practice.

In sum, we consider the indirect measure as valuable for risk perception research because it provides additional insights about the way people perceive risks. We conclude that both associative and cognitive processes play important roles in people's risk perception and discuss the implications for risk perception research and for the development and evaluation of risk communications.

TU-VI-6

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Societal cost benefit analysis for soil remediation operations in the Netherlands.

This societal cost benefit analysis for soil remediation operations in the Netherlands, distinguishes four options for future investments. In the zero option government funding will be terminated. Because -legal- incentives do not change, private parties continue with remediation. Besides, three policy options are distinguished with government-finance.

Soil remediation does deliver benefits to human health, the drinking-water supply, housing, perceptions and the ecosystem. Much of the Netherlands population is concerned about soil contamination.

The benefits for health, drinking-water supply and housing are expressed in monetary terms. To what extent the benefits weigh up to the money spent depends partly on the -value-taxed discount rate chosen. Use of the current discount rate of 4% means a slightly negative balance whatever the policy option chosen. Focusing on non-material benefits, such as ecology, can cause the scales to tip in another direction.

By using a lower discount rate future benefits, such as health and drinking-water supply, are considered more important. If the discount rate drops to 2% or less, all policy options may lead to a positive balance.

Particularly the health benefits that are veiled in uncertainty may be a reason for applying a surcharge and, in turn, a higher discount rate; in this case, all the options will lead to a net negative balance.

This analysis was carried out for the whole soil remediation operation; however, weighing up costs and benefits on remediation components or for individual sites will produce other results. The net benefits of soil remediation on an individual site are, excluding historical causes and type of contamination, particularly dependent on the soil use and population density.

MO-V-4

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Flooding experiences in the Netherlands: An empirical test of protection motivation theory.

Most scientists agree that earth's climate has changed rapidly in recent decades. This will have far-reaching consequences for low-lying countries like the Netherlands. Sensitivity to warnings is crucial in order to deal with climate change risks adequately and to motivate people to take precautionary actions. Our focus is on the role of prior experience with floods on the processing of warnings. Protection Motivation Theory (Rogers & Prentice-Dunn, 1997) predicts that people will take precautionary actions when threat appraisal is high, especially under the condition that coping options are appraised as potentially successful. We used structural equation modeling, using multiple groups, to test PMT under different conditions. We further hypothesized that the simultaneous effect of threat and coping appraisal on precautionary actions against a future threat, is itself moderated by experience (i.e., a three-way interaction). Specifically, we expected the simultaneous effect being more pronounced for people with flooding experience compared to a control group lacking such experience. In a survey among 516 households living near the Dutch rivers Rhine and Meuse, households with different experiences were compared: being (a) flooded and evacuated, (b) flooded, (c) evacuated, (d), threatened, and (e) controls. Results showed that the simultaneous effect of threat and coping appraisal was invariant across groups, thereby validating PMT. Provided that coping options were appraised as ineffective, a negative relationship was found between threat appraisal and precautionary actions. As predicted, this effect was strengthened by prior experience with floods. However, provided that coping options were appraised as effective, the positive relationship between threat appraisal and precautionary actions weakened when people had experience with floods. We expect that experiential processes (e.g., emotional injury, social support) can explain above mentioned results.

MO-IV-6

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Alternatives exist! ALARA in chemical risk issue management.

Certain chemicals have increasingly come under attack over their potential environmental health risks. In the last decade, where the science is inconclusive, or activist pressure too strong, EU regulators have turned to invoking the precautionary principle – banning

substances on the basis of uncertainty. Pressure on regulators is increasing with refinement in data collection via biomonitoring technologies and epigenetic studies.
European Union chemical policy management has adopted a precautionary 'substitution when in doubt' presupposition (as seen in recent EU legislation like the RoHS and Biocidal Products Directives and peculiar reclassification situations like ethanol and formaldehyde). With the recent passing of the EU Chemicals Regulation (REACH), precaution has been entrenched as the main European chemical policy strategy via the substitution requirements under the authorisation procedures.
One problem though is that precaution works with black or white issues when benefits are not influential in the decision-making process. But many chemicals are often toxic substances that are very effective chemicals which provide recognised benefits. Precaution-based chemical decisions have also led to many instances of the risk-risk paradigm where the alternatives, if any, have proven to be worse (banning of DDT, certain phthalates and flame retardants and certain biofuel policies). Policymakers need to rethink their chemical risk strategies before REACH gets too far into implementation.
An alternative to precaution does exist, although it has never been applied as a regulatory tool in chemical policy management. This is the concept of ALARA (As Low As Reasonably Achievable). ALARA is used as a policy tool in the nuclear and vaccine industries, where benefits are clear, alternatives unthinkable or unreasonable, leaving policymakers with the policy strategy that unavoidable risks need to be managed. The public can accept risks if industry is committed to working to ensure that any exposure is kept to as low as reasonably achievable. They will not accept risks if they believe the 'precaution assumption' - that they can continue to enjoy the benefits without any risk.
Chemical issue managers should articulate ALARA as a risk management policy tool. Remarkably, industry has not, even though ALARA is implicit in product stewardship and Responsible Care® philosophies, with its commitment to continuous improvement throughout the value chain. The literature is scant here. The paper examines several voluntary commitments to lower emissions (PVC and brominated flame retardants) as examples of ALARA-like strategies.
ALARA is about managing the risks, precaution is about evading them. A precautionary approach fosters distrust of industry – that the only way to manage risks is by removal. Chemical policy management fits the ALARA mould more that the precautionary one.
Methodology: Previous research in chemical issue management is combined with interviews with nuclear risk managers. A test group has been given ALARA and precaution scenarios to measure tolerance to chemical risks within benefit frameworks.

MO-V-7
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Lay people perception of radioactivity and radioactive waste: a mental models approach.
In 1996 the Slovenian national Agency for radwaste management - ARAO re-initiated the search for a low and intermediate level radioactive waste (LILW) repository location with a new, so-called combined approach to the site selection. In this context the influence of social models on acceptability was studied. Previous research on people's perception of the LILW repository construction, their attitudes towards radioactive waste, their willingness to accept it, based on several surveys, indicated significant differences in answers of experts and lay persons, mainly regarding evaluation of the consequences of repository construction. This findings support the use of mental models approach.
Based on the findings of pilot investigations a mental model approach to the radioactivity, radioactive waste and repository was used as a method for development of risk communication strategies with local communities which volunteered to host the repository. The mental models were obtained by adjustment of the method developed by Morgan and co-workers (Risk Communication, 2002) where expert model of radioactivity is compared with mental model of lay people obtained through individual opened interviews. Additional information on trust and role of main actors in the site selection process was gained with the overall questionnaire on the representative sample of Slovenian population.
While the project is still under way some preliminary results clearly show that the mental models of lay people do at least partially influence people's attitudes towards the LILW repository. By comparing the expert model with mental models of lay people it was found that the conceptions of both are quite different. Especially topics regarding the property of radioactivity, the characteristics of radioactive waste and the processes in the repository suggest that laypeople models are misunderstanding the expert knowledge. It was found out also that for the credibility of the main players, trust and other social issues are also important. The research was applied to the representative sample of the Slovenian population by using the confirmatory questionnaire. In this way a qualitative and also a quantitative mental model of the general public was obtained. In parallel, the questionnaire assessed also people's viewpoints of other important factors, e.g. trust, credibility of implementers, perception of own involvement and possibilities for participation. Obtained information provides data on the relative importance of mental models in comparison with different social variables.
The results of the research have once again confirmed that the process of communication with the general public is and will be very demanding and long-lasting. The acceptability of high risk projects such as LILW repository construction depends on credibility, reliability of information and participation of local people from the very beginning. Since the conceptualization of the general public is different from that of the experts, this must be taken into account. In its future activities, the ARAO agency will consider those differences in opinion and negotiate them in order to gain a common understanding of the problem.

TU-VI-5:
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Development of a support tool for practicing authorities in execution an evacuation plan.
Flooding is a potential thread for about 66% of the Netherlands. Technical measures try to minimize this risk. Still flooding can't be excluded. Evacuation plans are developed to prepare for preventive evacuation of people for this situation. Practicing the evacuation plan with the involved authorities is necessary for an efficient execution of the evacuation plan as well as adequate response to unforeseeable events. The practicing has to be simulation based due to the scale of this type of emergency. During the practicing a group of experts are in control of the case setting. The experts judge the handling of the authorities and the emergency worker in the case setting. For the experts a support tool is in development to help them to give realistic feedback to authorities and emergency workers. The support tool will include the dynamics of the traffic system, material management and flooding. In the paper the functional design of the support system will be presented.

Abstracts poster presentations

MO-P-1

Barilli, Elisa; Savadori, Lucia; Pighin, Stefania; Siegrist, Michael; Tyszka, Tadeusz; Mullet, Etienne (Institute DISCOF (Department of Cognitive Sciences and Education) at UNITN (Università degli Studi di Trento))
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How to communicate risk to patients? A web-based learning tool for physicians.

The Special Non-Invasive Advances in Fetal and Neonatal Evaluation Network (SAFE) is a NoE established under the EC 6th FP which aims at implementing routine, cost effective non-invasive prenatal diagnosis and neonatal screening. SAFE is developing a series of measures to enable the rapid introduction of new tests throughout the EU. At present, invasive tests are used and future parents ought to be correctly informed not only about risks of chromosomal anomalies for the fetus, but also about risks related to the testing procedure. Notwithstanding, when the non-invasive prenatal tests will be used, test accuracy values and other types of disease probabilities ought to be communicated to patients. Every good clinician should ensure that each patient fully understands the risk he/she is facing when making a decision. By fostering the central role of clinicians in promoting shared decision-making processes, SAFE aims at improving the quality of physician-patients communication. A team of psychologists composed by four European researching groups has been collaborating with the final purpose of devising a web-based training tool for physicians. The latter is a tutorial teaching MD effective ways of communicating probability to patients in order to allow them to "attach meaning to numbers". Taking input from the existing literature on risk communication and from the results of the research work carried out by the four psychological units during a three-year time, a series of topics have been selected and translated into guidelines for gynaecologists. The perspective adopted has been that of considering a good physician one that is informed about the consequences of using one type of communication rather than others. Both the structure and the content of the educational support for effective communication will be illustrated in the poster. A first version of the web-based learning tool will be showed to conference participants.

MO-P-2

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Structured mental model approach for agricultural systems: Theoretical backgrounds and operationalization.

This poster presents a new method, the Structural Mental Model for understanding the differences between experts' and farmers' underlying system understanding regarding their risk perception of pesticide application in developing countries. In developing countries, one problem one might encounter when applying the Mental Model Approach is that the differences in system conceptualization and understanding between laymen and experts are likely to be more prominent then in developed countries. This is probably even more pronounced in rural areas, where the literacy level is low, and traditional knowledge more prevalent. Furthermore, it has been stated that one weakness of current risk assessment approaches is that the selected system boundaries are too small, i.e., they fall short in analyzing the auxiliary consequences of potential risks. That is, for application in rural areas of developing countries, the mental model approach has to be adapted to consider the following issues: a) The social structure farmers are embedded in (in contrast to the one of experts), including culture, traditions, believe systems, and tacit and explicit norms b) The assets and the capabilities farmers have access to and how they use them in decision-making c) The social network they are embedded in d) The differences in cognitive and conceptual ability between experts and farmers The Structural Mental Model Approach aims at integrating these issues by (i) structuring the expert interview along the framework of farmers' livelihood including individual capitals and social capital in the analysis; (ii) discriminating among different levels of thinking and conceptualization; and (iii) providing a basis for adapting the lay interview to the culture and cognitive capacities of low-skilled indigenous people.

MO-P-3

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National security and environmental health risk: Vulnerabilities and responses.

This research examines the regulatory efforts to balance national security and environmental health resulting from military-related pollution. Actions taken in the name of national security often have second-order effects, where interpretations of probabilistic risk assessments are shifted for security concerns. Particularly in cases where scientific data are scarce, uncertainty remains large, and remediation costly, the proper role of epidemiological and public health sciences may be unclear. Analyzing environmental risk data for perchlorate contamination in the southwestern United States, a vulnerability framework is developed to determine the best role of scientific uncertainty in determining policy options. Perchlorate and similar endocrine disruptors pose a particular challenge for evidence-based policymaking, and the chemical has been used as a justification for new OMB risk guidelines in the US. Diverging from the OMB approach, this research argues that new approaches are needed, both in North America and Europe. By focusing on vulnerability and differential risk effects, one may better understand the unintended policy consequences of security policies and post-conflict situations.

MO-P-4

Brils, Jos; Track, Thomas; Negrel, Philippe; Brack, Werner; Müller, Dietmar; Barcelo, Damia; Blum, Winfried; Salomons, Wim; Vegter, Joop; Ragnarsdottir, Vala; Eccles, Cathy (TNO Build Environment and Geosciences)
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EC FP6 Coordination action (CA) on risk-based management of water-sediment-soil system at the River Basin scale (RISKBASE).

Introduction: In RISKBASE, leading European scientists and representatives of major, European stakeholder groups will review and synthesise the outcome of EC RTD Framework Program projects, and other major initiatives, related to integrated risk assessment-based management of the water/sediment/soil system at the river-basin scale. The synthesis will lead to the development of integrated risk assessment-based management approaches enabling the prevention and/or reduction of the negative impacts caused by human activities on that system.
Deliverables: 1) An overarching concept, generic approach and guiding principles to integrated risk based management of river basins, 2) Recommendations towards evolution and implementation of risk based management in national and community policies and towards implementation in management, and 3) A proposal for the European research agenda related to risk based management. Working modus: Based upon ample experience in

previous EC CAs, Thematic Networks and/or Accompanying Measures, a simple project structure is chosen, with only a minimum number of Work Packages (WP). Each WP will be managed by one WP-leader, supported by a few other partners (contractors) in the project. The WPs will organise several workshops dedicated to specific issues related to risk based management at the river-basin scale. Furthermore, RISKBASE will annually organise a General Assembly (GA) and will make use of EUGRIS as web-based information exchange structure. The workshops, GA and the website will be open to all who are interested and willing to contribute to achieve the RISKBASE goals and objectives. Furthermore, during the project, each WP will select core-team members to assist the WP-leader in reviewing, synthesising and then reporting of the outcome of WP-workshops. Thus an open, transparent and flexible structure is created ensuring the integration of all essential knowledge, expertise and experience in order to make RISKBASE a success.
Project duration: 36 months (start: 1 September 2006; end: 31 August 2009) Topic addressed: RISKBASE (Contract No. 036938 GOCE) addresses topic II.2.1 “Integrated risk based management of the water-sediment-soil system at river-basin scale”. This is a topic under the thematic sub-priority area “Global Change and Ecosystems” in the 4th FP6 call for proposals, call identifier: FP6-2005-Global-4.

MO-P-5

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Quantification and visualisation of environmental flood risk in Germany.

Background During the last decade Germany has repeatedly suffered tragic loss of lives, massive economic damage and severe environmental losses due to catastrophic flooding. A shift from flood response and the implementation of technical measures towards the enhancement of an adequate disaster risk management with focus on prevention can be observed. Quantification and visualization are important elements in the process of flood risk assessment, and contribute to risk reduction and disaster mitigation. Research Riparian zones, floodplains and river-marginal wetlands are key elements of strategic importance. They provide a broad range of ecological and socio-economic goods and services, including flood retention capacity, groundwater recharge, bio-production and recreational values in fluvial landscapes. Nowadays, however, these ecosystems are highly degraded throughout Germany, and they are among the most endangered freshwater systems worldwide. The major aim of this research is to select and quantify indicators in order to assess vulnerabilities and risks of the human-environment system affected by extreme flood events on a regional scale. Therefore, the interrelations between natural and human systems as well as the adverse impacts of flooding need to be analyzed. In this research risk is defined as the combination of vulnerability and hazard. Indicators are selected that represent both components of risk. In order to compare different levels of vulnerability and risk, quantification and scaling of indicators is required. Detailed expert knowledge and complex mathematical operations are necessary to carry out indicator quantification. As there is a strong need of applicable outcomes of this work, a Geographical Information System is chosen for analyzing and displaying the results of vulnerability and risk assessment. The objective of this research is to provide a policy tool for identifying issues that deserve greater attention within national flood disaster programs and across the population in general.

MO-P-7

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On the signature of new technologies: materiality, sociality, and practical reasoning.

In this paper I will examine critically some of the underlying sociological ideas present in recent debates about the social acceptability of new technologies. I focus on the notion of constructionism: a perspective and analytical approach that recognises, and seeks to explicate, the ways in which the categories of human discourse are socially negotiated and selected. I will argue that whilst the use of constructionist ideas has enriched such debates, and moved them away from a narrow technocratic reductionism, they have done so at the risk of losing track of the specific features of technological artefacts. In seeking to include human sensibilities in the analysis, a preference has been given to sociological theories of reality at the expense of engaging with what I will call the signature of the technology: the specific ways in which it is articulated in practical reasoning and discourse within real-world settings.

MO-P-8

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Social vulnerable factors in flood-prone areas in Taiwan.

Floods are usually accompanied by serious loss of properties and further result in disturbances of economical activities as well as human casualties. In 2004 Taiwan, had three major flood events. They were typhoons Mindulle, Aere and the 911 flood disaster. In order to gain a better understanding of the flood loss among the households situated in the flooding area, a household survey in the flood-prone areas was carried out. In the current study, we aim to propose a flood loss model using the data from a survey conducted by the National Center for Disaster Reduction (NCDR) (2005). In order to precisely collect the information on household loss, the flood victim list was gathered through the social welfare department in Taiwan. All subjects on the list had previously experienced flood disasters, and subsequently received financial aid from the government. In total, 367 victims were recruited, of which were the main financial supporter in their household. A set of standardized questionnaire containing information with regards to demographic variables, physical vulnerable factors, property loss, and disaster experiences as well as risk perception items were filled in by all the participants. In the proposed model, a set of vulnerability indices for flood loss were used. They are the depth of the water flooding in the house, flood experiences, the average household income per month, and the ownership of the house. Apart from having ownership of the house, all other the variables were positively associated with the financial loss of flood. The negative association between the duration of living in the risk area and financial loss caused by floods may be because people might have prepared more for the disaster.

MO-P-9

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IRIS, the practical integration of risk management.

Large construction projects are characterized by a chaos of people and processes. Naturally this leads to enormous risks. Hundreds of tools have been developed to recognize, analyse, quantify and control these risks. However, in practice, the major problem in construction projects is the communication about risks between people involved in the project.

To solve this issue and enlarge the knowledge about risk management, RISNET has initiated IRIS (Integration of Risk management In Cooperative projects). The ultimate goal of IRIS is to generate a change from defensive risk management to communicative risk management.
Methodology: IRIS has adopted a method of learning and development in practice. Through several pilot projects, information is gathered about the interaction of parties involved and why some projects are successful and others are not: 'learning'. 'Development' takes place in activities where people have a change to discuss their experiences.
Results: IRIS has been divided into two phases. The learning points from phase 1 have been elaborated and have resulted in the development of the IRIS method. The method comprises a series of cards in which vital lessons in the risk management process are highlighted: responsibility, interactive communication, focus, realisation, transparancy and verification. Attention is also given to how risk management can be implemented. IRIS is now shifting to phase 2. In this phase the focus will be on assisting the building world to use risk management in practice. To achieve this, several workshops will be organized throughout the Netherlands.
Aim of a presentation on the SRA meeting is to explain the method IRIS in further detail, the use of it and how it can be applied. For more information is referred to www.irisnet.nl or www.risnet.nl.

MO-P-10
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QRA & Emergency Plan Based on IRMS.
Much of the effort has been given to reduce the scale and probability of hazards in chemical plants. However, accidents such as fire and explosion by flammable liquids and gases, and toxic chemical release still happen because of design error, mechanical failure, human error and etc. The company which has hazardous installations or hazardous materials has to conduct quantified hazard assessment(QRA) and prepare emergency planning and response, according to the requirement of "Industrial Safety and Health Law". Well established emergency planning and response which reflects the result of QRA is the primary activity to reduce the probability of serious loss following fire, explosion and toxic chemical release. Therefore, QRA and emergency planning and response based "Integrated Risk Management System(IRMS)" is necessary. This paper introduces brief structure of IRMS and application output of IRMS in the NCC plant, i.e, results of QRA and emergency plan and etc.

MO-P-17
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Cultural Construction of What? Stakeholders' cultural bias and its effect on accepting the new public information system.
This study examines stakeholders' cultural bias and its impact on the acceptance of new public information system. The different attitudes toward the same information technology, NEIS (National Educational Information System), had brought out the social conflicts among stakeholders in Korea. This paper argued that those differences arose from the social relations and cultural biases which influenced the stakeholders' positions in the course of social conflicts around NEIS. Our analysis starts from reviewing CT (Cultural Theory) developed by Mary Douglas and Aaron Wildavsky. Then we show that the different cultural biases (Hierarchy, Egalitarianism, Individualism and Fatalism) are supported by five stakeholder groups (i.e., three teacher groups, bureaucrats, private system developers). Finally show that, based on those cultural biases, five groups show the different technology acceptances, risk perceptions and emotional responses. Our analysis based on the empirical data of 628 employees selected from five stakeholder groups.

MO-P-11
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Implementation barriers to a fully risk informed UK fire safety regime.
2005 saw the UK regulatory and legislative frameworks undergo a shift towards the adoption of a fire safety regime that was fully risk informed. This has resulted in employers or persons having control over the majority of existing workplaces, retaining a specific statutory responsibility to conduct a formal assessment of fire risk. They then should take reasonable steps to reduce the identified risk to an acceptable level and effectively manage any residual risk. This represents a significant move towards a simplified legislation framework and also full adoption of risk assessment based approaches, thereby resulting in a reduced legislative burden on businesses, whilst increasing risk minimisation responsibility on building designers, owners, occupiers and corporate entities. In addition, the framework has instigated a parallel shift to self-certification by building operators and adoption of risk assessment approaches in preference to legislative compliance. Perceived benefits of these changes result in some problematic procedural considerations that are argued to represent barriers to effective implementation of a fully risk informed UK fire safety regime.The project draws from the primary findings of a range of ongoing research projects involving a wide range of stakeholders within the UK. The findings indicated that responsible persons did not consider the setting of the risk assessment and management objectives an issue. Rather, their focus was on the lack of consensus and range of language associated with Fire Risk Assessment (FRA). An outline of procedural considerations resulting in significant difficulties to those with statutory duties under the new regime is presented.

MO-P-12
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UK research, educational & guidance needs in response to stakeholders' perceptions of fire risk.
Those with a statutory duty under the proposals for a risk informed fire safety regime within the UK have expressed concern over a lack of suitable research, training, and guidance on fire risk assessment and management (FRA/M). These concerns should be considered in the context of a fragmented development of the fire risk area. This has led to the isolated development of a wide range of stakeholder groupings, professional registers, special interest groups, and consultancy services being offered. Robert Gordon University undertook a major survey, supported by the industry, of stakeholder's perceptions of fire risk research, educational and guidance needs and support potential for an inclusive fire risk network. While the adoption of a risk informed regime was perceived as being appropriate, there were serious reservations over several practical issues. Significantly 95% of respondents consider FRA/M to require further research. Key priorities identified included: standardisation of terminology used within fire risk sector, greater FRA/M emphasis within related educational provisions, and the development of advisory documents addressing primary issues in the interpretation of legislative requirements and operational considerations in the completion of FRA/M. Specific priorities for research and guidance were identified as being (i) risk

mitigation strategies, (ii) survey procedures for existing buildings, (iii) methodology development, and (iv) role of FRA in the design process. Findings of the research can be used to inform the strategy and infrastructure development to address current shortfalls in fire risk research, educational and guidance provisions, and realisation of an inclusive fire risk network.

MO-P-13

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Scottish fire 'Risk' research – foundations and futures.

Scotland currently suffers from uncoordinated fire risk research investment, infrastructure development, policy integration and stakeholder involvement. These problems can potentially impact negatively on: the economic competitiveness of Scottish fire research providers; development of new provisions to fill current shortfalls; resourcing of fire research users' needs, along with implementation of a range of wider social policy agendas for Scotland. Thus far, improvements have resulted largely from informal networks between the established fire research teams in Scotland and the wider stakeholder community comprising fire research teams undertaking independent, although interlinked, studies. Encouraging the development of these informal relationships into formal collaborations would provide the foundations to allow for integrated fire research provisions in Scotland. UK Government continues to recognise the need to support fire research. Understandably, this has been defined in terms of the areas of activity championed by established players, which has resulted in a marginalising of areas lacking a champion, such as fire 'risk' and Scottish fire research. Thus, while fire engineering in general has secured considerable research funding, little has been directly focused on fire risk or regionally to Scotland. The proliferation of recent legislative changes and devolved powers to the Scottish Parliament on fire related matters have set in place a process of change, with a new emphasis on Scottish research needs emerging. A proposal for the development of a focal point, infrastructure and dissemination portal (a Forum) to allow adoption of such a strategic approach to fire 'risk' research and policy provisions in Scotland is introduced.

MO-P-14

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SCoPE: An integrated assessment frame as science policy interface for decisions on environmental health related risks.

Single numerical risk indicators often do not suffice to address the information needs of risk management in complex societal decision-making. The challenge is therefore to find new approaches to prevent and control these risks and deal with public anxieties about these (potential) hazards (RIVM, 2005). The current study will build an assessment framework for (environmental) risk policy decisions that makes optimal use of scientific knowledge in the fields of risk assessment, scientific uncertainty, remediation costs and public concern. Moreover, the general objective is to develop an integrated assessment framework, supporting the Belgian and Flemish government, aiming to: (i) improve transparency and communication between science, policy and stakeholders; (ii) help policy makers in setting environmental health priorities; (iii) integrate different scientific disciplines/knowledge on a well-balanced way (Renn, 2005; Van Bruggen et al., 2003). The objectives will be achieved using a combination of quantitative and qualitative research methodologies: the first phase of the research consists first of a literature study and content analyses of policy documents in order to define which criteria are essential in the risk decision process. Second, based on Comparative Risk Assessment methodologies, a proposal of a decision assessment frame that incorporates these essential criteria will be done. Third, assessment of the criteria, the decision framework and the format in which it is communicated will be conducted through Delphi/focus group and/or in-depth interviews with policy experts. Fourth, concrete data for the selected criteria and the assessment frame will be selected in a set of (environmental) risk-related case studies. Fifth, the data/values will be assessed with a set of users. In a second phase, this methodology will be expanded to other than environmental risks. The expected results will be a set of guidelines, a methodology reporting on how to perform an integrated risk assessment and how to compare the results with other risks for policy makers and a number of reference values for future, new risk assessments.

MO-P-21

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Framing plagues: Media influence and public understanding.

The termite, Cryptotermes brevis, is a well-established and serious plague of structural wood currently affecting different geographical areas of the Azores, Portugal. As a consequence there has been an increase in the scientific and political investment in risk mitigation and the giving out of information strategies. The impact of this investment in the population, however, has been considered weak. In order to reverse this situation, a research project – Citizen Participation in the Control of Termite Infestation in the Azores (TERMIPAR), was put forward, with the financial support of local authorities, in three islands of the Azores. In the scope of the project, a communication framework was setup to create an integrated balance between the perspectives of scientists, politicians, managers and the population regarding the risk situation and the management plans to cope with it.

Several survey studies (Almeida et al., 1997; Almeida et al., 2001; Gonçalves, et al., 2004) focusing on the impact of the media coverage of environmental problems in the Portuguese public opinion have shown that between 1997 and 2004, even though there was a substantial decrease in the confidence on information propagated by the media, people kept on attributing to the mass media the role of primary transmitters of information pertaining to environmental risks.

This paper presents the results of a study using a framing approach on the role of media in the spreading of information about termite plagues among the population. The analysis covered media material since the plague started in 2002 until the present in 67 local radio and TV news, and 247 articles from local newspapers and the national newspaper with more readers in the Azores.

Based on qualitative and quantitative data the analysis attempted to uncover the latent cultural frames of reference that mediate the citizens' interpretations of this risk.

The study focused on communicational aspects related with: (1) the manifest framing devices, such as the relevance of risk related information in the mass media agendas, or the discursive strategies employed; and (2) the manifest or latent reasoning devices such as, intentions and type of commitment with the situation, the sources and functions of information or the type of risk profile disseminated. The study also focused on other aspects related to the content propagated in the risk messages and to the major target groups under analysis.

Results from this research, together with findings from studies on other stakeholders, will contribute to define risk communication content and strategies to be further implemented in a later phase of this project.

MO-P-20

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Seismic and volcanic risk perception. A critical review of literature in the field.

Populations often show resistance to the work of risk management agents in the field of earthquake and volcanic eruptions. Such resistance prevents the reduction of vulnerability in face of those natural phenomena. Even when informed about the potential danger of living in a particular place, many people chose to stay there or to build houses ignoring the legislation that protects against that type of hazards.

This study is part of a broader project aimed at understanding those risky behaviours taking into consideration the social and cultural factors influencing the risk perceived by local segments of the population. The lack of a critical review of the conceptual and methodological approaches present in the literature on this area of risk perception, the scarcity of studies on the topic, and the diversity of scientific sources of information on these issues emphasize the relevance of carrying out a timely overview of the evolution of this field.

Some questions addressed were: Which theoretical approaches have played a leading role in this research field and how have it evolved? Was there any permeability to the social and cultural dimensions of situations? To what extent can the methodological features of research uncover the motives and interpretations underlying risk perceptions? Is there any clear prevalence of a particular theoretical approach? And, also, which dimensions of risk perception have been studied by different authors, what results emerge from that research, and how the information produced is converted into a usable resource in risk management.

This study focused on empirical research on earthquakes and volcanic risk perception published in the last twenty years. Searches were done through a Portuguese access link portal de acesso (b-on), which allows the access to scientific contents (social sciences, engineering and technology, etc), available in different resources such as libraries (e.g. Library of Congress), reference and full text databases (e.g. ERIC, Academic Search Premier, etc.), publishers (e.g. Sage, EBSCO, etc.), or indexes (e.g. Theses & Dissertations Catalogue, etc.). The Google Scholar was used to guarantee the access to studies published in French, Spanish and Portuguese and combinations of keywords such as “risk perception”, ‘”earthquake” and “volcanic”, in those languages, allowed to identify the 108 articles that were analyzed.

Some questions addressed were: Which theoretical approaches have played a leading role in this research field and how have it evolved? Was there any permeability to the social and cultural dimensions of situations, as observed in research of risk perception in other domains after the period of psychometric hegemony? To what extent can the methodological features of research uncover the motives, causal attributions and interpretations underlying risk perceptions? Is there any clear prevalence of a particular theoretical approach? What relationship exists between methodological orientations and the research questions addressed? It is also important to compare which dimensions of risk perception have been studied by different authors, what results emerge from that research, and how the information produced is converted into a usable resource in risk management.

MO-P-15

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Research for a safer society.

The Swedish Rescue Services Agency (SRSA) works for sustainable development in a safer society in which people and the environment in Sweden and other countries are highly valued. Research within the broad domain of risk management is a strategic, important means to achieving the long-term objectives expressed in the vision of the SRSA: “A full life in a world with an ever decreasing number of accidents and injuries. ”In the agencies new four-year research programme “Research for a Safer Society ” a number of specialist areas are described, within which the SRSA wants to stimulate and guarantee good knowledge-development during the period 2007 to 2010. These specialist areas mirrors that the SRSA:

- are a government authority that works for a safer society covering everything from everyday emergencies to disasters and war.
- concentrates on prevention work to reduce the number of emergencies that occur and thereby also their consequences.
- takes an active role in international cooperation and maintain a high state of emergency preparedness for humanitarian operations.

Calls will be published annually on our website – www.raddningsverket.se - opening up for researchers and research groups from Sweden and other countries to apply for research project funding. At our poster presentation we will introduce the research programme with focus on the specialist areas and, also, give some useful hints on how to apply properly.

MO-P-16

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Floods and urbanization in Mediterranean Spain: Is vulnerability increasing?

The Spanish Mediterranean coast has witnessed a dramatic increase in urbanization during the last decades with probably no parallel in Europe. Urbanization has been fuelled by cheap interest rates, the continuous expansion of tourism and migration from Northern and Central Europe (especially in Alicante) and by land availability put into the market by modifications in local land use plans searching to increase the amount of new housing built. Coastal Mediterranean Spain has, on the other hand, a very peculiar hydrological cycle characterized by the extremes of floods and droughts. Because of the predominant climate and fluvial networks (usually small, ephemeral streams), flash floods are quite frequent and their effects become exacerbated by the transformations in the local hydrological cycles brought about by urbanization as well as by settlements on flood prone land. All in all, urbanization is producing a more hazardous environment which will probably become even more dangerous as the effects of climate change materialize in Southern Europe. In this paper, however, we plan to test whether human societies living in this area are growing more vulnerable to the effects of floods. Through an extensive analysis of flood episodes occurring in the provinces of Girona and Alicante during the period 1995-2005 we will document losses in the public and private sectors and review flood remediation measures undertaken after the events. Our main contention is that vulnerability may have increased because of increasing losses but, from a more integrated vulnerability assessment, it is not clear that these areas are more prone to significant disruption since they are also richer. That said, it is also true that flood management needs improving, especially in what concern land use regulations.

MO-P-6

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Influence of political factors on country investment risk.

Complexity of the international environment implies difficulties in analysing and predicting it. Taking decisions about investment engagement is burdened by risk generated in several levels. Attempts to assess risk generated by a given area/economy (country risk) are based among others on rating evaluations of specialized institutions. An analysis of country risk involves a wide range of variables, both quantitative and qualitative ones. It can be found among others in methodologies of country risk assessment applied by leading rating institutions. Variables, constituting the rating evaluation, are economic, financial and political. Accuracy and rightness of rating evaluations is discussed in the literature on economics.

The subject of the analysis will be the assessment of the main components of country risk, especially the political one, with reference to selected Central-Eastern Europe countries. The objective of the paper will be indicating the main components of political risk and their influence on the level of investment risk in the area researched. The authors advance a thesis that country risk, especially the level of political risk, determines the intensity of the flow of investments into economies classified as emerging markets. Further, political variables have a decisive impact on the level of investment risk of these countries. The considerations presented in the paper will be the result of subject literature studies and authors' research on investment risk determinants.

MO-P-19

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On-line stakeholder and public dialogue via science-in-the-box.

The poster shows how Procter & Gamble uses its scientific website www.scienceinthebox.com and its consumer information website www.info-pg.com to address stakeholder and public concerns around the safety and benefits of chemical ingredients for its consumer products. In 2002, P&G created Science-in-the-Box, an internet communications tool to bridge the gap between the knowledge on the science and safety of cleaning products and the public perceptions of their risks. The creation of the website was driven by the P&G belief that sound judgment must be based on a good understanding of all relevant facts, as opposed to ignorance, (mis)perceptions or incomplete data. The website provides rich and factual information around the science, benefits of laundry and cleaning products, as well as their composition and safety and sustainability profile. It uses popularized as well as traditional communications methods to present the benefits and risk profile of 'chemical ingredients' in an open, engaging and understandable manner. It is an important element of P&G's stakeholder dialogue. P&G has been a pioneer in the use of the internet to communicate scientific information to non-specialists (including the general public, consumers, policy makers, NGO, journalists, scientists, academics, students and teachers). It has over 30,000 visitors every month, and is helping to improve the confidence and trust in P&G products and safety approaches. Science-in-the-Box has also gathered significant feedback over the last 5 years, providing P&G with information on public and stakeholder interests and concerns which P&G uses to improve its products, activities and communications. The poster gives examples of how the website develops targeted information around the safety and benefits of the P&G cleaning products. It will show how P&G collects feedback and adapts the website and its content to meet the diverse users' interests and concerns and, finally, how it will evolve in the future.

MO-P-18

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RISKBRIDGE.

RISKBRIDGE ('Building Robust, Integrative inter-Disciplinary Governance models for Emerging and Existing risks') is a Coordination-Action commissioned by the EC in order to develop Integrative approaches to risk governance. The project aims to develop an integrative risk governance approach connecting risk assessment - management and - communication based on a resilient and discursive approach. The project takes:

- an open project architecture rather than a specific model as starting point;
- policy learning as the central mode of operation, allowing for input across different science fields, geographical boundaries and science-policy interfaces;
- cases related to complex risk fields where the agreement of risk government approaches is limited. An approach with six partners and 30 members (scientists and policymakers)

The project is structured in three parts. In a preparatory phase the key partners exchange insights on risk governance practice, and transform this into a framework for risk governance learning. In the empirical work phase, six risk fields take centre stage. It concerns: Biotechnology/stem cells, Radioactive waste, Nanotechnology, Climate change, Sediments and Electromagnetic fields. For each risk field, a learning trajectory will be organized, in which 3 workshops form the focal points. Workshop 1 focuses on learning about best practices across disciplines and participants within each risk field. Workshop 2 "designs" a best science-policy interface for each risk field. Workshop 3 compares, analyses and learns across risk fields resulting in an accepted governance model including transdisciplinary lessons and input from scientists and policy makers. In the integration phase the results from the workshops and risk fields will be combined an integrated in a report (book) recommending how to handle complex and emerging risks in the form of a process scheme approach.

In other words: the Coordinated Action project "RISKBRIDGE" aims to make "bridges" between: different kinds of "risk fields"; scientific disciplines; policy making and science. The project takes policy learning as the central mode of operation, allowing for input across different science fields, geographical boundaries and science-policy interfaces.

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