SRA EUROPE

Maastricht University

Journal of Risk Research

Journal of Risk Research is the official journal of the Society for Risk Analysis Europe and the Society for Risk Analysis Japan.

Journal of Risk Research is an international journal that publishes peer-reviewed theoretical and empirical research articles within the risk field from the areas of social, physical and health sciences and engineering, as well as articles related to decision making, regulation and policy issues in all disciplines. The main aims of the *Journal of Risk Research* are to stimulate intellectual debate, to promote better risk management practices and to contribute to the development of risk management methodologies.

24th SRA-Europe Conference

15-17 June 2015, Maastricht, The Netherlands

Programme and Proceedings Book

SRA EUROPE

Maastricht University

The SRA Europe Annual Meeting 2015 is organized by Maastricht University

Sponsors

Routledge
Taylor & Francis Group

Gemeente Maastricht

MIND THE RISK

RIKSBANKENS JUBILEUMSFOND
THE SWEDISH FOUNDATION FOR HUMANITIES AND SOCIAL SCIENCES

Maastricht University

ORGANISING COMMITTEE

Assistant Prof. dr. Frederic Bouder, Maastricht University
Dr. Marijke Hermans, Maastricht University
Prof. dr. Wiebe Bijker, Maastricht University
Dr. Ric van Poll, Dutch National Institute for Public Health and the Environment (RIVM)
Nicolas Rossignol, l'Université de Liège
Arjen van der Heide, Maastricht University

With help from the secretariat of the Department of Technology and Society Studies and many more

SECRETARIAT
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TABLE OF CONTENTS

WELCOME TO THE SRA EUROPE ANNUAL MEETING 2015

It is a great pleasure for us to welcome you to the city of Maastricht for the 24th Annual Meeting of the Society for Risk Analysis Europe. This conference is organised by the *Maastricht University – Science, Technology and Society Studies* (MUSTS) research centre of the faculty of Arts and Social Sciences. MUSTS is a world-leading research centre on science-technology-society relations. Within the broad field of science, technology and society studies (STS), the specific emphasis of Maastricht STS research is on "cultures of innovation". MUSTS studies settings that are infused with new knowledge, instruments, artefacts and skills.

The special theme of the conference is "Science, Policy and Society - Bridging the gap between risk and science." We chose this topic to emphasise the growing

importance of the science, policy and society nexus for the risk community. As you will see from the programme we have paid special attention to including the perspectives of scientists working on risk concepts and applications, experts advising policy on risk as well as policy makers making decisions involving risks. We expect that the result will be a stimulating debate. We have also introduced the ''roundtable'' format that allows for the discussion of hot topics. This new format has been popular at SRA annual meetings and we hope that this innovation will be seen as valuable on this side of the pond too. This year's roundtable will be dedicated to Open Access and Transparency. Finally we have made sure that regional organisations of SRA Europe, i.e. the Nordic and Benelux chapters, get enough time to discuss common issues of interest. The healthy development of these organisations will contribute to the thriving of SRA Europe.

To arrange the conference, we have received support from several organisations, which we are very thankful for. The Department of Technology and Society Studies has provided critical financial and secretarial support. University Maastricht has also offered financial and logistical help. The Swedish Foundation for Humanities and Social Sciences, which funds the MindTheRisk project coordinated by The Centre for Research Ethics & Bioethics at Uppsala University has also generously offered support. We have also collaborated with Routledge to increase access to their publications. The management committees of SRA Europe have also provided much valued assistance. We would also like to extend our thanks to the King's Centre for risk Management, King's College London for their precious help. Finally, we would also like to thank the City of Maastricht for sponsoring the drinks at the municipality as well as SRA specialty groups for sponsoring mixers after the Poster Session.

We hope that you enjoy the conference, as well as the social activities, in Maastricht.

THE ORGANISING COMMITTEE FOR SRA-E 2015:
Frederic Bouder,
Marijke Hermans,
Wiebe Bijker,
Ric van Poll,
Nicolas Rossignol,
Arjen van der Heide
Jacqueline Graff
Dianne Borgignons
Ilona Vermeeren (PCO)

SOCIETY FOR RISK ANALYSIS EUROPE

STUDENT SCHOLARSHIP AWARD

The SRA-Europe Conference Scholarships (each worth €750) have been awarded to:

- Martina Gamp, University of Konstanz, Konstanz, Germany: Closing the Gap between Experimental and Field Studies: Experienced-based Health Risk Feedback and Lack of Reassurance
- Astrid Kause, Max Planck Institute for Human Development, Berlin, Germany: Do you get vaccinated? The role of different types of uncertainty and graphical presentation formats in vaccination decisions

The Ortwin Renn Student Prize for Applied Risk Research, sponsored by ExxonMobil (worth $500), has been awarded to:

- Hanna Landquist, Chalmers university of technology, Goteborg, Sweden: Estimating the consequences of oil discharge from potentially polluting shipwrecks in the Baltic sea

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. Its membership is multidisciplinary, interdisciplinary and international.

SRA provides an open forum for 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 stakeholders 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. 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. Since its founding SRA-E has matured and it is now a non-profit organisation with a separate legal status. Our Articles of Association can be found on our website: www.sraeurope.org.

To foster strong and healthy relations between SRA-E and SRA International there is a "Memorandum of Understanding" that describes key principles of good practice andsupport. This can also be found on the website. There are a number of other active regional organisations in North America, Japan, Latin America, Australia, New Zealand and Russia.

WHAT ARE THE ACTIVITIES OF SRA EUROPE?

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, researchers, students, 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 takes place in various countries in Europe in order to enhance the access to SRA-E for members and risk interested people all over Europe. We are always keen to hear from SRA-E members that are interested in hosting the conference. 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-E 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 need to be developed and enhanced.

HOW IS SRA-E ORGANIZED?

An Executive Committee comprising eight members ensures the functioning of SRA-E. For certain tasks (e.g. conference host) coopted members join the committee. A permanent secretariat is established to strengthen the liaison between members and the organization, *sraeurope@eu-vri.eu*.

WHY BECOME A MEMBER? WHAT ARE THE BENEFITS?

Membership of SRA-E carries automatic membership of the international Society for Risk Analysis, founded in 1981, with over 2000 members worldwide. SRA-E has around 300 members. Being a member of SRA-E offers multiple benefits. Members are part of the scientific community and can stay in touch with the latest news in research and practice in risk analysis. Members will also receive news of events and conferences

worldwide. SRA-E helps members to become familiar with national and international policies on risk analysis.

Furthermore, SRA-E encourages members to network and exchange ideas with other professionals working on different areas of risk research. The Newsletter of SRA informs all members several times a year about what's going on in the Society. In addition, SRA-E 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 have the opportunity to subscribe at a reduced rate to the *Journal of Risk Research*. You can become a member of SRA Europe through the SRA website **www.sra.org** and by selecting the option to belong to the SRA Europe regional organisation.

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 Executive Committee or by helping us with organizing a conference. You can contact the Executive Committee members directly or through emailing the secretariat: sraeurope@eu-vri.eu.

SRA EUROPE EXECUTIVE COMMITTEE

Name	Position
Lars Bodsberg	President
Mathew White	Secretary, Local organiser 2016
Pia Schweizer	Treasurer
Frederic Bouder	Local organiser 2015
Margôt Kuttschreuter	Councillor to SRA, website, membership officer
Michael Siegrist	President-elect
Seda Kundak	Local organiser 2014
Anna Olofsson	Member

ROUND TABLE SESSION ON OPEN ACCESS AND TRANSPARENCY

There will be a special round table to explore the consequences of the move towards more 'open data'. From the Netherlands Organisation of Scientific Research (NWO) policy on data management to the Transparent Food platform or Clinical trials legislation, Governments and Research Institutions request that data should be made available with the hope that more transparency will improve the relationship between science, industry and civil society. Four discussants will tackle the opportunities and challenges of a more transparent environment:

- Prof. Ellen Vos (Chair and Discussant), Maastricht University
- Assistant Prof. Dr. Frederic Bouder, Maastricht University
- Mr. Dirk Detken, Head of Legal and Regulatory Affairs, European Food Safety Authority
- Mr. Aleksandar Rusanov, Legal Administrator, European Medicines Agency

This special session will take place on 15 June 2015 from 17:00 to 18:00 in the 'Feestzaal' of the Law Faculty.

MAASTRICHT UNIVERSITY – SCIENCE, TECHNOLOGY AND SOCIETY STUDIES (MUSTS)

Maastricht University STS (MUSTS) is a world-leading research centre on science-technology-society relations. In the 2011 international research assessment MUSTS was rated 'excellent' on all dimensions, for the second consecutive time. Within the broad field of science, technology and society studies (STS), the specific emphasis of Maastricht STS research is on "cultures of innovation". MUSTS studies settings that are infused with new knowledge, instruments, artefacts and skills. These may breach the conventions in these cultures, or are moulded themselves while being appropriated. The focus on "cultures of innovation" then means to examine how change and innovation evolve in cultures such as the technology workshop, the regulatory body, the laboratory, the audio studio, the science café, or the hospital.

Cultures of innovation are studied in a radically interdisciplinary way. STS in Maastricht is practised as an emerging discipline. Although the classic disciplines of sociology, history and philosophy play an important constituting role, they are integrated into a common STS idiom, research style and set of methodological approaches. Sociological problems are historicized; historical questions are shown to have normative dimensions; and ethical issues are studied as social phenomena. The analysis will typically move between different levels: from micro-level studies of local practices to macro-level questions of governance, policy and morality.

MUSTS has several substantive research lines of varying size: (1) The governance of risk and vulnerability—with studies of telecommunication standardisation, hospital safety, nanotechnology governance, livelihoods in India as shaped by techno-scientific innovations, risks of chemicals or low-intensity electromagnetic radiation, and computer simulations for water management. (2) Technological cultures of sound—from innovation in musical instruments to airport noise regulation, from the epistemological status of sonic laboratory skills to the rise of car sound design. (3) Media technologies in knowledge and culture – ranging from the history of European broadcasting to the use of Internet and digitisation in scientific research. (4) Scientific research and innovation cultures – comprising historical studies of chemical industry, the co-production of biological sciences and urban ecology, the mutual shaping of international science and politics, and the role of value systems. (5) Techno-moral change – with a special focus on life sciences and emerging technologies.

Students on the "Hoeg Brögk" in Maastricht (Harry Heuts)

WELCOME TO MAASTRICHT

Historic buildings and trendy design shops. Beautiful churches and adventure-filled caves. Tantalizing menus and welcoming café terraces. Dynamic festivals and high-profile expositions. Open squares and expansive vineyards. Welcome to Maastricht! Maastricht is an international city – with 120,000 inhabitants – offering many opportunities. The city is located in the Meuse-Rhine Euregion, close to international cities such as Aachen, Düsseldorf, Liège, Brussels and Antwerp. The diversity of European culture is clearly visible in Maastricht. It is for good reason that Maastricht stood at the cradle of the European Union in 1992 at the time of the signing of the Maastricht Treaty - the treaty on European Union. Today, Maastricht still plays a major international role. Many congresses are held here, and transnational agreements are signed. Large numbers of tourists also come to Maastricht every year for a taste of the epicurean character of the south of the Netherlands.

For more information, visit the tourist information office (VVV) at the Dinghuis (Kleine Staat 1) or *www.vvvmaastricht.nl*

View of Chateau Neercanne (VVV Maastricht/Petra Lenssen)

TRANSPORTATION

The city of Maastricht is compact and is best experienceed on foot or by bike. A walk from the central station to the conference venue will take you around 20 minutes. Bikes can be rented at the central train station (fietspecialist "Aon De Stasie"). There are also buses by Veolia Transport that take you around the city and beyond. More information on how to get to Maastricht from Amsterdam or Brussels Airports can be found on the SRA-Europe webpage. Below we give some more information about the electronic smart cards that are used for public transport in the Netherlands.

The public transportation system in the Netherlands

In the Netherlands, the public transportation runs on electronic smart cards. There are several ticket options *(http://www.ns.nl/en/travellers/arrange-and-buy/tickets-and-passes/ticket-and-pass-types).*

a) the single-use chip card

If you are NOT planning on travelling a great deal in the Netherlands, the single-use chip card is the best option. This is a paper ticket that contains a chip inside. This paper chip card can be purchased from an NS ticket machine or a Tickets & Service desk, and is valid for all train operators. You do not have to add any credit to this card!

When you purchase a single-use chip card you always pay the full fare. There is a € 1 supplement on single journeys, return tickets, and day travel cards to cover the additional costs of the card. If you want to travel by bus, please bring enough cash with you (between €3 and €5 per ride).

Important: When you travel with a single-use chip card you must check in and out with each train operator through the gates or posts!

If you decide to buy a paper card, buy a one way ticket ("enkele reis") to Maastricht Central Station. Intercity trains are faster than local trains ("stoptrein" or "sprinter"). When in doubt, you can always ask someone at the ticket office. You will soon notice that almost everyone in the Netherlands speaks English fairly well. For journey advice and time tables you can check: *http://www.ns.nl/en/travellers/home*

b) the OV-chip card

If you plan to travel in the Netherlands a great deal, you can buy an anonymous transportation card (OV-chip card). The OV-chip card is the public transport smartcard that is used as a ticket for all public transportation in the Netherlands. The same card allows you to travel on the train, tram, bus and metro. The OV-chip card is usually more convenient if you are staying in the Netherlands for a longer period. You use this card to check in for each mode of transport as you depart and to check out again when you arrive.

There are two options to obtain this OV-chip card.

1. At the NS service desk (central hall Schiphol)
2. At one of the yellow vending machines available at all train stations in the country. These vending machines are also available at the Schiphol train station. Sales points are indicated by the pink OV-chip card logo.

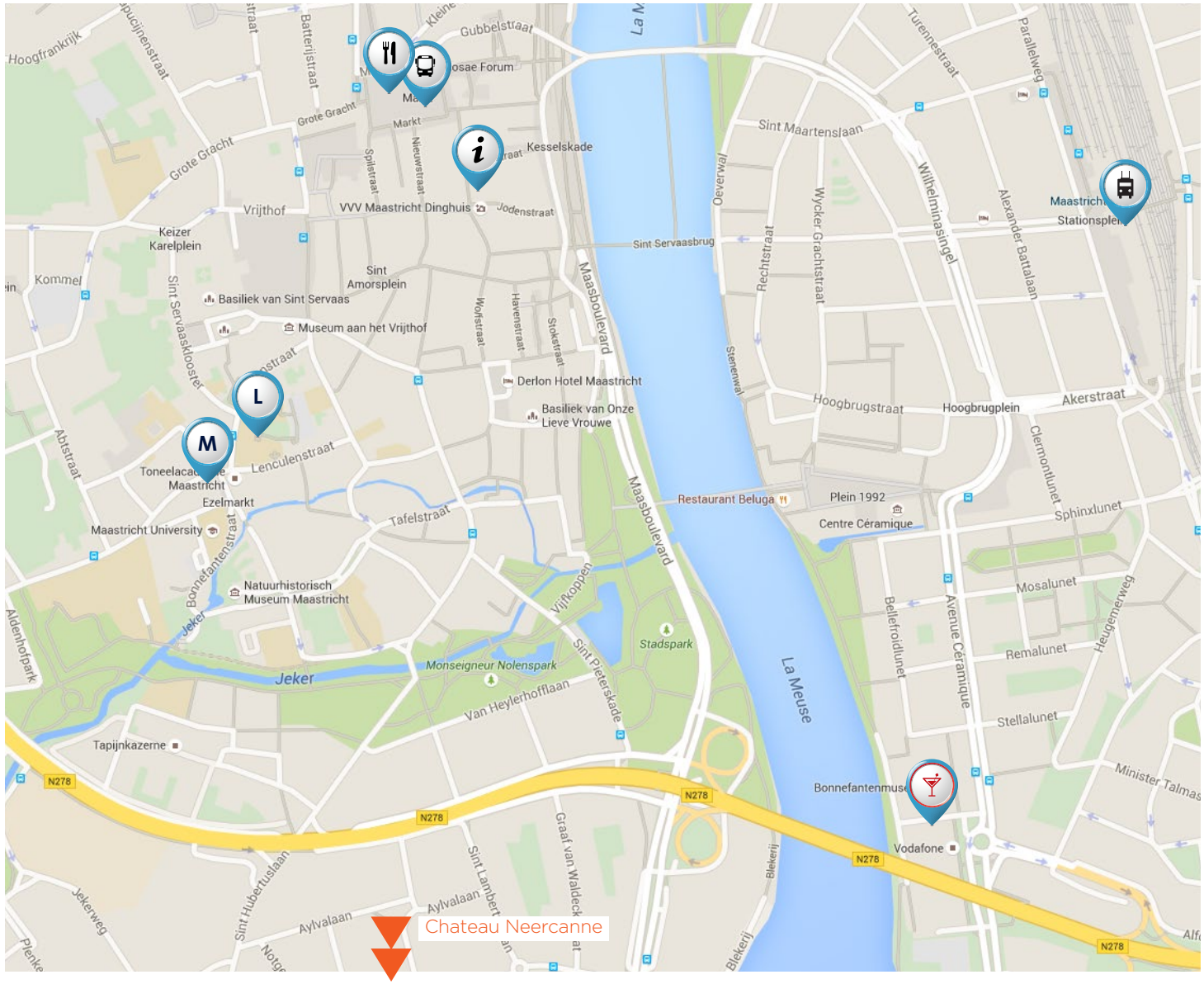
The card itself costs € 7,50. Each person has to buy his/her own card, since it is not allowed (and not possible) to check in several persons with 1 card.

If you have bought an OV- chip card at an NS service desk or an NS ticket machine you will be able to use it immediately for your NS train journeys. All you have to do is to add credit to the balance on your card and check in before starting your train journey. If you have bought an OV- chip card from another public transport operator you have to activate the OV-chip card at an NS ticket machine by adding credit to its credit balance. You can then also choose whether you want to travel first or second class. You can do that this at an NS ticket machine at the station.

The minimum boarding fee for travelling with the OV-chip card is € 20. If you have a bank card that is valid within the EU, you can top up the credit balance at any NS ticket machine as well as at NS Tickets& Service desks. At the service desk on most train stations, it is also possible to pay with by credit card.

MAPS

MAP OF MAASTRICHT CITY CENTER



Maastricht city center

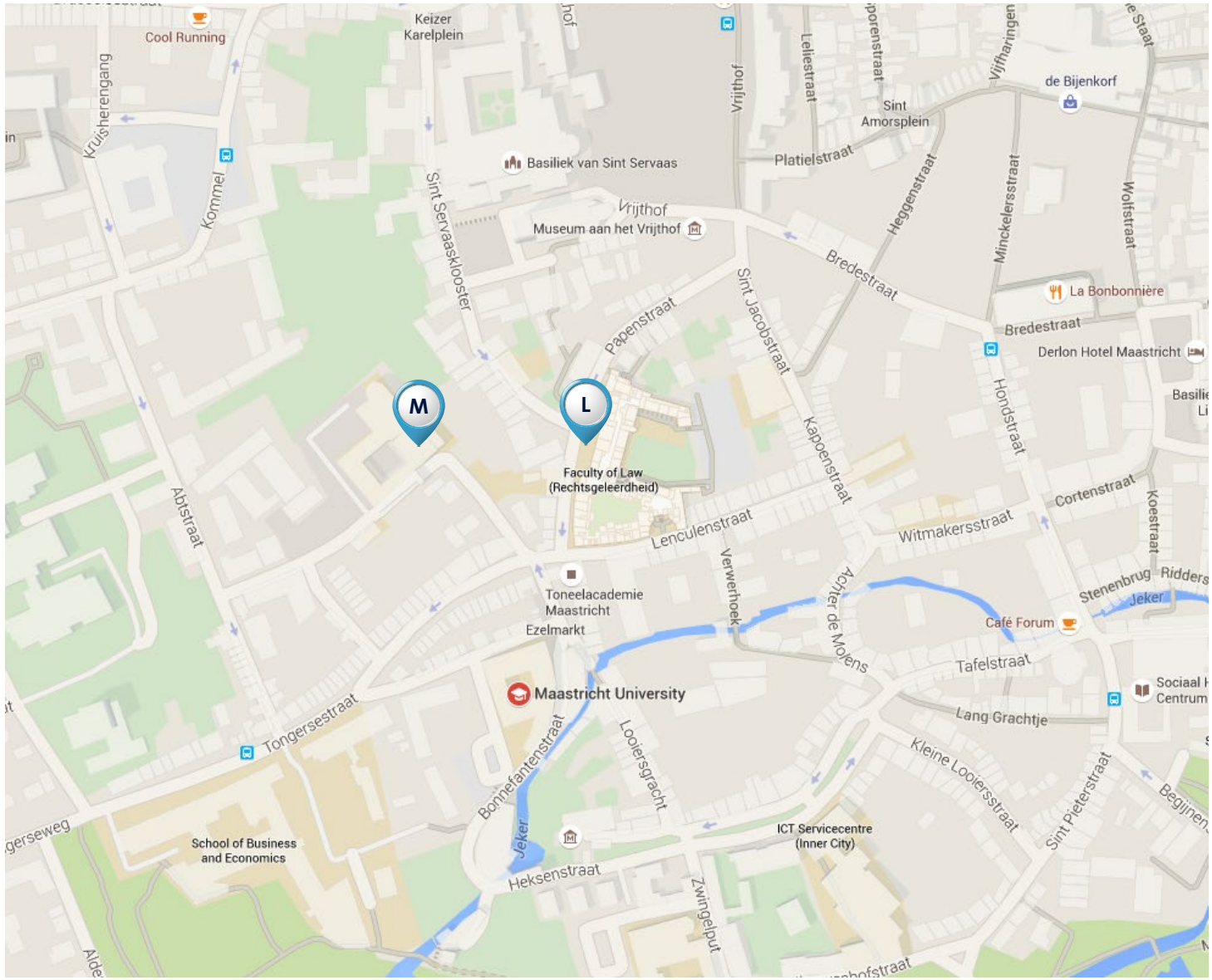
- Train station
- Tourist information point (Dinghuis, Kleine Staat 1)
- Ipanema (ice-breaking cocktail)

SRA-E venues

- **M** Minderbroedersberg 4-6
- **L** Law Faculty (Bouillonstraat 1-3)

- Municipality Maastricht (Markt 1) (reception before conference dinner)
- Markt (buses to conference dinner)

MAP OF CONFERENCE VENUES



Venues

M Minderbroedersberg 4-6

L Law Faculty (Bouillonstraat 1-3)

PRACTICAL CONFERENCE INFORMATION

CONFERENCE VENUES

There are two venues which are very close to each other:

The plenary sessions will be held at the Auditorium Minderbroedersberg.
Address details:
Minderbroedersberg 4-6
6211 LK Maastricht

Minderbroedersberg 4-6

The parallel sessions and round table will be held at the nearby Law Faculty.
Address details:
Bouillonstraat 1-3
6211 LH Maastricht

Bouillonstraat 1-3

SESSIONS AND ROOMS

The plenary sessions are held in the Auditorium Minderbroedersberg (for details see above) and the parallel sessions are held in the D-wing on the first floor (D.1.221, D.1.225, D.1.227) and on the second floor (D.2.221, D.2.215, D.2.225).
Coffee and lunch will be served on the ground floor in the B-wing of the Law Faculty, room B.006 close to the garden, please follow the signs.

Bouillonstraat 1-3, garden

REGISTRATION AND INFORMATION DESK

The registration area in the congress centre will be open for registration:

Sunday 14 June 2015:

17:00 – 19:00 hrs.
Location: Ipanema during Ice-breaking cocktail

Monday 15 June 2015:

08:00 – 09:00 hrs.
Location: hallway of Minderbroedersberg 4-6 (Plenary sessions)

09:30 – 15:30 hrs.
Location: hallway of Law Faculty (Parallel sessions)

Tuesday 16 June 2015:

08:00 – 09:00 hrs.
Location: Minderbroedersberg 4-6 (Plenary sessions)

09:30 – 15:30 hrs.
Location: hallway of Law Faculty (Parallel sessions)

Wednesday 17 June 2015:

08:00 – 09:00 hrs.
Location: Minderbroedersberg 4-6 (Plenary sessions)

09:30 – 14:00 hrs.
Location: hallway of Law Faculty (Parallel sessions)

THE REGISTRATION FEE INCLUDES:

- Admission to all scientific sessions
- Admission to the poster area
- Conference materials
- Daily lunch
- Daily coffee breaks
- Conference dinner
- Programme and proceedings Book
- SRA Europe membership 2015

PAYMENT REGISTRATION FEE

You can pay the registration fee on-site by credit card or cash. The official currency at the congress is Euros. Cheques and foreign currency are not accepted.

WIFI

You will have personalised WIFI access on-site.

BADGES

For security reasons, badges must be worn throughout the congress. Be careful not to lose your badge, as the Congress Committee cannot be responsible for lost badges, tickets or other valuable items. Entrance to lecture halls, poster and exhibition area will not be allowed to any person without a badge.

CERTIFICATE OF ATTENDANCE

All participants will receive a digital certificate of attendance by email after the congress.

LUNCH AND COFFEE BREAKS

Coffee and lunch will be served on the ground floor in the B-wing of the Law Faculty, room B.006 close to the garden, please follow the signs.

ANYTHING LOST?

Please go to the registration desk.

LANGUAGE

The official language of the congress is English.

LIABILITY

Upon registration, participants agree that neither the Organizing Committee nor the Conference Management can be subject to any liability concerning participation related activity. Participants should, therefore, organize their own (health and travel) insurance(s).

SCIENTIFIC INFORMATION

ORAL PRESENTERS

Each presenter is allocated about 20 minutes, including 5 minutes for discussion, depending on the number of presentations in the session. We kindly ask to bring your presentation on a USB key and show up in the allocated room at least 15 minutes before the session starts to introduce yourself to the session chair and upload and test your presentation.
A PC (Windows) and internet access will be available in each session room where PowerPoint files can be uploaded.

POSTER PRESENTERS

The poster session will take place on Monday June 15 from 18:00-19:30 hrs on the ground floor in the B-wing of the Law Faculty, room B.006 close to the garden, where also lunch and coffee will be served.
You are encouraged to hang up your poster in this room as soon as possible and leave it hanging during the entire conference. The conference secretariat can be contacted for instructions and equipment for hanging the posters. Posters should have an A1 portrait format (594×841 mm).

EVENTS

SUNDAY 14 JUNE

Ice-breaking cocktails

17:00 – 19:00 hrs.
Location: Ipanema café, Avenue Ceramique 250, 6221 KX Maastricht
You are able to pre-register during the reception

Ipanema café @ Bonnefantenmuseum
(VVV Maastricht Kim Zwarts)

MONDAY 15 JUNE

Regional Chapters meetings

12:30 – 13:30 hrs.
Regional chapters meetings of SRA-E Nordic and SRA-E Benelux will take place during the lunch break at the Law Faculty in rooms D.1.221 (SRA-E Nordic) and D.2.215 (SRA-E Benelux).

Round table session

17:00 – 18:00 hrs.
The round table session on Open access and Policy will take place in the 'Feestzaal' of the Law Faculty

Poster session & drinks

The poster session will take place at the Law Faculty in the common rooms (B-wing) directly after the programme. Drinks and nibbles will be served at SRA Specialty Group Mixers hosted by the Risk Communication Specialty Group (RCSG), the Ecological Risk Assessment Specialty Group (ERASG), the Risk and Development Specialty Group and Risk Policy and Law (RP&L) Specialty Group.

TUESDAY 16 JUNE

Reception in town hall

18:45 – 20:00 hrs.
The reception will take place in the Town Hall, Maastricht (Markt 1).

Town Hall (VVV Maastricht Hugo Thomassen)

Conference dinner

20:00 – 23:00 hrs.

The conference dinner will take place at Château Neercanne (Cannerweg 800, 6213 ND Maastricht). Buses will pick you up at the Markt after the reception and will bring you back to the Markt around 23:00 hrs. Dress code: smart casual.


Château Neercanne (VVV Maastricht/Petra Lenssen)

WEDNESDAY 17 JUNE

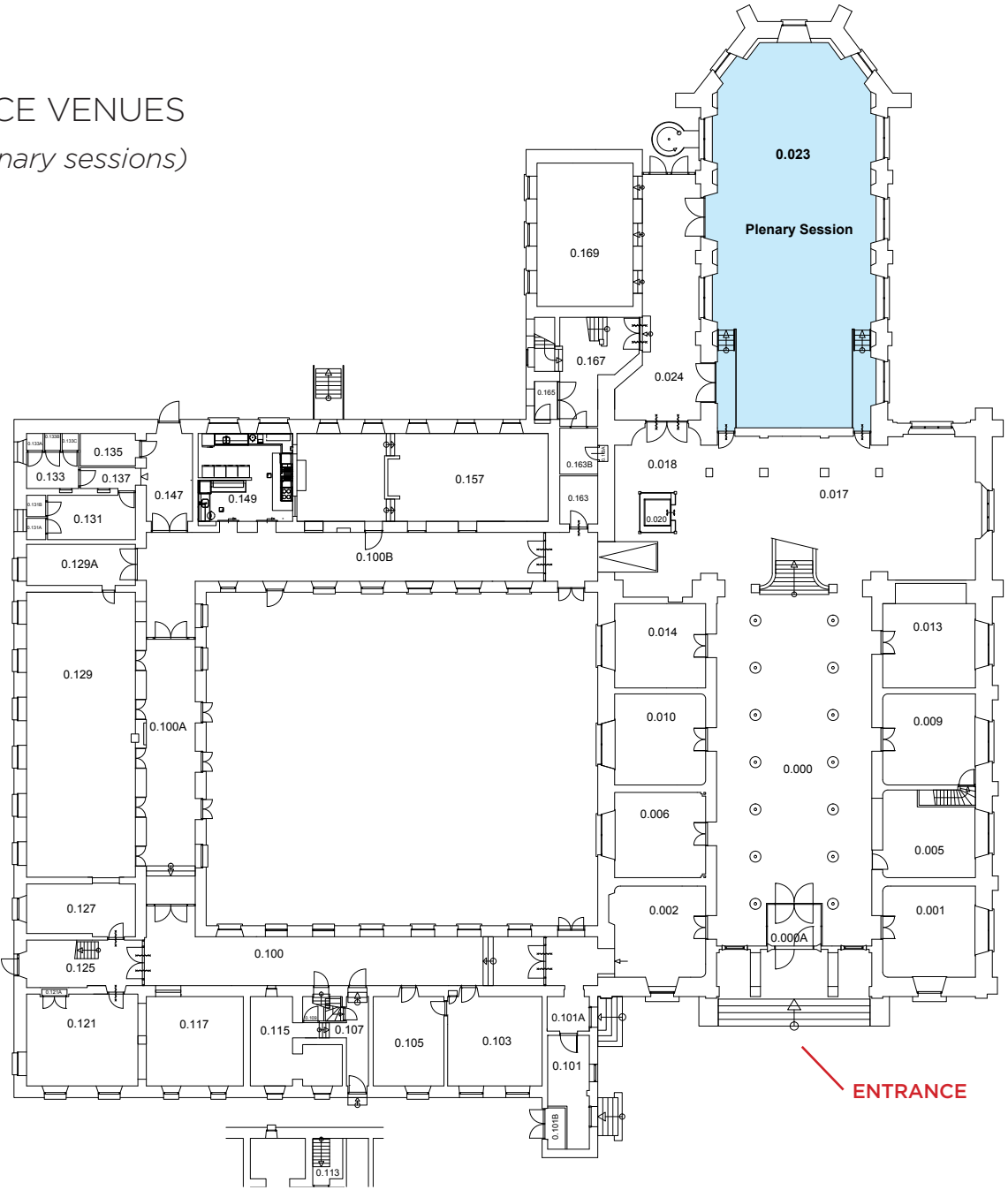
General Assembly Meeting

13:00 – 14:00 hrs.

The general assembly meeting will take place at the Law Faculty, the Feestzaal.

MAP OF CONFERENCE VENUES

Minderbroedersberg *(plenary sessions)*



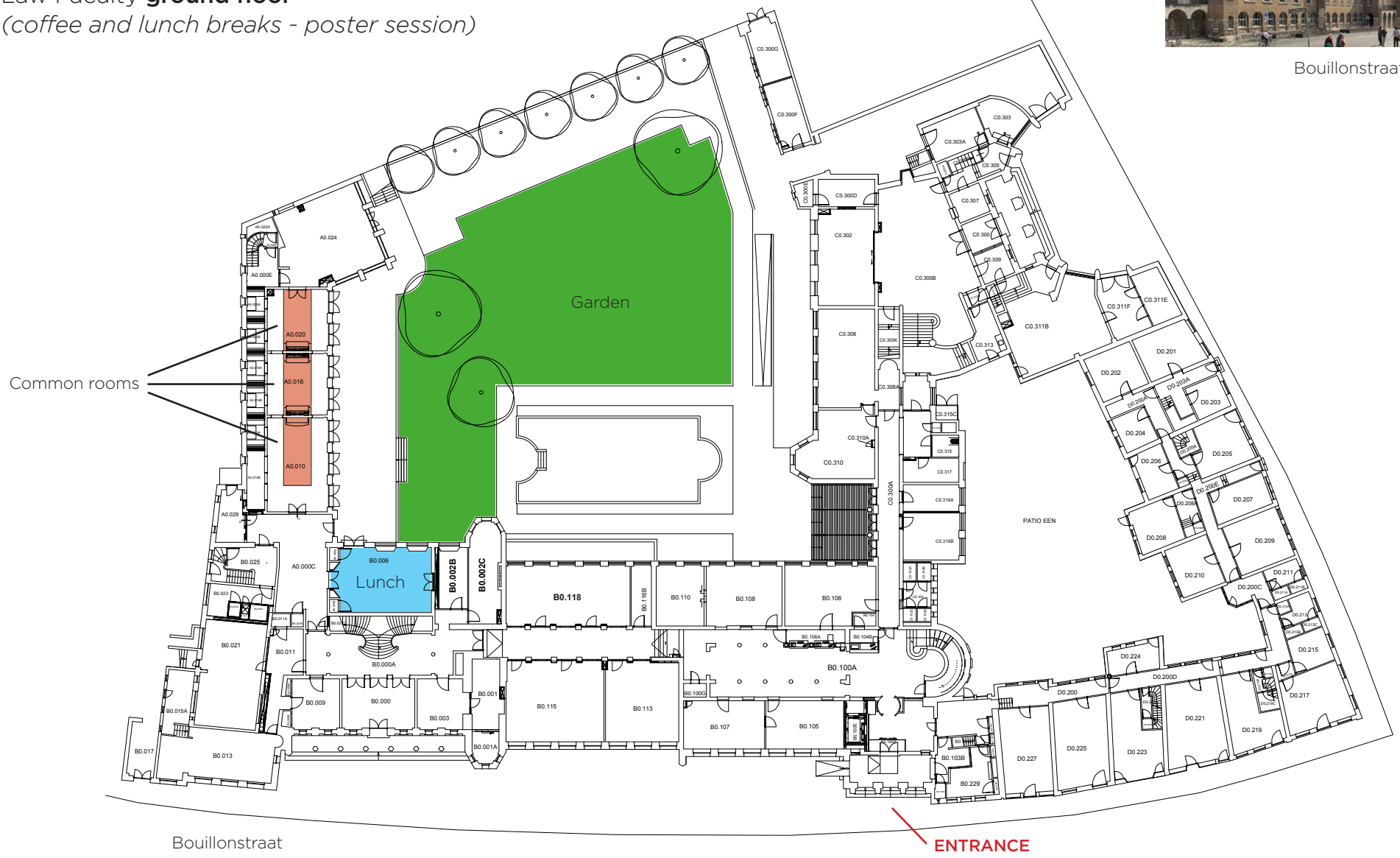
Minderbroedersberg 4-6

MAP OF CONFERENCE VENUES

Law Faculty **ground floor**

(coffee and lunch breaks - poster session)

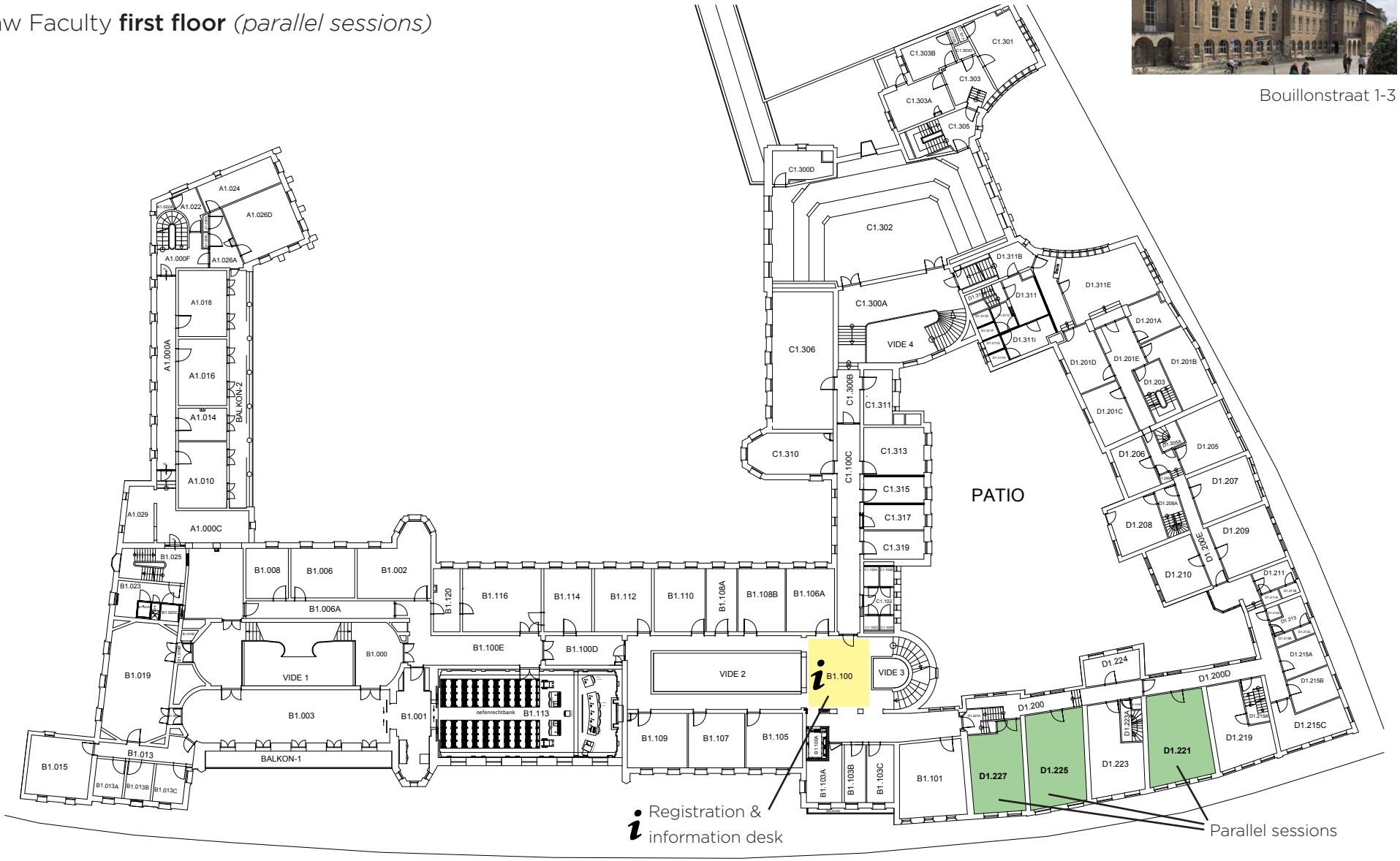
Bouillonstraat 1-3



MAP OF CONFERENCE VENUES

Law Faculty **first floor** *(parallel sessions)*

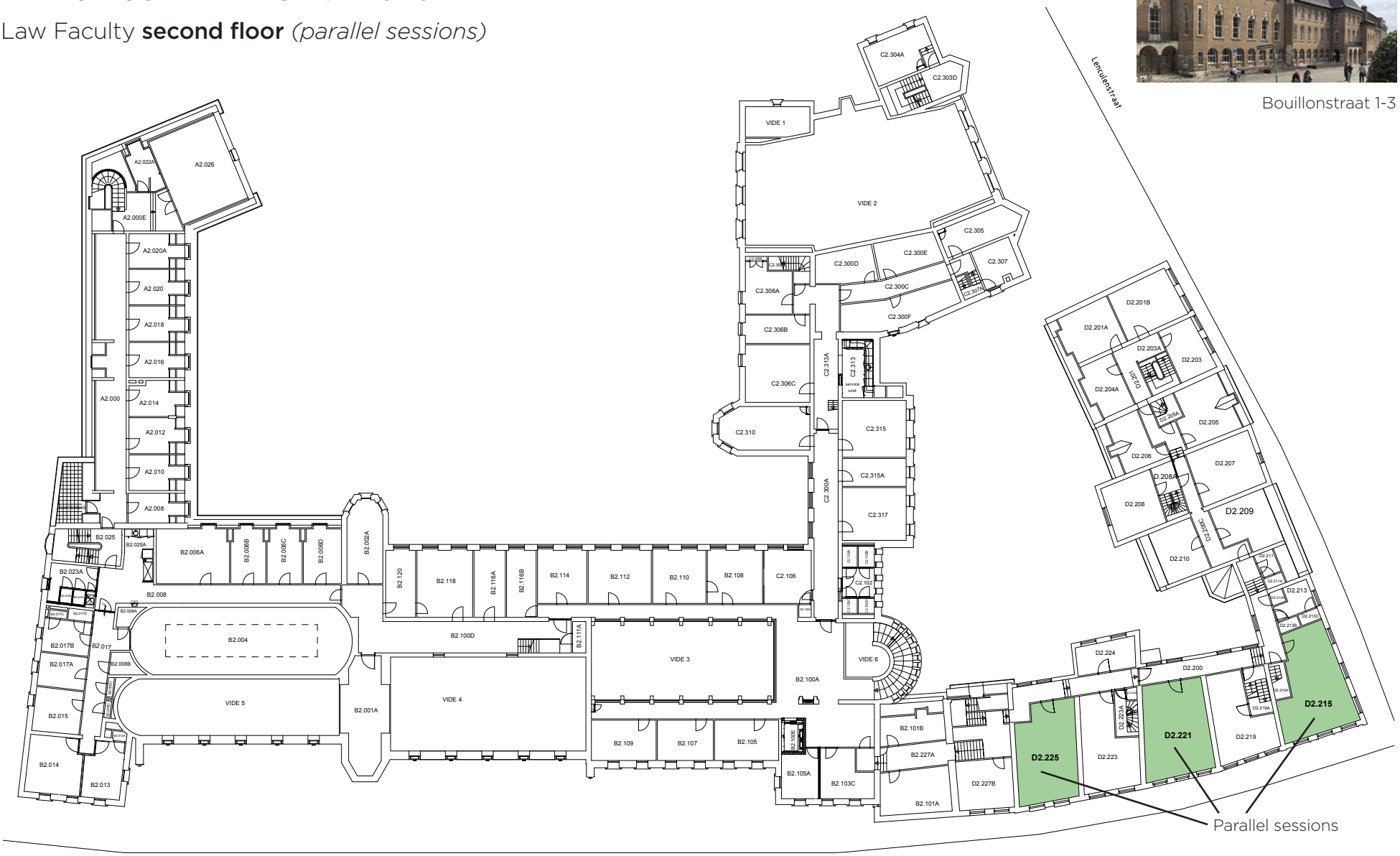
Bouillonstraat 1-3



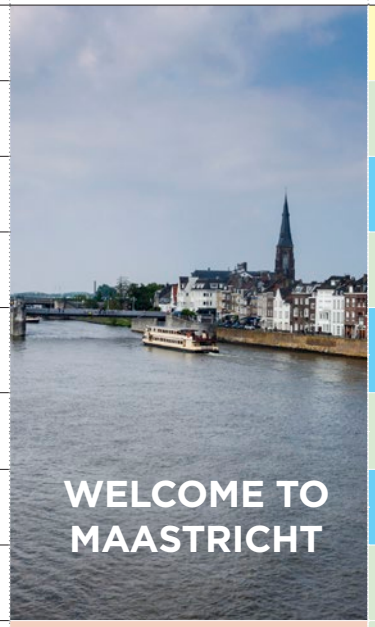
MAP OF CONFERENCE VENUES

Law Faculty **second floor** *(parallel sessions)*

Bouillonstraat 1-3



PROGRAMME OVERVIEW SRA-E MAASTRICHT

	SUNDAY JUNE 14	MONDAY JUNE 15	TUESDAY JUNE 16	WEDNESDAY JUNE 17	LOCATION
08:00-09:00		Registration	Registration	Registration	**Plenary** aula Minderbroedersberg 4-6
09:00-10:30		Plenary Session	Plenary Session	Plenary Session	
10:30-11:00		Coffee break			**Parallel Sessions & Regional CH Meetings** Law Faculty Bouillonstraat 1-3 **General Assembly** Law Faculty 'Feestzaal'
11:00-12:30		Parallel Sessions	Parallel Sessions	Parallel Sessions	
12:30-13:30		Regional Chapters meetings & Lunch Break	Lunch break	Lunch break **13:00-14:00** General Assembly Meeting	
13:30-15:00		Parallel Sessions	Parallel Sessions	**14:00-15:30** Parellel Sessions	
15:00-15:30		Coffee Break			
15:30-17:00		Parallel Sessions	Parallel Sessions		
Evening Programme	**17:00-19:00** Ice breaking cocktails at Ipanema & Pre-registration	**17:00-18:00** Round table **18:00-19:30** Poster session & drinks (Law faculty)	**18:45-23:00** Reception & Dinner		**Round table** Law Faculty 'Feestzaal' **Reception** Town Hall (Markt 78) **Dinner** Château Neercanne (Cannerweg 800, 6213 ND Maastricht) Buses will bring you to dinner at 20:00 hrs from the town hall

KEYNOTE DESCRIPTIONS

Monday 15 June: The future of Risk analysis

Moderated by Prof. Harro van Lente

Linking science and policy: The future of risk perception

Prof Ellen Peters – *Ohio University*

Dr. Peters is Professor of Psychology and Director of the Behavioral Decision Making Initiative at The Ohio State University. She conducts basic and applied research in judgment and decision making. She has worked extensively with the U.S. National Cancer Institute and Food and Drug Administration to advance the science of human decision making as it applies to health and health policy. She is current President of the Society for Judgment and Decision Making and is former Chair of FDA's Risk Communication Advisory Committee. She is also a Fellow of the Association for Psychological Science. Her research has been funded extensively by the National Science Foundation and National Institutes of Health. In her research, Dr. Peters focuses on understanding the basic building blocks of human judgment and decision making. She is particularly interested in how affective, intuitive, and deliberative processes help people to make decisions in an increasingly complex world. She studies decision making as an interaction of characteristics of the decision situation and characteristics of the individual. She has three major strands of basic research. First, she studies how numbers are processed in judgment and decision making. In recent publications, Dr. Peters and colleagues have focused on the roles of numeracy and intuitive number sense with respect to how individuals process and use numeric and non-numeric sources of information.

A second central strand of research concerns how affect and emotion influence information processing and decisions. Affect appears to have multiple functions in judgment and decision processes (as information, as a common currency, as a spotlight on information, and as a direct motivator of behaviors). Third, she is interested in how information processing and decision making change in complex ways across the adult life span.

In applied research, she is also generally interested in issues of risk perception and risk communication in health, financial, and environmental contexts, including how to present information to facilitate its comprehension and use. Recently, she has been quite interested in the psychological mechanisms underlying tobacco use and prevention and how to "nudge" people towards healthier behaviors.

Cognitive challenges and the future of risk communication

Prof. Claude Fischler – *School for Advanced Studies in the Social Sciences, Paris*

Claude Fischler is a French sociologist and anthropologist. He is a directeur de recherche of the French National Centre for Scientific Research and heads the Institut Interdisciplinaire d'Anthropologie du Contemporain (Interdisciplinary Institute for Contemporary Anthropology), a research unit of the School for Advanced Studies in the Social Sciences, in Paris. Claude Fischler's main area of research has been a comparative, interdisciplinary social science perspective on food and nutrition. His work covers the structure and function of cuisines, tastes and preferences and their evolution and change over time and space, as well as body image. His main current research is on commensality - eating together - its forms and functions, and its possible impact on public health. The anthropology of commensality ties into the general issue of sharing food, at the local and global levels.

Risk Governance

Prof. Marjolein van Asselt – *Dutch Safety Board*

Prof. dr. ir. Marjolein B.A. van Asselt is holding the Risk Governance chair at Maastricht University, the Netherlands. Her research interest and expertise is in the interplay between science, society and politics. She has specialised in the related topics dealing with uncertainty, risk governance, the regulation of innovation and foresight. From July 2014 she is a member of the Dutch Safety Board (Onderzoeksraad). From January 2008 till July 2014 she was also a member of the Scientific Council for Government Policy (Wetenschappelijke Raad voor het Regeringsbeleid - WRR). Van Asselt studied Computer Science and Philosophy of Science, Technology and Society at the University of Twente (The Netherlands). From 2005-2010, Marjolein B.A. van Asselt was member of the Young Academy (De Jonge Akademie - DJA) of the Dutch Royal Academy of Sciences (KNAW) and she was a member of the first board. Van Asselt has worked as an interdisciplinary researcher at the Dutch Institute of Public Health and the Environment (RIVM) (1993-1996), the Swiss Federal Institute EAWAG (1996- 1997) and she co-founded the International Centre for Integrative Studies (ICIS), Maastricht Univeristy (1997-2002). Marjolein enjoyed visiting scholarships at Oxford University (2005) and the King's Centre for Risk Management in London (2007).

Tuesday 16 June:
Risk Communication and Transparency policy

Moderated by Prof. Ragnar Löfstedt

Risk Policy and Transparency

Ms. Sharon Gesthuizen – *MP Lower Chamber, Dutch Parliament*

Sharon M.J.G. Gesthuizen (born January 23, 1976 in Nijmegen) is a Dutch politician. As a member of the Socialist Party (Socialistische Partij) she has been an MP since 30 November 2006. She is spokesperson on economic affairs, asylum and immigration policies and justice. Gesthuizen grew up in Millingen aan de Rijn and studied art at the Artez Institute of the Arts in Arnhem. From 2002 to 2003 she was a member of the Dutch National Students Union (LSVb). She owned a small company (Sciamachie) in video production, photography and web design in Haarlem before she became politically active. In her spare time Gesthuizen sculpts. One of her works is shown in Dutch Parliament (Roderick, 2011). She lives in The Hague and has one daughter.

Science-based policy-making in the European Parliament

Ms. Julie Girling – *MEP, European Parliament*

Julie Girling was born in London, educated at Twickenham County Grammar School followed by Liverpool University where she graduated in 1979 with a degree in History and Politics. She joined Ford Motor Company as a graduate trainee working on the shop floor in a supervisory role. She later moved into retail management with Argos, Dixons/Currys and Boots before heading up Buying and Marketing at Halfords. She then spent several years living and working in Indonesia with her husband. In 1999 Julie was elected as a Councillor on Cotswold District Council and became Leader of the Council in 2003. In 2000 Julie was elected to Gloucestershire County Council and became the Lead Cabinet Member for the Environment in 2005. Julie was elected as MEP for the South West of England and Gibraltar in June 2009 and successfully re-elected for a second term in May 2014. Currently, Julie is member of the Environment, Public Health and Food Safety Committee; rapporteur on Air Quality; member of the Agriculture Committee; member of the FEMM Committee, member of the ASEAN Delegation for relations with South East Asia.

Mind the gap - from science to science-based policy

Dr. Mikael Karlsson – *President European Environmental Bureau*

Dr. Karlsson has been President of the European Environmental Bureau, the largest environmental organisation in Europe, since 2005. He has been a member of e.g. the European Resource Efficiency Platform and two Commission High Level Groups on competitiveness and environment. In Sweden, he is an expert in the Government's Committee on Environmental and Climate Objectives and member of the board of the Swedish Chemicals Agency, and of the Swedish National Council for Nuclear Waste. Previously, Dr. Karlsson was President of the Swedish Society for Nature Conservation from 2002-2014. He has been expert in several governmental committees in Sweden, and a is a frequent participant at WTO, UNEP, OECD and EU meetings. Dr. Karlsson is an agronomist and holds a PhD in Environmental and Energy Systems. His research focuses on environmental policy and risk governance, including climate and energy issues, chemicals law, biotechnology, marine governance and sustainable business management. He is a senior researcher at KTH Royal Institute of Technology in Stockholm.

Wednesday 17 June:
Evidence-based risk informed policy in Europe

Moderated by Prof. Wiebe Bijker

Risk assessment at crossroads: The changing landscape of risk assessment and governance

Prof. Erik Lebret – *RIVM*

Erik Lebret is Chief Science Officer Integrated Risk Assessment at the National Institute for Public Health and the Environment (RIVM) and professor Environmental Health Impact Assessment at the Institute of Risk Assessment Sciences (IRAS) at Utrecht University. His main research interest is in the development, synthesis and interpretation of environmental health knowledge to inform societal and policy debates. This involves primary research in environmental epidemiology, methods to integrate information in disease burden indicators, monetisation of disease burden, risk governance practices, as well as research into the role of experts in advising policy makers and stakeholders about uncertain risk problems.

Risk-related policymaking in the Dutch Parliament

Prof. Sybe Schaap – *Senator, Dutch senate*

Sybe Schaap (Lemmer, May 20, 1946) is a Dutch politician and political philosopher. He is a member of the Senate on behalf of the People's Party for Freedom and Democracy (VVD). Schaap was also chairman of the Groot Salland Water Board. Schaap studied at the *Hogere Landbouwschool* (Higer Agricultural School) in Leeuwarden (now Van Hall Institute), where he earned his engineering degree in 1967. After studying Schaap went to work in the family business as a farmer in the Noordoostpolder from 1968 to 1970. During this time he received his certificate in teaching in Economics. In 1969 Schaap went to study social sciences at the Free University of Amsterdam, where he earned his Master's degree in 1973. Since 1979 Schaap was a lecturer in philosophy at the same university. Schaap was promoted in 1996 to Doctor of Philosophy at the Free University in Amsterdam. Then he got a guest lecturer in philosophy offered at Charles University in Prague, a position he currently holds inactive. Schaap is also extraordinary professor of water policy and governance at the Delft University of Technology and Wageningen University. Shaap was an employee of the D66 party in parliament (1981 to 1986) and member of the municipal council of Brederwiede (1980 to 1984). In 1986 Schaap left D66. Since 1988 Sheep is an active member of the VVD, and since June 12, 2007 he is a member of the Senate on behalf of that party.

Where should science end, where should politics begin in regulating decision making

Mr. Geoffrey Podger – *Executive Director, @Risk Ltd.*

Geoffrey Podger is currently Senior Visiting Research Fellow at the Centre for Risk Management, King's College, London. He is also the Executive Director of "@Risk Limited", a commercial company which offers ethical advice on risk management and risk communication to regulators and businesses. He holds a number of honorary positions in British organisations active in the areas of occupational health and safety. Geoffrey Podger has successively managed four regulatory agencies in the UK, the European Union and New Zealand. He was the founder Chief Executive of the UK Food Standards Agency and then of the European Food Safety Authority, thus playing a major role in the reestablishment of public confidence in the food supply after the BSE crisis. From 2007-2013 he was Chief Executive of the British Health and Safety Executive responsible for occupational health and safety in the workplace. He returned in April 2014 from New Zealand where he was the Acting Chief Executive for the establishment of their new agency, WorkSafe New Zealand.

PROGRAMME

Monday morning

08:00-09:00	Registration	Location: Plenary Aula, Minderbroedersberg 4-6				
09:00-10:30	Plenary session	The future of risk analysis: Prof. Ellen Peters (Ohio University), Prof. Claude Fischler (School for Advanced Studies in the Social Sciences, Paris) and Prof. Marjolein van Asselt (Dutch Safety Board)				
10:30-11:00	Coffee Break	Location: B-wing of the Law Faculty, room B.006				
11:00-12:30	**Symposium:** Risk governance from theory to practice I *Chair: Jeroen Devilee and Marijke Hermans*	**Symposium:** Comparative case studies of public engagement: lessons learned and future research questions *Chair: Pia Johanna Schweizer*	Safety culture *Chair: Nicolas Rossignol*	Risk perception *Chair: Margot Kuttschreuter*	Safety, Vulnerability and Resilience *Chair: Seda Kundak*	Risk perception & Communication theory *Chair: Asa Boholm*
	Room: D 2.215	*Room: D 2.221*	*Room: D 1.225*	*Room: D 1.227*	*Room: D 2.225*	*Room: D 1.221*
	M. Hermans: Obstacles for integrated risk governance. When normative models meet everyday practices in an institute for public health and environment	**P.J.E. Schweizer:** Public Engagement an Effective Instrument to Increase Social Acceptance? Lessons from the German "Energiewende"	**S.A. Kvalheim:** Perceptions of common terminology within the Safety Sciences and in operational settings: The Semantics of Safety, Risk and accidents	**L. Claassen:** Improving lay understanding of exposure to electromagenetic fields: the effect of information on perception of and responses to risk	**S.S. Alday:** Is an integrated Europe more vulnerable to risk?	**J. Wardman:** Computer-mediated risk perception and communication unplugged: Twenty years of processing
	E. Heugens: Opening the social sciences participation tool box to stimulate risk governance practices	**P.J.E. Schweizer:** Comparative case studies of public engagement: lessons learned and future research questions	**M. Boholm:** The concepts of risk, safety and security: Applications in everyday language	**P. Lienert:** Acceptance of high-voltage power lines in the context of the energy transition	**K. Sapountzaki:** Observing social processes for multi-crisis management - the case of the elderly in Cephalonia Island, Greece	**M. Nishizawa:** Why ruisk communication between scientists and lays often fails?: More attention to "language gaps" needs to be paid
	M. Mennen: National security strategy and national risk assessment in the Netherlands: further development steps.	**N. Pidgeon:** Creating a national citizen engagement process for UK energy policy	**R. Silva de Souza:** Sub-cultures of risk: Who is the expert?	**Y. Okan:** Improving risk understanding across ability levels: Benefits of dynamic icon arrays	**Y. Torun:** Trainings for nothing: Risk awareness campaigns in Turkey	**M. Poortvliet:** The howl of the world: How communication strategies perform risk discourses
	M.V. Florin: Dealing with the challenge of making evidence-based decisions in siutations of uncertainty and emergency	**B. Ram:** Public engagement in Denmark: is the past prologue?	**M. Ylönen:** Cultural characteristics of Finnish nuclear safety regulation	**T. Rundmo:** The role of exposure in travel mode risk perception	**U. Reichardt:** Improved European air traffic risk governance investigated with volcanic ash eruption scenarios	**D. Knuth:** Risk perception, experience and gender - An investigation of the accuracy hypothesis with respect to fires

Monday mid-day

12:30-13:30	Lunch	Location: B-wing of the Law Faculty, room B.006				
13:30-15:00	**Symposium:** Risk governance from theory to practice II *Chair: Jeroen Devilee and Marijke Hermans*	Experiments in risk decision making *Chair: Marijn Poortvliet*	Risk peception: Climate change *Chair: Frederic Bouder*	Risk Communication I *Chair: Jamie Wardman*	Medical risk *Chair: Dominic Way*	Risk participation *Chair: N. Rossignol*
	Room: D 2.215	*Room: D 1.227*	*Room: D 2.225*	*Room: D 1.221*	*Room: D 1.225*	*Room: D 2.221*
	J.A.M. Sips: Safe innovations approach: More than safe-by-design	**T. McCarthy:** Risk behaviour and instantaneous priming: A new version of the Balloon Analogue Risk Task	**C. Demski:** The experience of flooding and its impact on climage change risk perceptions	**H. Throne-Holst:** Comparing assigned roles of households in the Nordic risk management plans	**S.M. Driedger:** Risk communication challenges concerning contested medical procedures: Canadian perspectives of the CCSVI and liberation therapy debate for people with multiple sclerosis	**J.O. Zinn:** Multi-level governance in climate change adapatation - the case of the Latrobe Valley in Australia
	S. Roeser: Rationality, Emotions and Morality: towards a more balanced risk approach.	**M. Gamp:** Closing the gap between experimental and field studies: Experienced-based health risk feedback and lack of reassurance	**N. Pidgeon:** Public understanding of ocean acidification and implications for risk communication	**R. Armon:** Risk communication in current affair interviews - scientific contexts in experts' media talk	**M. de Haan:** To cure or not to cure: The regulation of medical risks in the Netherlands	**P. White:** Drought risk and health in the UK: Using an ecological stakeholder approach to investigate climate change impacts and adaptation options
	D. Jung: Working from basic safety levels towards long term ambitions	**J. Yi:** Emergency mapping roles in disaster risk management in case of Typhoon Haiyan, Philippines	**D. Knuth:** Flood experience in Germany - the impact on risk perception, concern, and social media usefulness	**M. Aoyagi:** Relationships among risk perception and media coverage on climate change and energy choice	**J. Hoekman:** Balancing uncertainty and unmet need in pharmaceutical early-access programs	**A. Michiels van Kessenich:** Political discourse as an undervalued means of risk acceptance
	G. Munnichs: Evidence based (risk) policy and public controversies	**B. Green:** Cybersecurity risk to critical utilities: the reflexive assessment of technical and social adaptation	**S. Kundak:** Risk perception after the great flood in Samsun	**J. Adekola:** Rethinking trust and communication in public deliberation of risk and uncertainties	**S. Grantham:** Using human factors engineering report information to expedite adoption of individual use medical devices and reduce the perception of risk by focusing on control	**A. Pinto:** Risks related to bivalve shellfish consumption: application of participatory strategies for risk communication

Monday afternoon

15:00-15:30	Coffee break	Location: B-wing of the Law Faculty, room B.006			
15:30-17:00	**Symposium:** Risk governance from theory to practice III *Chair: Jeroen Devilee and Marijke Hermans*	**Symposium:** Informing is for doing? A symposium on the communication of health risks *Chair: Viviane Visschers*	Risk Communication II *Chair: Wandi Bruine de Bruin*	Public perception *Chair: Mathew White*	Emergency planning *Chair: Ric van Poll*
	Room: D 2.215	*Room: D 2.221*	*Room: D 1.225*	*Room: D 1.221*	*Room: D 1.227*
	M. van Zijverden: RIVM in transition: from risk analysis to risk governance of new technologies	**A. Junghans:** Understanding how numeracy and visual presentation affect the information processing of medical risks using eye tracking	**M. Kievik:** Let's get together - the effect of personal experience with risk mitigating behavior on self-protectiveness of citizens	**S. Capstick:** Changing public perceptions of climate change in the UK	**K.G. Elgin:** Istanbul seismic risk mitigations and emergency preparedness project
	S.C.S. Clahsen: Dialogues as a means for RIVM to bridge the gap between risk governance theory and practice	**F.E.F. Mevissen:** (Mis)matching your risk: The impact of kind of risk feedback on preferred amount and type of risk information regarding sexually transmitted infections	**T. Rundmo:** Demand of risk mitigation in transport - personality, risk judgment and safety motivation	**I. Dawson:** The more the merrier? Towards and understanding of public risk perceptions of global population growth	**H. van Delden:** Integrating approaches to support multi-hazard mitigation planning
	M.M. Kraaij-Dirkzwager: Value of risk governance theory for crisis control?	**V. Visschers:** Reliability is the differentiating factor between ambiguity aversion and conflict aversion regarding uncertain risks	**B. Tiozzo:** Food risk media monitor: development of an automatic web tool to analyse the Italian mass media discourse on food safety and food related risks	**A. Wellmann:** Patterns of risk perception concerning natural hazards and the subsequent influence on behaviour in crisis situations	**P. Prpich:** Risk and resilience within global good systems
		A. Kause: Do you get vaccinated? The role of different types of uncertainty and graphical presentation formats in vaccination decisions	**B. Tiozzo:** Using time series to analyse the coverage of food safety issues in Italian newspapers. Considerations for an early identification of public concern for risks	**T. Motoyoshi:** Correlates of intentions to adapt seismic hazard adjustments after the 2011 Great East Japan Earthquake	**M.M. Bakema:** Learning from the rubble: disaster governance in the cases of New Zealand and Chile
18:00-19:30	Poster session & drinks	Location: B-wing of the Law Faculty, room B.006			

Tuesday morning

08:00-09:00	Registration	Location: Plenary Aula, Minderbroedersberg 4-6				
09:00-10:30	Plenary session	Risk Communication and Transparency policy: Ms. Julie Girling (MEP, European Parliament) and Ms. Sharon Gesthuizen (MP, Lower Chamber, Dutch Parliament)				
10:30-11:00	Coffee Break	Location: B-wing of the Law Faculty, room B.006				
11:00-12:30	Controversies *Chair: Marijke Hermans*	**Symposium:** Communicating the risks and benefits of enhanced food products *Chair: Carla Geijskes*	Security *Chair: Mara Wesseling*	Economic loss *Chair: Lars Bodsberg*	Environmental protection standards *Chair: Frederic Bouder*	Affect heuristic *Chair: Dominic Way*
	Room: D 1.225	*Room: D 2.215*	*Room: D 1.227*	*Room: D 2.225*	*Room: D 2.221*	*Room: D 1.221*
	M.J. Thomas: Public perceptions of 'fracking': US/UK comparisons	**E. Pajor:** Why do people use dietary supplements? The role of risk perception and other psychological determinants in decision making	**C. von Syvertsen:** How NATO can use risk management to meet Russian militariy initiatives in Ukraine	**K. Dakakni:** Economic loss in fracking practice, implications in insurance coverage	**M.G. Faure:** Strategic risk assessment in (environmental) law enforcement (1)	**V. Visschers:** Explaining pig farmers'and veterinarians'intention to reduce antimicrobial usage: Findings from two surveys in six European countries
	J. Porsius: Explaining health responses to power lines: the role of health risk perceptions	**M. Kuttschreuter:** Impact of message repetition on risk perception and attitudes toward enhanced food products	**A. Moraczewska:** Asymmetry of risk perception of the US-Mexico border	**B.B. Basbug Erkan:** Time, cost or safety: Management dilemmas in the Soma-Turkey mine fire May 13, 2014	**F. Blanc:** Strategic risk assessment in (environmental) law enforcement (2)	**M. Siegrist:** Solar radiation management: Impact of the affect heuristic on people's perception
	N. Huijts: The evaluation of hydrogen fuel stations by citizens: the interrelated effects of socio-demographic, spatial and psychological variables	**M.D. Hiverda:** Interest in food risk information and determinants of online information sharing	**O. Boe:** When encountering the unforeseen, which character strengths are most important for military leaders?	**C.J. Bryce:** Internal risk escalation in financial institutions: when do dictators intend to act	**P. Bentata:** The role of ENGOs in environmental regulation: A French case studies	**W. Bruine de Bruin:** Heat protection behaviors and positive affect about heat in the United Kingdom
	L. Ball: Validity of Risk Assessment Challenged: Deconstructing the 'Myth of the Month'	**K. Curfs:** Expert views on factors influencing communication about food supplements: An international Delphi study		**M. Sepehri:** Passive defense and business continuity	**B. van Oost:** Regulatory standards in risk governance - the case of carbon capture and storage (CCS) and carbon lock-in	**E. Bennett:** Linking risk perception and behavior: a key role for affect in decision making in response to multiple hazards

Tuesday mid-day

12:30-13:30	Lunch	Location: B-wing of the Law Faculty, room B.006			
13:30-15:00	Methodology in risk perception *Chair: Michael Siegriest*	**Symposium:** Tackling the complex problem of antibiotic resistance: connecting science, policy and practice *Chair: Mariken van der Lubben*	EU - Risk regulation *Chair: Pierre Bentata*	Emerging technologies *Chair: Marijke Hermans*	Genetic risk information *Chair: Frederic Bouder*
	Room: D 1.225	*Room: D 1.221*	*Room: D 1.227*	*Room: D 2.215*	*Room: D 2.221*
	O. Ozdemir Yilmaz: Measuring risk tolerance: Does the methodology matter	**M. van der Lubben:** The need to govern the complex issue of antibiotic resistance	**H. Rothstein:** European styles or risk regulation	**H. van Lente:** More than a matter of risk: the erroneous reduction of societal aspects of new technologies to risk perception	**A. Gorini:** Looking forward to personalized medicine: a new challenge to the personalization of genetic risk management
	M. Kaarstad: UN-METH - Methodology for handling the unforseen	**M. Mennen:** In-depth thematic analysis of the antimicrobial resistance threat within the perspective of the National risk assessment	**W. Xiang:** Regulating uncertainties of new breeding techniques in the EU: Problems and prospects	**B. Walhout:** All in the game? Learning from nanosafety governance in the Netherlands	**S. Georgsson Öhman:** Assessment of pregnant women's attitudes, knowledge and preferences of risk communication about non-invasive prenatal testing
	G.E. Torgersen: Strategic didactic model for the unforseen	**P. Spruijt:** Divergent viewpoints of antibiotic resistance experts: an international consultation	**V. Paskalev:** In science we trust: Another wrong idea in the wrong place	**I. van de Poel:** New technologies as societal experiments: implications for risk governance	**J. Inthorn:** Genetic risk information: new impulses by Ulrich Beck and Niklas Luhmann
	A. Olofsson: Towards a methodology for quantitative intersectional analysis of risk positions			**C.A. Maclaine Pont:** Constructive regulation for disruptive technology	**F.U. Kihlbom:** Risk communication with AML patients

Tuesday afternoon

15:00-15:30	Coffee break	Location: B-wing of the Law Faculty, room B.006			
15:30-17:00	**Symposium:** Psychological influences on risk assessment and decision-making *Chair: Eva Lermer*	Risk-based governance *Chair: Regine Paul*	Open access to data *Chair: Frederic Bouder*	Science and Society I: Unfolding risk governance *Chair: Nicolas Rossignol*	Organizational risks I *Chair: Mehran Sepehri*
	Room: D 1.221	*Room: D 2.221*	*Room: D 2.215*	*Room: D 1.225*	*Room: D 1.227*
	E. Lermer: Influences of different answer formats on risk assessment (accuracy)	**R. Paul:** Risk-based regulation against national obstacles? Understanding the role of Europeanisations	**E. Vos:** Transparancy and participation in the production regulatory science at EU level	**M.Letell:** Risk governance as knowledge production - upstream and downstream in the Swedish politics of water	**D. Sengul:** Multi-criteria business continuity centre location selection using fuzzy analytic network process
	E. Schneider: The zero risk-bias: Further examination of the phenomenon and its effects on risky decision making and risk-taking behavior	**H. Rothstein:** Varieties of risk regulation in Europe: How different countries address the problem of trade-offs in occupational health and safety regulation	**M. Noorman:** Negotiating the risks of making research data open	**O. Todt:** Health claim regulation and the hierarchy of the evidence	**S.H. Jore:** Building national resilience through the organizational security risk management - to what extent do organizations have the necessary tool box?
	E.G. Eller: Building bridges between theory and practice: the challenge of implementing psychological findings in risk management systems	**M. Wesseling:** A Europeanized approach to flooding? The introduction of risk-based flood assessment and management in France, Germany and the Netherlands	**D. Way:** Evaluating regulatory transparancy policies: The views of medical doctors and patients	**R. Silva de Souza:** Post-colonial structural violence of Basel's risk management standards	**Varzi:** Presenting a Risk Analysis Model of Technology Development and Transfer in the Energy Field Using the Fuzzy Logic
	B. Streicher: How to be bias-savy: Training reduces overcondfidence and conjunction fallacy		**R. Gaspar:** Food risk communication in a complex and uncertain world: consumers' deliberation, information avoidance and coping with uncertainty		
18:45-23:00	Reception & Dinner	Location: reception at the old town Hall Maastricht (Markt 1). Dinner at Château Neercanne (Cannerweg 800, 6213 ND Maastricht). Buses will pick everyone up at 20.00h sharp.			

Wednesday morning

08:00-09:00	Registration	Location: Plenary Aula, Minderbroedersberg 4-6				
09:00-10:30	Plenary session	Evidence-based risk informed policy in Europe: Prof. Sybe Schaap (Senator, Dutch Senate), Prof. Erik Lebret (RIVM) and Mr. Geoffrey Podger (Executive Director, @Risk Ltd.)				
10:30-11:00	Coffee Break	Location: B-wing of the Law Faculty, room B.006				
11:00-12:30	**Symposium:** Case studies on risk communication I *Chair: Dirk Scheer*	Uncertainty *Chair: Ana Olofsson*	Experiments in risk decision making *Chair: Dominic Way*	Science and Society II *Chair: Marijke Hermans*	Siting controversies *Chair: Mathew White*	Trust in communication *Chair: Frederic Bouder*
	Room: D 1.221	*Room: D 1.227*	*Room: D 1.225*	*Room: D 2.221*	*Room: D 2.225*	*Room: D 2.215*
	K. Ulmer: Communicating cyber risks: political framing the U.S. and Germany	**T. Jansen:** What is an uncertain risk? A scoping review	**S.H. Jorgenson:** Scenarios in urban road transport risk - developments in injuries and transport mode shift	**K. Beumer:** Travelling risk. Nanotechnology risks in India and South Africa	**J.F. David:** Keeping a relevant balance between renewable energy and quality of meteorological information: the weight of judicial expertise in front of a French administrative court	**K. Sano:** What makes information sources seem to be reliable
	D. Scheer: Public perception of geoengineering and its consequences for public debate	**N. Espinoza:** Defence of the ISO 31000 definition of risk	**L. Eriksson:** From the communicator's perspective: A study of forest risk communication in Sweden	**N. Rossignol:** The social (re)construction of an incident reporting system: opening-up, closing-down, sarting over	**A. Stasik:** Local communities and shale gas development: of what kind of risks are we talking about? Findings from Poland	**C. Jardine:** The role of trust in research partnerships between indigenous peoples and academic researchers
	R. Goldschmidt: Information and knowledge transfer between experts and laypersons and successful competence development of laypersons in risk communication	**A. Ridell:** Applying 'outcomes of interest' scenario framework to consider uncertainties imapcting risk reduction policies	**A. Sjölander-Lindqvist:** Matters of heritage: Risk tradeoffs in Swedish river restoration	**L. Soneryd:** The terms of engagement in risk governance: shaping stakeholderness in water management	**S. Ohnuma:** Determinants of public acceptance of siting a facility for high-level radioactive waste in the UK	**S. Grantham:** Social responsibility or social responsiveness? An examination of 12 years of ExxonMobils CEO Letter (2002-2013)
		K. Dakakni: Technological Society, Risk and Natural Behaviour	**A. Hanea:** Classical meets modern in a Delphi-like protocol for structured expert judgment	**L. Reis Castro:** Risk analysis of technologies for mosquito-vector control: A comparison between different techniques for manipulating mosquitoes	**E. Yoshida:** Common issues for social consensus building observed in different social problems related to environmental policies	**S. Furuno:** An empirical study of social trust and social confidence in the Japanese government: The case of nuclear power plants

Wednesday mid-day

12:30-13:30	Lunch	Location: B-wing of the Law Faculty, room B.006			
13:00-14:00	General Assembly meeting	Location: Law faculty, 'Feestzaal'			
14:00-15:30	**Symposium:** Case studies on risk communication II *Chair: Dirk Scheer* *Room: D 2.221*	Organizational risks II *Chair: Ragnar Lofstedt* *Room: D 2.215*	Critical infrastructure *Chair: Lars Bodsberg* *Room: D 1.225*	Energy *Chair: Ric van Poll* *Room: D 1.227*	Natural hazards *Chair: Seda Kundak* *Room: D 2.225*
	S. Grantham: Evaluating HPV risk messaging and vaccine adoption by young adult males	**J. Kringen:** A generic framework for analyzing regulatory value chains	**K. Quigley:** Adapting to vulnerabilities in the transportation system's critical infrastructure: Drawing lessons for risk governance from the re-decking of the Macdonald suspension bridge in Halifax	**T. Arnesen:** Public authority contract policy requirements and the balance of risk, resilience and transaction costs in upstream offshore petroleum industry	**N. Doorn:** The distribution of natural risks: reconciling efficiency and equity
	P. Sellke: Public Information Responses After Terrorist Events (PIRATE)	**Å. Boholm:** Expert based identification of risks to drinking water provisioning, in a climate change scenario: a Swedish case study	**H. Landquist:** Estimating consequences of discharge from potentially polluting shipwrecks.	**E. Connelly:** Combining risk analysis methods with life cycle assessment to prioritize R&D initiatives for innovative energy technologies	**E. Spence:** Mental models approach towards understanding marine environmental risks: How experts conceptualise ocean acidification
	D. Scheer: In Silico science for climate policy: How policy-makers process and use carbon storage simulation data	**R. Silva de Souza:** Risk: from solid to liquid	**L. Bodsberg:** Indicators for real-time monitoring of major accident risk in the petroleum sector	**J. Bierkens:** A guided "walking tour" through the chemical space of petroleum UVCBs, how changes in composition and mass distribution of an artificial petroleum product affect hazard and risk estimates of PETROTOX and PETRORISK.	**M. Ojala:** Explaining public risk perception of mosquitoes: The role of social norms, place identity, environmental values and concerns
	L. Lemyre: Flooding in Canada: Risk perception, trust in sources of information, beliefs and preparedness	**H.M.F. Marynissen:** The concept of complex interactive processes in organisational safety, risks and crises			

ORAL PRESENTATIONS ABSTRACTS

MONDAY 15 JUNE

■ Symposium: Risk governance from theory to practice I

Monday: 11:00 – 12:30, D 2.215
Chairs: Jeroen Devilee (RIVM, Bilthoven, The Netherlands),
Marijke Hermans (Maastricht University, Maastricht, The Netherlands)

Risk governance, which is the management of risk by its different stakeholders, is a well elaborated theoretical concept. For instance the IRGC risk governance framework provides a good description of the different relevant aspects. The IRGC has applied the framework retrospectively on different risks like e.g. nano technology and synthetic biology to prove its viability.

Nevertheless, the idea of risk governance remains rather academic and implementation in national risk analysis procedures of European countries is only marginal. For a proper implementation of risk governance in European risk management procedures, it is necessary that national institutes for risk assessment like RIVM, ANSES etc. take up the ideas that have been developed by academia. Only then risk governance will be applied in the volume that matches the number of uncertain and/or ambiguous risk dossiers.

The mini symposium proposed, provides a series of presentations in which is described in what way European Institutes for risk assessment, and particularly RIVM, make an effort to complement their traditional risk assessment role and make a transition towards risk governance. In this process they meet all kind of challenges, in which the identification of the own role and acting towards it, is one of the most important one. Moreover, power, financing, regulation, organizational issues and the need for speed in crises intervene with ideal scenarios for risk management. Nevertheless, the presentations show, that a slow but irreversible transition process is going on.

Obstacles for integrated risk governance. When normative models meet everyday practices in an Institute for Public Health and Environment

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Although the concept of risk governance already exists for several years, the transition from traditional risk assessments and management toward more integrated risk governance is a slow and difficult process. Apparently, there are some important factors in daily practice that prevent that normative risk governance models like that of the International Risk Governance Council (IRGC) are implemented at large scale in the risk assessment and management practice. The Dutch National Institute for Public Health and the Environment (RIVM) is an institute for risk assessment that wants to make the transition mentioned and indeed meets several obstacles on its way. In this article we use four controversial risk dossiers that the RIVM dealt with, i.e. nanosilica, scale gas, electromagnetic fields and synthetic biology, as cases to examine what these obstacles are. We argue that the extent to which RIVM practices can become more risk governance-based depends on three overarching challenges that relate to 1) the exploration of a particular case, 2) the role and positioning of the RIVM and 3) institutional culture and settings. In the pre-assessment phase, the RIVM makes the crucial decision whether to take up a particular case, but runs into several problems: the availability of scientific knowledge, the institutional and regulatory will to invest in a topic, the awareness of diverging framings of the

issue and the timing of its intervention (e.g. publication, press release or stakeholder meeting). All these issues are closely related to the second hurdle in the RIVM's transition to risk governance, i.e. its role and position in a particular case. We observed a conflict between the RIVM's diverging roles as an institute that performs scientific research, advises government and other stakeholders, signals new possible risks for society and acts as moderator for bringing together diverse stakeholders. The last challenge relates to the culture and organizational structure, including the political dependencies, of a major institute such as the RIVM. The bureaucracy and hierarchy often result in limited speed and flexibility to react to scientific developments and societal concern. Overall, we noticed both an eagerness within the RIVM to extend its traditional advisory role, in particular to become more embedded in society, and a reluctance to enter a game the institute is not familiar with. We conclude that risk assessment institutes should not shy away from what we consider to be a highly political role in the risk governance process.

Keywords: Risk governance, practice, RIVM
Symposium title: 'Risk governance from theory to practice'

Opening the social sciences participation tool box to stimulate risk governance practices

E. Heugens, S.C.S. Clahsen, J.L.A. Devilee
RIVM, Bilthoven, The Netherlands

What can societal sciences bring to life sciences? This is the challenge the Dutch National Institute for Public Health and the Environment (RIVM) is facing. The RIVM is a governmental research and knowledge institute providing policy support to the Dutch government. It performs tasks to promote both public health, and a healthy and safe living environment, with a strong focus on risk assessment.
In a new strategy, the RIVM expresses the ambition to get in more direct contact with societal actors concerning complex environmental and health risks in the areas of infectious disease control, environment & safety, and public health & health services. While RIVM cooperates intensively with stakeholders from governmental organizations and knowledge institutes, there is much less interaction with societal actors such as industry, civil society organizations (CSOs), and individual citizens. These actors may possess other types of knowledge and have other perspectives on risks than the RIVM, e.g. on social, ethical, economic and legal factors. Including these perspectives in projects concerning complex environmental and health risks increases the quality of the products the RIVM, broadens the group of stakeholders profiting from these products, and increases the visibility and acceptance of RIVM in society as an independent knowledge institute.
RIVM takes action to enable a broad field of RIVM employees to apply social scientific participation methods, thus 'opening the social sciences participation toolbox'. As an overview is missing, an inventory is made of RIVM projects in which stakeholder participation methods are already applied. Goal is to create an overview of methods and to analyze their effectiveness. Also methods new to RIVM are investigated (e.g. the possibility to assess perceptions of large groups of stakeholders by use of questionnaires or structured dialogues on the internet). The findings are matched to theories as Wilcox's or Arnstein's ladder of participation using different levels of participation. The results show RIVM's progress in moving from the 'ivory tower' towards a place in the middle of society. Also, the analyses provide employees not familiar yet with the social sciences participation toolbox to include stakeholder participation methods in their daily work: from theory to practice!

Keywords: risk governance participation toolbox
Symposium title: 'Risk governance from theory to practice'

National Security Strategy and National Risk Assessment in the Netherlands: further development steps

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In the National Security Strategy of the Netherlands, potential risks, threats and hazards which might affect the undisturbed functioning of our society are analyzed in order to and enhance adequate preparation and capacity building. This instrument for multi-hazard risk management is intended to contribute to the prevention of societal disruption as a consequence of a disaster or a crisis in the Netherlands. The Strategy comprises an All Hazard approach, which implies that both natural hazards, hazards caused by technical failure and malicious threats are included. The analysis is performed using a methodology called the *National Risk Assessment (NRA)*. In this methodology threats and hazards are described in scenarios, which are assessed in terms of likelihood and impact using a uniform scoring method and are therefore rendered comparable. The impact criteria reflect the five vital interests of the Netherlands: territorial security, physical safety (public health), economic security, ecological security and social and political stability. On the basis of the NRA, a capabilities analysis is performed to assess whether the country (government, private sector and civilians) has sufficient capabilities to adequately deal with the threat, and to determine which capabilities should be strengthened or developed.
Since the National Security Strategy was established, in 2007, approximately 50 scenarios have been developed and analyzed, covering a broad spectrum of hazards and threats, among which are floods, infection diseases, radicalization, terrorism, large scale CBRN incidents, cyber threats, disruption of critical infrastructure and organized crime. On the basis of the NRA, several capabilities have been developed or reinforced. Although the strategy and methodology have proven their practical use and demonstrable support in decision making and policy, there are also limitations and weaknesses requiring further investigation. For instance, it is well known that there are considerable differences in perception of various risks, impact and likelihood amongst civilians, societal communities and other stakeholders, that are not adequately accounted for in the assessment. Also, issues such as human manageability, differences in acceptance rate of risk and risk mitigation measures, uncertain and ambiguous risks, and ethical matters (for example, long-term isolation of groups of infection disease patients carrying resistant bacteria) might require improved participatory governance in the NRA and capability planning process. In this paper, these issues are evaluated and possible (innovative) strategies for improvement of the National Security Strategy and methodology are discussed.

Keywords: National Security; National Risk Assessment; methodology; capability planning; risk governance
Symposium title: Risk governance from theorie to practice

Dealing with the challenge of making evidence-based decisions in situations of uncertainty and emergency

M.V. Florin
International Risk Governance Council, Lausanne, Switzerland

Collection and provision of scientific information for policy and decision-making is particularly important when uncertainty and ambiguity create situation of fear and anxiety, or during emergencies. Based on insights collected by the International Risk Governance Council over past project work, and case study analysis (2009 swine flu, 2010 volcanic eruption in Iceland, 2011 Fukushima accident) this presentation will offer two suggestions to address some of the challenges faced by policymakers when little or contradictory evidence is available and decisions have to made with regard to risk, often in situation of crisis. The first is that some concepts and instruments for inclusive risk governance can be particularly useful in these cases. These includes: using social media for engaging with stakeholders, or inviting knowledge-brokers in the communication process. Risk governance itself can be used as intermediation between evidence and policy, and thus act to bridge science and policy.The second is that the role of the Chief Scientific Adviser in public sector organisations includes those of a Chief Risk Officer.

Keywords: evidence-based decision uncertainty complexity ambiguity risk governance

Symposium: Comparative case studies of public engagement: lessons learned and future research questions

Monday: 11:00 – 12:30, D 2.221
Chair: Pia Johanna Schweizer (University of Stuttgart, Stuttgart, Germany)

Climate plans in Europe have led to ambitious renewable energy deployment strategies. Many European nations have goals for a variety of renewable energy technologies, including wind, solar, and biomass with doubling of capacity over the next 10 years in some cases. Although the deployment strategies are commercially viable and cost effective, in many cases the level of "acceptability" of these technologies across communities is uncertain until the technology is introduced or sites are already identified. Building of a robust knowledge base and communicating these potential risks and benefits to local communities and stakeholders are central to understanding effective public engagement strategies. Scientists understand this challenge because of the diversity of sites, risks, public concerns, and decision making approaches. This symposium will explore local (municipal) case studies of various public engagement strategies employed across cultures and local political structure (see table below). The symposium will examine the effectiveness of these strategies, the outcomes, and the lessons learned. In addition to national and international lessons learned, the presenters will also suggest a research question(s) that needs further exploration in the risk community as well as for renewable energy experts and decision makers.

Public Engagement an Effective Instrument to Increase Social Acceptance? Lessons from the German 'Energiewende'

P.J.E. Schweizer
University of Stuttgart, Stuttgart, Germany

The German energy transformation implies an accelerated phase-out from nuclear energy, a considerable increase of renewable energy in both electricity and heat production and greatly extended energy efficiency. These challenges call for innovative research, policy making and infrastructural planning. The talk examines the potential of public engagement and participative processes for effective infrastructure planning in the context of energy policies. By 2050, at least 80% of Germany's electricity is to be derived from renewable energy sources. This includes the comprehensive and accelerated extension of the electricity grid. As a result, the German energy transition will not proceed without societal debates and controversies. Some of the debatable issues refer to questions of equity, such as how (financial) burdens but also benefits should be allocated across society, resolution of conflicts regarding values, and diverging societal preferences. Public engagement is certainly no panacea for enhanced social acceptability, yet it offers substantial potential to facilitate the German Energiewende. Stakeholder involvement and public participation are crucial factors of success for governing the transition process. The presentation will focus on the potentials and limits of discursive approaches for facilitating the Energiewende. Furthermore, the talk will investigate critical issues such as public distrust of science and politics, biased assimilation of new information, power structures and value uncertainty.

Keywords: Public Engagement, Stakeholder Involvement, Risk Governance, Energy Transition, Policy Making

Comparative Case Studies of Public Engagement: Lessons learned and Future Research Questions

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Climate plans in Europe have led to ambitious renewable energy deployment strategies. Many European nations have goals for a variety of renewable energy technologies, including wind, solar, and biomass with doubling of capacity over the next 10 years in some cases. Although the deployment strategies are commercially viable and cost effective, in many cases the level of "acceptability"of these technologies across communities is uncertain until the technology is introduced or sites are already identified. Building of a robust knowledge base and communicating these potential risks and benefits to local communities and stakeholders are central to understanding effective public engagement strategies. Scientists understand this challenge because of the diversity of sites, risks, public concerns, and decision making approaches. This symposium will explore 4 local (municipal) case studies of various public engagement strategies employed across cultures and local political structure (see table below). The symposium will examine the effectiveness of these strategies, the outcomes, and the lessons learned. In addition to national and international lessons learned, the presenters will also suggest a research question(s) that needs further exploration in the risk community as well as for renewable energy experts and decision makers.

Keywords: Risk Governance, Risk Communication and Participation, International and Cross-Border Collaborations in Risk Reduction

Creating a National Citizen Engagement Process for UK Energy Policy

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This paper examines some of the challenges involved when designing and conducting public deliberation processes for energy policy. We take as our illustrative case study a recent research project investigating public values and attitudes towards future energy system change for the UK. National-level issues such as this are often particularly difficult to engage the public with because of their inherent complexity, derived from multiple interconnected elements and policy frames, extended scales of analysis, and different manifestations of uncertainty. With reference to the energy system project we discuss ways of meeting a series of science communication challenges arising when engaging the public with such topics, including the need to articulate systems thinking and problem scale around risks and benefits, to provide balanced policy framings in ways that open up spaces for deliberation and reflection, and the need for varied methods of facilitation and data synthesis that permit access to participants' broader values. While resource intensive, such national level deliberation is possible, and can produce useful insights for both participants, policy and risk governance.

Keywords: Risk governance, communication and participation
Symposium title: Comparative Case Studies of Public Engagement: Lessons learned and Future Research Questions

Public Engagement in Denmark: Is the Past Prologue?

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The Danish energy goals state that the nation will move towards 100% fossil free with a large share of the electricity system supplied by wind turbines. In fact, Denmark has the highest wind generation as a proportion of electricity consumption in the world - upwards of 40% in 2014. Denmark is also known to have a large share of jointly owned or cooperative owned turbines over the last few decades. In addition, they were pioneers in utility scale offshore wind plants being first movers with Horns Rev and Nysted over ten years ago. With this type of success, perhaps the process of public engagement for their energy transformation could be labeled a success? Moving towards a deeper transformation that replaces more fossil fuels for electricity and heat production (they already decided on no new nuclear energy), however, will require a considerable increase of renewable energy, including wind power on land and at sea. Recently, there is more media attention and government concern about citizen opposition to larger land based wind turbine and increasing attention to risks and uncertainties (e.g., low frequency noise) and qualitative factors (e.g., equity, planning processes). Moreover, ownership patterns are shifting from cooperative owned to corporate or individual farmer owned. This talk will highlight the current trends in the wind energy sector and the potential for public engagement and participative processes within the Danish context. Although the wind sector maintains a high level of political and industrial support, there has been limited exploration of the social context and conditions of the communities and the underlying values that shape risk perceptions --- whether the citizens are accepting wind, debating it, or engaging in controversies. Building a robust knowledge base that reflects public concerns and involving stakeholders are critical for this energy transition. The talk will touch upon some important dynamics, including social trust, institutional responsibilities for public involvement, and building capacity within a university with strong traditional engineering competencies and very limited social sciences. The presentation will propose some future research questions in the Danish context and explore lessons learned across national boundaries. Examining the trends of a global wind power leader is instructive for the Nordic region and beyond.

Keywords: public engagement, Denmark, wind energy, social trust
Symposium title: Comparative case studies of public engagement

Safety culture

Monday: 11:00 – 12:30, D 1.225
Chair: Nicolas Rossignol (University de Liège, Liège, Belgium)

Perceptions of common terminology within the Safety Sciences and in operational settings: The Semantics of Safety, Risk and accidents

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NTNU, Trondheim, Norway

Assessing the status of operational safety is a necessary and important part of any safety management system. This can be done in various ways, dependent on industry specific demands and the safety management philosophy the organization has chosen. The results from Safety Culture surveys can in theory be used as an indicator of the state of the safety related operational safety condition, but an unanswered question is which type of risk we are covering; does a safety culture survey cover major accident risk, occupational risk, or both? The constructs covered in a Safety culture survey is typically coming from experience with major accidents, but when applied in practice it becomes unclear which types of risks the investigations are meant to say something about. Attempts to test the validity of Safety culture surveys on safety has, with a few exceptions, tried to connect the survey results to incident registers. Typically, this will however contain mainly incidents related to occupational accidents, since major accidents are so few. It is unclear whether researchers within the field are making a distinction between major accidents and individual accidents at all. The literature is commonly introduced and actualized by examples of major accidents where safety culture has been pointed out as a major causal contributor, but little or no space is devoted to describing or placing the research with regards to which type of risk it is relevant for. The lack of sensitivity to various risk types, their nature and the potential differences between organizational native language and researchers' jargon regarding risk, safety and accidents is a fundamental problem in itself; especially if we rely on self-assessment tools as indicators for the state of the operational safety condition relevant for major accident risk.
In this paper, I will investigate how common items in safety culture assessment tools can be related to findings from major accident inquiries, how the terminology commonly is used by researchers and analysts. The results of this will be compared to the perceptions of the same items by practitioners at the sharp end; personnel likely to constitute the respondents of the surveys used.

Keywords: Validity of self assessments, common understanding of terminology, closing the gap between science and practice

The concepts of risk, safety and security: Applications in everyday language

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The concepts of risk, safety and security have received substantial academic interest. Several assumptions exist about their nature and relation. Besides academic use, the words risk, safety and security are frequent in ordinary language, for example, in media reporting. In this article, we analyze the concepts of risk, safety and security, and their relation, based on empirical observation of their actual everyday use. The "behavioral profiles"of the nouns risk, safety and security and the adjectives risky, safe and secure are coded and compared regarding lexical and grammatical contexts. The main findings are: (1) The three nouns risk, safety, and security, and the two adjectives safe and secure have widespread use in different senses, which will make any attempt to define them in a single unified manner extremely difficult to implement. (2) The relationship between the central risk terms is complex and only partially confirms the distinctions commonly made between the terms in specialized terminology. (3) Whereas most attempts to define risk in specialized terminology have taken the term to have a quantitative meaning, non-quantitative meanings dominate in everyday language, and numerical meanings are rare. (4) The three adjectives safe, secure, and risky are often used in comparative form. This speaks against interpretations that would take them as absolute, all-or-nothing concepts.

Keywords: risk; safety; security; everyday use; corpus linguistics; concept analysis

Sub-cultures of Risk: who is the Expert?

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This article aims to understand the implementation of risk management in a Brazilian Development Bank, considering it as a political process of interpellation. Therefore, using the Discourse Theory of Laclau and Mouffe, it problematizes the logics behind the idea of expertise, exposing how 'experts' were constructed in this discourse in opposition to 'other groups'. Conceptually, the idea of expertise was constructed to reinforce the 'knowledge', therefore, power of 'trained expert' to set the right direction in different departments. However, examining the genealogy of this discourse, this paper clarifies that through logic of differences and logics of equivalence, this discourse initially overshadowed internal different under a discourse of 'good for all', that after all also create polarities and opposition under a discourse of 'expertise'. During this fieldwork risk management's practices were in crisis, and risk experts reinforced a 'risk culture' that blamed other managers to present a 'weak risk culture' in their department and do not understand properly risk management's practices which reinforced their position as 'non-experts'. Nonetheless, this discourse just creates more resistance and was unworthy to risk management practices inside the bank in a dispute for power through a debate about 'who is the expert'? Therefore, this article critically analyse these events as a way to highlight implementation's problems of risk management's practices. This paper exposes how the claim for expertise, creates a polatiry between 'experts' and 'non-experts', not including, but exluding actors in a suuppodsely participatory and collaborative process of Enterprsie Risk Management implementation, which generate more opposition against risk management experts, and consequently, risk management practices.

Keywords: Expertise. Risk Management. Discourse Theory. Social Antagonistic Groups. Post-Structuralist Identity.

Cultural Characteristics of Finnish Nuclear Safety Regulation

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Nuclear safety is international, national and socio-technical phenomenon by nature. The more new challenges nuclear safety and the regulatory field encounter in the form of accidents, new nuclear power countries, several subcontractors and workers, the more important an understanding of cultural aspects becomes. In addition, the ongoing harmonization efforts in the field of nuclear safety e.g. by the Western European Nuclear Regulators' Association, have given rise to the need to understand specific national cultural features which may either hamper or contribute to safety. The paper focuses on Finnish cultural characteristics of nuclear safety regulation. Culture is understood here as consisting of institutional dimensions, i.e. how organisations, such as the regulatory body, act with regard to safety. Culture includes normative (how safety should be dealt with), cognitive (what is relevant for safety), social (how the relationships among the authorities and between authorities and industry has been arranged) dimensions. The data includes documents, such as regulatory guides and interviews with 18 inspectors. Method is content analysis. The findings include two different types of inspectors with different orientation to regulation; Two desirable and two avoidable roles of inspector; mechanisms that create similar as well as different understandings of safety among the inspectors; Finnish model of safety regulation is examined in regard to command and control and self-regulation type of controlling.

Keywords: safety, regulation, culture

Risk perception

Monday: 11:00 – 12:30, D 1.227
Chair: Margôt Kuttschreuter (University of Twente, Enschede, The Netherlands)

Improving lay understanding of exposure to electromagnetic fields: the effect of information on perception of and responses to risk

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EMGO/VUmc, Amsterdam, The Netherlands

Studies show that, although many people are concerned about the potential health risks of being exposed to electromagnetic fields (EMF), lay understanding of exposure, an important determinant of risk perceptions and responses, is limited. In an online consumer panel (n=245), we tested the effects of providing people with information about EMF on lay understanding of exposure and perceptions and responses to risks, using an experimental 2x2x2 design. Providing people with specific information explaining the distance-exposure relationship, clarifying EMF policy, or specifying personal exposure management options actions, resulted in a better understanding of exposure. We demonstrated that information provision as such, had no effects on concerns about EMF nor on perceived risk of personal sources, i.e. mobile phones, but lowered perception of risk of public sources, i.e. mobile phone base stations, and high voltage power lines. In addition, information explaining the distance-exposure relationship in combination with policy information, resulted in reduced self-reported risk aversive responses. Moreover, participants who understood more about exposure in relation to the distance to the source showed lower perceptions of risk, were less likely to restrict their own exposure, and more likely to accept new installations of public sources of EMF in their neighbourhood. In contrast, awareness that exposure was mainly determined by personal use of EMF sources corresponded with higher perceptions of risk from personal sources and more likely to restrict their own exposure. Our findings provide focal points for improving communication materials on EMF. In particular, we suggest to include information clarifying the distance-exposure relationship to improve understanding of exposure.

Keywords: Risk, Electromagnetic fields, Communication, Perception, Responses

Acceptance of High-Voltage Power Lines in the Context of the Energy Transition

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The expansion of power grids is a key element for the successful implementation of the energy transition in Switzerland. People generally are in favor of the energy transition. However, they do not automatically associate it with infrastructural issues. The public acceptance of high-voltage power lines (HVPL) is generally low, which means that necessary changes in power grids due to, for example, the decentralization of the energy system tend to face problems with public acceptance. This constitutes a major challenge for the implementation of the energy transition. The present study aims to answer two main questions: (1) Does the acceptance of HVPL expansions increase when people are aware that the expansion constitutes a precondition for the energy transition, or does this awareness diminish people's acceptance of the energy transition itself? And (2): Does people's acceptance differ across different types of grid extension?
An online study was conducted (N=160) in which participants either were informed about the importance of the power grid extension for the successful energy transition (framing condition) or received neutral information about the grid extension, without mention of the energy transition. Participants indicated their acceptance of different types of grid extensions and reported their risk and benefit perception concerning HVPL. Although in the framing condition significantly more people related the grid expansion to the energy transition, we found no significant differences between the two information conditions. Even after receiving information about the link between grid extensions and the energy transition, a considerable number of the participants still believed that the decentralization of the energy system associated with the energy transition renders further grid extensions redundant. People who were subject to that misconception reported significantly lower acceptance of the extension of HVPL and perceived higher risks and lower benefits related to HVPL, compared with people who made the link to the energy transition. Furthermore, technological innovations and necessary renovations were better accepted than visual intrusions, such as modifications in size and the construction of new HVPL.
In conclusion, there seems to be some quite-resistant misconceptions that prevent people from linking the energy transition with necessary grid extensions, even after receiving the respective information. However, once the link is made, people show higher acceptance of grid extensions, although there also might be a decrease in acceptance of the energy transition itself. Furthermore, the findings underline the importance of distinguishing between different types of grid extension when asking people about their acceptance.

Keywords: Energy policy, High-Voltage Power Lines, energy transition, public acceptance, risk perception

Improving risk understanding across ability levels: Benefits of dynamic icon arrays

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Informed decision making about health often requires understanding complex quantitative information about risks and benefits of different options. Graphical displays can be highly effective decision aids that have been found to substantially enhance the comprehension of risk information and reduce biases in risk perception. Icon arrays in particular have received a lot of attention in recent years, and are increasingly being used in an attempt to improve health communications (e.g., in patient information websites and pamphlets). Unfortunately, recent research has revealed that many individuals have low graph literacy skills and experience only limited benefits from these visual aids. We sought to enhance the efficacy and reach of icon arrays by developing and testing three types of dynamic design features"'i.e., computerized displays that unfold over time. Specifically, we manipulated the sequential presentation of the different elements of icon arrays, the presence of explanatory labels indicating what was depicted in the different regions of the arrays, and the use of a reflective question (which required the generation of the solution not explicitly represented in the display) followed by accuracy feedback. The first two features were designed to promote specific cognitive processes involved in graph comprehension, while the third feature was designed to promote a more active, elaborative processing of risk information. Design features were developed taking into account prominent graph comprehension models as well as work on active processing of visualizations. We measured participants' understanding of treatment risk reduction associated with drugs for heart attack prevention. Different design features differentially contributed to performance. Explanatory labels were effective to improve risk understanding among less graph literate participants, while reflective questions resulted in large and robust performance benefits both among participants with low and high graph literacy. In contrast, displays designed to direct attention to the different regions in arrays by presenting information sequentially did not contribute to enhance comprehension. These findings converge with recent studies showing that interactive and animated design features in graphical displays do not necessarily contribute to improve risk comprehension. Notably, our results also show that the benefits of features supporting active, elaborative processing can extend to individuals of different ability levels. The design features and theory developed in the current research should be relatively easy to integrate with many types of information technologies (e.g., websites, interactive patient information kiosks), providing tutorials that improve people's ability to interpret and understand information about risk across diverse contexts.

Keywords: Health risk communication; decision making; risk visualization; graph literacy

The role of exposure in travel mode risk perception

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Sustainable transportation in urban areas is associated with an increase in the use of public travel modes and a reduction in private travel mode use. Security on public transportation modes is very much focused due to violence, sabotage, terrorism, harassment etc. that takes place in public transportation. Lay people's perception of such risks may be associated with travel mode choices. The core key elements in perceived risk are subjective assessment of the probability of an event and the judgement of severity of consequences if the event should take place. In risk estimation models exposure is also given weight. In subjective risk judgements it could be that the travellers' own mode use is taken into consideration and that the perceived risk increase with the frequency of use. However, it could also be that those who seldom or never use public travel modes assess the probability as well as judgement of severity of consequences to be larger compared with those who often use public transportation. The main aim of the current research is to examine the role of exposure in perceived risk related to the use of private and public travel modes in urban areas. The results are based on a self-completion questionnaire survey carried out among representative samples in six urban areas in Norway (n=1043). The results showed that respondents who seldom or never used public transportation for commuting perceived the risk of using such modes to be larger compared to those who regularly used public travel modes. These differences were particularly related to judgements of security (e.g. blind violence, sabotage at transport mode, harassment and other uncomfortable episodes, terrorism, sexual abuse, and theft). The results will be discussed in relation to the use of pull and push factors to further reduce the use of private travel modes among commuters in urban areas.

Keywords: Risk perception, security, travel mode use

Safety, Vulnerability and Resilience

Monday: 11:00 – 12:30, D 2.225
Chair: Seda Kundak (Istanbul technical university, Istanbul, Turkey)

Is an Integrated Europe More Vulnerable to Risk?

S. Seno Alday
The University of Sydney, Sydney, Australia

Europe leads the world as an example of successful regional integration mainly aimed at fostering sustainable social and economic development among member countries. Originally, the union was based on the idea that countries that actively engage in international trade create interdependent relationships with each other, thus increasing the likelihood of conflict avoidance. By extension, conflict avoidance can be viewed as an opportunity to reduce both political and economic risk in the region; therefore, the European Union can be viewed as a large-scale international, cross-border collaboration ultimately aimed at reducing risk.

This paper examines the extent of European integration, focusing specifically on intra-regional trade as the main mechanism for integration. Trade relationships in the Union are modeled as a network using data from the World Bank's World Integrated Trade Solution (WITS) database, and the evolution of the topology of the network from 1990 to 2012 is analyzed using contemporary empirical approaches in graph theory. Particular characteristics of the network are examined during three periods of shock: the 1997 Asian financial crisis, the 2000 internet bubble, and the 2008 global financial crisis. The paper then aims to address the following questions:

1. how has the topology of the intra-European Union trade network changed through time?
2. in light of the topology of its trade network, what is the extent of integration achieved by the European Union?
3. given its topology, what are the implications on the European Union trade network's vulnerability, robustness and resilience?

Previous studies of various types of networks (e.g. electrical grids, the internet, etc) show that high levels of network integration and interconnectedness lead to less vulnerability, greater robustness and increased resilience to shocks, thus translating to lower levels of risk. This paper tests this proposition specifically on economic networks within the European Union, and empirically examines how efforts in European integration have contributed to the region's vulnerability to risk.

Keywords: networks, economic shocks, regional risk

Observing social processes for multi-crisis management - the case of the elderly in cephalonia island, greece

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When risks realize as actual crises, they offer evidence of causal connections among hazard/stress, exposure and vulnerability, resilience and loss management, risk perception and vulnerability fluctuations. In cases of multiple stressors such evidence is very telling about the actual processes of multi-crisis management undertaken by social and institutional agents.
Nowadays, Southern Europe countries, among them Greece, are cases where extreme natural events occur on top of a background socio-economic crisis connected to public debt crisis and economic recession. This background crisis affects every critical factor for the vulnerability of social and institutional agents which are doomed then to face future shocks from an even more feckless position. The agents experiencing intensification of their vulnerability due to the economic crisis are expected to suffer greater losses in case of a new shock (e.g. from a natural hazard) and confront further increase of their vulnerability after partly recovery due to declined coping capacity.
Above assumptions are tested in the case of the old age population group of Cephalonia island, Greece, which was recently hit by a sequence of seismic events starting from 26 January, 2014. Critical queries are:

- How is pre-existing vulnerability of the elderly affected by a public debt and macro-economic crisis?
- If a natural disaster hits the already exposed to the economic crisis group, will impacts magnify further due to double exposure? How will the coping capacity of the group be affected?
- What is the timing of resilience manifestation (milestones)? What are repercussions on vulnerability, losses and coping capacity? How are risk perceptions of the group intervening and affecting resilience and vulnerability?

The authors carry out a qualitative and quantitative research based on primary data and fieldwork (a questionnaire survey) to illustrate the nexus of interactions among vulnerability, resilience, risk perception, losses, and potential for recovery of the elderly in the island Cephalonia, as these evolve through two overlapping crisis management processes, (a) the socio-economic and (b) the process following the seismic sequence of January 2014.
A significant finding is that planning for the management of single, isolated crisis events does not have a chance in the real world where social and institutional agents are faced with multiple threats and manage them by means of selective risk perception, vulnerability mitigation, resilience timing and coping capacity employment. Monitoring and knowledge of such complex processes is a precondition for effective public policies aiming at multi-risk mitigation.

Keywords: multi-risk, social vulnerability, elderly people, crisis management, resilience, risk perception

Trainings for nothing: Risk awareness campaigns in Turkey

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According to the Hyogo Framework [1], providing information and motivating people to get disaster prevention and resilience culture, with accessible knowledge and information, can yield to lessen disaster losses exceedingly. Moreover, it indicates that community based trainings should be arranged to contribute to local efforts for mitigating and coping with disasters. In this direction, great number of risk awareness and public education trainings have been organizing by different actors at local and national scales in different regions of the world, which are susceptible to natural and human-made disasters. However, conduction of these trainings do not always mean that effective risk reduction conclusion will be achieved. Paton et al. [2] pointed out that traditionally designed public educations aiming increasing awareness and/or risk perception haven't resulted with desired adaptation of household preparation to hazards. Development of risk communication strategies which are community context dependent, is emphasized as critical to link risk perception and risk reduction behavior. Similarly, Tanaka [3] suggested that ignorance of diverse considerations like human, cultural and context should be avoided while planning all dimensions (information, materials, means, approaches) of educations.

In light of these views, public education and risk awareness trainings in Istanbul, most of them started after devastating Marmara Earthquake, is highly worthy to take into consideration. Last 15 years, governmental emergency management agency, various NGOs, few research institutions have implemented disaster educations with high number of trainees. In this study, trainings of Istanbul Provincial Disaster and Emergency Directorate (AFAD), have been investigated. Web based survey has been conducted to reveal how participants get informed and act on this information. Preliminary results demonstrate that similar concerns related to missing contextual characteristics resulted with low success rate of aimed outcomes.

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Keywords: risk education, istanbul, risk perception

Improved European air traffic risk governance investigated with volcanic ash eruption scenarios

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There are about 35 active volcanoes in Iceland and an eruption occurs every 4-5 years on average. The Eyjafjallajökull eruption in 2010 illustrated the threat of volcanic ash for European airspace.
The guidance of the International Civil Aviation Organization regarding ash contaminated airspace was to avoid the airspace completely but the impact of the Eyjafjallajökull incident on the aviation industry and the societies called for a revision. Since then, various regulatory and procedural changes have been made to increase the efficiency of cross-border risk management and to mitigate economic impact due to volcanic eruptions while maintaining aviation safety. The question remains whether these amendments suffice and how well they would function in the face of volcanic eruptions of a historically known magnitude.
This research examines the current state of volcanic ash risk governance in the aviation industry as well as the collaboration between scientific institutions, regulatory bodies and airlines. The study also tests how well the aviation industry is prepared to meet the risk of another volcanic ash cloud reaching the European continent.
The first part of the study builds on literature and policy reviews along with stakeholder interviews of representatives from institutions involved. It analyses the institutional changes and cooperation that have been developed since the Eyjafjallajökull eruption in 2010. In the next step, two scenarios of large volcanic eruptions in Iceland are created to visualize the possible spread of volcanic ash in the European airspace. Data collected from historic eruptions and weather observations serve as inputs to an established volcanic ash distribution model. The output will be mapped with a newly developed visualization tool for the air traffic flow capacity management in order to illustrate the ash distribution and the European airport infrastructure likely to be affected. The maps are the basis for a stakeholder workshop analyzing the aviation sector's response to a large volcanic eruption, using up-to-date air traffic regulations. The results will illustrate the state of preparedness and highlight areas of possible improvements to help increase societal resilience.

Keywords: Risk Management, Volcanic Ash, Aviation, Multi Stakeholder Partnership

Risk perception & Communication theory

Monday: 11:00 – 12:30, D 1.221
Chair: Åsa Boholm
Gothenburg University, Gothenburg, Sweden

Computer-mediated risk perception and communication unplugged: Twenty years of processing

J. Wardman
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The mass proliferation and popular uptake of information and communication technologies has markedly expanded the repertoire of risk communication tools and resources that are now commonly available and employed by policymakers and risk management practitioners. Yet, with few notable exceptions, the emergence and impact of this burgeoning area of research and practice has passed by with surprisingly little critical examination. Building on Baruch Fishhoff's (1995) earlier seminal work characterizing key developmental stages in risk communication learning and practice, this paper offers an assessment of important advances and trends in the evolution of 'computer-mediated risk perception and communication' over the past twenty years. The paper proposes a new series of developmental stages each characterized by focal new media strategies that researchers and practitioners now 'hope will do the trick', and discusses the lessons learned about how far each will go when confronted by risk governance problems in the digital age.

Keywords: Digital media, computer-mediated risk perception and communication, risk management, policy tools

Why risk communication between scientists and lays often fails?: More attention to 'language gaps' needs to be paid

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Drawn from a communication-related experiment and first-hand experiences in the aftermath of the Fukushima nuclear accident, this paper investigates why communication between scientists and laypersons often fails.
It shows the results of risk communication practices on radiation that the author conducted for the evacuees from the disaster affected region in Fukushima between 2001 and 2012, as well as those of a communication-related experiment named "Scientists talk science". The author designed and conducted this event in Tokyo in the late 1990s, in order to see whether the perception about the safety of genetically modified crops could change by the languages which scientists with different backgrounds use.
The author argues that common communication failures were identifiable not in scientific information itself, but in the ways science was conveyed to the lays. Whereas scientists try to explain science by the use of numbers and logics, laypersons understand information by images and emotions.
It suggests that this perception gap needs to be acknowledged, and in order to fill the gap, scientific experts ought to improve/choose the languages that they use when to explain safety information to non-experts.
This can lead to the enhancement of current risk communication exercises whose aim are to make the best use of science and technology and create a safer and healthier society.

Keywords: scientists, lays, communication gaps, logics, images

The howl of the wolf: How communication strategies perform risk discourses

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In this paper we argue it is necessary to think beyond the real/perceived dichotomy that is dominant within many academic and applied risk discourses, in order to better understand the effects and the effectiveness of risk communication. We argue that risk communication is not just about the transmission of the calculated or perceived risks. Instead of representing, it often contributes to the construction of temporally or more durable risk practices in which risk communications become part of larger power and knowledge frameworks that enable and constrain action. We introduce the concepts of performance and performativity as a conceptual lens trough we analyse three cases (wolves, fracking, and nuclear power stations) of risk communication in the Netherlands. The results of an in-depth media analysis indicate that risk is performed in these practices in ways that render risk 'real' in various ways, in various practices. The strategic communication of risk can reinforce and objectify existing or new risk discourses, it can also make them overt, or it can smoothen and/or subjugate them.
We conclude that for an evaluation of strategic risk communication practices the performativity effects should be actively monitored and anticipated upon by parties who are involved in risk communication practices.

Keywords: Risk Communication; Risk Perception; Performativity

Risk perception, experience and gender - An investigation of the accuracy hypothesis with respect to fires.

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Approximately 190,000 fires are reported each year in Germany with about 500 fatalities [1]. Precautionary measures can be mandatory (e.g. like smoke detectors in most federal states in Germany) or non-mandatory such as fire blankets and fire extinguisher. A sometimes found negative relationship of preparedness measures and risk perception has been interpreted as an indication of the so-called *accuracy hypothesis* [2]. It is assumed that risk perception correctly displays the actual risk at this point of time and people with preventive measures therefore have lower risks whereas people without these measures correctly state higher risks [2]. The Social Amplification of Risk Framework [SARF; 3] emphasizes the effects of direct experience with a hazard which can heighten risk perception for this event. Recent research demonstrated that the effects of experience on risk perception might differ for men and women [4].
The present study investigated the impact of experience and gender on the validity of the accuracy hypothesis with respect to fires. A representative sample of 2175 participants from Germany completed a computer-assisted telephone survey including preparedness measures, risk perception as well as experience with fires. The results suggest that the accuracy hypothesis was true for people with prior fire experience at their home but not for people without this experience. Furthermore, looking at men and women separately the results revealed that the hypothesis was only true for men but not for women. Additionally, the effects of prior experience on risk perception also depended on the current status of preparedness. If preparedness measures were taken, no association between experience and risk perception could be found, whereas a positive association of experience and risk perception was confirmed for people without these preparedness measures.
The results give an insight on the interaction of emergency experience, preparedness, gender and risk perception. They underline the importance of assessing experience with an event when investigating the relationship of preparedness and risk perception. On a different matter, they also reveal the importance of preparedness measures when investigating the impact of experience on risk perception. The results might offer an explanation for previous results that failed to find an association between experience with an event and risk perception.

Keywords: Risk perception, Experience, Preparedness, gender, fire, accuracy hypothesis

Symposium: Risk governance from theory to practice II

Monday: 13:30 – 15:00, D 2.215
Chairs: Jeroen Devilee (RIVM, Bilthoven, The Netherlands), Marijke Hermans (Maastricht University, Maastricht, The Netherlands)

Safe Innovations Approach: more than Safe-by-Design

J.A.M. Sips, C.W. Noorlander, A.G. Oomen, M. Groenewold, M. Zijverden van National Institute for Public Health & the Environment (RIVM), Bilthoven, The Netherlands

Innovation is regarded important to boost economic growth and sustainable development; it is seen as the most important driver of societal prosperity. Emerging technologies such as nanotechnology, synthetic biology, and 3D-printing receive huge public and private funding to stimulate their development into commercial utilization. However, when innovative products near the stadium of commercialization both industry and regulators face discussions about human and environmental safety. Often these discussions deal with uncertainty about safety or unsafety of new technologies and their products. Regulatory questions first pop-up in a field of established interests and are by some regarded as a threat to full blossoming of the investments done before.
In 2013 the European Risk Forum [1], representing the most important European industries investing in innovation, expressed their concern that the necessary balance of precaution and proportion is increasingly being replaced by a simple reliance on the precautionary principle and the avoidance of technological risk. They formulated The Innovation Principle based on a set of 7 recommendations aiming at dealing sensibly with higher risks which they consider to be inherent to innovations. Especially in the policy arena, the concept of Safe-by-Design has gained interest over the last years in order to address the issues described above. The concept is in line with regulatory requirements (such as REACH), making industry responsible for assessing and managing the risks posed by chemicals and providing appropriate safety information to their users. However, industry requests more clarity from regulators on data requirements to demonstrate (un)safety of new safety aspects that might come along with innovative technologies. In 2003, Owen et al [2] already referred to a time delay between innovations, resulting products and, as a consequence, regulatory amendments and policy developments.
Based on the observations described above, RIVM developed the Safe Innovations Approach aiming to address safety needs for innovations and there products as timely and efficiently as possible. This approach combines Safe-by-Design concepts during various phases of the innovation chain, with activities to be undertaken to come to regulatory preparedness based on innovation models generally applied by innovators. A more in depth description of the Safe Innovations Approach will be presented for safety of nanomaterials.

[1] European Risk Forum - Policy Note 12 The Innovation Principle, October 2013 (January 19, 2015: *http://www.riskforum.eu/innovation-principle.html*)
[2] Owen, R., Baxter, D., Maynard, T., and Depledge, M. (2009). Beyond regulation: risk pricing and responsible innovation. Environ. Sci. Technol. 43, 6902-6906.

Keywords: Safe-by-Design, Regulatory, Adaptive governance, Nanotechnology, emerging technologies, innovation
Symposium title: Risk Governance from Theory to Practice

Rationality, Emotions and Morality: towards a more balanced risk approach.

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TuDelft, Delft, The Netherlands

Nanotechnology, biotechnology, ICT, and nuclear energy can improve human well-being, they may also convey risks due to, for example, accidents and pollution. As a consequence of such side effects, technologies can trigger emotions, including fear and indignation, which often leads to conflicts between experts and laypeople. Emotions are generally seen to be a disturbing factor in debates about risky technologies as they are taken to be irrational and immune to factual information. Psychological literature on risk perception and dual process theory seems to support this idea. I will present an alternative account according to which this is based on a too narrow understanding of emotions. Emotions can be a source of practical rationality and moral insight. Emotions such as fear, sympathy, and compassion help to grasp morally salient features of risky technologies, such as fairness, justice, equity, and autonomy that get overlooked in conventional, technocratic approaches to risk. Emotions should be taken seriously in debates about risky technologies. This enables a more balanced debate in which all parties are taken seriously, which increases the chances to be willing to listen to each other and give and take. This is needed in order to come to well-grounded policies on how to deal with risky technologies in a responsible way.

Keywords: risk governance, emotions
Symposium title: Risk governance from theory to practice

Working from basic safety levels towards long term ambitions.

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The Netherlands

Safety and risk-strategy always start with unambiguous targets. These targets result from historic developments, political decision making., pragmatical considerations as well as scientific explanations on facts and data. Comparing between the different policy strategies, targets tend to differ, from ‘every year some improvement’ to ‘zero (fatal) casualties’. Often these target-values were determined in the past, and translated into operational objectives, standards and guidelines, and even occasionally laid down in legislation. As a consequence, differences occur in e.g. investments to risk reduction ((fatal) casualties, environmental damage). While there is a certain acceptance for hundreds of deaths from traffic accidents, in other segments no investment seems to be too high to reduce (the number of) any accidents (rail-safety).
Better alignment in risk-policy areas, and, as a consequence, perhaps even improvement of the quality of different risk-strategies, could be obtained by establishing a basic risk (protection) standard (level) for all risk and safety issues. Efforts should be directed towards achieving that objective in the first place. An indicative level of ambition could be set, to serve as a clear objective in the long run. It would also be possible to simply agree on the fact that current technological and available capabilities do not suffice to achieve the required (standard) level of safety.

Keywords: Risk governance, safety, ambitions
Symposium title: Risk governance from theory to practice

Evidence based (risk) policy and public controversies

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The Netherlands

Policymakers are increasingly turning to science to substantiate their policy measures. There is much to be said for this evidence-based policy. Policymakers assume that their policy decisions will be more persuasive if they can give scientific arguments to support those decisions. But the practice of invoking science is not always trouble-free. Recently, public controversies have raised, amongst others, about drilling for shale gas, the assessment reports issued by the Intergovernmental Panel on Climate Change (IPCC), and vaccinations against cervical cancer. Based on an analysis of six recent controversies, the following questions will be discussed: How should the public unrest be understood?; What role does scientific evidence play in allaying controversy?; How to deal with the scientific uncertainties that are inherent in health or environmental risk estimations? What (broader) concerns or interests are at stake? What lessons can be learned from the way that scientists and policymakers deal with public controversies?

Keywords: Risk governance, risk policy
Symposium title: Risk governance from theory to practice

Experiments in risk decision making

Monday: 13:30 – 15:00, D 1.227
Chair: Marijn Poortvliet (Wageningen University, Wageningen, The Netherlands)

Risk behaviour and instantaneous priming: A new version of the Balloon Analogue Risk Task

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Risk behaviour research in laboratory conditions tends to be limited to measurement of stable traits (i.e. general risk propensity). This study presents a novel method that measures risk behaviour changes when participants are primed to various risk-related concepts. Specifically changes in risk decision making in the context of cyber-security were measured. The developed method extends the increasingly popular Balloon Analogue Risk Task (BART). The BART is a computer based gambling game which involves participants pumping a graphic balloon on screen which bursts at random intervals. If the balloon bursts the participant gains no points but the more they pump the balloon (without it bursting) the more points they accrue. If they "bank"their points before the balloon bursts these points are collected. The BART has been shown to correlate with sensation seeking, impulsivity, and several real world risk behaviours, such as drug use and gambling. The developed variant in this study includes a priming component similar to that used in the Affective Priming Task. Cyber-security terms, such as Identity Theft or Hacking, were briefly flashed on screen prior to each balloon. The average amount of balloon pumps administered after each term was then compared to a baseline condition where no term was shown. As such, an "instantaneous priming"version of the BART was developed. We expected that participants would associate the terms with different levels of high or low risk and their behaviour (i.e. amount of balloon pumps) would then alter in comparison to the baseline.
Our results found no significant difference for some terms but there was a difference for the term, Identity Theft. Participants had rated Identity Theft as particularly high risk (based on additional survey and interview data), and subsequently pumped the balloon more, therefore taking greater risks. This suggests that when people perceive high risk, priming them with high risk terms leads to higher risk-taking behaviour. This could have implications for various risk communication techniques, such as warning signs and safety instructions. Future research would benefit from including this behavioural measure along with perceptual measures.

Keywords: Risk behaviour, Priming, Cyber-security, BART, Risk perception.

Closing the Gap between Experimental and Field Studies: Experienced-based Health Risk Feedback and Lack of Reassurance

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Background: Changing risk perception is a central topic in health interventions. Accordingly, health risk screenings providing personalized risk information are gaining prominence. High-risk health feedback is typically received more critically than positive feedback. Yet, empirical evidence from experimental and field studies on how people react to low-risk health feedback differ. While experimental studies indicate acceptance of assigned low-risk health feedback, field studies providing actual risk information show mixed responses. This discrepancy in responses towards low-risk feedback provided in experimental and field studies may result from different processing modes triggered in field compared to experimental studies. To close the gap between experimental and field studies in research on health risk feedback reception, the present experiment, therefore, realizes a new experienced-based study paradigm.
Methods: The new experienced-based paradigm utilizes the highly intuitive relationship between stress and heart rate. Accordingly, participants' heart rate variability (HRV) was measured by an electrocardiogram and the health feedback for a fictitious stress-related disease was ostensibly based on that measure. Thus, participants (N = 96) 'experienced' their risk indicator in real-time (HRV). After pre-feedback expectancies were assessed, participants received randomly assigned, evaluative low- or high-risk feedback about their risk status. Accordingly, the new experimental paradigm induced high vividness and self-relevance of the risk indicator and given feedback.
Findings: Participants' reactions to the personalized feedback differed as a function of feedback valence but also pre-feedback expectancy. Unexpected low-risk feedback was associated with less acceptance (F(1, 91) = 9.19, p = .003, ηp^2 = .092) and higher perceived personal consequences (F(1, 91) = 5.24, p = .024, ηp^2 = .054) compared to expected low-risk feedback, indicating a lack of reassurance as reported by field studies.
Discussion: Implementing experimental designs with greater experiential value can mitigate the gap between experimental and field studies on health risk feedback reception. Using experienced-based risk factor tests for fictitious, yet familiar diseases (e.g., stress-related diseases) enables to complement high self-relevance and ecological validity commonly obtained in field studies by experimental control and internal validity of experiments. Moreover, from a theoretical perspective this study provides evidence for the impact of further variables in addition to feedback valence on health risk feedback reception. As the lack of reassurance phenomenon indicates, external information (feedback) is not interpreted independently of pre-existing expectancies.

Keywords: risk perception, risk communication, risk feedback, experienced-based feedback, lack of reassurance

Emergency mapping roles in disaster risk management in case of Typhoon Haiyan, Philippines

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On 8 November 2013, the super typhoon Haiyan (Yolanda) struck Eastern Visayas Region, the Philippines with wind speed of 315 km/h. Due to this devastating disaster, United Nations (U.N.) agencies reported after two and a half months from the typhoon that 14.1 million people had been affected, with more than 4.1 million displaced. Estimates of the number killed had risen to 6,201 with more than 1,785 missing. Map is one of the most effective materials for rescue activities and field survey in emergency situation. People in affected area in Leyte province, washed out with strong wind and storm surge, like Tsunami. The large amount of debris has been scattered all over the places and has blocked ways. Residents are surviving with relief goods and are returning to the original place, where they lived, and rebuilding their own house using materials from the debris. A problem with GIS based maps of Tacloban city obtained from Internet, however, is that some of them are not accurate. For example, road map is roughly drew, not classified by road levels, local streets are missing and DEM is 90 m, so this is ineffective for hydrology analysis. For an early-stage risk management, emergency mapping can be subscribed as understanding the situation and estimating the damage level.

Development of geospatial data using high-resolution satellite imagery including tabulate database can contribute to risk management decision making and suggestions on course of action. These databases can be periodically updated. To show, to the community, more accurate results of the analysis and of the risks associated them is one of the objectives in this study.

Keywords: Emergency mapping role, disaster risk management, typhoon Haiyan, Leyte-the Philippines

Cybersecurity risk to critical utilities: the reflexive assessment of technical and social adaptation

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Most of a modern society's critical utilities are operated by industrial control systems that increasingly are connected to public telecommunication networks, adopting standardised telecommunication protocols. The inherent vulnerability of such systems has been demonstrated by attacks such as Stuxnet, and Flame (Miller & Rowe, 2012), and by the recent attack against a German steel mill (Pauli, 2014). What such incidents have also demonstrated is that 1) vulnerability is created jointly by technical and social processes; 2) vulnerability is a function also of the way in which systems have adapted to the measures taken to mitigate vulnerabilities; 3) vulnerability is furthermore produced by the limitations of the vulnerability analysis itself.

In this study our aim was to develop and test a method of analysing cybersecurity risk to industrial control systems that addressed these characteristics. The method has two starting points in the literature: McQueen et al's (2006) compromise graph analysis which represents the path that cyber-attacks take to reach a target state; and the six-level representation of industrial control systems (Green et al., 2014) which shows how several levels of control and communication processes connect physical sensors and actuators, rendering their functionality accessible to attackers. We develop a process with seven basic steps: 1) the construction of a compromise graph with superimposed levels and categories of edge - such as those of McQueen et al (2006) to aid estimation of time-to-compromise; 2) the addition of protective objects to the edges, both technical and social; 3) the quantification of compromise times for each edge; 4) the identification of actual or potential adaptations to the protective objects; 5) the modification of protective objects following this adaptation; 6) if the risk in the system is above some acceptance threshold then there is a return to step 4, otherwise 7) the identification of risk arising from limitations, selections and biases in the model. We argue that a suitable proxy for acceptable risk is the acceptable shortest-path time-to-compromise for a given level of attacker capability.

We apply this to the case of a specific, small European utility and discuss our observations. We argue that risk assessment methods explicitly accounting for adaptation, and providing reflexivity, are uncommon - and that such properties are needed for all analyses of security risk.

Keywords: Security, SCADA, Industrial Control System, ICS, Critical National Infrastructure

Risk perception: Climate change

Monday: 13:30 – 15:00, D 2.225
Chair: Frederic Bouder (Maastricht University, Maastricht, the Netherlands)

The experience of flooding and its impact on climate change risk perceptions

C.C. Demski[1], S.B. Capstick[1], R. Sposato[1], A. Spence[2], N.F. Pidgeon[1]

[1]Cardiff University, Cardiff, United Kingdom
[2]The University of Nottingham, Nottingham, United Kingdom

It has often been argued that climate change is temporally, geographically and socially distant from people's everyday lives, so leading to a lack of engagement. By contrast, direct personal experience of climate-related impacts is one of the few ways in which climate change can become more proximal and salient for people. For example, weather events might act as a strong 'signal' or 'focusing event' (Renn, 2011) whereby future climatic events are made more imaginable. This is particularly relevant because climate change is predicted to lead to more frequent and severe extreme weather events around the world, including increased incidence of floods across the UK. However, thus far, the existing research examining the role of experience influencing individual risk perceptions has found mixed evidence of its effects.
The current research considers the role of extreme weather as a critical influence on climate change risk perceptions, through a focus on people's responses to the series of widespread flood events that affected the UK in early 2014 (Met Office, 2014). These events attracted sustained political and media attention nationally, including contentious reporting on attribution of the flooding to climate change.
Data collection took place as close to the flooding event as possible to obtain a nationally representative sample (N=1002) as well as sub-samples in five flood-affected areas (N=200 each). The questionnaire was designed to enable detailed comparisons to be made between the perceptions of those affected by the flooding as compared to those who did not directly experience it. We utilised a carefully constructed questionnaire to enable a distinction to be made between the causal effect that extreme weather events have on beliefs, as opposed to prior beliefs about climate change influencing the interpretation of 'experience' of extreme weather. This was achieved by including questions measuring material impacts (e.g. property damage) of the flooding, in addition to self-reported perceptions of experience. Climate change risk perceptions were also elicited prior to any questioning about people's experience of flooding to avoid making this association salient.
The findings will be discussed in terms of contributing to effective and appropriate climate change communication, and ways of informing policy that seeks to promote public engagement and resilience in response to extreme weather events.

Keywords: Public perception, climate change, flooding, extreme weather

Public understanding of ocean acidification and implications for risk communication

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Ocean acidification (OA) is an environmental risk of increasing interest to climate and ocean scientists. However, very little research has examined how this risk is recognised by and understood by members of the public. Findings are presented here from two nationally representative online surveys conducted in autumn 2013 (n=1,001) and spring of 2014 (n=1,500) to gauge people's general awareness and knowledge of the causes and consequences of OA, perceptions of risks about OA, and views about its personal and policy relevance. The research had also been designed to assess possible impacts on perceptions of publication of the IPCC Working Group reports. Core findings show that public awareness remains very low, although some limited associations with climate change do exist. Images associated with OA are predominately negative. An additional survey manipulation in the second wave involved framing OA in concert with or separate from climate change. The results are discussed in the context of developing effective risk communications.

Keywords: ocean acidification, climate change, risk perception

Flood experience in Germany - the impact on risk perception, concern, and social media usefulness.

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Specific field of interest:According to the International Disaster Database [EM-DAT; 1] at least 443,108 people have been affected by the floods in Germany within the last 20 years. The increasing use of social media and especially social networks [e.g. 2] has entailed possibilities for the public not only to get engaged during these events, but also to link volunteers and organise help actions [3]. For example, during the 2013 floods in Germany, about 625,000 people were either actively or passively involved via 157 Facebook pages and groups [4]. In order to reduce the harmful effects and increase preparedness in the vulnerable population, the investigation of risk perception for floods has received much attention [e.g. reviews 5,6], revealing a positive association of flood experience and risk perception for future floods [7,8]. Contrary results [9] might be due to differences in operationalization of risk perception, the time since the event or changes of location after the event. Issues addressed:The aims of the study were: (1) to investigate the association of social media use during floods and usefulness ratings for future events and (2) to investigate the impact of prior flood experience, time since the event and location changes after the event on two dimensions of risk perception (a) perceived likelihood and (b) perceived concern.Methodology:The study is part of the multi-national project iSAR+ (Online and Mobile Communications for Crisis Response and Search and Rescue) which is funded by the European Commission within the Seventh Framework Programme (FP7). An online survey was developed and distributed via the online panel www.soscisurvey.de. A total of 1090 participants from all 16 federal states took part in the study. The mean age was 45 years with a range between 18 and 84 years.Results achieved or expectedAbout 50% of the sample had previously experienced a flood at least once. (1) The use of social media during the flood to either receive or send information was associated with higher social media usefulness ratings. Furthermore, a positive relationship of (multiple) experience(s) and still living in the area with the (a) perceived likelihood as well as (b) concern was found. Results further indicate an association between social media use during a flood and risk perception.The use of social media is increasing and therefore important to consider for risk and crisis communication. The results combine established risk communication factors with social media use during crisis situations.

Keywords: social media, flood, risk perception, experience

Risk Perception after the Great Flood in Samsun

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Risk perception studies on natural phenomena are new fields of research in Turkey, which have been increased by number after the 1999 earthquakes. Even though earthquakes are considered as major threats, floods are common hazards causing loss in life and properties. However, multi-hazard approach, that would cover both all hazards and their interaction, has not been set yet at the level of national and regional strategic plans. The lack of concern on natural hazards except earthquakes, amplifies the risks in the northern part of the country which is called as the Black Sea Region. In the Black Sea Region, while the eastern part suffers from floods, inundation at the costal line and landslides mostly triggered by heavy precipitation; the western part faces to both hydrogeological hazards and earthquakes. In the last decade, 15 flood disasters occurred in this region. The recent large scale flood occurred in Samsun (the most populated province at the Black Sea Region) in 2012 showed that flood prevention and mitigation measures are still missing, even in the well-planned parts of the city. After the flood disaster, a comprehensive survey was conducted in Samsun to evaluate flood risk perception and mitigation efforts of inhabitants. In the fall 2014, 270 face-to-face interviews were accomplished in both flood-prone and non-flood-prone areas. Cross-tabulation technique is used to evaluate the influence of socio-economic and demographic characteristics of individuals on the willingness to participate mitigation activities to reduce flood risk. The results underline that personal characteristics make difference in risk perception. However, this state cannot be transferred to mitigation activities or participation. In the case of Samsun, the greatest motive in taking action is to have flood disaster experience in the near past and to be exposed to future flood threats.

Keywords: risk perception, flood, Turkey

Risk Communication I

Monday: 13:30 – 15:00, D 1.221
Chair: Jamie Wardman (The University of Hong Kong, Hong kong, Hongkong)

Comparing assigned roles of households in the Nordic risk management plans

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The aim of this contribution is to identify the expectations and responsibility of citizens in national risk plans in Norway, Sweden and Iceland.

This contribution is part of the Nordic HomeRisk-project addressing the role of citizen-consumers in modern risk perception and risk assessment. As the household is the crucial setting in everyday life the project focuses on household vulnerability in situations where infrastructures breakdown, with prolonged fallouts of public services as a result. More specifically, the project concentrates on energy service systems and Information and Communication Technology (ICT).

A striking fact about 'late modernity' is society's fundamental dependence on ICT and electricity. A substantial part of Nordic households lack a back-up system for heating, and they depend on electrically powered freezers and refrigerators for food storage, as well as mobile phones, (DAB) radios and other communicative devices which require steady supply of electric power. Moreover, buying necessities quickly becomes impossible in stores without electricity and ICT. Thus, advanced technologically dependent systems and complicated institutional layouts increase the vulnerability of citizen-consumers in important ways.

Within this framework we ask how individuals/households can prepare themselves for breakdowns in such fundamental societal services. More specifically this contribution will be concerned with the question: What expected roles and responsibilities do citizens have in national risk plans? How are households understood and perceived in these documents? Households are of course affected when electricity and ICT-infrastructures collapse. However, they can represent resources and capabilities in these situations as well. We will highlight to what extent this duality reflected in the national risk plans. This will have implications for risk governance.

The wider aim is to discuss how to strengthen the role of citizens in future policy making on national risk management, and draw attention to the potential discrepancy between citizen and governmental expectations and risk perceptions.

The applied methodologies are document content analysis of available risk plans, as well as interviews with key personnel in national institutions. This will be conducted in all three countries, focusing on the anticipated role of households and citizens.
Insufficient attention has been paid to how ordinary people deal with emergency situations, how prepared households are if such crisis should occur, and the importance of individuals in risk management. The roles and responsibilities of households in national risk plans /security strategies should be highlighted, in order to get a better perspective of the societal security of citizens.

Keywords: Risk governance, Risk communication and participation, electricity and ICT infrastructure collapse

Risk communication in current affair interviews - scientific contexts in experts' media talk

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While the news media plays a major part in the social amplification of risk "the precise ways in which the media and other social agents actually amplify risks in public debates are unclear"(Raupp, 2014:565). Risk communication research usually faults Journalists for misrepresenting and amplifying risks and dangers in cases of limited or contrasting scientific evidence (Driedger & Eyles, 2003, Claassen et al., 2012, Raupp, 2014). And yet scientists (Hilgartner, 1990, Weingart, 1998, Albaek, 2011) were identified partners in the framing of science news and the picture that audiences receive. Current scholarship employs primarily retrospective analysis, either through the examination of published contents or by interviews with its producers and sources. In contrast this paper explores news interviews with health experts, as way to directly observe the highly contested science-media terrain. Adopting a conversational approach to narrative analysis (Georgakopoulou, 2007) this study identifies the storylines that journalists and experts occasion in backing claims and counter-claims. Conversational stories were noted as occasioned for a multiplicity of argumentative functions, including the accounting for particular actions and decisions, endorsing factual claims or moral standpoints, impose orderliness on otherwise contingent experiences (Ochs & Capps 2001, Georgakopoulou, 2007). By applying narrative analysis to expert interviews this study identifies the incorporation of research and clinical contexts as resource for authoritative claims regarding the health risks. Rather than committing to a definite stance regarding the implications of their study or becoming tangled in notions of scientific uncertainty, referencing the research in a narrative form supports a contextual yet confident presentation of the health advice provided.

The observations of this study will be discussed with an eye for their potential at informing media trainings of medical experts. Responding to the mismatch between what scientists want to cover in the media and what media people regard as newsworthy, research institutions train their workers to prepare in advance of an interview the main points that they want to deliver or an engaging story that journalists may favour. And yet media interests cannot always be predicted and news talk is to a large extent unscripted and unpredictable (Clayman and Heritage, 2002). The detailed and step-wise examination of broadcasted interviews offer participants an opportunity to examine how they can impact and what to expect from media interactions as they unfold.

Keywords: news interviews, narrative analysis, science-media gap

Relationships among risk perception and media coverage on climate change and energy choice

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Climate change issues are closely related to the energy choice plan in one country. In this paper, we use the results of focus group interview (FGI) and media coverage to investigate people's risk perception of climate change and energy choices. Our FGI was done in October 2012, just after then Japanese government completed nationwide DP (Deliberative poll) on Japanese energy choice in that summer. Our FGI consists of four groups, classified by gender, living area, working status and age groups.
In our FGI, we used some texts and newspaper articles for participants to understand above issues. The results of our FGI show that 1) Almost of all groups of participants are aware of unusual weather events, such as stronger rain, stronger and frequent Typhoons, extreme hot weather. But they connected those extreme weather events with climate change, but not carbon dioxide, especially female participants. 2) Most of the participants, especially female, did not accept nuclear power generation as "clean"energy. But some male did. The points were (un)employments, and economy. 3) Participants were not more likely to change their lifestyles, were more likely to prefer renewable energy to nuclear. But there were almost further discussions in detail.
As it seemed that participants' knowledge depended on reading newspaper regularly or not, we further investigated media coverage (newspaper) on climate change, energy choice and nuclear power generation from 2011 to 2014. We used newspaper databases for nationwide circulated three newspapers, such as Asahi, Yomiuri and Mainichi. We used the word "Climate change OR Global warming"(CC), "Basic Energy Plan"(BEP), and "Nuclear Power Generation (NPG)."In three newspapers total, CC appeared 15.5% of BEP articles in 2011, 11.2% in 2012, 7.1% in 2013, and 12.0% in 2014. BEP appeared 1.77% of CC articles in 2011, 1.10% in 2012, 1.11% in 2013, and 2.82% in 2014. NPG appeared 26.9% in CC articles in 2011, 21.49% in 2012, 13.66% in 2013, and 15.06% in 2014. Those numbers told us that most of all newspaper articles did not refer to climate change issues when reporting about the Basic Energy Plan, which is still in a process of revision after the 2011 disaster, or vice versa. In those media cicumstances, people discuss hardly about energy issues with climate change issues, or even people have no clue about the issue connectedness, as mass media is the key information source for people to know those issues.

Keywords: media coverage, risk perception, climate change, energy choice

Rethinking Trust and Communication in Public Deliberation of Risk and Uncertainties

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Understanding public health risk and uncertainties requires technical analysis and social evaluation of the risk, thus the need for interaction and communication between technical experts and non-experts. This paper suggests a new conceptualisation of trust and communication. It proposes a coupled relationship of trust and communication amongst stakeholders in a public deliberation of risk and uncertainty to minimize risk amplification. Literature suggests that social amplification of risk has social, political and economic implication and could cost governments millions of pounds. A coupled relationship of trust and communication reinforces stakeholders roles (experts and non-experts) and allows mutual learning and understanding leading to improved coordination and decision making in the face of high uncertainties. However, this relationship raises a number of interesting questions: trust and communication of what, in whom and why? The paper sets out a theoretical framework for understanding the nature of trust and communication in public deliberation and construction of risk amongst interest groups using the electronic cigarette debate in United Kingdom (UK) as an illustrative case study. In a coupled system of communication, the public questions and concerns should be communicated to the technical expert so risk analysis processes reflect social concerns. On the other hand, the technical experts should communicate scientific understanding of the risk stating clearly areas of uncertainties. It also involves the technical expert's willingness to acknowledge critical views about the operation of current scientific institutions and not becoming defensive in the face of criticism. This means seeing things from a different perspective rather than trying to fit other views into already established ways of scientific thinking. In a coupled system of trust, trust in the credibility and honesty of technical expertise is essential in accepting scientific underpinning of risk; although experts often disagree, the spaces of disagreement will allow some degree of social judgement over technical analysis bringing in new perspectives (from the non-experts) that may fosters risk acceptability. This way, disagreement within the scientific community is viewed as a resource rather than a challenge in public deliberation of risk and uncertainties. This allows the public to be treated as a valued partner in the construction of risk (rather than a spectator merely viewing how technical experts carry out risk analysis). It also involves trusting the public to respond rationally to areas of scientific disagreements and uncertainties. The paper finds that a coupled relationship of trust and communication amongst stakeholder allows minimal risk amplification.

Keywords: Deliberation, Participation, Trust and Communication

Medical risk

Monday: 13:30 – 15:00, D 1.225
Chair: Dominic Way (King's College London, London, United Kingdom)

Risk communication challenges concerning contested medical procedures: Canadian perspectives of the CCSVI and liberation therapy debate for people with multiple sclerosis

S.M. Driedger[1], G.M. Annable[1], R.A. Marrie[1], M.C. Brouwers[2]

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Background: The chronic cerebrospinal venous insufficiency (CCSVI) hypothesis was controversial in Canada. Some very early Canadian media presentations of Italian researcher Zamboni's hypothesis about CCSVI, and the proposed endovascular treatment to correct this problem, gave patients hope but warned them to expect their physicians to prevent them from accessing this life-changing therapy. It also represented one of the first major moments where scientists and clinicians globally were receiving the news of this new hypothesis at the same time as the public.
Objectives: We aimed to examine the communications challenges contributing to the controversy surrounding the CCSVI hypothesis in Canada.
Methods: Qualitative focus groups (n=7) that included 59 patients with multiple sclerosis (MS), and convergent interviews (n=12) with MS clinicians (e.g. neurologists, occupational therapists, physiatrist) and community stakeholders (provincial MS organizations, CCSVI stakeholder groups) were conducted.
Results: Patients had a substantial distrust of the policy process and the necessary scientific protocols required to establish if endovascular treatment ('Liberation Therapy') is safe and effective. There was a sense that neurologists were uninterested in Liberation Therapy for fear of "being put out of business". Others were simply frustrated that promised randomized control trials were being delayed despite government announcements. By contrast, MS clinicians and community stakeholder groups understood patient concerns but recognized with hindsight that insufficient empathy to patient perspectives had been expressed for an open dialogue to occur.
Conclusions: A cultural shift in science and the academy is needed. More concerted effort is needed for scientists to engage the public in their research through the development of plain language descriptions of their work and these types of communications need to be valued as much as peer-reviewed communications of science. While the trials are still underway in Canada, some positive aspects have already emerged. MS patients have had a say in how research priorities are directed. Clinicians have identified further need to engage patients in collaborative dialogues for healthy debates, and the need to create respectful spaces for patients who may disagree with medical advice provided. Researchers have recognized the need to explain their science and to engage the public more.

Keywords: risk communication, uncertainty, multiple sclerosis, qualitative research, health policy

To cure or not to cure; The regulation of medical risks in the Netherlands

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Although dealing with similar problems, EU member-states have adopted various approaches of regulating the risks surrounding the performance of complex medical procedures by healthcare professionals. Some, have totally banned unauthorized practice of medicine (e.g. France), while others have opted for a liberal approach (e.g. U.K.). The Netherlands however, seems to have placed itself in the middle by adopting a mixed system in which only fourteen medical procedures are off-limits for non-traditional healthcare professionals [1]. These procedures are referred to as 'reserved procedures' since they may only be performed by certified professionals (e.g. physicians) or, in certain situations, by professionals (e.g. nurses) whom have received direct orders to perform that procedure by a certified professional [2]. A critical element of the regime is deciding whether a professional is "authorized"and "proficient"enough to independently perform the procedures safely [3]. Although this features prominently within Dutch healthcare legislation, it has received little academic attention. In order to increase our understanding of the risk trade-offs behind this system, we aim to 1) identify the overall intentions of Dutch legislation governing these reserved procedures and subsequently 2) test whether this meets everyday practice. Finally, 3) we strive to relate our findings to existing knowledge of other European healthcare systems. Much has changed, both within Dutch and other European healthcare systems, since the classification of European healthcare systems by de Bie [1]. Through conducting expert-interviews, analysing policy-documents and assessing decisions by the Medical Disciplinary Boards in such matters we intend to explore whether a re-evaluation of this classification is needed. As medical procedures are becoming more complex, it is expected that such risk trade-offs will become increasingly important in the future.

[1] de Bie, J. (2006). Reserved Procedures in Dutch health care: practice, policies and perspectives of physicians, nurses and management. Dissertation; Vrije Universiteit Amsterdam.
[2] de Bruijn-Geraets, D., van Eijk-Hustings, Y. and Vrijhoef, B. (2014). Evaluating newly acquired authority of nurse practitioners and physician assistants for reserved procedures in the Netherlands: a study protocol. Journal of Advanced Nursing. Vol: 70, Iss: 11, pp. 2673 - 2682.
[3] van Meersbergen, D. (2011). Task Shifting in the Netherlands. *World Medical Journal*. Vol: 57, Nr. 4, pp. 126 - 130.

Keywords: reserved procedures, healthcare risks, risk regime, science-informed risk decisions, risk trade-offs

Balancing uncertainty and unmet need in pharmaceutical early-access programs

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Drug regulatory agencies around the world need to strike a balance between timely access to medicines and a demand for comprehensive data on the benefits and risks of these medicines. Since the introduction of early-access programs, such as Conditional Marketing Authorization (CMA) in Europe and Accelerated Approval (AA) in the United States, these agencies can strike this balance differently by tolerating more risks and uncertainties when addressing 'unmet medical needs'. This study aimed to examine how pharmaceutical companies and authorities negotiate about this balance during marketing authorization procedures for innovative oncology medicines that were granted early-access by the European Medicines Agency.

We conducted a mixed quantitative-qualitative study focusing on all oncology medicines that were approved through the conditional marketing authorization procedure in Europe in the period 2006-2013. We collected data on (i) uncertainties in the evidence on the safety and efficacy of medicines and (ii) regulatory procedures resulting in marketing authorization. Furthermore, we conducted interviews with industry officials, regulators and policy-makers that were involved in (i) the design of the CMA scheme or (ii) the assessment procedures leading to the authorization of these medicines. The interviews covered relevant stakeholders from 10 out of 11 conditionally authorized oncology medicines.

Preliminary results show that regulators, industry officials and policymakers need to learn how to apply the specific evaluation criteria that are used for granting CMA. In standard marketing authorization procedures, risks are assessed vis-à-vis drug benefit. In CMA, they are also assessed in relation to the degree of unmet medical need and whether it is likely that uncertainties about risks can be reduced through the conduct of studies after marketing authorization. We observed a strong association between the level of uncertainty about drug benefits and risks and the scope and length of the regulatory procedures resulting in marketing authorization. Furthermore, in a number of cases the evaluation criterion 'unmet medical need' was actively constructed by regulators and companies *during* the marketing authorization procedure as a means to legitimize early-access based on lower evidentiary standards. The latter process coincides with the emergence of personalized treatments, facilitating fragmentation of therapeutic indications through the construction of indications based on biological or genetic-markers.

Theoretically, we build on and contribute to literature on 1) institutional logics, and 2) social construction of knowledge and expertise in the field of regulatory science.

Keywords: risk-benefit; regulatory decisions; early-access; pharmaceutical innovation

Using Human Factors Engineering Report Information to Expedite Adoption of Individual Use Medical Devices and Reduce the Perception of Risk by Focusing on Control

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This study examines how Human Factor Engineering (HFE) report content for medical devices is used in packaging the devices to consumers. Medical device regulations require manufacturers to test and report on the user interface with the device by answering10 questions. These questions address the relative advantage, compatibility, complexity and observability components of the Diffusion of Innovations (Rogers, 2003). This information often focuses on the risk perception of control in an effort to inform consumers about the device.
The packaging of two types of individual-use medical devices, pregnancy tests and glucose monitors, was examined to determine which Diffusion of Innovations components were targeted as well as the risk perception of control. The pregnancy test packages were designed so that they could be displayed either vertically or horizontally and basically had two package fronts identical in content. All packages contained a picture on the front showing the device with results. The text on the package front focused on relative advantage in two ways. First, the accuracy of tests was prominently displayed, but always with an asterisk. The asterisk led to a chart reporting the rates of accuracy of the test based on how close one took the test prior normally getting their period. Second, the picture indicates the ease of use of the device and ease of interpreting the results highlighting the control the consumer has in obtaining accurate information. The pictures also addressed the complexity and observability components of adoption.
The glucose monitoring systems also contained pictures on the front of the packaging showing the device with results and focused on ease of use, small sample size needed for accurate results, and supported the perception of control over one's test results by being able to detect glucose patterns which addressed relative advantage and complexity of use. Additional information and pictures on the side panels or back of the packages addressed compatibility with certain testing strip brands. The ease of use claim for the devices was similar across all brands. The differences in the packaging focused more on the test results, ease of understanding and providing a tool to gain control of one's glucose levels.
By using content from the HFE reports, manufacturers are able to document how the device should be used and highlight information consumers want and need to know before adopting one brand over another brand.

Keywords: Human Factor Engineering, medical devices and adoption, risk perception

Risk participation

Monday: 13:30 – 15:00, D 2.221
Chair: Nicolas Rossignol (Universite de Liege, Liege, Belgium)

Multi-level Governance in Climate Change Adaptation - the Case of the Latrobe Valley in Australia

J.O. Zinn
University of Melbourne, Melbourne, Australia

The management of complex risks such as climate change challenges political decision making and regulation on different societal levels. This presentation reports from a case study that examined the planning and decision making processes in Australia which were triggered by the foreshadowed implementation of a carbon tax in Australia in 2012.

We examined the responses to the carbon tax by the example of the Latrobe Valley, a region which is characterized by the world wide highest polluting coal burning power stations such as Hazelwood, and was expected to be one of the most affected regions by the tax. In 2011 ministers of the Commonwealth and state governments set up a hybrid organization to plan for the transition of the regional economy to manage the economic and social impact of the possible closure of power stations. The Latrobe Valley Transition Committee was exceptional in bringing together a number of different players from Commonwealth, State Government and regional level to transform the Latrobe Valley region. The research examined the interwoven processes of strategic planning and governance, the set-up of the Labrobe Valley Transition Committee and the development of a Roadmap to transform the region as well as the funding of concrete projects to provide new jobs within the region. What has been seen by many as a smooth and successful process came to a halt when the political conditions changed again in 2013.
At the same time it became clear that allegedly smooth process had some weaknesses. Since the process had been driven by funding promises of Commonwealth and State Government, the region did not develop an independent vision of the transformation of the region. The decision-making processes were mainly shaped by existing institutional arrangements, a regional identity, and an uncertain political future. This structured the inclusion of stakeholders, the management of knowledge and the relationship to the community. Of most significance were underlying power structures that provided stakeholders with different opportunities and resources to advance their interests.
The presentation will argue that successful climate change adaptation requires participative approaches that build legitimate and broadly supported transformation processes.

Keywords: multi-level governance; climate change; Australia; decision making;

Drought risk and health in the UK: Using an ecological stakeholder approach to investigate climate change impacts and adaptation options

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Drought already poses many well-documented risks to human health and well-being around the world (Stanke et al., 2013). In the UK, however, drought is still a relatively rare occurrence and there is, as yet, little awareness of what impacts greater risk of drought from rising temperatures and more extreme weather events will have on mental and physical health. The aim of the current research is to engage relevant stakeholders (e.g. river authorities, health services, urban planners, publics etc.) with this growing risk issue and start to consider drought related mitigation and adaption strategies for the UK in the face of global environmental change. In particular, this is the first time the novel 'ecosystems-enriched Driver, Pressure, State, Exposure, Effect, Action' (eDPSEEA) approach (Reis et al., 2015), has been used to build on stakeholder engagement to identify impacts of drought on health, both direct and indirect through changes in ecosystems. This talk will outline the theoretical background behind the eDPSEEA approach to stakeholder risk engagement, provide brief outcomes from a worked example (of seafood related risk) and present the early findings from an ongoing series of stakeholder meetings to discuss drought risk in the UK.

Keywords: Drought risk, Stakeholder engagement

Political discourse as an undervalued means of risk acceptance

A.T.P.E.M Michiels van Kessenich[1], R. Geerts[2]

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A political discussion is most often treated mainly as a method to obtain a certain result. In the case of discussions concerning risk, this result is a position or an outcome to answer a specific question, to wit : "do we as a community find this an acceptable risk?"(I leave aside the point that this is actually only one half of the question, which should be formulated "an acceptable risk as a counterpart of a specific and desirable outcome?"
Although this outcome or decision is certainly a necessary result, it is not in itself sufficient as a valid political result (although, and this may seem confusing, it does result in viable legal results). This is because risk acceptability is not static, but prone to undergo changes as a consequence of recent developments in the society that has to accept the risks.
A static preference will thus usually miss the mark the moment de discussion gets critical (f.i just after an accident).
To obtain valid political results, it is possible to reinstate the role of the political debate as the heart of the process of decision making. In doing so we leave the situation in which a certain obtained consent is treated as a given (a monad in the sense Leibnitz described them, or "thing"which can exist separately) and we move towards a cybernetical model of decision making, in which each result is fed back into the continuing discussion for testing and, if necessary, adaptation.
A model which treats an ongoing political discussion concerning risks as a given, provides a solution for at least two associated problems. Because the debate is more or less continuous, it provides an arena for the public at large to gradually get used to the fact that risks are an inescapable part of decision making and taking political action. Risk thus becomes an more integrated part of, f.i spatial planning.
The second advantage is that a political debate concerning a risk that is inseparable from a specific good that a society wishes to obtain, forces all the participants in the discussion (like the members of a city council) to become explicit in their acceptance or refusal of the risk. This will take some of the weight of the shoulders of Aldermen and should go some way into making the political discussion on risks itself less politically risky and unpleasant.

Keywords: communication

Risks related to bivalve shellfish consumption: application of participatory strategies for risk communication

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Bivalve shellfish are one of the main food resources not only in Italy, but throughout the world. From a healthcare point of view, however, bivalve shellfish can be considered foodstuffs at risk, since they are filter feeders and act as bioaccumulators of pathogens and toxic substances and since the consumption and preparation methods. Shellfish are generally eaten raw or undercooked to avoid altering their organoleptic characteristics, exposing consumers to risks caused by viruses (mainly Norovirus and hepatitis A virus), bacterial (such as Salmonella spp, E. coli, etc.) and parasitic risks (like Giardia, Toxoplasma, etc) in addition to chemical ones (like heavy metals, toxic substances, algal biotoxins). The private home setting is considered the place in which foodborne diseases mainly develop. This is due not only to poor both personal habits and environmental hygiene, but also due to wrong practices in food handling and consumption. The present study was developed with the aim to provide consumers with correct information on shellfish consumption through the dissemination of validated guidelines. Research methods, based on participatory and interaction strategies, were applied in order to select targeted information able to facilitate and promote risk communication for consumers. The Delphi method was used to identify the key aspects for analyzing the marketing and consumption of shellfish, such as scientific knowledge, risk perceptions and risk reduction behaviours to adopt. This stage involved a selected panel of Italian experts (veterinarians, biologists, chemists and epidemiologists). The aspects encoded by the experts were than controlled and classified by the stakeholders involved in the bivalve shellfish production chain and the operators in the field of health control and production by means of the Nominal Group Technique (NGT). Consumer perceptions and domestic practice were explored through focus groups.
The research activities were implemented in the Veneto and Marche Regions and a comparative study of these settings was performed.
Overall the data collected allowed the identification of the main risks associated with the consumption and marketing of shellfish and their classification according to the spread and severity of the danger. These results were combined with the analysis of consumers' behavior in relation to domestic handling practices and consumption of shellfish. Therefore, the guidelines for informing consumers were builtstarting from the interaction and exchange of the various viewpoints hold by experts, stakeholders and consumers. The guidelines were presented to the Italian Departments of Prevention in order to disseminate correct practices among consumers.

Keywords: Risk communication; Nominal Group Technique; Bivalve shellfish

Symposium: Risk governance from theory to practice III

Monday: 15:30 – 17:00, D 2.215
Chairs: Jeroen Devilee (RIVM, Bilthoven, The Netherlands), Marijke Hermans (Maastricht University, Maastricht, The Netherlands)

RIVM in transition: from risk analysis to risk governance of new technologies

M. van Zijverden, E. Heugens, J. Devilee
National Institute for Public Health and the Environment (RIVM), Bilthoven, The Netherlands

The Dutch National Institute for Public Health and the Environment(RIVM) is responsible for risk analysis in several areas, from consumer products to chemical substances and new technologies. For emerging technologies like synthetic biology, 3D printing etc., routine risk assessment is not adequate as a result of the uncertain nature of their benefits and risks. And when risks are of an uncertain or ambiguous nature, science on its own cannot deliver the conclusive results that are demanded by society or policy makers.
Therefore, now a challenge for the RIVM is to reflect on its own position and the possible roles it can take in dealing with different types of risk, with the purpose to develop 'societal robust' risk assessment.
In this challenge, experience with emerging technologies in which RIVM is already playing a broader role, other than purely scientific/technical risk assessment, forms a rich source of information. For example on the topics nanotechnology, electromagnetic fields and synthetic biology RIVM includes stakeholders in the risk management process.
Evaluation of these cases showed that RIVM sometimes lacked insight in the options for profiling and positioning itself in the risk governance arena. And not taking an active role can also potentially have a (profound) effect. RIVM needs earlier identification of upcoming technological innovations (horizon scanning) and a quick scan to determine which signals need to be addressed (and by whom). Moreover RIVM staff expressed their need to be able to share also "non-scientific"signals (such as worries or societal concern) in an informal structure. Ideally, all this leads to a broad, multidisciplinary assessment of related risks, benefits, and ethical and social issues in a risk governance process.
From its natural position close to policy makers, but acting independently in its sustained effort for better health and environment, RIVM may be able to make a change in the area of timely identifying and handling uncertain risks of innovation, moving responsible research and innovation forward. In order to accomplish this, regular meetings between personnel of RIVM-projects on emerging technologies will be established with the aim of sharing best practices and providing effective guidance to real-life governance processes. Moreover, during the (slow) transition process, thoughts and actions by RIVM-employees will be documented and reflected upon in a qualitative social scientific study that more or less independently describes relevant characteristics.

Keywords: risk assessment, risk governance, emerging technology, uncertain risks, best practices
Symposium title: Risk governance from theory to practice

Dialogues as a means for RIVM to bridge the gap between risk governance theory and practice

S.C.S. Clahsen[1], A. Dijkstra[2], E. Heugens[2], J. Devilee[2]

[1]RIVM, Bilthoven, The Netherlands

One of the key aspects of risk governance theory, such as the IRGC framework for risk governance, is the subdivision of risk assessment and risk management processes into specific phases, each involving various forms of risk communication. For example, in the IRGC framework for risk governance, risk communication is characterized by varying degrees of stakeholder participation, ranging from informing relevant parties about risks to two-way dialogue and stakeholder involvement in a risk governance process. Proposed benefits of participative risk assessment and management approaches include the formation of a broader scope of risk management options and increased acceptance of risk management outcomes.

As a part of its strategic outlook, the Dutch National Institute for Public Health and the Environment (RIVM) expressed the ambition to include stakeholder consultation and participation in the existing risk assessment research procedures. Practical implementation of this ambition resulted in the organization of three small dialogue sessions, devoted to nanotechnology (one session involving stakeholders, one session involving citizens) and the electronic cigarette (one session involving citizens). Methodologically, these dialogues were inspired by the focus group method, and perspectives of the participants were collected. Themes discussed included the perceived relation of participants towards nanotechnology and the electronic cigarette, their degree of knowledge concerning these topics and their perceived roles and action perspectives when confronted with these topics in society. The sessions were guided by experienced dialogue moderators.

In this presentation, the organizational process and the outcomes of these dialogues will be discussed, and related to RIVM's ambition of bridging the gap between academic risk governance theory and practice. The institute does so by entering a dialogue with several societal actors, whilst also considering its roles towards commissioners and society as a whole. In this process several questions are encountered: does consultation of stakeholders or citizens belong to RIVM's role? Should RIVM perform consultations themselves, or should RIVM contract specific parties to perform consultations? Special attention will be given towards the perspectives of stakeholders and citizens and the implications for RIVM.

Keywords: risk governance, risk communication, citizen dialogue, stakeholder dialogue, participative approaches

Symposium title: Risk governance from theory to practice

Value of risk governance theory for crisis control?

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Background: The National Coordination for Communicable Disease Control (LCI), part of the National Institute for Public Health and the Environment (RIVM), works on the interface of "Science, Policy and Society". During infectious disease outbreaks, the LCI supports medical professionals with evidence-based guidelines, policy officers and political decision-makers with proposals for scientifically grounded collective control measures and society with context-specific risk communication. Risk Governance Theories focus on integrated risk appraisal and risk management, including stakeholder- and concern assessment if dealing with uncertain, complex or ambiguous risks. However, rapid methodologies for stakeholder- and concern assessment are lacking, while rapid decision-making is vital.

Methodology:
Between 2011-2014 we undertook multiple activities to translate risk governance theory to daily practice:
a) application of the IRGC framework to the risk governance of a Q-fever outbreak (2007-2010) and emerging risk of Schmallenberg virus (2011-2012)
b) elicited views of 18 key experts, policy officers and decision-makers involved in infectious disease control on the needed 'expert- advice' during emerging risks/ outbreaks.
c) developed an approach to systematically identify stakeholders, for example: groups at increased infection risk, health professionals, environmental- and/ or veterinary partners, scientific experts, industrial actors, nongovernmental organizations, and decision-makers.
d) applied this approach to four cases (risks and outbreaks) and interviewed 20 stakeholders to understand their information-needs and views on stakeholder participation.
Results: a and b) all interviewees agree that stakeholder involvement is important, but have varying perspectives on the desired outcome and subsequently the type and intensity of stakeholder involvement.
c) and d) we identified an average of 40-70 stakeholders per case. Interviewees expressed different perspectives on information needs and expected roles in assessing risks and implementing control measures.
Conclusion: Control measures could be better developed and implemented, if risk managers (experts and policy makers) can effectively match their expertise with the information needs of stakeholders. This is not surprising, but challenging due to the large amount and variety of stakeholders. Our approach to stakeholder- and concern assessment concentrates its efforts on understanding the varied information needs among stakeholders. It appears to be a valuable instrument for experts and policy makers to capture the whole range of stakeholders and their views. During 2015/2016 three in -depth social network analyses will be undertaken to identify the key- components of a rapid stakeholder analysis in a dynamic situation. Outcomes will be used to further develop our approach to stakeholder- and concern assessment.

Keywords: risk governance, infectious diseases, stakeholder analysis
Symposium title: Risk governance: from theory to practice.(Jeroen Devilee cs)

Symposium: Informing is for doing? A symposium on the communication of health risks

Monday: 15:30 – 17:00, D 2.221
Chair: Vivianne Visschers (ETH Zurich, Zurich, Switzerland)

The perceived probability of a health risk is one of the important factors influencing laypeople's decisions about protection measures and treatment options. In order to help people making adequate risk judgments and decisions, it is thus important to know how to best communicate health risks. The presenters in this symposium will focus on how type of risk information and communication format can impact information processing, risk perception and decision making for various health risks and using various methods.
Alex Junghans talks about information processing of graphical displays of probability information regarding a heart condition and the moderating influence of numeracy, assessed by means of an eye tracker. Fraukje Mevissen presents a study on how a (mis)match between perceived probability vs. actual probability on getting a sexual transmitted infection influences people's need for additional risk information. Vivianne Visschers investigated people's perceptions of univocal probability information, ambiguous probability information and conflicting probability information regarding a medical treatment, presented in scenarios. Last, Astrid Kause looks at different kinds of uncertain statistical information, and at graphical and numerical formats for communicating such uncertainties. She hypothesizes that narratives will have a larger impact on risk perception than graphical probability information, when the probability is uncertain.

Understanding how numeracy and visual presentation affect the information processing of medical risks using eye tracking

A. Junghans, M. Siegrist, C. Keller
ETH Zurich, Zürich, Switzerland

Conveying medical risks is an important part of the communication between physician and patient. Understanding this numerical information is essential for making informed decisions that are in line with patients' values and preferences. The aim of this research is to improve the presentation of medical risks, especially for low numerate individuals.
For low numerates, graphic presentations of the medical risk information have been found to be more suitable than plain text. The aim of our study was to examine the strategies people use to process graphical and numerical presentation formats to extract the numerical information. Using eye tracking, we compared performance for four different and widely used presentation formats. We opted for a rather complex medical scenario, involving the comparison of two treatment options and their side effects.
The sample comprised 151 individuals (74 women) from the German-speaking population in Switzerland. Age ranged from 19 to 63 (M = 30.51; SD = 10.41). Participants were asked to imagine having a heart condition that would require an operation. They were informed about two treatment options that reduce the probability of a necessary operation, with one of the two having a higher success rate, but also a higher probability of causing side effects. Participants were shown a visual stimulus with information on the treatment options (side effects and success rates), depicting either two tables (one for success rate, one for side effects) or four graphs (either pie charts, pictographs, or stacked bar charts), with information on success rate (one per treatment option) and side effects (also one per treatment option). Each graph came with standardized scales and legends. Participants were asked to choose the treatment they preferred. Subsequently, participants answered questions measuring the extraction of numerical information. Numeracy, demographics, and graph literacy were assessed.
Preliminary analyses indicate presentation format and numeracy influencing information processing. Results provide more insights into the question of why which presentation formats are the most suitable for high or low numerates and how they can be further optimized.

Keywords: numeracy, eye tracking, medical risk, graph comprehension

(Mis)matching your risk: The impact of kind of risk feedback on preferred amount and type of risk information regarding sexually transmitted infections

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Many young adults in heterosexual relationships underestimate their probability to get infected with a sexually transmitted infection (STI). In order to communicate young adults' risk for STI, a website providing tailored risk advice was developed. Visitors (partly voluntary and partly actively recruited as part of a controlled effect evaluation trial) had to indicate their perceived risk for STI as well as their sexual experience and the sexual experience of their current sex partner. Based on the combined sexual experience (self + partner), they received personalized STI risk information (no risk, low risk, high risk, or unknown risk in case no information on their partner was available). After having received their personal risk status, visitors were offered different kinds of risk information (prevalence rates, severity information and narratives) which they could voluntary select to read or not. We analyzed the impact of type of risk feedback and difference between actual vs. perceived risk on amount and type of risk information visitors voluntary selected to read. In addition, the potential moderating role of type of visitor (recruited vs. voluntary) was explored.
Data of N = 9000 young heterosexual visitors (voluntary and recruited) of our website were analyzed (59.7% female). A difference score was calculated based on perceived vs. actual risk. Linear and logistic regressions with type of risk feedback and risk difference as predictors and type of information and amount of risk information requested as outcome variables were performed.
Data showed that the recruited sample had significantly lower risk perceptions than the voluntary visitors ($t = 4.48$, $p < .001$) and requested significantly less risk information ($F = 5.4$, $p < .05$). People receiving the 'unknown risk' feedback turned out to respond similar to people in the 'high risk' feedback group: Both requested significantly more risk information as compared to people in the no or low risk group ($X^2 = 31.27$, $p < .01$) and both were more willing to act on the safe sex advice as compared to the no/low risk groups ($F = 6.0$, $p < .01$). However, a (mis) match between perceived and actual risk did not show a significant influence on risk information decision making.
Results show that type of risk feedback and type of information receiver (voluntary vs. 'forced') has more impact on people's risk-related decision making than the difference between perceived and actual risk.

Keywords: risk communication, STI, perceived risk, actual risk, risk information preference

Reliability is the differentiating factor between ambiguity aversion and conflict aversion regarding uncertain risks

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People often have to make decisions about problems that not only involve a probability of a risk but also an uncertainty around this probability. Uncertainty that arises through a lack of knowledge (i.e., ambiguity) is thereby distinguished from uncertainty that results from conflicting knowledge on the hazard's probability of occurring. Previous studies have shown that people are ambiguity averse when comparing a univocal risky option with an ambiguous option. Moreover, they appeared to be conflict averse when comparing an ambiguous option to a conflicting option. Relatively little is still known about how people perceive univocal, ambiguous and conflicting probability information about the riskiness or effectiveness of a problem. Two online experiments were therefore conducted to investigate people's choices and their perceptions of univocal, ambiguous and conflicting probability information among various health (Alzheimer's disease) and environmental problems (e.g., soil contamination). Members of an Internet panel received a description of the health or environmental problem with two options to solve the problem. The options either had a univocal probability, an ambiguous probability or conflicting probabilities of the effectiveness or the risk. Respondents were asked to choose one of the options and to rate each option on uncertainty, effectiveness, willingness to apply each option and reliability of the information. In Study 1, the probability and uncertainty were expressed numerically. In Study 2, verbal descriptions about the type of uncertainty were added for the respective options.
Results showed that respondents mainly appeared conflict averse: options with conflicting probabilities were chosen less often and perceived as less effective and more uncertain than options with a univocal probability. Respondents only preferred the ambiguous option over the univocal option when the information included both numerical and verbal descriptions of the uncertainty. Moreover, they did not distinguish between ambiguous and conflicting information in their choices and not in, for example, their willingness to apply each option or perceived effectiveness of the option. Nevertheless, conflicting information was perceived as less reliable than ambiguous information.
Hence, I suggest that it is easier for people to distinguish conflicting information from univocal information than from ambiguous information, because conflicting and univocal information are perceived to differ on two dimensions, certainty and reliability, whereas conflicting and ambiguous information only seem to differ on the reliability dimension. Future research and communicators of conflicting uncertainty information should therefore consider the cause of the conflict and the credibility of the information.

Keywords: health communication, uncertainty information, ambiguity avoidance, conflict avoidance

Do you get vaccinated? The role of different types of uncertainty and graphical presentation formats in vaccination decisions

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While there is a vast literature investigating uncertainty visualizations in other domains (e.g., meteorology and finance), health applications are currently understudied. However, when communicating medical evidence to patients, there are a number of different ways in which uncertainty can occur around estimates of risk, including imprecision, conflicting evidence, or a lack of information (e.g., unknowns). Numerical or visual cues have been used to represent such uncertainty, most frequently with error bars, numerical ranges, colors or shading, or symbols. From previous work, there is mixed evidence about how different visual cues are able to communicate the different types of uncertainty. Further, few direct comparisons exist across visualisations and uncertainty types.
In study 1, we examine vaccination decisions and investigate how different visual representations of uncertainty can influence knowledge and interpretation of information about risks and benefits. We test representations for three types of uncertainty (imprecision, conflicting information, and lack of information) in relation to risk information (point estimate) using different visual cues (colour, shading, number, and symbol). We hypothesize that participants will have more difficulty with and perceive uncertain information to be less reliable and trustworthy than risk information. In addition, we expect that specific features of the visual cues (spatial distance; visual size, symbolic association) will determine which visualisations are better for communicating the different types of uncertain information.
In study 2, we extend this work to investigate whether uncertain information influences people to use more social information (e.g., comments other patients make in online forums) than when the information is not uncertain but risky. We present participants with medical information that varies in the degree of uncertainty, and narratives on vaccination experiences from online forums in a 2 (Information type: Risk versus uncertainty) x 2 (Narrative type: Only positive versus only negative) between subjects-design. In line with previous research, we predict that social information has a disproportionate influence on medical decisions and that this is larger when information is uncertain. In sum, our research thus accounts for the structure of the 'real' world where almost nothing is certain and bridges a gap between two fields of research: risk and uncertainty perceptions and the impact of social information on knowledge and behavior.

Keywords: Uncertainty, medical risk communication, graphical presentation formats, social influence on risk perception

Risk Communication II

Monday: 15:30 – 17:00, D 1.225
Chair: Wändi Bruine de Bruin (Leeds University Business School, Leeds, United Kingdom)

Let's get together - the effect of personal experience with risk mitigating behavior on self-protectiveness of citizens

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In our increasingly high-risk society, self-protectiveness of citizens is gaining popularity. In order to increase citizen self-protectiveness adequate risk communication proves to be crucial, but difficult (Kievik & Gutteling, 2011; Gutteling et al. 2010). Despite numerous studies on effecting self-protectiveness, some pieces of the puzzle are still missing. We know that increasing the level of risk perception, self-efficacy and response-efficacy helps individuals to protect themselves against threats (Kievik, ter Huurne & Gutteling, 2011; Kievik & Gutteling, 2011). After all, an individual will only take precautionary measures when a risk is perceived as threatening. Also the individual must perceive options to mitigate the threat as useful (response-efficacy) and feasible (self-efficacy) to engage in action. However, what we do not know is when the individual perceives options as useful and feasible.
In this study we explore the effect of personal experience with risk-mitigating behavior on perceived usefulness and feasibility of risk-mitigating options directly and self-protectiveness indirectly. We chose the eastern part of the Netherlands to conduct our experiment. Trains transporting highly dangerous chemical substances, ride through the center of many cities and villages in that area daily, making it an excellent area for experimentation.
The experiment consisted of an intervention in the form of a training. A total of 47 participants attended the training (all residents of Borne - a small town in the eastern part of the Netherlands). A few months prior to the training the participants were informed about self-protective behaviors related to the transportation of chemical substances in their area (using leaflets, newspapers and Websites). In the training, these risk-mitigating options were actively practiced. At the start of the training, individual levels of risk perception, efficacy beliefs and the self-protectiveness were pre-tested in an online-questionnaire. During the training, several scenarios were simulated (for instance the explosion of a train transporting chemical substances) and participants were asked in each scenario to act according to their thoughts and knowledge. Their behavior was observed and each scenario was thoroughly evaluated with participants. At the end of the training, a post-test was conducted measuring individual levels of risk perception, efficacy beliefs and self-protectiveness again.
The results show that personal experience with risk-mitigating behavior leads to higher levels of risk perception as well as increased levels of perceived usefulness and feasibility, subsequently leading to higher levels of actual self-protectiveness among citizens. The results will be discussed in more detail at the conference.

Keywords: risk communication, risk perception, efficacy beliefs, personal experience, self-protective behavior

Demand of Risk Mitigation in Transport - Personality, Risk Judgement and Safety Motivation

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The role of personality, transport-related risk judgement and safety motivation for public demand for transport risk mitigation is incompletely understood. The aim of this study is to test a model aimed to predict public demand for transport risk mitigation by these psychological risk constructs. A mailed self-completion questionnaire survey was conducted in a random sample of the Norwegian population aged 18-65 years obtained from the Norwegian population registry (n = 6203). Results from structural equation modeling supported the hypothesis that personality, risk cognitions and transport-related worry mediated relations to demand for transport risk mitigation through safety motivation. The findings are discussed in relation to personality-entailed measures as well as the link between cognitive and emotional approaches to transport risk.

Keywords: Risk mitigation, personality, risk judgement

Food risk media monitor: development of an automatic web tool to analyse the Italian mass media discourse on food safety and food related risks

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Food issues are one of the main topics covered by the media over the last decades, due to public health crisis that have affected the food sector and drawn the attention of citizens and Institutions as well. Thus, media have been gaining greater attention, also being the information source people use at most when seeking information on food related risks. However, media strongly influence people's perception and acceptance of food risks and they often emphasize risks increasing unjustified anxiety, without any valid scientific foundation. For all these reasons, it is crucial to monitor the media discourse about food safety to prevent the diffusion of any unjustified alarmism. The present study intends to monitor food safety and food related risks issues covered by the Italian mass media in order to verify whether there is a correspondence between mass media discourse and effective health risks for the consumer.
At the end of 2012, an automatic media-monitoring tool has been developed to track the web versions of the leading Italian daily newspapers to monitor the discussions about food safety and related risks. The system captures RSS feeds of websites and goes back to 2000, enabling the construction of a constantly updating database based on a thesaurus of almost 200 words. Three main case studies have been investigated from 2010 to 2013, i.e. Anisakis risk, *E. Coli* epidemics, and presence of melamine in food stuffs. These themes have been selected by the project's experts team, according to recent epidemics or effective risks for consumers' health, in order to verify whether the media would consider them with the same level of attention.
The media-monitoring tool tracked 2,449 relevant articles (normalized data). *E. Coli* epidemics, sorbitol scandal, dioxin in feeds, "mozzarella blu"(Italian cheese contaminated by *Pseudomonas fluorescens*) and Hepatitis A registered the highest number of articles published on the newspapers, with respect to the thesaurus. Instead, Anisakis and melamine risks had no relevant mentions. Avian influenza did not reach a peak, however the system registered related articles over the selected period. Preliminary results highlight that newspapers cover food safety issues, which could be different from those relevant to the public health authorities. For this reason, Institutions should follow the mass media discourse to find out what could influence the public perception of food risks and consequently to plan communication interventions to mitigate wrong food risk perceptions or unjustified alarmism.

Keywords: media monitoring, food safety, risk communication

Using time series to analyse the coverage of food safety issues in Italian newspapers. Considerations for an early identification of public concern for risks

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The repeating occurrence of unexpected food safety incidents and related damages demonstrates the need for an early identification of the hazards involved and of consumers' opinions. People learn about food safety incidents mainly through mass media who often reports health risks in an emphasized manner, eliciting strong - sometimes unmotivated - public concern. Thus, monitoring the press coverage of food safety issues is relevant to understand how food risks reporting rises and falls.
This study intends to analyse time series related to Italian newspapers coverage of food risks in order to describe their general trend and to find out the presence of any recurrent pattern. If present, the pattern would account for the way (how much and when) newspapers report food risks and it could be suitable to explain further new emerging risks.
Time series have been extracted from data collected from an automatic media-monitoring tool. The system tracked the web versions of articles published by the four leading Italian daily newspapers according to a thesaurus of almost 200 words covering food safety topics. Data collection was made from January 1, 2010 to 31 December 2014 and included the following variables: date (with indications of day, month and year), number of articles on food safety published per day and the total number of articles published per day. Since these last two variables changed continuously in the reference period, analysis considered the time series obtained from the ratio of the number of articles on food safety and the total number of articles published. Analysis intended to identify the components of the time series (trend and seasonality) and to verify the presence of a recurrent pattern that would describe the newspaper coverage of risks linked to food.
Results assess which model esteems the time series at best by means of appropriate measures of goodness of fit of the model to the estimated data.
Studying the presence of the pattern in news media stories can help health Institutions to identify rapidly the early signals of emerging food risks and enable concerned authorities to plan effective communication interventions to reduce unjustified alarmism.

Keywords: time series, food safety, newspaper coverage, monitoring

Public perception

Monday: 15:30 – 17:00, D 1.221
Chair: Mathew White (University of Exeter, Truro, United Kingdom)

Changing public perceptions of climate change in the UK

S. Capstick, N. Pidgeon, C. Demski, R. Sposato
Cardiff University, Bristol, United Kingdom

Public perceptions of climate change have been subject to several shifts over the time period that this has been a salient risk issue. During the early to mid 2000's, data suggest a broad trend towards increasing public acceptance and concern about climate change, but this was followed by growing 'scepticism' about climate change towards the end of the decade in the UK and elsewhere. We use nationally representative survey data obtained through face-to-face interviews in people's homes across Britain (n=1,002) towards the end of 2014, to argue that public attitudes towards climate change are changing direction once more. Our most recent British survey data is compared to previous findings over the past decade, to suggest that public acceptance of the reality of climate change, and of a human component to climate change causation, are at higher levels than recorded for some years. We question the frequent characterisation of climate change as a topic which is considered largely irrelevant by most people, through data that point to its importance being on a par with other social issues such as crime and education. We interrogate the notion of 'psychological distance' with respect to people's perceptions, and suggest that there is wide variability in how proximal climate change is felt to be, depending upon how this concept is operationalised. Findings are interpreted in terms of theories of risk perception at an individual and societal level. We also consider the implications of our findings both for climate change communication and for policy-making.

Keywords: climate change survey

The More the Merrier? Towards an Understanding of Public Risk Perceptions of Global Population Growth

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In 2011 the global human population reached seven billion and continues to increase at a rate of more than 200,000 people each day. Median variant projections by the United Nations Population Division suggest the world population will reach 10 billion around the middle of this century. While some commentators and strands of empirical evidence highlight how this growth could present several benefits (e.g., economic growth, accelerated innovation), other theorists and evidence suggest that the growth will increase the likelihoodof many adverse events (e.g., climate change, resource shortages) and the impact of these events because more people are exposed to the outcomes. While concerns about the potential adverse effects of population growth are well-documented in the academic literature and, increasingly, the media, there is a dearth of evidence concerning the public's perceptions of the risks associated with global population growth and how these perceptions are likely to influence behavioural decision making. To address these issues we conducted a UK-based study using a telephone questionnaire that examined respondents' risk perceptions of global population growth, their willingness to adopt adaptive and/or precautionary behaviours, and potential reasons for variations in these two factors. We found that global population growth is perceived as a moderate-to-high risk, with predominant concerns being about the increased likelihood of resource shortages, ecological damage and violent conflict. Our respondents believed that the worst effects of global population would arrive around the middle of the 21st century and would be experienced by the world's poorest people. Those respondents who perceived greater levels of risk from population growth were generally those who indicated a greater willingness to adopt adaptive behaviours (e.g., reduce resource consumption) and preventative actions (e.g., support action to limit population growth) and who held left-leaning political identities. Higher risk perceptions also correlated with a tendency to associated global population growth with negative affective imagery (e.g., famines). These and other aspects of our findings will be discussed with a focus on highlighting how they could be utilized to assist humanity to better manage the challenges associated with global population growth.

Keywords: Decision making; Global Population Growth; Risk Behaviour; Risk management; Risk perception

Patterns of risk perception concerning natural hazards and the subsequent influence on behaviour in crisis situations

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University of Stuttgart, Stuttgart, Germany

As climate change and globalization proceed natural hazards develop to common phenomena in public life. Interacting with such extreme natural events is still a subject in need of exploration as is the influence of risk communication on behaviour of persons involved.
Even though this study is still in its very early stages, a conceptual framework of the planned process might be of interest to everyone concerned with risk perception factors, experimental methodology, international risk behaviour and ultimately risk communication. Structuring the topic into two complementing parts, the prime section shall consist of thorough quantitative data analysis using a risk perception survey published by the Gallup Organisation Europe on behalf of Swiss Re in 2013. With groups of over 1000 respondents in each of 19 selected countries worldwide the data is expected to represent the national adult population and hence function as a suitable scientific base for overall risk perception comparison.
Based on results arising out of the first part a number of geographically similar areas shall be identified in which to conduct further empirically founded experiments on the influence of risk communication strategies on behaviour in crisis situations. Therefore in each region subjects will be divided into groups and exposed to a stress indicator composed of video and audio material of a selected natural hazard. Strategies of risk communication is added as an independent variable. Results are expected to reveal a preferred method of communication as well as further information about interrelations between lay people and experts in crisis situations. Ultimately the study shall develop a best practice of risk communication and thereby offer solutions for science, policy and society resulting in increased resilience and reduced vulnerability concerning hydrometeorological hazards. The study aims at addressing a variety of concepts within models of behaviourism and microsociology. Risk perception factors identified by Slovic and Fischhoff (1982) are taken into account measuring the degree of perceived risk on the basis of voluntariness, immediate consequences, control over risk and more. Including the concept of the psychometric paradigm referring to an individual's multidimensional subjective perception and connecting it to rational choice theory is expected to explain striving for self-referred advantages in decision making. Therefore it is proposed that risk communicators inherit a certain degree of trust which can be established using three components identified by Ragnar Löfstedt (2005): 1) Fairness, 2) Competence and 3) Efficiency in order to positively influence decisions concerning natural hazards.

Keywords: risk perception, risk communication, decision-making, patterns of behaviour

Correlates of intentions to adapt seismic hazard adjustments after the 2011 Great East Japan Earthquake

T. Motoyoshi
Kansai University, Takatsuki, Japan

This study examined the relationships of intentions to adapt seismic hazard adjustment with respondents' demographic characteristics, perceived seismic risk, apprehension toward earthquakes, perceived cost and benefit of protective courses of action, subjective norm regarding adjustment, and general concerns about natural disaster. A Web questionnaire-based survey was conducted 3 years after the 2011 Great East Japan Earthquake to residents living in Tokyo (n=400) and Osaka (n=400). The study revealed that intentions to adapt seismic hazard adjustments were significantly affected by the respondents' perceived benefit of hazard adjustments, apprehension toward earthquakes in the near future, subjective norm regarding preparation, and general concerns about natural disasters. Perceived seismic risk was not direct predictors of intentions to adapt seismic hazard adjustments.

Keywords: earthquakes, risk perception, hazard adjustment

Emergency planning

Monday: 15:30 – 17:00, D 1.227
Chair: Ric van Poll (RIVM, Bilthoven, The Netherlands)

Istanbul Seismic Risk Mitigation And Emergency Preparedness Project (ISMEP)

K.G. Elgin
Istanbul Governorship Istanbul Project Coordination Unit, Istanbul, Turkey

Istanbul is most vulnerable city because of its seismic-prone location nearby the North Anatolian Fault,and its high population and commercial/ industrial densities. Istanbul Seismic Risk Mitigation and Emergency Preparedness Project (ISMEP) started in 2006 and is implemented by Istanbul Project Coordination Unit. ISMEP is financed by the World Bank, European Investment Bank, Council Of Europe Development Bank, Islamic Development Bank with a budget of 1.5 Billion Euro in total by the year of 2014. The main objectives are to improve the city of Istanbul's preparedness for a potential earthquake through enhancing the institutional and technical capacity for disaster management and emergency response, strengthening critical public facilities for earthquake resistance, and supporting measures for better enforcement of building codes and land use plans. ISMEP has 3 components;

Component A:"Enhancing Emergency Preparedness".

Component B "Seismic Risk Mitigation for Priority Public Buildings" By the end of December 2014, 648 public campuses were retrofitted, 185 public campuses were reconstructed, the retrofitting works of 47 public campuses and reconstruction of 37 Public campuses are ongoing.

Component C, "Building Code Enforcement".

Safe Life Trainings were prepared for the public to participate in the disaster preparedness activities and to build and extend "Safe Life Culture". Within this context **226.378 volunteers were** trained between 2009 and 2014. ISMEP Project pursues a pro-active approach to mainstreaming risk mitigation and prevention for a potential of earthquake in İstanbul. The activities of ISMEP Project have crucial importance in terms of the prevention of potential loss of lives and mitigation of social, economic and financial impacts. Besides, ISMEP Project will be an outstanding model for the design and implementation of other national and international projects and activities in the field of disaster risk mitigation. Project results show that disaster management capacity of first responder institutions in Istanbul is improved in terms of technical, institutional and professional levels. They receive full marks on many platforms for immediate establishment of communication and information technology to provide services at international standards. A total of **1175** available public buildings including hospitals, schools and dormitories which will be used primarily as a priority after the disaster are currently resistant against any disaster. Moreover, the pilot municipalities continue to monitor the results of their activities aiming at improving the efficiency and transparency of building permit issuance procedures. **The overall workflow has decreased from 106 steps to 70 and the duration of permit issuance from 10 days to 4.**

Keywords: seismic, risk, earthquake, drr, retrofitting, reconstruction, public awareness
Symposium title: Istanbul Seismic Risk Mitigation And Emergency Preparedness Project (ISMEP)

Integrating approaches to support multi-hazard mitigation planning

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Hazard mitigation planning is a multi-facetted problem. Besides understanding the risk of various hazards at present, one also needs to understand how the probability of occurrence and the consequences change over time, what the impact of potential mitigation measures is on reducing the risks, and what the side effects of hazard mitigation options are on adjoining disciplines.
Due to a large number of influencing environmental and anthropogenic factors, risk attributed to hazard likelihood is prone to inaccuracy, exaggerated by the large uncertainty in the future socio-economic consequences. Furthermore, resources are always scarce, and benefits of good mitigation planning are hard to sell to the public as tangible benefits are not always clear. Consequently, dealing with hazard mitigation planning encompasses various aspects that require different support techniques.
In order to ensure consistency and complementarity these techniques should be used as a closely linked tool set as proposed in this paper. The framework uses participatory methods in combination with analytical tools and includes development of exploratory scenarios, quantitative analysis, forecast modelling, and optimisation techniques. The problem context for the policy making process is decided through stakeholder engagement, with problem analysis and definition supported by quantitative analyses to understand relevant historic and ongoing developments. Exploratory scenarios are developed in a participatory process with stakeholders to enhance the understanding of future uncertainties. Based on the problem definition and the scenarios, a generic forecasting model for simulating the integrated assessment of hazard mitigation options is applied to the geographical area of interest. This involves discussions regarding the selection of models from the choices contained within the generic model, discussions on data issues, and calibration of the application to the context of the selected area. Using quantitative analysis and participatory activities, scenarios drivers are provided as model input in order to simulate various possible future developments of the city, region or country under consideration.
From the calibrated application and the optimisation routines, a set of near-to-optimal mitigation portfolios is provided that is tested under these different scenarios to assess the impact of future uncertainties on mitigation options. These mitigation portfolios are subsequently discussed and ranked in a workshop setting to provide support to natural hazard mitigation planning.
Overall the proposed framework uses a combination of qualitative and quantitative information, integrates participation with modelling and allows for combining simulation and optimisation models in order to combine scientific and stakeholder knowledge in supporting hazard mitigation planning.

Keywords: natural hazard mitigation, decision support, scenarios, integrated assessment modelling

Risk and resilience within global food systems

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Building resilience within global food systems requires that policy makers identify emerging risks before they occur. These risks, however, are difficult to predict and their character is diverse. Examples include contamination, fraudulent substitution, and extreme weather. Though deeply uncertain, steps can be taken to improve our understanding of the character of emerging risks and the impact they may have on vulnerable elements of a food supply system. This information may then be used to inform medium to long-term strategies for building resilience. The challenge for policy makers is to make sense of this complexity and to make best use of the limited information available to them.

By way of case study, this presentation will discuss the development and application of a methodology that enables policy makers to analyze emerging risks within complex food supply systems. Combining risk and foresight techniques, this method assists policy makers in the gathering, assessment, and interpretation of information about emerging risks from a range of different sources across the entire system. In addition, this presentation will also discuss how such an explorative approach can be used to promote a shift in thinking about resilience in food supply systems from being reactive (responding to events as they happen) to proactive (seeking new opportunities for management).

Keywords: emerging risk, resilience, food systems

Learning from the rubble: disaster governance in the cases of New Zealand and Chile

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A post-disaster context offers the opportunity to learn from the disaster event, to build back better and to strengthen the resilience of a place. However, planning under stress often leads to randomly designated governance responsibilities. This can be manifested through unplanned implementations that seem to be highly relevant in the short-term recovery, but potentially constrain longer-term sustainability aspirations (Ingram et al., 2006). As we found that more is needed beyond good formal institutions and technical knowledge to allow for good governance in societies in the face of disasters (Ostrom, 2010; Swyngedouw, 2005), in this paper we explore multi-level governance arrangements in the aftermath of disasters. First, we theoretically reflect on governance approaches to deal with risk and disasters from a social-ecological systems perspective (Folke et al., 2005). Building on this approach, we argue that disasters occur at the intersections between nature and societies. Additionally, the shift from disaster management towards governance (Tierney, 2012) enables multi-level and multi-actor collaboration, highlighting learning possibilities from the dynamic nature of post-disaster transitions. Second, we further the understanding of these mutual learning processes by focusing on the relationships between different actors on different levels in two cases: the case of Christchurch, New Zealand after the earthquakes of 2010 and 2011, and the case of Chiloé, Chile, after the aquacultural crisis of Infectious Salmon Anemia (ISA) in 2007. Based on ethnographies and in-depth interviews with actors from a wide variety of roles in both cases, we explore the diversity of learning that is/has taking place in the recovery processes. We found that there is a self-reinvention taking place of the city of Christchurch, because of the unique grassroots (transitional) projects in the post-earthquake city. The case of Christchurch shows the importance of collaborative efforts from both bottom-up initiatives and good (formal) institutional structures. Additionally, tensions around the environmental impacts and the sustainability of the salmon industry in the case of post-ISA Chiloé emphasizes the need for a clear and balanced division of governance responsibilities between different public, private and civil society institutions in crisis situations.
Building on the insights obtained from both cases, we investigate how transitions are and can be fostered from ad hoc 'learning by doing' to structural improvements of governance structures in places in the face of disasters. Finally, we conclude with reflections on the share of governance responsibilities between different institutions on multiple levels in social-ecological systems under transformation.

Keywords: disasters, institutions, multi-level governance, resilience, social-ecological systems

TUESDAY 16 JUNE

Controversies

Tuesday: 11:00 – 12:30, D 1.225
Chair: Marijke Hermans (Maastricht University, Maastricht, the Netherlands)

Public perceptions of 'fracking': US/UK comparisons

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We present preliminary results of a cross-national study investigating public perceptions of shale gas and oil extraction by hydraulic fracturing ('fracking'). Fracking is a process by which pressurised liquid is injected into rocks to fracture them and facilitate the flow of oil and gas. The United States has undergone a shale gas 'boom' in the last few decades, and more recently there has been interest in shale gas prospectivity in Britain, with Prime Minister David Cameron announcing that the UK is 'going all out for shale'. But fracking has been met with opposition from local communities, and concerns have been raised about its environmental and social impacts. Understanding public perceptions of these technologies is important given the role that they may play in future policy decisions, and while survey studies have broadly gauged awareness and opinions in both countries, much less work has looked at the underlying dimensions of these perceptions. This study therefore qualitatively investigates public perceptions of shale gas developments in Britain and the USA, in order to a) gain an understanding of these perceptions, b) explore how social contexts influence beliefs, and c) provide a comparison between perceptions in countries where shale gas extraction is new and where it is more established. Following three pilot workshops, we carried out four full-day deliberative workshops (N=55) in October 2014 with members of the public in two UK cities and two US cities, chosen because they represent diverse demographics, and are located in areas that have not yet experienced high degrees of social amplification around fracking. The workshops consisted of a variety of tasks to engage participants with fracking processes, its advantages and disadvantages, and considerations such as responsibility, governance and decision making. This paper presents the preliminary results of the study. We compare perceptions between the two countries, identify degrees of public acceptability, and explore questions, trade-offs, conditions and concerns. We then discuss the implications of these for future shale gas development.
This research is a collaboration between two institutions: the Understanding Risk Group and Tyndall Centre for Climate Change Research at Cardiff University in Wales, UK; and the NSF Centre for Nanotechnology in Society, University of California in Santa Barbara (UCSB), USA.

Keywords: Public perceptions, shale, fracking, deliberative methods

Explaining health responses to power lines: the role of health risk perceptions

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In many countries the construction of new high-voltage power lines (HVPLs) is deemed necessary to renew old energy infrastructures, as well as to fulfil the growing need to connect renewable energy supplies to the electrical grid. There is public concern about the health effects of exposure to extremely low frequency electromagnetic fields emitted by HVPLs. While experts consider the health risks of living near HVPLs as small, residents believe these risks to be much higher and to entail non-specific health complaints such as headaches and neurological problems. These relatively high risk perceptions may adversely affect well-being and health through a psychosocial pathway linking exposure to potential environmental hazards to symptom reporting. In a prospective field study we investigated whether nearby residents reported more symptoms after a new power line has been put into operation. We found a larger increase in symptom reports of residents living nearby (0-300m, n = 229) than farther away (500-2000m, n = 536). In the present study we investigate to what extent these health responses can be explained by health risk perceptions of power lines. We measured risk perceptions and self-reported symptoms before and after the new HVPL was put into operation. To answer our research question we applied longitudinal mediation models within a structural equation modelling framework. Preliminary results will be presented and implications for risk communication will be discussed.

Keywords: power lines, health risk perception, environmental risks, risk communication, risk governance

The evaluation of hydrogen fuel stations by citizens: the interrelated effects of socio-demographic, spatial and psychological variables

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Hydrogen fuel use in vehicles can potentially have a positive effect on the environment and on energy security. Very few fuel stations are, however, currently available. A potential barrier to the implementation of hydrogen fuel stations is resistance by citizens living nearby. The current study aims to gain insight into the citizens' attitude towards a local hydrogen fuel station, called acceptability, and specifically in the effect of socio-demographic, spatial and psychological on this attitude.
An online questionnaire was administered via a market research bureau. The questionnaire was filled out by 1214 respondents living throughout the Netherlands, of which 800 received information, 412 did not receive information. The respondents were asked to imagine that a hydrogen fuel station would be placed at the to them nearest fuel station location in the questionnaire. Since the market response bureau already had the information about socio-demographic variables available, the questionnaire contained questions about situational and psychological factors. Multiple questions were used to measure the psychological variables. Structural Equation Modeling was used to estimate the effect of all variables simultaneously. The results show that the psychological variables explain public acceptability better than the socio-demographic and spatial variables. The strongest predictors are positive affect, negative affect, expected local effects and expected societal and environmental effects. An interesting finding is that citizens living closer to a fuel station location are a little bit more negative about the placing of a hydrogen fuel station there than citizens living further away. This is in line with the idea of Not In My Backyard (NIMBY), but contrary to findings in previous hydrogen fuel station acceptability studies. The analyses indicate that those living nearer have a lower acceptability level because they have a lower level of trust in the industry placing and maintaining a safe hydrogen fuel station and less strongly experience positive affect when thinking about the placing of a local hydrogen fuel station. Furthermore, the informed respondents had a somewhat higher acceptability level than the uninformed respondents. The informed respondents not only had a higher self-rated and tested knowledge level, but also a higher level of trust in those responsible for the technology.
Overall, we conclude that many different factors contribute to explaining the citizens´ evaluation of a local hydrogen fuel station. The effects of most spatial and socio-demographic variables are fully mediated by the psychological variables, suggesting that their effect is explained by the measured psychological constructs.

Keywords: technology acceptance; hydrogen technology; risk perception; trust; knowledge; distance

Validity of Risk Assessment Challenged: Deconstructing the 'Myth of the Month'

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Risk assessment, in some form or another, has existed for thousands of years. During the 20thC new techniques were devised in the UK and some spread globally. However, a problem has arisen in the UK during the last decade which has damaged risk assessment's plausibility and standing with the wider public. The spread of health and safety practices into public life has received considerable public, media and political attention in recent years in the UK. Tales of killjoy risk assessors prohibiting activities in the name of safety have become enduringly popular. This may well have contributed to the apparent erosion in the credibility of risk assessment itself, which is now frequently the subject of controversy, criticism and even ridicule. In part to counter this, in 2007 the UK's lead regulator, the Health and Safety Executive (HSE), created a 'Myth of the Month' challenge panel – a mechanism aimed at independently challenging advice or decisions, apparently made in the name of health and safety, that were believed to be disproportionate or inaccurate. This paper provides an analysis of these myths and their origins. It posits that the ill-repute which has befallen H&S and risk assessment in the UK is largely attributable to its application beyond the factory fence, as opposed to activities in conventional workplaces. This in turn points to an underlying conflict of philosophy. The tendency towards achieving risk minimisation in the workplace is arguably ill-suited to public life, in which a degree of risk is generally accepted in exchange for the benefits that public activities provide. The implications of this are discussed, in conjunction with the UK's Health and Safety at Work Act and current UK risk assessment protocols.

Keywords: HSE, HSWA, Risk assessment, risk minimisation

Symposium: Communicating the risks and benefits of enhanced food products

Tuesday: 11:00 – 12:30, D 2.215
Chair: Carla Geijskes (Maastricht University, Maastricht, the Netherlands)

Under authorities responsible for communicating on food risks, there is a growing ambition to base their communications on scientific evidence. The communication practice is complex, however, given that with foods there are risks and benefits involved. Applying current communication theories and research results to communication practice is thus not straightforward. This seems in particular the case with respect to novel products such as food supplements, products that are grown organically and products in which nanotechnology is applied.
This symposium aims to facilitate the translation of communication research into evidence based advice. It consists of four presentations on enhanced food products. Underlying theme is that the public is exposed to information from various sources that might provide contradictory advice. When faced with a decision on an issue or an appropriate course of action, the individual has the difficult task of making sense of all this information and to decide on the course of action.
The presentations will focus on important questions related to the consumer's risk perception, information processing and information sharing. The implications for the communication practice of a food safety authority will be a focal point of the discussion.

Why do people use dietary supplements? The role of risk perception and other psychological determinants in decision making

E.M. Pajor, K. Curfs, A. Oenema, M. Eggers, H. de Vries
Maastricht University, Maastricht, The Netherlands

This study explores which factors may play a role in deciding for the usage (or non-usage) of dietary supplements of which the effects may be uncertain, scientifically not proven, or not even present. The consumption of capsules, powders, liquids et cetera which may contribute to the normal functioning to the body, has increased since the 80's and is nowadays very high. This study also aims to discover the information need of consumers regarding this topic.
Using the Integrated Change Model as theoretical background we aimed to discover and understand which psychological determinants (such as risk perception, attitude) may play a role in the decision making process of the consumer.
Since there is little known about the process itself we aimed to obtain in-depth knowledge by conducting focus group discussions among users and non-users separately. We explored their perceptions and thoughts on dietary supplements, the main advantages and disadvantages they see in (not) using them and their feelings about the certainty of the decisions they make. Finally, we also asked them how they gathered information on dietary supplements and what their information need was.
We used a structured interview guide with open-ended questions for each session. In total we have had 7 focus group discussions with 28 dietary supplement users (7 males, 21 females, age range: 19 - 78). Additionally, we have conducted 4 group discussions with 19 non-users (8 males, 11 females, age range: 20 - 65).
All group discussions have been audio recorded and transcribed. Framework analysis will be applied on the qualitative data by two independent coders. This type of content analysis allows for the inclusion of *a priori* as well as emergent concepts, for example in coding.
Results, including a comparison between users and non-users, will be reported and their implications for risk-benefit communication will be discussed.

Keywords: Decision-making, Dietary supplements, psychological determinants

Impact of message repetition on risk perception and attitudes toward enhanced food products

M. Kuttschreuter, M.D. Hilverda, J.T. Seifert University of Twente, Enschede, The Netherlands

There is ample research on the effect of information messages in the context of food risk communication. This research focused on the effect of exposure to only one message. In the communicating risks to the public, this is however seldom the case. Sources repeat messages, and other sources echo them. This means that the public is often exposed to a message several times. This is currently the more so, in view of the diversity in traditional and social media channels transmitting information.

This paper presents the results of a study in which participants are 2 times provided with information on the risks and benefits of nanotechnology to improve food products. The design was an extended pretest-posttest design, in which the perceptions and attitudes towards the use of nanotechnology to enhance food products were measured 3 times: before the first message, directly following the first message, and again after a second and a third message. The participants were randomly assigned to one of three conditions that differed in the order in which the messages were presented. Each message was approximately 20 lines long and discussed the advantages and disadvantages of the application of nanotechnology in a specific food related context: the creation of food products that are healthier, the development of food packages with particular characteristics that enhance the quality of the food stored in them, and the improvement of food products and food production techniques in agriculture. The structure of the three messages and the topics addressed were similar. The three messages were also perceived in a similar manner. Differences between the three moments in time on the dependent variables could thus be attributed to the *number* of the messages rather Participants were students at the University of Twente (n=115). Preliminary results show a very consistent pattern reflecting a growing concern with the application of nanotechnology to enhance food products, the more messages the participants read: increase in perceived risks, increase in perceived dread, decrease in perceived benefits, less favourable attitude and a decrease in the willingness to purchase and consume products in which nanotechnology was applied. The implication of these results for risk communication theories and practice will be discussed.

Keywords: Risk Communication, Food, Nanotechnology, Message repetition

Symposium title: Communicating the risks and benefits of enhanced food products

Interest in food risk information and determinants of online information sharing

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University of Twente, Enschede,
The Netherlands

This presentation focusses on the question *"What motivates people to share food risk information online with others?* "A lot of research has been conducted about information seeking and processing, and the predictors thereof. So far, information sharing and what motivates people to share risk information online has been given little attention. By integrating the Theory of Panned Behavior (TPB) and the Risk Information Seeking and Processing Model (RISP), a model predicting online information sharing about the risks of organic foodwas developed. Knowledge about what stimulates people to share information is useful for food risk communicators during times of food crises, but also to inform people about chronic risks attached to certain food products.
We report on an online survey study among 500 respondents (250 females and 250 males, *age range* = 18 to 75) conducted in the Netherlands, that explored how information sharing can be modelled. Questions were posed to tap variables from TPB, such as the attitude towards sharing and self-efficacy beliefs about sharing information online, and variables related to the perception of food risks and the specific risk of eating organic food that are based on the RISP model. In particular, participants were questioned regarding their interest in food-related information, the relevance of food safety in their lives, risk perception regarding eating organic, negative emotions when thinking about the risks of eating organic, and trust in food companies and risk regulation.
Following regression analyses, structural equation modelling will be applied. A model predicting online information sharing will be tested using AMOS.
We will present what concepts are most important in explaining online information sharing, and what individual characteristics may account for differences in information sharing intentions. The implications for authorities communicating on risks associated with food will be addressed.

Keywords: Online information sharing, Organic food, Risk perception, Attitude

Symposium title: Communicating the risks and benefits of enhanced food products

Expert views on factors influencing communication about food supplements: An international Delphi study

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Maastricht University, Maastricht,
The Netherlands

In 2011, it was estimated that the overall prevalence of food supplement use in the Netherlands ranged from 27 to 56 percent. Although a substantial proportion of the Dutch population uses food supplements, scientific evidence for their health effects is often uncertain and conflicting. Furthermore, there is no consensus among experts on the manner in which effects of food supplements should be communicated to consumers or which outcomes should be achieved with these communication efforts. The aim of the current study was to investigate experts' views on how effects of food supplements should be communicated to (potential) users most effectively in order to improve informed decision making (IDM) about their use or nonuse. We conducted an online three-round international Delphi study, in which we asked experts with various professional backgrounds for their opinion on the effectiveness of communication strategies regarding food supplements. During the first round a group of 38 experts (22 females, 15 males, 1 unknown gender; *age range* = 25 to 69), responded to a questionnaire with open-ended questions and identified 101 unique factors potentially related to communication about food supplements. More specifically, they identified 13 unique characteristics of an informed decision regarding the use of food supplements, 46 facilitating and hindering factors for IDM, 25 alternative communication outcomes besides IDM and 17 factors that may increase awareness of the effects of food supplements. During the second round, a larger group of 89 experts (55 females, 33 males, 1 unknown gender; *age range* = 25 to 69), was asked to rate the factors mentioned above on importance. In addition, the degree of consensus among the experts on the importance of the factors was measured. Consensus was reached on the importance of 6 of the 13 characteristics of IDM, on 18 of the 46 facilitating and hindering factors for IDM, on 11 of the 25 alternative communication outcomes besides IDM and on 11 of the 17 factors that may increase awareness of the effects of food supplements. During the third round, experts were encouraged to reach consensus on factors for which no consensus was reached in the second round. The results of this third round are currently being analyzed. The results of all rounds will be presented at the conference.

Keywords: Risk Communication, Food Supplements, Informed Decision Making

Security

Tuesday, 11:00 – 12:30, D 1.227
Chair: Mara Wesseling (Sciences-Po-CNRS, Paris, France)

How NATO can use risk management to meet Rusian military initiatives in Ukraine

C.M.S. von Syvertsen
The Norwegian Defence University Colleg, Oslo, Norway

Purpose: The purpose of the article is to suggest how the Ukraine crisis can be understood using risk management as a tool combined with using cognitive psychology of political leaders and the people of Russia. The article focuses on Russian military operations after the Second World War, particularly operations in states with close geographical and psychological distance to Russia. Defensive motives such as a rather positive role towards EC and NATO in former East European states can explain Russia's active military role. However, offensive arguments such a better economic performance and a greater degree of self confidence in international politics can also explain why Russian leaders and her people might have a tendency go back to their roots and lay strategies in accordance with a history built on centralization, a strong leadership from the top level in politics, and a tendency to have a long term focus on economic, political and military operations. An analysis must also pay attention to the roles of other states, particularly within EC and NATO and the poor economic performance, affecting military expenses negatively, affecting the power balance towards Russia.
Design/methodologies/approaches: Using Russian history, economic and political science as frames of reference, we try to get a better understanding of cognitive psychology related to military operations of both Russian leaders and her people. To focus on the dual relationship between Russia and the counterparts in EC and NATO we use game theory ("war gaming") as our main methodology. Given the increased economic, political and military tensions in the world game theory ("war gaming") is supplemented with classical and newer academic findings in chaos theory to gain deeper insights within cognitive psychology.
Findings (expected): Russian military operations are in general built on strong analytical reasoning deeply founded on a strong and proud Russian history. The military operations often have roots in mental frames of political leaders. These findings have consequences for how to react to react to risk.
Orginality: The study focuses on military operations of Russia in nations close by, measured using both geographically and psychological dimensions. The esearch focuses on concrrete examples of Russain military intiatives and how to react to risk management. Through studies of Russian history, economics, politics and military operations it might be possible to gain deeper insights on the Russian mentality of the leaders and her people using risk management as a tool.

Keywords: Risk management, Russian military invasions after World War II, Russian history, politics, economics, cogntive psychology, game theory, chaos theory

Asymmetry of risk perception of the US-Mexico border

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A lot has been written about US-Mexico border and it's one of the most frequently invoked case study of border disputes in the world. Mexico and the United States of America have held hundreds of meetings, signed dozens of documents in search of solution to this problem and in spite of these an optimized method of remedying was not found. Hence this article may not be very innovative and its purpose is to identify one among from many obstacles to solving this dispute, but rather missed by national political elites and researches. This is a risk perception at both sides of the border that is implied to be asymmetric. This asymmetry contributes to disparities in developing ways of risk management at the border. A comparative method, to be used, is based on collation of at the same time non-identical and not completely different objects. The analysis concerns the US-Mexico border and a way it is perceived through the prism of risk at the human and state level and consequences of this.
It has been found that differences in risk perception towards the same frontier and disparities between Mexico and the US elicit three groups of opposite risks: a unitary risk vs. a group risk, a human risk vs. country risk, a risk of a low standard of living vs. a risk of the national economy. At the same time methods of risk management used by both parties reflect these disparities and consolidate them. While the US primarily uses preventive activity towards border risks, the opposite side adopts mostly reactive methods of risk management. On the other hand costs of risk management are high for both sides, however proportionally to their incomes.
The comparative method of studies under risk perception, in that case, produces several more types of juxtapositions between countries sharing the border.
As far as it orders research methodology of risk perception and clarify a tense situation at the border it does not give a clear answer and solution to this long-lasting dispute. Hence a discussion concerning existent methods or forming new methods of risk management in the Mexico-US border management should arise as a consequence of this study.

Keywords: risk, risk perception, asymmetry, border

When encountering the unforeseen, which character strenghts are most important for military leaders?

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Norwegian Army officers being educated at the Norwegian Military Academy (NMA) will most likely serve in international operations after graduating. There is a very high probability that these officers will encounter unforeseen situations while serving in international operations. To account for this and to ensure that the officers have what it takes to encounter the unforeseen, the NMA's has launched a new concept of leadership development. In this concept character is a seen as a significant factor contributing to an officer and his or her leadership. At the NMA, emphasis is put on officer development which is thought to lead to a skill referred to as officer competency incorporating character in each officer. The concept is visualized in the NMA's pyramid of competency. The pyramid of competency visualizes how officer competency can be understood as a function of self-proficiency, subject-matter proficiency, and social proficiency. Character in each officer is regarded as an absolutely central feature of the officer competency. Officer competency is intended to constitute the acting dimension of an officer facing the unforeseen as well as unknown and unknowable situations. The NMA aims to develop character in its officers, but which character strenghts that are the most important for military officers is not clear. What character is and how it can be developed in officers needs to be investigated. The NMA has therefore initiated a new R and D-project in order to find out which character strenghts are most important for military officers. Two groups consisting of military officers and one group consisting of subject matter experts were given a list of 24 character strengths. The subject matter experts group was requested to only select the most important character strengths for military officers. The two military officers groups were requested to rate each of the character strenghts indicating how important they perceived each character strenght to be for military officers. The answers given by the three groups yielded a very high correlation regarding which character strenghts were perceived as the most important ones. Of the 24 character strenghts, 12 character strenghts were perceived as the most relevant and important for military officers. It is highly plausible that these 12 character strenghts will be important for other professional groups that may encounter unforeseen situations.

Keywords: Character; character strenghts: the unforeseen; officer development; officer competency

Economic loss

Tuesday, 11:00 – 12:30, D 2.225
Chair: Lars Bodsberg (SINTEF, Trondheim, Norway)

Economic loss in fracking practice, implications in insurance coverage

K.P. Dakakni
La Sapienza, Wollerau, Switzerland

The causal link between seismic growth following drilling activities, has been profusely analysed and described in recent studies specifically in the "hydro fracking technology"field.
The nexus between the two subjects has undoubtedly a strong reason d' être, inasmuch a high-pressure fluid injection that is causing earthquake effects is empirically understandable.
The events of May 2012 in Italy and in Australia also have highlighted other important aspects of seismicity in mining area and in well injections correlated operations.
The results of data analysis, extracted from worldwide earthquakes databases, have shown that data referred to seismic activity were in temporal and space dependencies to the gas-repositories/ extraction's activities data. The assessments have revealed important facts on the impact that industrial operations can have on the timing of earthquakes and on the probability that earthquakes are exceeding their normal strength (previous activity) during continued development of drilling operations.
However, because of uncertainties within the data, due to instrument error and occasionally missing samples, it is difficult to establish if some of the reported earthquakes were triggered by industrial extractions or by natural causes.
Gas can provide energy in the future with minimal environmental impact, or at least relatively minimal compared to oil emissions. However, this ecological conscience does not reflect on the other side the sustainability between additional costs resulting from the disposal of wastewater contaminated by chemicals, degradation of the territory and profits of the shale operators.
This paper is addressing different social and economic aspects deriving from the growing number of economic losses due to earthquake damage by addressing risk and insurance coverage implications mainly in the coverages redundancy. In the paper is presented also a framework for consistently structuring risk mitigation strategic actions to aid in developing the insurability processes and to preserve our living environment from ecological and therefore economic losses.

Keywords: insurance, economic loss, insurability, fracking, earthquakes, data analysis

Time, cost or safety: Management dilemmas in the Soma-Turkey Mine Fire May 13, 2014

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Turkey is located in a land which has rich mineral resources such as boron, chromate, copper, marble and coal. These resources are widely use especially in electricity generation. On May 13, 2014, in Soma-Manisa, the most devastating underground coal mine fire occurred in Turkey. 301 miners died and 122 were injured as a result of this event. There was a severe business interruption in the region since coal mines in Soma are the main resources of the thermal power plant in the same area. Experts mention there is at least $50 million economic loss due to loss of production. There is a choice for mine owners to conduct risk analysis and to invest accordingly, or to take the risk and most probably lose at the end. There is a cost- benefit decision to make by using existing official figures on the number of events, payments made to compensate for these events and number of insured. This paper investigates the economic aspects of coal sector in Turkey with a discussion on investment opportunities and safety regulations.

Keywords: mine, risk, cost, benefit,

Internal risk escalation in financial institutions: when do dictators intend to act?

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Since the global financial crisis regulators have been keen for financial services organizations to improve their 'risk culture', albeit they provide little evidence or guidance to assist them. However, the early escalation of risk events by employees within these organizations is considered as a positive indicator of 'risk culture', partly due to the scale of financial and reputation losses that can be incurred. In this article, we argue that the prevalence of risk escalation within these organizations is grounded in the pro-social behavior of the labor force whilst distinguishing between the motivations of employees. We employ a mixed methods field investigation involving the Theory of Planned Behavior and an innovative derivation of the classic dictator game that allows for the introduction of dishonesty and deception to take into account the cultural norms, collective moral climate and individual morality of employees within this industry.

Keywords: Operational Risk, Risk Escalation, Risk Culture, Risk Integrity, Dictator Game, Meta-Analysis.

Passive Defense and Business Continuity

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Organizations need to take steps to protect cyber or civil assets against malicious and hostile actions. Various passive defense policies are assesses and implemented using possibilities of hostile actions, value at risk and time to repair and recover. This is supplemened with Crisis Management policies oncce damage is done and business is interrupted. Both economic and social factors are considered and optimized using risk assessment and DEMATEL algorithms. A pilot case is implemented in Iran's Judicial system.

A business continuity mindset requires the ability to think of the worst-case scenario while simultaneously suggesting numerous solutions. Trial and error is not an accepted discipline at the first line of defense. It is necessary to maintain a list of contingency plans and to be always on alert watching for possible threats. Organizations and individuals should always be prepared with a rapid response plan to emergencies which would require analysis, drills and exercises.

The credibility and reputation of organizations may be heavily influenced by the perception of their responses during crisis situations. The type of procedures and communication involved in responding to a crisis in a timely fashion are critical challenge in businesses. There must be open and consistent communication throughout the hierarchy to contribute to a successful crisis-communication process. During the crisis management process, it is important to identify types of crises, as different crises necessitate the use of different crisis management strategies. We categorized ten types of crises: Natural disaster, Technological crises, Confrontation, Malevolence, Organizational Misdeeds, Workplace Violence, Rumors, Terrorist attacks/man-made disasters, Economic Disaster, Cyber and Information Disaster.

In general, risks in Iran Judicial system are broken into 3 types: information and cyber, physical, and technological. Review of existing facilities and systems reveal the potential threat and the affiliated risks. Thereafter, a proper response is devised to reduce the possibility and impact of a disaster, and the follow-up crisis management plan, should a disaster occurs. The overall goal is to reduce possible damages to value at risk and to assure the business continuity.

Business continuity of business assets and information are planned by passive defense and crisis management plans to reduce the damages caused by various threat and disasters. World Bank reports only about 4% of the estimated $10 billion humanitarian assistance is devoted to prevention. We review concepts and approaches to business continuity, passive defense and crisis management. A twelve part approach outlines the proposed business continuity plan process.

Keywords: Passive Defense, Business Continuity, Safety and Security Issues, Risk Mitigation

Environmental protection standards

Tuesday, 11:00 – 12:30, D 2.221
Chair: Frederic Bouder (Maastricht University, Maastricht, the Netherlands)

Strategic Risk Assessment in (Environmental) Law Enforcement

M.G. Faure[1], F. Blanc[2]

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Strategic Risk Assessment in (Environmental) Law Enforcement by Florentin Blanc & Michael Faure
The European Commission is increasingly interested in improving the quality of inspection and monitoring at the Member State level. Whereas the recent OECD report on regulatory enforcement and inspections generally deals with regulatory enforcement in all domains, the European Commission, more particularly the DG Environment is strongly focusing on the necessity to improve the quality of environmental inspections. The European Commission originally only had a soft instrument in this respect, more particularly a recommendation with minimum criteria for environmental inspections. However, recently the European Commission is increasingly, at least in the environmental domain, also stressing the necessity to increase the quality of inspections and monitoring within Member States and is hence also considering the use of more binding instruments.
Some theoretical views in the literature refer for example to the so-called "Tit for Tat"strategy by enforcers whereby agencies would reward firms that would voluntary self-report violations with a more lenient treatment. In this paper we explore the idea of smart supervision and enforcement, which does not involve random monitoring and inspections of all potential regulatees, but focuses efforts on those where higher benefits of inspections could be expected - and also does not impose sanctions in a mechanical way to any violation found, but modulates the enforcement response based on risk and compliance behaviour. The goal of our paper is to critically discuss this phenomenon of smart enforcement by highlighting both the theoretical basis as well as the empirical evidence. Moreover, recent developments at OECD, EU and other policy levels with respect to the implementation of those types of targeting strategies will also be discussed.
The paper will be set up as follows: after (1) an introduction including definitions of the key concepts and of the scope of the paper, (2) the theoretical basis for smart enforcement and targeting will be provided; next (3), the available empirical evidence with respect to the (in)effectiveness of targeting strategies will be reviewed. Next (4), the policy perspective with respect to evidence-based enforcement (both OECD and EU level) will be presented. This will be followed by a critical discussion of specific issues inter alia focusing on the relevance of monitoring and compliance mechanisms within industries and the possibility to lay down specific rules concerning evidence-based and smart enforcement within mandatory legislation or guidelines (5). Section 6 concludes.

Keywords: targetting, compliance, enforcement, smart enforcement, inspection and monitoring

Symposium title: Strategic Risk Assessment in (Environemntal) Law Enforcement

The Role of ENGOs in Environmental Regulation: A French Case Studies

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CRED - University Paris II Panthéon Assas, Montrouge, France

In this article, we try to observe whether ENGOs have specific goals and specific strategies in trials. We do this on the basis of a unique database consisting of the entire set of environmental cases judged by the French Supreme Court during 1956-2010. We observe that ENGos are more successful than other parties in trials and that they heavily rely on regulatory knowldedge and scientific information to deal with the two major failures of environmental litigations: evidence of causation and assessment of damages. We conclude that ENGOs' legal actions encourage compliance with regulation and help solve civil liability failures, especially causal uncertainty and victims' apathy. Finally, we observe that ENGOs act as latent interest groups that become active only under specific circumstances to ask for more stringent regulation.

Keywords: Risk assessment, Scientific data, Litigations, Pressure groups
Symposium title: Open access and data transparency: next steps

Regulatory standards in risk governance - the case of carbon capture and storage (CCS) and carbon lock-in

B. van Oost
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Policy-makers in the EU and the US have reluctantly embraced CCS as a crucial element of the future energy mix. This is spurred by the expectation that fossil fuels will remain the world's main energy source for decades to come. Although introduced to reduce the risk of anthropogenic climate change in a fossil-based economy, (the prospect of) underground CO2 storage may also increase the risk of carbon lock-in. That is, the promise that CO2 emissions will eventually be abated at some point in the future may legitimize the construction of new fossil-fired power plants, even though the actual commercial-scale application of CCS remains unsure: it entails numerous economic and technical uncertainties and several CCS projects in the EU and the US have recently been cancelled.
To reduce the risk of 'carbon lock-in', regulatory standards play a crucial yet contested role. A recent proposal by the US Environmental Protection Agency to mandate (partial) CCS on coal-fired power plants attracted over 2 million (!) public comments. Parties strongly disagreed on the state of CCS technologies and on the risks and uncertainties involved in their commercial-scale application. It is tempting to understand this as an 'instrumental use of doubt', where reference to risks and uncertainties merely serves the interests of environmental or industrial groups in having either stringent or lenient regulations. In my presentation, I want to propose a different interpretation of this regulatory debate. Taking inspiration from Science and Technology Studies (STS), I want to suggest that regulatory standards are negotiated within 'evidential contexts'. Technical knowledge, proof and evidence (i.e. on risks and uncertainties) should be understood in relation to this context. The presentation is based on field work done in the United States, where 22 qualitative interviews were conducted with parties involved in CCS commercialization (e.g. DOE/NETL, EPA) and documents from EPA's standard-setting process were analyzed. I will reflect on the tensions that emerged between regulatory standards that were introduced at both the Federal and the State level. In conclusion, I will reflect upon the potential of regulatory standards for governing CCS development and mitigating the risk of carbon lock-in.

Keywords: Risk governance – regulatory standards – evidential context – carbon lock-in

Affect heuristic

Tuesday, 11:00 – 12:30, D 1.221
Chair: Dominic Way (King's College London, London, United Kingdom)

Explaining pig farmers' and veterinarians' intention to reduce antimicrobial usage: Findings from two surveys in six European countries

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Antimicrobial (AM) resistance is an increasing problem in human and veterinary medicine and has been related, among other factors, to the extensive use of AM in pig farming. To manage this problem, it is important to know which factors influence both pig farmers' and veterinarians' intention to reduce AM usage in pig farming. Their intention-or willingness-is a prerequisite for actually taking measures to reduce AM usage.
As part of the European MINAPIG project (www.minapig.eu), we conducted a mail survey among 1,309 pig farmers in Belgium, Denmark, France, Germany, Sweden and Switzerland. Additionally, 334 veterinarians from the same countries completed an online survey. Items in both questionnaires concerned, among other topics, the risks, benefits and need of AM usage, intention to reduce AM usage, perceived control (i.e., perceived ease of reducing AM usage), and the relation with their veterinarian/farmers. Farmers also estimated the AM usage at their farm and completed a knowledge scale. The veterinarian survey additionally included items about social pressure to prescribe AM and the feasibility of reducing AM usage in pig farming.
Two regression analyses were conducted to explain farmers' and veterinarians' intentions to reduce AM usage. Among the farmers, higher intention was related to higher perceived risks of AM usage, lower perceived need to use them, higher self-reported AM usage, a better relation with their veterinarian and, most significantly, higher perceived control to reduce their AM usage. Knowledge about AM did not influence farmers' intention. Also, Swedish farmers showed less intention to reduce their AM usage than other farmers. Among the veterinarians, intention to reduce AM usage at their clients' farms was related to lower perceived need to use AM, higher perceived control by farmers to reduce AM usage, higher feasibility of AM reduction in pig farming, and a better relation with farmers. Social pressure to prescribe AM did not affect veterinarians' intention to prescribe. French, German and Swiss veterinarians appeared more willing to reduce AM usage than Danish veterinarians.
In sum, to increase farmers' and veterinarians' intention to reduce AM usage in pig farming, it appeared important to show them how they can practically achieve an AM reduction at farms, for example, by pointing out alternative methods to keep pigs healthy and that reducing the AM usage at farm level leads to large reductions on a country level. A good relation between farmers and veterinarians is therefore essential.

Keywords: Antimicrobial resistance, Pig farming, European countries, Risk perception, Intention

Solar radiation management: Impact of the affect heuristic on people's perception

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Different geoengineering strategies have been proposed to fight climate change. However, public perception and acceptance will be crucial for the implementation of these technological approaches, such as solar radiation management (SRM). We used an experimental approach to examine factors influencing laypeople's perception of SRM. Participants (N = 250) were randomly assigned to one of three conditions. The control group did not receive any specific information about SRM but was only informed that technologies existed for fighting climate change. The participants in the experimental groups received a short explanation of SRM, either with or without mentioning possible risks associated with this technological approach. Our experiment's results indicated that a mere description of the technology already reduced support for technological solutions to fight climate change. This finding poses a serious challenge to researchers interested in convincing the public to accept experiments related to SRM. In the control group, the affect associated with climate change was significantly correlated with the evaluation of SRM. However, the participants who received information about SRM did not rely on affective responses regarding climate change. Finally, the results of a mediation analysis showed that the experimental manipulation evoked different levels of negative affect in the three conditions; based on the evoked affect, the participants evaluated the benefits and risks associated with SRM differently.

Keywords: risk perception, climate change, geoengineering

Heat protection behaviors and positive affect about heat in the United Kingdom

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Climate experts warn that heat waves are expected to become more frequent, longer lasting, and more intense in the future. Heat waves pose serious health risks. Yet, people in the UK seem to look forward to experiencing hot summers. Such positive feelings about heat may reduce their willingness to implement heat protection during heatwaves. Indeed, research on the affect heuristic suggests that any positive or negative emotions evoked by risk messages may be used as cues to inform concerns about risk protection.

In line with the affect heuristic, our national UK-wide survey (Study 1) found that public warnings to protect against heat during the 2013 heatwave were associated with positive feelings among UK residents. Mediation analyses suggested that heat protection recommendations may motivate heat protection behaviors by increasing their perceived effectiveness, but undermine their implementation by evoking positive affect about hot weather. One possible interpretation of these findings is that heat protection warnings to UK residents could be more effective if they did not evoke positive feelings about the impending hot weather.

In a subsequent national survey-based experiment (Study 2), we therefore compared three intervention strategies for promoting heat protection among UK residents, to a no-intervention control group. The first intervention strategy built on the availability heuristic by evoking memories of high summer temperatures. However, recalling high temperatures made our UK participants feel relatively good, which undermined their intentions to protect against heat. The second intervention strategy built on the affect heuristic and aimed to evoke negative affect about summer temperatures, but it led to many participants recalling relatively unpleasant experiences with low summer temperatures. The third strategy combined both approaches and effectively evoked memories of high summer temperatures that were also unpleasant. Across three experiments, the third strategy consistently increased intentions to protect against heat as compared to the control group, performing as well as or better than the two alternative strategies. Mediation analyses indicating the role of recalled temperatures and affective evaluations of these recalled temperatures. We discuss our findings in the context of the affect heuristic and its implications for developing interventions about other 'pleasant hazards.'

Keywords: Risk perception and communication, affect heuristic, heatwaves

Linking risk perception and behaviour: a key role for affect in decision making in response to multiple hazards

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Establishing the links between perceptions of risk, decision making and behavioural outcomes in real-life situations remains an elusive goal for risk research. This is partly because it is rare for individuals or groups to be presented with a single, compelling, focal hazard. Far more frequently people are faced with numerous, qualitatively different hazards. This forces them into a dual decision process; first to prioritise and select the most salient (at that time) and, only secondly, to decide what to do about it. A key influence on part one of this decision process, selection, is thus the extent to which one hazard is perceived to require a more urgent response than the others.

The paper is based on qualitative research investigating the contribution of perceptions of risk to the aetiology of adverse events in UK National Health Service (NHS) hospitals. Patient safety remains a key issue in healthcare with around 7% of patients admitted to hospital being put at risk of harm through a potentially dangerous occurrence (adverse event). Respondents in this study were 1) ward-based clinical staff observed during their working day and then interviewed in depth about how they prioritised (made choices about) what they did and why; and 2) staff reporting an adverse event, interviewed retrospectively about their recollections of the incident and the choices they had made at the time.

The empirical findings reported here suggest that staff do perceive a wide range of qualitatively different hazards in their surroundings and select (with or without conscious thought) a focal hazard to which to respond. However, the selected hazard may not relate to patient welfare, even where a threat to patient safety is recognised. Hence, the prioritised hazard may not be the most obvious or objectively desirable.

A further and highly important finding was that affect, or the emotional (rather than cognitive) connotations of the perceived risk from a particular hazard, may be critical in determining both selection and behavioural response. From a patient safety perspective this may explain both variation between individuals in their response to patient needs and how routine safety precautions may be neglected in favour of responding to a novel hazard which may appear more urgent.

Keywords: risk perception, decision making, patient safety affect

Methodology in risk perception

Tuesday, 13:30 – 15:00, D 1.225
Chair: Michael Siegrist (ETH Zurich, Zürich, Switzerland)

Measuring risk tolerance: does the methodology matter

O. Ozdemir Yilmaz, S. Sahin
Middle East Technical University,
Ankara, Turkey

Risk tolerance is widely used in the personal financial planning referring to an investor's attitude towards risk. It is the amount of uncertainty or investment return volatility that an investor is willing to accept when making a financial decision. Risk tolerance scores are used (1) to examine the relationship between demographic characteristics and risk tolerance, and (2) to investigate the effects of risk attitude on predicting portfolio risk for different countries/ cultures. In this respect, the methodology used in assessing individuals' risk tolerance becomes an important issue. In literature, there are mainly two different approaches in measuring risk tolerance; lottery versus financial risk assessment technique (FRT). In the lottery approach, risk tolerance is measured using gambling scenarios, whereas the FRT measures risk tolerance using investment scenarios. This paper investigates whether lottery risk assesment technique and FRT differ in measuring the risk tolerance of individual investors. Moreover, it examines the differences in two well-known financial risk assessment techniques. The preliminary results obtained from asking questionnaires to the students showed that the individual risk attitudes differ when measured through lottery versus FRT (FRT measurement tend to result in more risk aversion). However, the two different FRT fall into the same line.

Keywords: risk attitude

UN-METH Methodology for Handling the Unforeseen

M. Kaarstad, G.E. Torgersen
Institute for Energy Technology, Halden, Norway

Through a research project at Institute for Energy Technology (IFE), *UN-METH*, a methodology for evaluating an organisations' ability to handle the Unforeseen has been adjusted and developed. UN-METH comprises two methods that can be used separately or in combination: *UN-CAF* (UNforeseen Competence Assurance Framework) and *UN-ORG* (UNforeseen ORGanization questionnaire).

UN-CAF is a theoretical analysis method, that can help identifying to which extent there is a good correlation between an organization's plans for general emergency preparedness, and its principles for dealing with the unforeseen. Further, the analysis can provide relevant input to adjustments of strategic preparedness documents in the organization at hand. Focus of the analysis is explicitly on competence in handling the unexpected in emergency situations, and not on skills related to technical disciplines.

UN-ORG is a tool where individuals with emergency experience in an organisation can assess the extent to which their organization has emergency plans and routines that can handle the unforeseen. Currently, this tool exists as a questionnaire, consisting of a number of indicators divided into dimensions that are rooted in basic research about the unforeseen. The questionnaire can provide average values on each dimension, illustrating for the organisation in which area they need to improve. However, it is desirable that this questionnaire is further developed into a reliable instrument.

UN-METH was tested in a case study, and through the case study, both strengths and weaknesses in the organisations' ability to handle the unforeseen were uncovered. The UN-CAF and UN-ORG methods can be used separately or as a supplement to each other to consider whether there is an agreement between the analysed documents, and the opinion of individuals.

So far, UN-METH seems promising, and we believe it can be used in industry to help organisations calibrate their general emergency preparedness towards their ability to handle the unforeseen in emergency situations.

Keywords: Methodology, Unforeseen, Emergency

Strategic didactic model for the unforeseen

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For institutions and individuals, many serious incidents come unexpected. *Is it possible to plan, teach and train for something unknown? How to get one step ahead of the unforeseen?* In this paper, we present some results from a Norwegian research and book project *Pedagogy for the Unforeseen* (forthcoming 2015). The paper introduces a brief description of the concept of the unforeseen and connects it with models of teaching, in which the objective is to 'master' unexpected events, and argues that traditional didactic models, e.g. the didactic relation model (Instructional Systems Development/Design), are unsufficient when it comes to the dealing of unforeseen events. Therefore, such models cannot be used as models for the design of training and practice of mastering unforeseen events. In fact, we do not really know what kind of skills that should be developed, as we do not know what an unforeseen event does require. Hence the need to find structures that can replace traditional didactic thinking. Thus, this paper introduces principles and theoretical background for the development of new educational factors which we denote "didactic degrees of the unforeseen", as a contribution to a more comprehensive and adapted didactic model for an education and training of the unforeseen (e.g. development of scenarios, detecting warning signs). Such pedagogical thinking would be particularly relevant for those who involved in strategic competence development in education-, crisis- and military organizations.

Keywords: Instructional design unforeseen

Towards a methodology for quantitative intersectional analysis of risk positions

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Theaim of the paper is to develop the methodology for quantitative intersectionalanalysis and test it empirically. In short, the common ground of the differentapproaches of intersectional research is that society has multiple systems ofsocial stratification, i.e. individuals are ranked hierarchically according to economicand social status. These systems of social stratification are interlocked, i.e.every individual holds a position in different systems simultaneously. Thelocation in the matrix of domination influences individual worldviews andlife-chances, and do it differently than the impact of any single form ofstratification would. Itis recognized that quantitative approaches to intersectionality are lacking orare in development. One thing that several studies focus on is the use ofinteraction effects as a way of identifying multiplicative disadvantages. Thesestudies often proceed from the same kind of analyses that are common inquantitative studies, starting with bivariate analysis of, say, gender orethnicity, and then adding multivariate analyses and interaction effects. Inline with Bourdieus way of linking objective structures to subjectiveexperiences we argue that multiple correspondence analysis (MCA) is well suitedto capture the social space where the matrix of domination occurs. This hypothesisis tested on quantitative data composed of a Swedish national survey from 2011 aboutrisk perceptions and risk positions. Preliminary results indicate that MCA iswell suited for quantitative intersectional analysis and can enhance knowledgeabout the relation between social stratification and risk positions.

Keywords: risk positions, risk perceptions, intersecionality, doing risk

Symposium: Tackling the complex problem of antibiotic resistance: connecting science, policy and practice

Tuesday, 13:30 – 15:00, D 1.221
Chair: Mariken van der Lubben (National Institute for Public Health and the Environment (RIVM), Bilthoven, The Netherlands)

The rise of antibiotic resistance (AMR) has become a serious threat to health, welfare and. The tackling of this problem requires an integrated approach, because of interdependencies and the various and sometimes conflicting interests of many stakeholders: the health care sector, the science community, the agricultural sector, national and local government and, not the least, civilians.
In this symposium, the risk of AMR will be discussed and analysed using the IRGC framework. The current policy measures against AMR follow the perspective of human medicine: screening, treatment and isolation of infected hospital patients. Future measures may be stricter and give rise to ethical questions such as long-term isolation of patients and measures that go beyond the medical profession and maybe affect for instande the veterinary domain. Implementation of these measures leans upon integrated care and a one-health approach. It was recently concluded that the health care system in the Netherlands lacks integrated care at some points.
An analysis of the threat of antibiotic resistance according to the Dutch National Risk Assessment methodology shows that the impact on society can be serious if different types of incidents relating to AMR occur more frequently and at the same time. Unrest amongst the population can grow, faith in governmental and other institutes can be undermined and in the future the numbers of cases of serious illness and fatalities, costs and economic damage, particularly within the agricultural sector, can rise to an unacceptably high level. Experts in the field of AMR confirm the necessity to tackle the complex issue. However, an international consultation shows divergent viewpoints among experts, which may impede decisive policy action.

The need to govern the complex issue of antibiotic resistance

I.M. van der Lubben, J. van Dissel
National Institute for Public Health and the Environment (RIVM), Bilthoven, The Netherlands

Background and Aims The rise of antibiotic resistance (AMR) has become a threatening and costly problem. Following the IRGC model, the risks related to AMR can be classified as ambiguous since the ability of antibiotics to cure infections is very limited. The transmission of AMR can easily be underestimated. For long time, resistant bacteria can go unnoticed, while they also spread among healthy people and animals. The current policy measures against AMR follow the perspective of human medicine: screening, treatment and isolation of infected hospital patients. Future measures may be stricter and give rise to ethical questions such as long-term isolation of patients and measures that go beyond the medical profession and affect the veterinary domain. Implementation of these measures leans upon integrated care and a one-health approach.
Methods A multidisciplinary group of scientists, policy makers and human and veterinary medical professionals were asked which actions are most needed in the control of antibiotic resistance. Two scenarios - descriptions of fictitious developments- covering problems relating to AMR in a nursery home and veterinary setting were used.
Results and discussion it was agreed upon that the health care system in the Netherlands lacks integrated care at some points. It was also concluded that this integrated approach against antibiotic resistance is needed. An integrated governance model to ensure the timely and integrated approach of this urgent threat is needed. Human, veterinary and environmental aspects need to be addressed. We therefore propose a governmental approach in which discussion about conflicting interests can be addressed and facilitate a national action plan.

Keywords: Antimicrobial resistance (AMR)

In-depth thematic analysis of the antimicrobial resistance threat within the perspective of the National Risk Assessment

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Background and Aims In 2007, the Netherlands established an All Hazard National Security Strategy, in order to classify potential risks, threats and hazards and enhance adequate preparation and capacity building, This instrument for multi-hazard risk management is intended to contribute to the prevention of societal disruption as a consequence of a disaster or a crisis. Potential hazards (both natural and technical) and malicious threats are analyzed using a methodology called the *National Risk Assessment (NRA)*. These threats and hazards are described in scenarios, which are assessed in terms of likelihood and impact using a uniform scoring method and are therefore rendered comparable. The impact criteria reflect the five vital interests of the Netherlands: territorial security, physical safety, economic security, ecological security and social and political stability.
Methods This methodology has been used to conduct an in-depth thematic analysis regarding antimicrobial resistance (AMR). Eight scenarios - descriptions of fictitious developments and events in the future - were created covering a wide spectrum of potential problems and risks relating to AMR and selected from a variety of perspectives (healthcare; environment; veterinary) and types of problem (endemic/ non-endemic). A multi-disciplinary group of both AMR and impact criteria experts evaluated these scenarios using the NRA methodology.
Results and discussion The likelihood of the AMR scenarios was given a relatively high score and it was noted that a number of the AMR scenarios already take place in the real world or are on the verge of occurring. Their impact was assessed to be limited. However, the impact can be serious if one-off incidents relating to AMR occur more frequently and at the same time. Unrest amongst the population can grow, faith in governmental and other institutes is undermined and in the future the numbers of cases of serious illness and fatalities and financial consequences can be high. For one particular scenario, economic damage is expected within the agricultural sector.
Since AMR forms a serious threat, activities have been or will be put in place to limit the consequences of AMR. In a variety of areas, prevention and combatting of AMR will be reinforced in the years to come. Activities will be initiated and perpetuated with regard to prevention of infectious diseases, proper use of antibiotics in human healthcare, monitoring, international action, development of new antibiotics, research as well as prevention of animal diseases in the livestock farming sector, and communication about AMR.

Keywords: antimicrobial resistance (AMR)

Divergent viewpoints of antibiotic resistance experts: an international consultation

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Background and Aims Scientific experts differ in the way they provide policy advice on complex issues such as antimicrobial resistance (AMR). For example, whereas some experts may feel their primary task is to carry out fundamental research, others may actively engage in the policy dialogue. The literature only provides theoretical, ideal-typical ideas about expert roles, with little empirical underpinning. To provide empirical evidence for these theories, we conducted an international expert consultation with as main research question: What are the different roles of AMR experts when they provide policy advice? **Methods** Q methodology was used in order to explore different expert roles. Data was collected with the web-based program POETQ, among international experts who were selected through a structured expert nominee system. In total 28 AMR experts participated. Each expert evaluated and ranked 38 statements describing different aspects of the ways in which experts may see their role as policy advisors. Responses were analyzed using Principal Component Analysis (PCA). **Results** The consultation shows a rather wide range of different viewpoints among the participants. However, almost all experts see AMR as a great hazard. According to virtually all experts, the use of antibiotics needs to go down. They suggest different ways of doing that: improving diagnosis, reducing prescription and more prudent use (both in the human medicine as well as in the veterinary sector). Other important issues in the domain of AMR are: lack of new antibiotics and incomplete scientific knowledge on the origin of AMR. Furthermore, experts agree that AMR is a problem to society that needs to be governed. **Conclusion** Experts in the field of AMR confirm the necessity to tackle the complex issue. However, the consultation shows divergent viewpoints among experts about their role as policy advisor. Furthermore, they suggest different measures to reduce the use of antibiotics. These divergent measures may impede decisive policy action.

Keywords: Roles of scientists, Antibiotic resistance, Uncertainty, Policy advice, Expert consultation, Q method
Symposium title: Tackling the complex problem of antibiotic resistance: connecting science, policy and practice

EU - Risk regulation

Tuesday, 13:30 – 15:00, D 1.227
Chair: Pierre Bentata (CRED - University Paris II Panthéon Assas, Montrouge, France)

European Styles of Risk Regulation

H. Rothstein
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Contemporary debate over risk regulation in Europe has often pitted those that point to a continental European proclivity for disproportionate and precautionary risk regulation that inhibits growth against those who decry arguments for more risk-based regulatory rationales as neo-liberal deregulatory assaults on public protection. Yet recent comparative international research from the *HowSAFE* project (tinyurl.com/howsafe-project), suggests that such debates may overlook important differences within the EU in how member states think about and manage risk. Drawing on a comparison of the UK, France, Germany and the Netherlands, this paper both maps some of those differences as well as points to a set of institutional factors that helps explain those differences. In particular, the paper suggests that national regulatory variety is related, inter alia, to: constitutionally embedded governance norms that shape the scope and limits of the state's protective rights and duties; accountability structures; legal traditions of common and civil law; and even the design of the welfare state. The paper suggests that studies that pay insufficient attention to how such factors shape regulatory behaviour are liable to misunderstand why risk ideas have greater salience in some polities than others, and potentially mistake ambitious regulatory goals of safety for risk aversion. In so doing, the paper suggests a new way thinking about the centrality of risk ideas to regulation.

Keywords: European Styles of Risk Regulation; States' protective duties; legal tradition and regulation; welfare state

Regulating Uncertainties of New Breeding Techniques in the EU: Problems and Prospects

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Regulation of Genetically Modified Organisms has been one of the core focuses of risk regulation research for more than one decade worldwide. Nowadays, due to the development of several new breeding techniques (NBTs), their derived products brought new challenges to risk regulation area, since they blur the distinction between GMOs and non-GMOs (Podevin et al., 2012), and proves to be more controversial to regulate.

From technical view of point, two aspects are noted when organisms are defined as GMOs. Firstly the genetic material has been altered; secondly the alteration will not occur naturally. It is arguable that the traditional process-based approach fits the interpretation facing challenges brought by NBTs. Rather it is more appropriate to interpret the definition of GMOs to address both aspects, namely, the process aspect that actually the way to alter genetic materials through biotechnology, and also the product aspect that the resulting organism is indeed possessing a new combination of genetic material. In addition, this change cannot be expected to occur naturally (Jacobsen and Schouten, 2009). So the first step is to provide the more certainties for NTBs-derived products technically.

From legal view of point, facing challenges of NTBs and increasingly pressure from other trade partners within the WTO regime, the EU might need to rethink about its *de facto* process-based regulatory framework. Two implications provided are to consider legal uncertainties of NBTs. Firstly, interpretation of definition of GMOs needs to take into account the implementation of international regimes in the EU. Secondly, a derogation targeting NBTs might be considered in the EU Directive 2001/18/EC, similar to the derogation in the existing definition on GMOs in the EU, which is currently concerning mutagenesis and cell fusion (Palmgren et al., 2014).

Therefore, it deserves an in-depth analysis on the risk regulation of NBTs, the problems and prospects will be respectively analyzed in the course of the paper, it aims to provide an appropriate way for decision-makers to deal with uncertainties of NBTs in the EU, which is not only ideally from technical perspective, but more importantly from legal perspective.

Keywords: Uncertainties, New Breeding Techniques, EU

In Science We Trust: Another Wrong Idea in the Wrong Place

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The European Union suffers from increasing lack of trust. While this is a problem even for the high-level institutions, the Union's response in many cases is to employ specialised agencies - which often prejudice the political decisions. The latter are little known to the public, and trusted even less, yet their claim to authority is allegedly justified by their expertise. On the assumption that agencies can be trusted if they muster the 'best scientific expertise' everything they should do it to excel. Excellence is expected to bring about universal suport. The proposed paper argues that this misunderstands both science, which thrives on controversy rather than consensus, and trust, which is a prize to be gained by performance and not a resource to draw upon. Agencies themselves *need* trust, they cannot tap 'Science' for that, but must *build* trust in *their* science.

Thus, the project will study how trust in European expertise is being built. It departs from the concept of epistemic subsidiarity, proposed by Sheila Jasanoff, who identified that in different countries there are different systems for generation of trust the process of production of policy-relevant knowledge. Thus, the unique nature of the EU presents a challenge, because it needs policy-relevant knowledge generated at European level but cannot rely on any existing model for generation of trust.

The paper will present several document-based case studies of the ways the European Food Safety Authority (EFSA) deals with salient regulatory questions - the authorisation of the cultivation of a GM potato, the prohibition of certain pesticides dangerous for bee populations and the e-coli outburst in 2012. The commonality between these cases is that they all require great reliance on very specialised knowledge, yet in the same time they affect much broader societal concerns. On the other hand, each of them is governed by its own legal regime and their comparison potentially allows us to identify the institutional circumstances, which facilitate the generation of trust and those which dissipate it.

Keywords: GMO, food safety, trust, evidence, science, STS

Emerging technologies

Tuesday, 13:30 – 15:00, D 2.215
Chair: Marijke Hermans (Maastricht University, Maastricht, the Netherlands)

More than a matter of risk: the erroneous reduction of societal aspects of new technologies to risk perception

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New technologies come with great expectations that they will deeply change the way society operates, and that they are relevant and urgent for the 'grand challenges' of European societies. Nanotechnology in particular is often labeled as a 'disruptive technology' that, due to its enabling and pervasive character, has the potential to become the carrier of the next industrial revolution. Industrial and governmental roadmaps of nanotechnology promise to change most domains of economic and social life: energy production, material use, food production and medicine. Yet, when such sweeping statements receive more elaborate attention and when the question of societal embedding of new technologies comes to the fore, a typical reduction of scope occurs from societal embedding to risk perception.
This paper delineates the two steps that are implied with a reduction-to-risk: (i) the question of societal embedding is reduced to a problem of public acceptance; (ii) the problem of public acceptance is reduced to risk perception. The paper draws from cases of the US National Nanotechnology Initiative (NNI) and the Dutch NanoNextNL program, a big research program on nanotechnology with over 250 PhD projects and 100 industrial partners. The theoretical outlook is Science and Technology Studies (STS) and the applied methods are discourse analysis of policy documents, and participant observations of program meetings.
Societal embedding of new technologies is more than public acceptance. It refers to broader questions about the way economic structures are re-organized, about changing responsibilities and liabilities, about new roles and identities, about new ethical dilemmas. Public acceptance, in its turn, refers to more than 'risk perception'. Lay people will have moral and political concerns as well, such as privacy or solidarity. Typically, for developers of nanotechnology the possible resistance of the public appears as a barrier to be countered with better communication.
Finally, the paper discusses how the erroneous reduction-to-risk connects with other diagnoses of the fate of novel technologies in society, in particular the work of Ulrich Beck on 'risk society' and Anthony Giddens on 'reflexive modernization'.

Keywords: new technologies, societal embedding, risk perception

All in the game? Learning from nanosafety governance in the Netherlands

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The Netherlands

A decade of nanosafety governance in the Netherlands provides an interesting case for reflecting on risk governance philosophies and strategies. This paper builds on a detailed history of actions and responses across different social spheres (science and technology, policy and politics, media and societal organisations) in the Netherlands, within the context of international, and in particular European, discussion and (lack off) regulatory action. It is the broad range of actors, populating these different spheres, but all involved in processes of sense making and decision making, that has legitimated approaches under the label of 'risk governance', in relation to the challenges of complexity, uncertainty and ambiguity in risk assessment and risk management. However, it is also this force field of actors that points to the political nature of governance, playing out in different, but connected arenas (Benz 2007).
We will argue that processes of political agenda setting, features of the institutional landscape and the organisation of responsibilities are not just questions of 'implementation', but have to be at the heart of risk governance philosophy and strategy when pursuing risk governance functions like coordination and participation. In the case of nanosafety this has to do with the central role of the government in stimulating research and innovation in new and emerging technological domains, such as nanotechnology. Closely related is the role of political agenda setting and policymaking vis-à-vis parliament. Analysing these roles, the paper argues that both are crucial for understanding whether risk governance processes lead to a reconfiguration or a reproduction of responsibilities within the existing institutional landscape.
For example, establishing precautionary measures for dealing with the uncertainties in nanosafety, such as providing guidance, establishing oversight or facilitating dialogue, have widely been endorsed. But actions and debate on how to establish such precautionary measures have been playing out differently in different domains. The ability of firms and research organisations to take up local/individual responsibility for occupational safety has been profiting from a number of guidance instruments. But establishing oversight, which is particularly important for protecting consumer product and environmental safety, has been running against tough political challenges with regard to collective responsibilities. We will show that the political nature of organising responsibilities is all in the game of risk governance and propose governance concepts and perspectives for facing problems of organised irresponsibility accordingly.

Keywords: risk governance; nanotechnology; political agendasetting; institutional landscape

New technologies as social experiments: implications for risk governance

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Tu delft, Delft, The Netherlands

It has been argued that when new technologies, such as nanotechnology or synthetic biology, are introduced in society this amount to a kind of social experiment. One reason to call the introduction of new technology an experiment is that we do not and usually cannot fully known all risks of these technologies before they are actually introduced in society. As a consequence, some risks will only become known or can only be reliably assessed and estimated after a technology has been introduced in society.
This perspective on new technologies and the risks they may bring to society has consequences for risk governance. In the paper, we will discuss several of these consequences. The main implications we will discuss are: 1) the need to not only assess risks beforehand but also to assess uncertainties and, in as far as possible, ignorance about possible risks, 2) the need for systematic monitoring of risks (and other effects) after a technology has been introduced in society, 3) The desirability of a conscious and gradual scaling up of the use of the technology in society, 4) the desirability of flexible and adaptive design of technologies so that design changes can be made easier if unexpected risks are detected during the introduction of a technology, 5) allowing citizens (and other experimental subjects) the possibility to withdraw from the experiment, 6) attention for institutional and normative learning in addition to learning about risks, 7) the carrying out of 'regulatory experiments' to allow for such learning.
We will argue that some of these implications have been implanted in the risk governance in biotechnology in Europe, mainly as a response to public protest and unrest. However, in the field of nanotechnology, these lessons seem still to be largely ignored.

Keywords: risk governace, uncertainty, experimentation, new technology

Constructive regulation for disruptive technology

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The Dutch government sees innovation as the key ingredient for economic growth and employment. It aims for the Netherlands to win back its place among "innovation nations". Innovations on the basis of NBIC technology (Nano-, Bio-, ICT and Cognitive technology) seem particularly promising. Not only could they provide economic-industrial progress, they also help address grand societal challenges. The aim to innovate comes with a call for "creating space"by liberating entrepreneurs from inhibitory regulations. That innovation and regulation are treated as opposites is not surprising. Regulation often takes a risk-based approach. In the EU the precautionary principle is the fallback for disruptive technologies. And in general, politicians tend to meet public unrest or uncertainty with swift regulatory action, in the Netherlands dubbed as the "risk-rule reflex".This Rathenau project explores the relationship between regulation and NBIC-technologies, examining what is wrong with several assumptions in the current debate. To analyse what the government can, and cannot, do to make the relationship more constructive, it uses four cases by guest authors: Liability regimes and authorship on internet (Maurice Schellekens); Synthetic biology and IP-regimes (Henk van de Belt); Innovation paths in automated driving in the Netherlands (Bonno Pel); and innovative EU regulatory arrangements for nano-medicine (Bärbel Dorbeck-Jung).On the one hand, the cases confirm a current turn towards "anticipatory governance"in regulating innovation. The fast pace, complex interactions and unpredictable character of "NBIC convergence"make it impossible to manage or even understand the risks entailed. Regulation requires flexibility and cooperation, as provided by soft-law and self-governance arrangements. Also, the government cannot control developments and risks cannot be avoided. Rather, stakeholders should be more explicit about (un)acceptable loss and (un)desired outcomes.On the other hand, however, the cases show that a "government"approach - hard law and linear accountability schemes - play an important role in promoting innovation. For one, regulatory regimes influence new developments from the start because every innovation carries a 'heritage' which demands scrutiny. But it can also help to drive innovation, for example, by reassuring investors, by ensuring a fit between new and existing systems and/or by securing confidence needed for any innovation to succeed. The question is which conditions require which type of arrangement.Government policy, rather than aim for "more innovation through less regulation"should focus on "better innovation through constructive regulation".

Keywords: regulation, NBIC, governance

Genetic risk information

Tuesday, 13:30 – 15:00, D 2.221
Chair: Frederic Bouder (Maastricht University, Maastricht, the Netherlands)

Looking forward to personalized medicine: a new challenge to the personalization of genetic risk management

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Humans decisions are often based on heuristics and biases and guided by feelings and emotions which, whether naturally occurring or experimentally induced, exert a strong influence on individuals' risk perceptions, risk preferences, and decision making. Giving informational inputs into decision making, emotions may influence individuals' choices directly by evoking specific tendencies toward action and appraisal or indirectly by interfering with their ability to retain and process information, thereby impacting comprehension. Among the others, medical decisions, especially those that require important risk evaluation such as the genetic ones, are particularly influenced both by heuristics and emotional interferences. This because, by nature, humans do not easily manage the concept of (genetic) risk, not only because of their well-known innumeracy, but also because emotional reactions usually alter the rational analysis of statistical information, especially when related to personal health.
The present contribution is aimed to present a new challenge to help individuals (healthy and non-healthy) to face genetic-related decisions starting from their personal profile via face to face interventions or through the use of decision tools. The increasing availability of cheap sequencing data and other personal information as well as the global diffusion of electronic medical records and personal networks arising from social media is bringing health care to a tipping point. Instead of reacting to disease in a standardized way, health care systems will soon access a "virtual data cloud"including genomic data, clinical measures, lifestyle and other personal information that are central to a new health care paradigm based on the need to tailor decisional and psychological supportive interventions to the personal characteristics of each individual. According to this approach, health organizations should replace traditional untailored prevention and treatment programs with personalized multidisciplinary paths that, integrating genetic information with socio-demographic, clinical, lifestyle, emotional and psychological characteristics of each individual guide him/her through health related choices. In our opinion this is a promising way to optimize individual wellness controlling the affective factors in favor of a clearer and more rationale understanding of risks and outcomes.

Keywords: decision-making, genetic risk, health care, personalized medicine

Assessment of pregnant women's attitudes, knowledge and preferences of risk communication about Non-Invasive Prenatal Testing

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Background: The field of fetal examinations and diagnostics is facing great changes in the near future related to the possibilities of Non-Invasive Prenatal Testing (NIPT). The possibility with NIPT is to detect cell free fetal DNA in the pregnant woman's blood and from that analyze examine the genome and chromosomal aberrations of the fetus. In Sweden the clinical implication of the method are at hand. The technique for the test is developed and the discussions about the routines for offering the test are ongoing. Therefore, it is of great importance to study how this method perceives by the pregnant women and to study their knowledge about the method. Their general attitudes to fetal examinations will be examined, the attitudes to having a child with a chromosomal aberration, how the decisions are made as well as the preferences for information risk communication about the new method. There is a possibility that the new method will be more widely spread due to the simplicity, reliability and the non-invasive character. The test has to be performed in early pregnancy which requires rapid decisions.

Aim: The aim of the study is to assess pregnant women's attitudes, knowledge and preferences of risk communication about NIPT.

Material and Methods: A short questionnaire will be filled in by 1000 pregnant women recruited in the waiting room of seven antenatal care units spread in the Stockholm area during February to March, 2015. The data will be recorded and analyzed using the data programme Statistical Package of Social Science version 22.0 for Windows(PSS Inc, Chicago, IL, USA). Verbal and written information about the study was given. Participation was voluntary and the women had the possibility to withdraw from the study at any time. The questionnaire was filled in anonymous. The ethical committee of Karolinska Institutet approved the study (DNR 2014/1817-31/4).

Significance: The benefits from this project are to get an understanding about the knowledge, preferences for test results, risk information and risk communication and the decision-making in these issues among pregnant women in Sweden within this field. The result of this study will increase the understanding and will form the information given by the midwives and doctors at the antenatal clinics. This is a first, preparing study for performing enlarged studies with qualitative methods and discrete choice experiments (DCE) methods to scrutinize the women's preferences for risk information related to prenatal examinations.

Keywords: Prenatal examinations, Non.Invasive Prenatal Diagnosis, Chromosomal aberrations, RIsk information and risk communication

Genetic risk information: new impulses by Ulrich Beck and Niklas Luhmann

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Background: Genetic risk information has a growing importance within many different fields of medical application. Genetic tests are used for preconceptional carrier screening, in prenatal diagnosis, as predictive tests for currently healthy adults and to adjust medication in personalized medicine. They provide information about the future risk of getting a disease, of having a sick child or of treatments' side effects. Ideally, there are different options how to address a specific risk eg how to prevent a disease. At the moment the concept of genetic risk is mainly based on medical and biological knowledge which is growing rapidly with progress in genetic research and development of new technologies for genetic testing. This knowledge is also introduced in doctor patient communication and leads to an increase of risk communication while often there are no specific measures known to address the risk.

Aim: The paper takes a closer look at the relation between the development in genetic risk research and the notion of genetic risk. A special focus will be on the question how developments to address known risks or unwanted events lead to more tests and a steady increase in risk information and medical risk management.
Method: Theoretical approaches by *Ulrich Beck* (Risikogesellschaft) and *Niklas Luhmann* (Soziologie des Risikos) are taken as a starting point to analyse the mutual dependency of genetic risk, its management and development in research in order to take a closer look at the specific features of this relationship in genetic medicine. Limitations of these applications to a field where risk factors are regarded personal and embodied will also be critically discussed.
Results: The understanding of genetic risk is situated within modern societies where risks are ubiquitous. Sociological theories point at the relevance of and strong connection to technological development. Concepts of genetic risk can be informed by these sociological thoughts. Especially in reproductive medicine, new genetic tests are introduced to avoid possibly unwanted outcomes of a pregnancy or even to avoid possibly harmful decision situations, which contributes to the medicalization in this field of medicine. These results can help to critically assess the added value of further risk information in genetic research and genetic risk information in patient consultations. Furthermore, it can inform ethical analysis how normative aspects such as the right not to know can be integrated in this framework.

Keywords: risk communication, genetic risk, Ulrich Beck, predictive medicine, ethics

Risk communication with AML-patients

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Uppsala University, UPPSALA, Sweden

The clinical context of risk information and consultation with acute mycological leukaemia (AML) patients is complex, including considerations on both short-term and long-term adverse effects as well as the patient's own attitudes towards risks and counselling.
Risk information is acquired for groups of patients, or at the population level. But it needs to be tailored to individual needs, taking into account the differences in genetic profiles, age, comorbidities, performance status and response to initial therapy, and used in communication with an individual with particular background, needs, preferences towards risks and decision making.

In this talk we will present an ongoing project aiming at investigating AML-patients' relative attitudes towards risks, risk communication and decision-making, as well as matching attitudes of hematologists. To elicit these, we will use the method of discrete choice experiments that enables us to estimate how trade-offs are made by patients facing complex scenarios. We will also present some preliminary results from a pilot study.

Keywords: Risk communication, attitudes, discrete choice experiments

Symposium: Psychological influences on risk assessment and decision-making

Tuesday, 15:30 – 17:00, D 1.221
Chair: Eva Lermer (Ludwig Maximilian University Munich, Munich, Germany)

The assessment of risks becomes more and more important for economy, society, and everyday life. It is thus hardly surprising that psychological research on risk is an area of strong growth. However, by today it is not fully understood, how psychological factors influence human risk judgments and how biases can be reduced. Furthermore, practitioners often struggle with the implementation of psychological findings on risk assessment and decision-making.
This symposium encompasses research and application on different factors influencing risk assessment and decision-making. In the first part of the symposium, we present results from two experimental studies displaying the influence of different risk perspectives (e.g., vague person, self), and different answer formats (e.g., rating, open percentage) on risk assessments (accuracy). In the following, several study findings on the "zero risk bias" are presented and psychological mechanisms causing the bias are discussed. In the second part of the symposium we focus on the application of such psychological findings. We therefore present the results from an experimental investigation on the effectiveness of knowledge transfer regarding heuristics and discuss different starting points for the implementation of insights from risk psychology in corporate risk management practice (e.g., improvement of methods and organizational processes, and development of corporate culture).

Influences of different answer formats on risk assessment (accuracy)

E. Lermer[1], B. Streicher[2], R. Sachs[3], D. Frey[1]

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People's subjective risk estimates and in particular their accuracy is of great importance for many areas of life (e.g., insurance and banking industry, economy, science and in everyday life). However, to date knowledge on the question of how to measure risk estimates is ambiguous and the psychological processes underlying risk estimates are still not well understood. In a previous study (Lermer, Streicher, Sachs, & Frey, 2013) we examined the influence of different risk perspectives by using four different target persons (who could be affected: abstract person, self, specific person, specific others) and four different questionnaire answer formats (rating, open percentage, open and closed frequency) on risk assessments. Results showed that participants used two different systems in terms of probabilistic reasoning: a distributional approach for abstract targets leading to higher risk estimates and a singular approach for specific targets leading to lower risk assessments. Moreover, qualitative (verbal) formats as well as closed formats compared to open formats seemed to be more intuitive (and easier to answer) than quantitative (numerical) formats, which in contrast should trigger more deliberative reasoning. Furthermore, there were great differences in the degree of estimated risks due to the used answer format. In the current study (N=179) we explored the influences of different scales on risk estimates' accuracy by using seven different questionnaire answer formats (three different rating scales [-3 to +3; 0 to 7; 7-step verbal scale], open and closed frequency scale, open percentage scale, and visual analogue scale). Participants were asked to estimate the probability for a person in Germany to die from different negative events (e.g., heart attack) within one year. In order to calculate the accuracy participants' estimates were compared with actual statistics (from the Federal Statistical Office of Germany). Results showed significant differences between scales regarding the accuracy of risk estimates. Particularly for very rare risks not every answer format is recommendable. Results give first methodological advices when to use which scale for measuring subjective risk estimates. Accordingly, the present research aims at serving as a starting point for a systematical examination of scales for accurately assessing risks.

Keywords: risk assessment, risk estimates, accuracy, answer format, scales
Symposium title: Psychological influences on risk assessment and decision-making

The zero risk-bias: Further examination of the phenomenon and its effects on risky decision making and risk-taking behavior

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Uncertainty is a dynamic state which is perceived as discomforting and people are highly motivated to reduce these feelings through cognitive, affective or behavioral reactions. Humans' quest for certainty causes remarkable deviations from the economic rational agent model, especially with regard to risk perception and decision making. People tend to overestimate risks close or equal to certainty - a phenomenon that is referred to as the zero-risk bias (Kahneman & Tversky, 1979). When deciding between the reduction of one of two (or more) risks, the safe option (i.e. reducing the probability of one risk to zero) is preferred, even if this option is less favorable than the other alternatives (e.g. reducing more overall risk). For example, assume that your firm is at risk of two losses that can both cause insolvency. Due to limited resources you can only intervene in one of these risks. The probability of the first risk occurring is 15%. Intervention A would reduce this risk to 5%. The probability of the second risk occurring is 5%. Intervention B would reduce this risk to 0% (Eller, Streicher, & Lermer, 2012). If humans were complete rationalists they would choose intervention A, yielding to the lower overall risk. However, a lot of people opt for the zero-risk by choosing intervention B. Several studies were conducted in order to investigate this bias, using different measures (e.g. questionnaires, interviews, behavioral responses) and different populations (students vs. businessmen). In order to detect psychological mechanisms causing the bias, additional variables like emotional concern, cognitive effort and personal relevance of the decision were collected. In sum, results indicate that the zero-risk bias is not just a methodological artifact, but a person specific tendency to prefer subjective certainty, regardless of potential disadvantages. This tendency is stronger pronounced in psychological distant situations and in social contexts. In particular, 10% to 50% of the subjects showed the bias, regardless of the relative disadvantage of the zero-risk option and there were effects of risk domains (see Blais & Weber, 2006) and psychological distance or construal level (Trope & Liberman, 2010) on subject's choice. Practical implications can be drawn from the findings, for example for a better resource allocation in order to reduce risks (e.g., waste disposal or guidelines for toxic chemicals) or for insurance policies. In conclusion, obtaining certainty is a powerful driver in decision making and can cause remarkable deviations from the rational agent principle.

Keywords: zero-risk bias, decision making, domain specific risk-taking, construal level
Symposium title: Psychological influences on risk assessment and decision-making

Building bridges between theory and practice: The challenge of implementing psychological findings in risk management systems

E.G. Eller, R. Sachs
Munich Re, Munich, Germany

Risk management relies on early identification and accurate measurement of risks. However, quantitative methods can only be applied reasonably under the premise that enough data has been collected and the contextual conditions are stable enogh so that past events have a predictive value for future developments. If relevant empirical data is sparse, risk managers have no choice but to use subjective risk estimates and thereby consult alternative approaches of risk assessment such as think tanks, expert pools, expert elicitation or individual judgments.
In search of improving subjective risk estimates, risk managers´ attention was drawn to the psychology of risk long ago: The exploration of human risk perception and risk behavior has a long research tradition and to this day, a large research community explores the psychological determinants of both risk perception and risk behavior. For instance, it has been indicated that risk perception and decision-making can be affected by factors of 1) the situation, 2) the person questioned and 3) the social and organizational environment. Whereas there is little doubt that such psychological insights have significant potential for improving risk management practice, there is also little experience in terms of practical implementation. Thus, the real challenge for risk managers is not only to gain a profound understanding of human judgment formation but also to derive concrete action, e. g. by analyzing and redesigning their corporate processes and continually validating and improving their methods of surveying experts. It is not obvious how the multitude of theoretical findings can be transferred effectively to actual improvements in risk management practice.
We intend to stimulate a discussion on how insights from psychological research can be linked with the existing risk management systems. Therefore, we present a selection of psychological phenomena influencing risk assessment and decision-making that we consider especially relevant for risk management practice. Subsequently, we discuss potential starting points for the implementation of these theoretical insights into risk management practice (e. g., transfer of knowledge, improvement of methods and organizational processes, and development of corporate culture). We discuss difficulties associated with the application of psychological findings and make suggestions for future research from a corporate risk management point of view.

Keywords: Risk management, psychology, implementation, expert judgment, intuition, methodology
Symposium title: Psychological influences on risk assessment and decision-making

How to be bias-savvy: Training reduces overconfidence and conjunction fallacy.

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When making decisions people often use heuristics to achieve satisfactory outcomes, especially when too little information is available. Since the work of Kahneman and Tversky (1979) there is a large body of research literature on heuristics and decision making showing that people are very prone to biases in different judgment contexts. However, little is known about reliable methods to avoid biases. The question, therefore, is to what extent the risk of making misjudgments can be minimized through interventions. In this context it is important to consider the differentiation between two modes of thinking. Regarding to Kahneman a system 1 allows us to make quick decisions, however this also can lead to misjudgments due to time restrictions and limited consideration of relevant information. System 2 is slower but more thought out. We investigated the question whether prior knowledge about heuristics (making participants aware of system 1 heuristic errors) reduces heuristic biases. In our research we conducted a short training session and measured accuracy of participants' answers before training, directly after training and two weeks later. The experimental group learned about the anchor heuristic (i.e., tendency to rely heavily on the first piece of information offered), overconfidence (i.e., overestimation of one's own competence), and the conjunction fallacy (i.e., assumption that specific conditions are more probable than a single general one). The control group was trained in feedback rules. Knowledge was mainly taught by using power point presentation. Results showed no differences between groups before training regarding heuristic biases. However, after the intervention the experimental group showed significantly less errors regarding overconfidence and conjunction fallacy compared to the control group. These differences enlarged after two weeks. The bias due to the anchor heuristic remained at the same level in both groups. In sum, the present research shows the advantages of transfer of knowledge concerning heuristics.

Keywords: biases, training, overconfidence, conjunction fallacy, anchor heuristic
Symposium title: Psychological influences on risk assessment and decision-making

Risk-based governance

Tuesday, 15:30 – 17:00, D 2.221
Chair: Regine Paul (University of Bielefeld, Bielefeld, Germany)

Risk-based regulation against national obstacles? Understanding the role of Europeanisation

R. Paul
University of Bielefeld, Bielefeld, Germany

Instead of the regulation of risks, the regulation by risk-based rationalisation has recently gained scholarly attention. Such approaches seek to prioritise interventions by calculating the varying likelihood and impact of potential future harms ex ante. Only the riskiest events will then be targeted while lower risks will be deemed acceptable. Studies of so-called risk-based regulation have mainly highlighted national variations in countries' proclivity to adopt risk-based policies. Obstacles to risk-based approaches have been idetified, inter alia, in polity fragmentation of federal systems, in strong corporatist negotiation settings, or in constitutional commitments to equal treatment or physical integrity. From this perspective, the outlook for the introduction of risk-based regulation in German or French policies seems rather bleak, but also the Netherlands seem to offer no wholly fertile ground. So far much underexplored, however, is the potentially mitigating role of European integration to crack such national obstacles to risk-based approaches. This talk therefore seeks to offer conceptual reflections on the extent to and the conditions by which EU regulation - where it is decisively risk-based - can help overcome such obstacles. I argue that the concept of Europeanisation - to be explained in more depth during the talk - helps scholars of risk-based regulation to:
1) compare national pressures to adapt to the terminology, goals and methods of EU policies, 2) investigate adaptation dynamics in different countries and/or policy domains, and 3) account for comparative drivers of change towards EU-induced risk-based regulation.
I elaborate the argument with illustrative examples from risk-based regulation across a number of policy fields. Overall my presentation indicates the strong potential of even 'soft' EU policies to loosen national breaks on risk-based regulation, especially so if national players make strategic use of the EU venue to induce otherwise hardly achievable change.

Keywords: risk-based regulation, Europeanisation, EU, comparative research

Varieties of Risk Regulation in Europe: How different countries address the problem of trade-offs in occupational health and safety regulation

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Analysis of the goals of occupational health and safety (OHS) regulation in EU member states suggests that while the UK legally mandates risk-cost-benefit trade-offs, continental countries insist on ambitious goals of safety. At first sight, this is consistent with risk regulation literatures that suggest a cleavage between European precaution and Anglo-Saxon neoliberal risk-taking, as well as the Varieties of Capitalism literature that suggests workers are likely to be better protected in co-ordinated rather than liberal market economies. Detailed analysis of OHS regimes in the UK, Netherlands, Germany and France, however, suggests that a narrow focus on headline regulatory goals misses the way that each country makes regulatory cost-benefit trade-offs on safety. In particular, the analysis demonstrates that the nature and outcome of trade-offs substantially varies according to long-established national legal traditions of common and civil law, and the degree of coupling between regulation and domestic social insurance regimes. As such, the article identifies a novel set of institutional factors to explain risk regulation variety that reflect deep institutional differences in national European political economies and philosophies of regulation, some of which pre-date the birth of capitalism itself.

Keywords: Varieties of risk regulation in Europe; Occupational health and safety regulation

A Europeanized approach to flooding? The introduction of risk-based flood assessment and management in France, Germany and the Netherlands

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Following the important floods of major European rivers in Central and Eastern Europe in 1998-2002, the EU member states decided to adopt the European Flood Directive (2007/60/EC). This Directive prescribes three subsequent objectives: the completion of preliminary flood risk assessments by the end of 2011, the establishment of flood hazard maps and flood risk maps by the end of 2013, and the design of flood risk management plans by end 2015. Although the Directive emphasizes that flood risks vary across countries and regions and should therefore be determined by Member States themselves according to local and regional circumstances, it does impose a risk-based approach based on the combination of the probability of a flood event and of the potential adverse consequences (art. 2.2).
This paper presents the first findings of fieldwork done in France, Germany and the Netherlands. It will especially focus on France where floods are common but no risk-based approach to floods existed prior to the 2007 directive. It examines all three countries with regard to how the European requirement for the introduction of risk-based approaches to flood assessment and management were/are translated on the national level. What kind of adaptation processes (inertia, absorption, accommodation, transformation, retrenchment (see: Radaelli, 2003; Börsel and Risse, 2003)) can be identified? It also discusses the how the risk-based approach is embraced or resisted by regional and local authorities and what the wider implications of the new understanding of flood risks are. Have structural or institutional obstacles to the introduction of risk-based approaches in the on the national level been overcome and which actors have gained power in this process?

Keywords: Risk based governing flooding HowSAFE

Open access to data

Tuesday, 15:30 – 17:00, D 2.215
Chair: Frederic Bouder (Maastricht University, Maastricht, the Netherlands)

Transparency and Participation in the Production of Regulatory Science at EU level

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The Netherlands

The constitutional principles of transparency and openness enable citizens to participate more closely in the decision-making process and guarantee that the administration enjoys greater legitimacy and is more effective and more accountable to the citizen in a democratic system, as the EU Treaties (Articles 1, 10 TEU; 15 and 298 TFEU) and the Court of Justice of the EU (e.g. cases C-41/00 P, Case C-28/08 P; C-92/09 & C-93/09) underline. These principles thus strengthen the democratic character of the EU institutions and the trust of the public in the administration. More openness and transparency are not a goal in itself but serve to enhance the quality of decision-making. This not only applies to rulemaking but also the production of regulatory science. The General Food Law (Reg. 178/2002) for example requires the European Food Safety Authority (EFSA) to undertake its risk assessments in an independent, objective and transparent manner whereby EFSA must publish various documents. The law is however silent about the level of transparency and openness it should adhere to in its scientific work, for example in relation to the meetings of its panels and committee where EFSA opinions are being prepared. At the same time, as the concepts of transparency and participation are closely linked, it will also address the issues of participation in the science production. This paper will borrow concepts used in the social studies of sciences literature (Hilgartner 2000; Bal, Bijker and Hendriks 2004) and develop two kinds of transparency: procedural and substantive transparency. On this basis a more normative understanding of transparency of science-making will be conceptualized, which will be applied to EFSA's strategic vision on transparency ('Open EFSA'). Moreover it will analyse transparency in the context of other scientific advice given to the president of the Commission, previously done by the position of Chief Scientific Advisor.

Keywords: transparency, participation, EU law, science, scientific advice, EFSA

Negotiating the risks of making research data open

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Open Access to research data is increasingly regarded as a positive development that should be encouraged and stimulated. Several influential journals are now requiring researchers to make the data that supports their publications openly accessible, while national and private funding agencies make open access to research data a condition for funding. According to its advocates, open research data holds many promises: it will contribute to scientific progress and help tackle some of the world's greatest challenges. It will also limit duplication of work, enhance public trust in science, and open up new avenues for research. However, making research data open to a broader audience may also carry certain risks. Researchers have, for example, expressed concerns about the privacy of research participants, dual use, the misrepresentation or misinterpretation of data and other issues. In this paper, I examine how these risks are negotiated in practice and what new kinds of mechanisms and organizational structures are developed in order to address these risks. The paper focuses, in particular, on health and environmental research.

Keywords: open access, research data, risk, ethics

Evaluating regulatory transparency policies: The views of medical doctors and patients

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Over the past 20 years or so, scientific regulatory agencies across Europe - such as the European Medicines Agency (EMA) or European Food Safety Authority (EFSA) - have firmly committed to a wave of transparency policies. The overwhelmingly majority of these policies focus on releasing scientific information online and providing open access to regulatory data. Yet, few academics or policymakers have critically examined the effectiveness of the regulators' policies on the achievement of public policy objectives (e.g. building trust). This study adds empirical evidence on the effects of pharmaceutical transparency policies on the end-users of 'transparent' information (i.e. doctors and patients). In particular, through conducting a large European survey (N=2,000) comparing the views of medical doctors (N=1,000) and patients (N=1,000) from Spain, Germany, France and the UK, the study found that the types of transparency policies adopted by European pharmaceutical regulators are likely to be ineffective in (a) building doctor and patient trust and (b) providing a better understanding of Agency decision-making (e.g. why a medicine was approved). The large majority of respondents were found to have poor knowledge of how the regulators assess the safety of medicines, and would be unconfident in interpreting what safety-related information means (e.g. as contained in documents being made publically available). Doctors and patients were also found to differ significantly over key transparency issues including when safety information should be made publically available in the first place. The presenter concludes by discussing recommendations on improving transparency discussions in European regulation that centre on achieving positive outcomes for patients and healthcare professionals.

Keywords: Transparency, open access, decision-making, Europe

Food risk communication in a complex and uncertain world: consumers' deliberation, information avoidance and coping with uncertainty

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In recent years, the health communication context in general and, particularly the domain of food risks and benefits communication has become increasingly more complex and uncertain. The large and diversified amount of information that is now available makes it difficult for consumers to deliberate upon food risks and benefits and, thereby, modify their attitudes and behaviours accordingly. This has strengthened the barriers and constraints to effective communication and consumers' engagement in food related issues and posed new challenges to risk communicators and stakeholders. In order to respond to these challenges, the FoodRisC project (2010-2013) delineated a set of steps and corresponding procedures to provide evidence based research, which can be used in the development of effective tailored communication strategies. Examples of this evidence based research are provided, including studies on consumers' deliberation on multiple risk-benefit configurations, risk information seeking and risk information avoidance, and expressions of coping with food crisis. This included mixed methods data collection and analysis procedures, including focus groups, an online platform for analysing deliberation, survey questions and social media analysis. Implications of results for reducing the complexity and uncertainty of todays' communication context are discussed, including the potential of new data collection channels and consumer engagement tools, such as social media analysis.

Keywords: food risk communication; risk information seeking; risk information avoidance; consumer's deliberation; food crisis

Science and Society I: Unfolding risk governance

Tuesday, 15:30 – 17:00, D 1.225
Chair: Nicolas Rossignol (University de Liège, Liège, Belgium)

Risk Governance as Knowledge Production - Upstream and downstream in the Swedish politics of water

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In recent years the notion of risk governance has been elaborated into a concept. As societies are facing up to the uncertainties, complexities and ambiguities of many risk issues, the literature suggests: “risk governance cannot be routinized”(van Asselt & Renn 2011). And as a response to inadequate regulatory models built on the basis of “simple”risks, a multi-dimensional and holistic approach to risk is advanced. This conceptual elaboration has been taking place in tandem with the actual development of risk rationalities and risk practices in many parts of the world, the politics of water in Sweden being a case in point.

The Skagerrak and Kattegat Water District is one of five water districts in Sweden, since the 2004 Water Quality Management Ordinance, which introduced the EU Water Framework Directive into Swedish legislation. According to the new water authority that was created at the same time, this new piece of legislation also brought in a new “holistic approach”to water issues in Sweden. In this paper we will interrogate this “holistic approach”in relation to recent elaborations of the concept of risk governance, focusing in particular on the integration and production of knowledge.

The organisation of the districts as well as of the local Water Boards within the districts is dependent on the local circumstances of watersheds and may not follow the administrative boundaries between municipalities and counties. What does it take to make these “natural”domains (the drainage areas) intelligible and governable? While the Common Implementation Strategy stress that new forms of cooperation and coordination are required, what does “the holistic approach”bring about in terms of knowledge integration? Are new forms of expertise being formed?

In this in-dept case study of the relationships between the national Water Authority and a local water board (Göta älv), we ask questions about the integration of upstream and downstream knowledge, issues and values. We are particularly interested in the integration of experiential/indigenous knowledge and scientific/managerial knowledge, and the making of expertise in relation to holistic risk governance. And we will seek to illustrate how risk governance can be conceptualised as a process of knowledge production in its own right, how knowledge and social order are co-produced in this particular case, and what implications the holistic approach have on the governability of the risks associated with the river, Göta älv.

Keywords: holistic risk governance, knowledge integration, expertise, politics of water, Water Directive

Health claim regulation and the hierarchy of the evidence

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The European regulatory process for health claims (claims about a relationship between consumption of specific food ingredients and desired health outcomes) has sparked debate about the level of evidence that can be considered adequate for authorization of such claims. Our contribution analyzes the controversies about methodological choice that underlie regulatory decision making by way of a study of regulatory documents and scientific publications. Central to the operationalization of the regulation, which is responsibility of the European Food Safety Authority, is a hierarchy of evidence. This hierarchy of methodologies for generating regulation-relevant data encompasses, in descending order, human (intervention and observation), animal, in vitro and other types of studies. Current regulatory practice places a higher value on the former types of studies, particularly human intervention trials, in line with clinical trials for pharmaceuticals. In this way the regulatory process aims at minimizing false positives in order to protect consumers from insufficiently substantiated claims, but has made obtaining positive evaluations for health claims difficult. This raises the question as to the adequacy of applying such a hierarchy of evidence in health claim regulation, given that it is not clear if methodologies for data generation taken from pharmaceuticals regulation are adequate for the nutrition context. Our results show that those who criticize reliance on data from human intervention studies point to the necessity for relaxing the standards of proof and selecting other scientific methodologies on the basis of non cognitive values.

Keywords: health claim regulation, decision making, methodological debate

Post-Colonial Structural Violence of Basel's risk management standards.

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Ideas of progress and development are implicit in reframes of the hegemonic discourse of risk. Although traditionally considered as a neutral and objective practice, this paper analysed current changes in the articulation of risk management and portray it as an advanced capitalist discourse. We explored politics within the emergence of risk's regulatory statements and how they were implemented as universal solutions, ignoring specific necessities of developing countries. Concepts of 'best-practices', 'efficiency', 'progress' and 'development' were embedded is risk management implementation and the proposition of a 'new public management' approach. This paper argues that this represented an attempt to maintain an illusion of progress, while overshadows priorities what should be the real focus of developing countries. This paper offers a coherent framework to scrutinize power imbalances in the construction of risk. As a neoliberal hegemonic discourse form outside, risk represented and unquestioned logic of transition through the adoption of international solutions proposed by Basel's standards that caused harm in a chain of 'structural violence' to this countries.

Keywords: Structural Violence. Risk Management. Basel Accords. Developing Countries. Post-ColonialTheory.

Organizational risks I

Tuesday, 15:30 – 17:00, D 1.227
Chair: Mehran Sepehri (Sharif University of Technology, Tehran, Iran)

Multi-criteria Business Continuity Centre Location Selection Using Fuzzy Analytic Network Process

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Istanbul Technical University, Istanbul, Turkey

The location of a business continuity centre is the most critical and strategic decision in a business continuity management system. A corporation should ensure the operational continuity of her delivery channels and networks, human resources and operations by managing the risks, but at the same time, without incurring high expenses for resilience. Business continuity centre location is a long-term investment decision and is influenced by many factors that are often imprecisely defined for the decision-makers. Therefore, the conventional methods and approaches tend to be less effective in dealing with the linguistic assessments. Fuzzy analytic network process is a proper multi-criteria method to define this vagueness. Our paper presents an application of fuzzy analytic network process to a business continuity centre location selection problem. It is believed that this study will contribute to the business continuity practitioners by suggesting an effective implemention of the decision analysis.

Keywords: Business continuity, multi-criteria, fuzzy, analytic network process, resilience.

Building National Resilience through Organizational Security Risk Management - To What Extent do Organizations Have the Necessary Tool Box?

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In recent years, the use of risk-management approaches for protecting vital societal functions and critical objects against intentional crimes, such as terrorism, has increased in many countries. In Norway, new object security legislation based on a risk-management approach has been passed, and new standards for security risk analysis have been developed in the last couple of years.
Several scholars have discussed and described the advantages and challenges organizations faces when applying a "risk-management regime"in general, but little focus has been given to the consequences the application of a risk management regime have for private and public organizations when dealing with security threats. This paper aims to describe and discuss some of the challenges with applying a risk management regime within the area of security. In line with Pièrre-Cambacédès & Chaudet (2010) we call protection from terrorism or other intentional crimes for security -in contrast to safety risks witch implies protection from non-intentional acts. This paper aims to identify the differences organizations face when governing security risks in contrast to safety risks, by illustrating the different characteristics of safety risks versus security risks. Furthermore, this article discusses the new risk analysis tools that have been proposed by Norwegian authorities and Norwegian Standards in light of risk governance theory (e.g Renn 2008).
We conclude that several aspects with security risks make the application of a risk-management regime challenging in an organizational security risk management context, both concerning the characteristics of security risks and for the current risk analytical tools available to organizations. Furthermore, we conclude that the new role of Norwegian organisations in security management is a new trajectory in Norway that places a national security management responsibility on organizations, in which they are not necessarily equipped to address.

Keywords: security risk management

Presenting a Risk Analysis Model of Technology Development and Transfer in the Energy Field Using the Fuzzy Logic

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Ministry of Energy, Tehran, Iran

As to the topic of the essay, different definitions of risk and its various types will first be mentioned in detail. Then the process of risk interpretation as well as the importance of risk assessment will be discussed. After that, the topic of analysis techniques will be raised in which a number of applied techniques such as FMEA, HAZOP, FTA, and ETA will be mentioned along with their application, advantages and disadvantages as well as brief definitions of the fuzzy logic. Then the input variables will be put in the fuzzier box through the fuzzy model-making in order to calculate the risk including its probability and intensity effect. The data input will meet the linguistic variables in this section and take on corresponding linguistic amounts. First, the inputs of the system should be specified for which a reference set, membership functions and linguistic amounts will then be defined. The functions will be determined using the experts' knowledge and experience; that is through a subjective method which has also been used in the present essay to identify the membership functions. For the input factors of intensity, the rectangular membership functions have been used while the rectangular and trapezoidal membership functions have been applied for the output factors of risk level.

Keywords: Trading risk, hybrid, hazard and operability, fault tree analysis, cause-consequence analysis, event tree analysis, fuzzy logic, fuzzy converter

Symposium: Case studies on risk communication I

Wednesday, 11:00 – 12:30, D 1.221
Chair: Dirk Scheer (Zirius, Stuttgart, Germany)

The presentations in this symposium pick up issues on risk communication in a case study design. However, the view on risk communication is expanded: how can simulation help in communication? How is the framing different in different cultures, leading to different communication strategies? How can risks be communicated that are subject to public outcries, such as terrorism?

Communicating Cyber Risks: Political Framing in the U.S. and Germany

K. Ulmer
German Institute for International and Security Affairs (SWP), Berlin, Germany

Whereas the advancements in information and communication technologies offer vast opportunities for society and economy, cyber risks such as cyber crime, cyber espionage and cyber warfare pose a major challenge in our time. Some of the risks in and emanating from cyberspace can be understood as 'systemic risks' (Van Asselt/Renn 2011), characterized by high uncertainty, complexity and social ambiguity. In consequence, the probability and the possible damage of incidents cannot be fully calculated. Expert judgments of cyber risks and their potential impact differ widely.
Since a strictly scientific risk assessment is not possible, political interpretations of cyber risks weigh all the more. These interpretations notably take place in political discourses and inform and legitimize political action. Against this background, it is highly interesting and relevant to analyze political discourses on cyber risks, which I understand as cyber risk communication.
In a qualitative analysis following Reiner Keller's Sociology of Knowledge Approach to Discourse (SKAD), I analyze recent political discourses on cyber risks in the U.S. and Germany, two countries particularly vulnerable to cyber risks.
My data set notably consists of official documents, speeches and interviews and covers the time period since 2007. The analysis focuses on the research question how governments on both sides of the Atlantic frame cyber risks, i.e. which 'interpretive schemata' (Snow/Benford 1992) they use to communicate about them.
My presentation focuses on two aspects: First, I analyze frames for cyber risks in governmental discourses in the U.S. and Germany. Preliminary results point to several competing frames within each country's risk communication. Moreover, the ongoing analysis hints at fundamental differences between U.S. and German discourses regarding problem definition and the formulation of policy solutions. These differences are linked to differing underlying conceptions of security and digitization. Second, the presentation analyzes how the identified framing strategies in the U.S. and Germany are related to their respective institutional structure in the emerging field of cyber policy and thus explores the link between cyber risk communication and policy-making.

Keywords: Risk Communication, Cyber Risks, Frames, U.S., Germany

Public Perception of Geoengineering and Its Consequences for Public Debate

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Zirius, Stuttgart, Germany

Reviewing the existing studies of public perception and drawing analogies from other risk technologies, this paper explores the public positions on research and implementation of geoengineering as a means to combat climate change. Existing studies on geoengineering perceptions show low levels of awareness and a lack of knowledge. Hence, existing attitudes on geoengineering can be judged instable and stimulus-dependent. When judged in isolation, at least one third favors the use of geoengineering technologies preferring CDR over SRM technologies; when judged in comparison to other climate mitigation options, approval rates lose considerably support. Moreover, people seem to cautiously support research but oppose deployment while attitude formation depends on personal values and belief systems. The results of the empirical studies were fed into a Delphi workshop with experts for reflecting on the future development of public opinion and for designing a communication and public involvement process that corresponds to the empirical insights gained from the perception studies. Conclusions derived by drawing parallels with other technological debates (carbon capture and storage, genetic engineering, biofuel, nuclear energy, etc.) give some indication of how the population might react to geoengineering initiatives. What all of these areas have in common is that the chances and opportunities were presented first, relatively euphorically, while the risks were downplayed. Over the course of the time the risks eventually came to occupy dominant positions in the respective debates. This is also likely to happen in this new policy arena unless risk and benefits become equally important topics in the debate. In the light of these results, we recommend that further and more thorough investigations of public attitudes, concerns and uncertainty in relation to geoengineering should be conducted in parallel with technological research and development work and with a public dialogue with stakeholders and citizens. This dialogue should first involve stakeholders and then be extended to cover the public at large.

Keywords: public perception, geoengineering, public dialogue
Symposium title: Case studies on risk communication

Information and knowledge transfer between experts and laypersons and successful competence development of laypersons in risk communication

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University Stuttgart, Stuttgart, Germany

The contribution investigates the research question of how knowledge and information transfer between experts and laypersons can be organized successfully in several formats of risk communication. This is related to the question of how competences of laypersons can be developed appropriately. The study focuses on dialogue oriented communication formats, which allow a direct exchange between experts and laypersons. Non interactive forms such as information material are considered, too. A conceptual reflection examines systematic differences between experts and laypersons not only in terms of available knowledge and information, but also in terms of the way, new information will be understood and processed. For instance, findings from expertise research indicate that experts have much more experience to cope with cognitive challenges in their field, so that they can resolve respective decision problems more efficiently than laypersons. However, there are certain limitations of experts and expertise. From this first examination, two main objectives for organisers of risk communication can be derived, which structure the further analysis: The available expert knowledge has to be synthesized for laypersons in an appropriate information quality and quantity. A second objective is to establish an adequate process of knowledge transfer and exchange, which fosters the understanding and the reflection of information. For deriving concrete criteria for organising risk communication, concepts such as 'scientific literacy' or 'deliberation' are investigated. The conceptual argumentation will be supported by findings based on data from evaluation surveys and interviews, gained during different formats of risk communication. These results deepen the understanding of the presented criteria and mark some pitfalls of practice. For instance, participants, meaning laypersons, in deliberative formats perceive interactive communication modes as more relevant for the development of the ability to judge than non interactive communication forms. However, both forms turned out as prolific, but they differ in the way they support the rational decision making and the effectiveness of risk communication. Another empirical result is a typology, which was derived from interview data. It contrasts the differences between experts according to their style of communication and interaction with laypersons. Based on a conceptually and empirically funded argumentation, the contribution works out specific principles and criteria for a successful risk communication, especially concerning aspects such as the exchange between experts and laypersons and the competence development of laypersons. The criteria are merged in a coherent framework based on the competence concept 'ability to judge'.

Keywords: competence development, knowledge transfer and exchange
Symposium title: Case Studies in Risk Communication

Uncertainty

Wednesday, 11:00 – 12:30, D 1.227
Chair: Ana Olofsson (Mid Sweden University, Oestersund, Sweden)

What is an uncertain risk? A scoping review.

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Some researchers propose a sharp distinction between uncertain risks and traditional risk. The basis of this distinction however is not very clear. When does an uncertain risk become a 'known' risk? One interpretation is that the concept of uncertain risk suggests there is uncertainty regarding the presence of a hazard, i.e. the potential of adverse health effects. Once the potential of adverse health effects is determined one could state a risk is demonstrated and hence a 'known' risk is born. Another interpretation is that the concept of uncertain risk relates to all uncertainties surrounding a risk appraisal such as uncertainties regarding vulnerability assessment and socio-economic impacts. The different interpretations might have very different consequences for risk management, risk evaluation and risk communication.

The current study is a scoping review with the goal to gain more insight in the conceptual usage of "uncertain risk"in the (environmental health) risk domain. We aim to answer three research questions: i) Can scientifically uncertain risks be distinguished from scientifically not-uncertain risks? ii) (If so:) On the basis of what characteristics are scientifically uncertain risks distinguishable from scientifically not-uncertain risks? And iii) To what extent are scientifically uncertain risks dealt with differently than scientifically not-uncertain risks in the risk governance process? Multiple inclusion/exclusion criteria were used in order to determine eligible articles. To analyze our results we developed a framework using the three dimensions of uncertainty proposed by Walker and colleagues and the IRGC risk governance framework. Preliminary results suggest an inconsistent usage of the concept of uncertain risk, differing from field of interest to individual authors within the field. The results will be presented and implications for risk governance will be discussed.

Keywords: Uncertain risks; risk governance

A Defence of the ISO 31000 Definition of Risk

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Abstract. In 2009 the International Standard Organisation (ISO) released a new risk management standard, ISO 31000 Risk Management - Principles and Guidelines. The ISO 31000 standard offers a definition of risk, which states that risk is the "effect of uncertainty on objectives".
Although fundamentally different from traditional definitions of risk, there are several advantages with this definition. We argue that the ISO definition is fundamentally pragmatic, promoting a wide spread utilization of risk management.
However, the definition has not been well received in all corners. One of the most notable counterarguments, as to why the definition should be rejected, is that it does not correspond to our intuitive understanding of risk and that it deviates too drastically from the traditional notion of risk, understood in terms of the probability of an unwanted event (or other similar definitions).
In this paper we will show that the most notable objections to the ISO definition of risk can be met. We explicate the most salient counterarguments in the literature and show how most of them miss their mark. In cases where the counterarguments are deemed adequate we show that they can be taken into account by slight revisions to the definition. The revised definition, which we propose as a new standard, is in line with the original definition but does not suffer from its shortcoming, all the while maintaining its pragmatic appeal.

Keywords: iso, risk

Applying 'outcomes of interest' scenario framework to consider uncertainties impacting risk reduction policies

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Decision-makers dealing with natural hazards face difficult decisions around resource allocation, scheduling and planning priorities to mitigate hazard impacts. Along with day to day operational and short term management decisions, planners must face the complexities of long term change coupled with multiple actors and sources of ambiguity that create wicked problems for an integrated planning response to the changing threat of natural hazards. To counter this ever increasing uncertainty from natural, socio-economic and political drivers, planners must embrace advanced techniques to understand not only possible future developments but also the implications of intervening in these complex and volatile systems.

In support of decision makers and planners in the natural hazard field we propose the development and use of scenarios framed around key *outcomes of interest*, which in this study were elicited from a group of key stakeholders. From these stakeholders top down mitigation policies and resilience based approaches were highlighted as critical outcomes in effectively managing and minimising natural hazard risks. From these two highlighted outcomes, scenarios are placed within two axes, each one representing an increasing challenge to either top down mitigation or resilience allowing the robustness of risk reduction approaches to be tested. By selecting these axes, exploratory scenarios are developed that combine economic and demographic developments, technological advances, and social perceptions to test uncertainties that are critical to the effectiveness of mitigation and resilience based approaches to risk management. Construction of scenarios in such a manner ensures that the scenario spans the entire region of interest for policy makers, which in turn ensures solutions are robust to a wider range of uncertainties than other development techniques which can restrict scenarios to just two critical uncertainties. With this framework the scenarios are developed using qualitative and quantitative analysis resulting in four extreme scenarios, and one central (or intermediate) case. These are then modelled using an integrated simulation model framework incorporating a land use model, various hazard risk models along with climate and socio-economic components. This modelling framework allows decision makers to consider the various futures and their associated risks, along with the ability to test the performance of a range of policies to minimise hazard likelihood and impact. These exploratory scenarios and simulation model outputs can then be coupled with formal optimisation tools to provide decision makers with quantitative results to support risk reduction policy development and implementation.

Keywords: Exploratory scenarios, integrated modeling, mitigation planning

Technological Society, Risk and Natural Behaviour

K.P. Dakakni
La Sapienza, Wollerau, Switzerland

With the increasing complexity of social-organizational structures that coalesces with technological applications of human activities, the etiology of phenomena associated with unforeseen outcomes, become more entangled in obscure causal links mechanisms. This demands a different perspective to manage risk. Actions and decisions subjected to risk analysis are taken without disregarding the mindfulness of the probability of error; jointly, rationality and science, meant as knowledge; in turn, they do influence the perception of the risk. Risk therefore, must be integrated in the phenomenology of its evolution within a certain social dimension.
This poses a question, if there is a conflict between risk inquiring and risk researches. Risk researches mainly focus on the uncertainty or variability, associated with risk, or on the short-sighted negative consequences of the possibility at stake. The literature extensively describes risk models to control the variability and uncertainty that influence the risk decision process. However, those one cover limited risk management approaches under the holistic point of view and they do not consider the social dimension of the risk.
The aim of this paper is to investigate the boundaries of risk understanding within such context. The method is an explorative research that develops a natural science comparative, linked to animal behaviour, observed in the settlement of the Chernobyl Nuclear Plant Exclusion Zone, to determine an alternative perspective and new insights into risk understanding. By using new metrics, we investigate the role of risk, in a natural environment and in social context, addressing the variability associated with risk decision, in human perspective and in the wildlife environment.
Results show that risk is an opportunity dimension, it concedes, variety, and opportunity of choices and it is dependent to interactions of the social dimension, both human and animal.
The risk concept progresses, therefore, inherently both socially and in the natural environment, as a complementary part of the threat dimension.

Keywords: risk management, uncertainty, competition, perception, societal structure, variability, unpredictability, cultural evolution, originating context

Experiments in risk decision making

Wednesday, 11:00 – 12:30, D 1.225
Chair: Dominic Way (King's College London, London, United Kingdom)

Scenarios in urban road transport risk - developments in injuries and transport mode shift

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The aim of the paper is to develop some new perspectives on scenarios for the risk of urban road traffic injuries in Norway the coming 10 years. The focus is new targets in urban transport policy and shifts of mode of transport. Injury data (killed and seriously injured road users) from one big, three medium sized and two smaller urban regions 1998-2012 (N = 4709 casualties) form the basis for estimates of changes in injuries and patterns. Calculation of number of injuries and rates are made by type of road user (motorized versus non-motorized) by sex and age group.

A predicted increase in the total population by 2025 (on average 25%, medium growth alternative) in the urban regions will reverse the preceding fall in injury figures. The baseline scenario involves a structural steady decline in injuries and also incorporates population growth. Alternative scenarios are outlined and estimated based on public policy options and priority settings geared towards a modal shift from private vehicles to safer public transport. Injury by km traveled, by type of road user and safety measures related to the environment and behavior are employed. Various mobility scenarios including 10 - 30% shift from car use to public transport give lower injury figures.
Restrictions on private car use may also lead to reduced mobility or crossover effects to active travel (biking, walking) generating higher injury risk per travelled distance. Transport mode shifts may induce other traffic injuries of various degree of severity. These figures may partly offset each other. A door to door transport approach (pedestrians on their way to/from public transport nodes) implies elevated exposure for non-motorized road users for the whole trip. Diminishing return to the majority of road safety countermeasures must also be taken into account. The paper demonstrates uncertainties in the scenarios and limitations.
This is a project in the Norwegian Research Council's Transport Safety Program.

Keywords: Road injury risk, scenarios, private car reduction, urban

From the communicator's perspective: A study of forest risk communication in Sweden

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In current research, risk communication is often defined as a potentially two-way communication between the communicator and target groups. Even studies exploring risk communication from the communicator's perspective need to take this into consideration.
To this aim, a conceptual framework describing risk communication by means of the components within-communicator, relational and content was developed and employed in a study of forest risk communication in Sweden. In this context, the Swedish Forest Agency (SFA) uses information and advice to reach forest owners and professional foresters dealing with risks damaging the forest, including natural hazards such as storms, climate change and forest management damaging, for example, ecological values.
The implementation of risk communication was examined through interviews with advisors at the SFA. Semi-structured telephone interviews were conducted with forest advisors in the spring of 2014 (n= 27) taking on average 50 minutes. To reflect the diversity at the SFA, a stratified selection strategy was used with the aim to include approximately one-third women, and an equal number of participants from the three organizational regions at the SFA (north, middle, and south). A thematic analysis of the interviews was conducted, using a top-down approach guided by the three components identified in the conceptual framework.
Results revealed that risk communication was conveyed in response to forest damage, focusing mainly on reactive advice and integrated within the larger risk management at the SFA but also in other contexts, for example being incorporated in pro-active forest management advice. The risk communication included both one-way and two-way communication, although strivings for inter-subjectivity regarding risks were only in the beginning stages, involving a limited number of actors in specific circumstances (dialogue projects). A conceptual understanding of how risk communication is prepared and implemented from the communicator's perspective was facilitated by employing the components of within-communicator, relational and content. The policy and regulatory framework, the management of the agency, the location of the agency, and the balancing of different interests were explanatory themes relevant for understanding risk communication in this context. Conceptual issues and practical implications for risk communication are discussed.

Keywords: risk communication; forest risks; Sweden

Matters of heritage: Risk tradeoffs in Swedish river restoration

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The reduction of risks to the environment is one of the most important tasks of governments. But, as pointed out by Graham and Wiener (1995), the implementation of regulation and policy may decrease certain environmental risks but increase other risks or shift risks to other areas. The case of river restoration provides a case in point. According to regulations at international and national levels (e.g. the EU Water Framework Directive), waterbodies shall be ecologically sustainable. Implementing this goal requires the improvement of hydrological, geomorphic and ecological processes in degraded watershed systems. Different measures are implemented, including modification of water passages and establishment of fish passage solutions, to reduce the impact human-induced activities has and have had on waterbodies. At the same time, these resources are parts of landscapes that have evolved in response to complex geological and climatic history, and the result of specific socio-cultural, economic, political and cosmological beliefs that must be regarded and continuously preserved. Usually, restoration of waterbodies involve replacing or recreating lost or damaged elements of ecosystems as well as removing cultural remnants hindering ecological rehabilitation. Consequently, agency administrators are immersed in a situation where they need to facilitate the implementation of competing regulatory and policy frameworks. They encounter a risk tradeoff situation; efforts to reduce the identified risks of human impact affect the material/immaterial basis for and expression of human activity in the past and the ability of present and future societies to reconnect with history and fortify cultural identity.
Through interviews with policy workers at fishery and cultural heritage units at a regional authority in Sweden, I collected their views and ideas about competing regulations and policy. Archaeological investigatory walks along watercourses, conducted by cultural heritage managers to map ancient remains, were observed. I analyze how bureaucratic agents dealt with the dilemma encountered when seeking to manage fishery and natural and cultural heritage conservation interests and conflicting understandings of 'at stake' issues in river restoration. The analysis is framed within the risk vs. risk discussion provided by Graham and Wiener (1995), which outlines how efforts to reduce a particular risk can give rise to unintended consequences or 'countervailing risks'. Focusing on intra-organizational collaboration and the negotiation of policy at the agency level, the paper emphasizes the conditions, multiple contestations, and regimes of power that create and sustain decisions on risk intervention and the role of science in risk management.

Keywords: Heritage, risk tradeoffs, river restoration

Classical meets modern in a Delphi - like protocol for structured expert judgement

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Uncertainty is ubiquitous in risk modelling and decision support modelling. Evidence-based decision making involves using data to make empirically supported decisions. When empirical data is unavailable, expert judgment is the only alternative. Performed rigorously, expert elicitation is a powerful means for obtaining rational estimates of uncertainty.

This research presents and further investigates a novel method of structured expert judgement (SEJ) for quantifying parameter uncertainty using multiple experts. Generally, multiple expert opinions need to be aggregated. The two main flavours of aggregation, behavioural and mathematical, define two main classes of SEJ protocols. A third one, the so-called "mixed"approach combines aspects of both behavioural and mathematical methods. The Delphi method represents the oldest and maybe the most popular instance of such combination.

The SEJ protocol proposed here is a Delphi-like protocol that mixes specific elements from the three SEJ classes of approaches mentioned above, such that their disadvantages are minimised and their respective advantages cumulate. The experts give their individual opinions in subsequent rounds of elicitations, in a remote manner. In the first round, the experts are required to answer the questions without engaging in any (virtual) discussion with the other experts. They are then given the opportunity to discuss differences of opinion and reconcile the meaning of questions and context. The debate is remote (using an online platform) rather than face-to-face. This has the advantage of promoting the wisdom of crowds, whilst avoiding the tensions associated with group discussion between dominating personalities. The second estimate is again individual and strictly anonymous. At the end of the second round the output is a set of estimates that should further be mathematically aggregated.

A sizeable data set containing predictions (made by a large number of experts) for outcomes of geopolitical events for the period 2012-2015 is used in this research. Several aggregation rules, most of which performance based, are proposed and compared. Experts' performance is measured in terms of accuracy and informativness. The final aggregated estimate is also compared with prediction markets which are known to be effective at tracking group opinion over time. This research investigates what demographic aspects and/or social attributes could explain good performance. Finally, we postulate that the dependence introduced through the discussion between rounds is not significant and it is justified by the potential increase in information resulting from sharing judgements.

Keywords: evidence-based decision making; uncertainty quantification; structured expert elicitation; aggregation of expert opinions

Science and Society II

Wednesday, 11:00 – 12:30, D 2.221
Chair: Marijke Hermans (Maastricht University, Maastricht, the Netherlands)

Travelling risk. Nanotechnology risks in India and South Africa

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University of Groningen, Groningen, The Netherlands

This paper investigates the construction of nanotechnology risks in India and South Africa. Even though 'risk' has widely spread as an organizing concept of governance, up to the point that we may speak of a world risk society, I argue that the way risks are constructed varies from place to place.
Developing countries are particularly interesting in this respect. While they are increasingly exposed to modern technologies, they did not go through the particular form of modernization that is implied to precede the stage of reflexive modernization and often lack the institutional arrangements associated with first modernity. Hence it is unlikely that the construction of risks in developing countries followed a similar pattern as in reflexive modern societies.
The construction of risks is investigated by focusing on the way that nanotechnology risks travelled from their European and North American places of origin. Risks were not an issue in India and South Africa when these countries started engaging with nanotechnology in the mid-2000s, despite the fact that by that time risks were the dominant concern in Europe and North America. Nowadays, however, risk is a prominent concern in both India and South Africa.
The origins of risk discourses concerning nanotechnology in India and South Africa is traced by a combination of semi-structured qualitative interviews and in-depth document analysis. Over fifty interviews were conducted with key stakeholder involved in Indian and South African nanotechnology since the early days and a wide variety of publically available documents (including policy documents, speeches, institutional mandates, newspaper articles and cartoons) were analyzed.
The results of this investigation are two-fold. First, highlighting the role of globalization in the construction of risks, the paper identifies various mechanisms by which risk discourses travel - these include high-level procedures such as OECD best practices and WTO trade agreements but also include more 'mundane' mechanisms like NGO e-mail lists and international conferences where scientists from developed and developing countries meet.
Secondly, the paper shows that the way risk issues are formed cannot be understood without attending to local meanings of science and society. Although in both India and South Africa risks have emerged as the dominant issue following their engagement with nanotechnology, and hence one could indeed speak of a world risk society, these risks have been given different meanings and they are dealt with in different ways. The construction of risks cannot be separated from local histories, meanings, and practices.

Keywords: Nanotechnology, globalization, developing countries, postcolonialism, constructivist

The Social (Re)construction of an Incident Reporting System: Opening-up, Closing-down, Starting over

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The literature on incident reporting generally describes Incident Reporting Systems (IRS) as technological tools aiming at improving safety in organizations by initiating a learning process from previous events, in order to prevent future incidents and accidents to occur. In this respect, many studies tend to focus on "barriers to reporting"in order to understand why people report (or not) incidents in the dedicated system. Alternatively, we proposed to study IRS as socio-technical artifacts which are embedded in a specific organizational culture and which are interpreted in different ways, illustrating what has been called "interpretive flexibility". This communication is divided in two parts. First, relying on the Social Construction Of Technology (SCOT) framework, we present the different practices and meanings attributed to the reporting of incidents within the Belgian Nuclear Research Centre (SCK-CEN). We link these to the various modes of learning that they enable. By doing so we participate to the opening-up of the research on Incident Reporting to alternative discourses, practices and meanings, unforeseen situations and uncertainties. Second, we present the preliminary results of creative workshops during which we initiated the participatory re-construction of the IRS within the Centre, drawing on and extending the results of the "opening-up"phase. By doing so, we aim at contributing to a transparent realization of the reduction of complexity leading to an informed and collective decision on what could/should be the IRS of the Centre. In conclusion, we propose a reflexive analysis of this process, and we formulate tentative future research directions.

Keywords: Incident Reporting; Vulnerability; STS

The Terms of Engagement in Risk Governance: Shaping Stakeholderness in Water Management

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Increased transparency and participation have been promoted as important in order to improve risk governance in several areas. The forms and practices around participation have shaped differently in different risk governance regimes. In the case of water management the EU Water Framework Directive and the Common Implementation Strategy raises demands on open and participatory processes. Broader participation is partly motivated by the transboundary character of the risks involved; many diffuse sources to pollution demands cooperation between authorities with different responsibilities as well as other actors with different perspectives, knowledges and engagement in the area. How broadened participation takes shape will however also depend on how the water framework is implemented in the different member states. In this paper, we explore the role of water councils in Sweden as an attempt to increase stakeholder involvement.
In the water councils a broad set of actors such as public officials, nature conservancy associations, forest owners, farmers, sport fishers, and politicians are expected to work together, exchange competences and experiences in order to improve water management. Thus, the broadened participation in water management through the water councils could be seen as mainly concerning stakeholder groups, i.e. groups with particular 'pre-defined' stakes (as owners, experts, nature conservancy and so on). When conducting an in-depth case study of the practices of one water council in the west of Sweden, our starting point is that this stakeholderness is not a pre-given category but rather produced through the boundaries drawn between the relevant issues, actors, competences, engagements and responsibilities. On the basis of this case study we draw conclusions on how stakeholders are shaped and links are created between various actors and risk issues such as pollution and flooding. The paper discusses the implications of these negotiated boundaries in relation to risk management and water.

Keywords: Stakeholder involvement, stakeholderness, participatory governance, Water directive

Risk Analysis of Technologies for Mosquito-Vector Control: A comparison between different techniques for manipulating mosquitoes

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Advances in molecular biology and genetics bring about developments that can offer important contributions to the field of mosquito vectored disease control, where the implementation of genetically modified (GM) and non-GM techniques could significantly increase our ability to control mosquito populations spreading human diseases, such as dengue, malaria, and chikungunya. Considered to be tropical illness, these mosquito-borne diseases are increasing in numbers even in places like Europe and United States, because new mosquito vectors have arrived or because through hybridization previous non-vectors can now transmit the pathogen.
While new or improved technologies could offer the possibility to solve serious problems, such as the incidence of mosquito-borne diseases around the world, they might also be coupled with potential and even unforeseen risks. It becomes a difficult task to decide over which technologies to adopt or not, when the risks we are (potentially) facing are new and unknown. This paper proposes a risk analysis comparison of novel and older technologies that attempt to reduce the cases of mosquito-borne disease by manipulating these vectors and transforming them into the tool used to control the disease. These different technologies can be categorized under *population suppression, containment, or eradication* - which involve developing mosquitoes that cannot reproduce or cannot normally survive in the environment - and *population transformation or replacement* - which aim not to eliminate the vector but either reduce or blocs the insect's ability to transmit a disease.
This paper looks at strategies such as radiation-based sterile insect technique (SIT), repressible dominant lethal, cytoplasmic incompatibility, Wolbachia-induced pathogen resistance, and refractory genes. Based on these, we will suggest some aspects that should be taken into consideration when deliberating the adoption of these different manipulated mosquitoes. Thus, this paper also aims at contributing to the discussion around the various solutions developed or under development to control mosquito populations by highlighting their main characteristics and differences.

Keywords: mosquito-borne diseases, risk analysis, molecular biology and genetics

Siting controversies

Wednesday, 11:00 – 12:30, D 2.225
Chair: Mathew White (University of Exeter, Truro, United Kingdom)

Licensing a wind farm in the surrounding of a meteorological radars : keeping a relevant balance between renewable energy and quality of meteorological information: the weight of judicial expertise in front of a French administrative court

J.F. David
Compagnie Nationale Des Experts
De Justice En Environnement, France

Wind farms are both a well-known way of producing renewable energy, a subject of environmental concern ; anyway their location is subject to various restrictions such as : urban planning, or landscape preservation. Presentation will describe the rationale of balancing :

- Interest of a wind farm location in a rural location in Northern France,
- Oppositions drawn from nearby location of a meteorological radar and the likely drawbacks of wind mills wings in radar echo reception.

1 Scope and approach

Presentation will describe a legal and administrative controversy :

- Assessing the level of inconvenience and drawbacks resulting in the location of a wind farm in a certain perimeter of the meteorological radar, the level of associated uncertainties,
- Assessment of the actual interest of meteorological data in hazards prevention, i.e. determine how.

2 Actors and stakes

Actors in the process are private wind farm investor and public authorities linked with licensing process (i.e. in France, the "préfet").
Opponents is the meteorological agency, which has to provide meteorological products related with hazards prevention, in order to insure the quality of data and meteorological contribution to hazards prevention and is bound to thwart any installation or work which may meteorological intelligence.

3 Arguments and their balancing – Development of independent judicial expertise

appropriate meteorological information. Front to a judicial contest of the refusal of the licensing, an independent expertise has to be set up to develop :

- the concept of relevant windmill/ meteorological radar related impact area,
- the inventory of natural and technological hazards the impact of which may be foreseen or mitigated by meteorological radar data ,

That inventory gives room to European directive 2007/60 23rd October 2007 as a source of reference to shape what is a relevant flood hazard – the major natural hazard in that area.

4 Conclusion

Conclusion will stress the role and weight of independent expertise in a court's conviction balancing hazards prevention and green energy production interest.

Keywords: wind farm, meteorological hazards prevention, conditions for licensing

Local communities and shale gas development: of what kind of risks are we talking about? Findings from Poland

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Shale gas production is often presented as a great opportunity for the economy and as a temporary solution for the problem with energy resources depletion: a gate to the “golden age of gas”(IEA 2012) and “bridge fuel”to the world fuelled by renewable power. At the same time, environmental risks are considered by some actors - from state authorities and local government to activists from global environmental movements and local communities - as serious enough to stop the enterprise.
Perspective of members of local communities is especially vital; at least in some cases, they are able to stop the process, as in Polish village Żurawlów. Thus the understanding of the local communities’ perspective is important for both supporters and opponent of shale gas production. What is the risk or loss which local inhabitants want to avoid? Basing on field research carried out in several locations in Poland and analysis of materials from public hearing, we investigate concerns most important for local inhabitants and activists. We find that in many cases, not the technological risk itself is seen as a threat, but rather what is perceived as unequal power of actors (investor and local communities members) engaged in the site. Inhabitants are especially concerned with the possibility that in case of problems, investor will be free to leave and they will be forced to deal with unforeseen consequences with their own means; and with the rules regulating the access to common goods they are depend on, as water and road infrastructure; again they see the risk that investor may gain the privileged access to these goods to their cost. The lack of transparency and difficult access to official information makes these concerns even stronger, in accordance with classic Fischhoff’s (1995) statement that “people fear that those who disrespect them are also disenfranchising them”.
Thus, the risk connected to technology impact is considered to be serious only as an element of the broader framework regulating relation between inhabitants / citizens and corporations, which is often perceived as not securing the interests of the latter adequately from the possible externalization of operational costs. This finding leads to the recommendation to shift the public discussion on shale gas production (as well as other “risky”technologies) from “technological”aspects of the process to political question of balance of power between different stakeholders and the role of state authority in regulating these relations.

Keywords: shale gas; siting controversies; local communities; externalization

Determinants on public acceptance of siting a facility for high-level radioactive waste in the UK

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Deciding on the appropriate siting of a facility for High-level Radioactive Waste (HLW) is one of the most difficult NIMBY issues to gain public acceptance of. This study explores the factors related to public acceptance of HLW facilities in terms of procedural fairness, which is important particularly when trust in authority is low. Increasing opportunities for participation by various stakeholders and the public was expected to have positive effects on procedural fairness and lead to greater acceptance. However, social stigma, that is concern about the negative image from people living in other places, might prevent people from accepting any involvement with siting because people care about intergenerational subjective norms, including the welfare of their children, grandchildren and future generations. Hence, people tend to find siting unacceptable when the issue involves their community.
In the UK, Public Stakeholder Engagement (PSE) was conducted through three steps from 2009 to 2012 in West Cumbria and involved public meetings, workshops and deliberative meetings. Initially, a public opinion poll conducted after the PSE process was completed, revealed that the majority of participants supported the initiation of an investigation process to choose a site. However, after the county council of Cumbria and the borough councils of Copeland and Allerdale each took individual decisions on whether they should proceed to the next stage in January 2013, the majority of the Cumbria county council voters against the motion. Therefore, while there were more a majority of proponents for proceeding in the two borough councils, the Government decided not to proceed to the next stage in West Cumbria.
An internet survey was conducted in London and Cumbria, to compare the differences of attitudes between regions. A quota method stratified by age and sex was used for the sampling. Two types of acceptance were measured: 1) Acceptance of the decision about West Cumbria and 2) Acceptance of a siting HLW facility in their community using a hypothetical question in which respondents were the residents of the proposed candidate site for a geological disposal facility for HLW.
The results showed that acceptance of the decision concerning West Cumbria was high and procedural fairness had a strong effect on this acceptance. However, although procedural fairness still produced a significant effect, fear of stigma and concern with perceived intergenerational subjective norms had negative effects on the acceptance of a siting facility in the individual's community.

Keywords: public acceptance, procedural fairness, stigma, intergenerational subjective norm, High-level Radioactive Waste

Common issues for social consensus building observed in different social problems related to environmental policies

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This study extracts issues for social consensus building commonly observed in different social problems related to environmental policies and examines how unbiased value judgment of environmental policies could be achieved. As the social problems subjected to this study, three specific problems related to prevention of natural disaster, environmental pollution and infrastructure development are taken. The three problems have, on the one hand, issues unique to themselves, but, on the other hand, if we look at the three problems beyond boundary such as mechanism of problem occurrence, institutional unfairness or communication among stakeholders, governments and scientist, we expect that we could find issues commonly applicable to all the three problems, from which we may be able to find ways to improve the current symptomatic management of environmental policies. In order to achieve this objective, we conduct bibliographic survey of each of the three specific problems, attend and observe symposiums in which victims of the subjected environmental problems make presentations and conduct questionnaire surveys of anxiety and self-efficacy to general public about their involvement in the making process of policies concerning environmental problems to reveal psychological process of feeling of resignation of victims. The results reveal that due consideration of social needs and victims' resigned feelings are needed for unbiased value judgment of environmental policies.

Keywords: environmental problems, social consensus building, environmental policy, common environmental issues, value judgment of environmental policy

Trust in communication

Wednesday, 11:00 – 12:30, D 2.215
Chair: Frederic Bouder (Maastricht University, Maastricht, the Netherlands)

What makes information sources seem to be reliable?

K. Sano
National Institute for Environmental Studies, Tsukuba, Japan

We studied how information was received to identify effective methods of risk communication after the accident at the Tokyo Electric Company's Fukushima Dai-chi Nuclear Power Plant.

We aimed to investigate how daily impressions of information sources influence their trustworthiness. Last year, we developed a questionnaire survey to assess the degree of daily utilisation and the perceptions of reliability and general impressions of 15 selected information sources. The sources were television, radio, newspapers, books and magazines, the internet, social networking service/sites (SNSs), family members, colleagues, parents of children's friends, neighbours, friends, teachers, experts/researchers and research organizations and local and national government publications.

The results revealed the highest ratio of 'using always' for the TV and internet, exceeding 55%. Family members with a 42% ratio of 'using always' assumed the second position. However, the ratio of participants admitting 'using always' for researchers, research organizations and government or local government publications were all extremely low (about 1%); it remained less than 40% even in the 'using frequently' and 'using sometimes' categories.

The perceived trustworthiness of the information sources was highest for family members, wherein 25.8% of the participants checked 'highly reliable'. The other perceived reliable sources were newspapers and friends, with approximately a ratio of 6%. Family members held 74.4% in the combined ratios of 'highly reliable' and 'reliable', followed by newspapers at 62.5% and television at 55.3%. The trustworthiness of researchers and research organisations was not low considering the extremely low degree of utilisation .

Further, we asked participants to select one or more from among 30 given adjectives to describe their daily impressions of the 15 information sources. A correspondence analysis was then used to analyse the relations between trustworthiness and impression. Consequently, 30 adjectives were classified into 6 groups. The higher trustworthiness scores gained from the impressions of newspapers and local government publications were characterised by adjectives such as 'representative', 'equitable', 'preservable' and 'useful'.

These results indicate that the principal factors determining the trustworthiness of information sources are not expertise or the prompt accessibility of information; rather, familiar and fair information sources are more often relied upon.

Keywords: Trustability, Information source

The Role of Trust in Research Partnerships between Indigenous Peoples and Academic Researchers

C.G. Jardine
University of Alberta, Edmonton, Canada

Risk communication is integrally linked to participatory research approaches, as the success of these partnerships is dependent on the trust that results from productive dialogue and collaboration on risk issues and management options. Research partnerships between Indigenous peoples and academic researchers are known to be a mutually beneficial and effective way to co-generate the knowledge required to address important health issues (such as cancer, diabetes and addictions), and thereby to improve health outcomes and reduce disparities. Trust is particularly critical to the success of these partnerships, as there is still a post-colonial legacy of skepticism based on past abuses of trust. This trust is thus very fragile, as was made evident by the high profile case of inappropriate genetic research with the Havasupai tribe in the United States. This research explored the applicability of the trust, confidence and cooperation model for risk communication in participatory health research partnerships between Indigenous groups and academic researchers, as viewed through the lens of this Arizona case study where trust has been jeopardized and research relationships compromised. Semi-structured interviews were conducted with members of Arizona tribes and Indigenous organizations, and with academic researchers and students engaged in research with Indigenous groups, to explore experiences and perspectives. A search of publicly available information on the positions of tribes who refuse to engage in research (and thus would not consent to an interview) was conducted to capture their views. The results indicated that the Havasupai case is regarded as a terrible betrayal of trust by Indigenous peoples in Arizona, and continues to be an overall barrier for potential research partnerships for several tribes. However, individual researchers have built strong and productive partnerships with other tribes and organizations. Both Indigenous and academic research participants indicated that confidence in past performance ("doing what they say they will do") and trust based on shared values ("improving health for Indigenous peoples") are paramount to cooperation in addressing health risk issues. All participants noted that researchers need patience, perseverance, flexibility and a humble approach to develop trust in partnerships. They also noted that Indigenous partners must likewise try to accommodate the expectations of academic research. While participants agreed that lost trust cannot be easily restored, they did indicate that partnerships may still be established based on accountability and relationship-building. Procedures and formal agreements that provide Indigenous peoples with control over research activities are seen as a way to foster accountability.

Keywords: trust, confidence and cooperation; participatory research; Indigenous/academic research partnerships

Social Responsibility or Social Responsiveness? An Examination of 12 Years of ExxonMobils CEO Letters (2002-2013)

S. Grantham[1], E.T. Vieira[2]

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Social Responsiveness (SR) messaging covers Corporate Social Responsibility (CSR), Corporate Social Performance (CSP) and Corporate Sustainability Communication (CSC). SR messaging focuses attention on specific actions an organization is taking to deal with internal and external issues and can influence stakeholder perceptions of the organization including risk.
This study examines 12 years of ExxonMobil's CEO letters to establish trends in the SR messages in relationship to external events such as the 2007 financial crisis and the 2010 BP oil spill to determine if the type of SR messaging changed following these events and which areas of risk were highlighted in these messages.
To evaluate the letters, the researchers used a Text Network Analysis (Paranyushkin, 2012, 2013) computational approach informed by the Landscape Model of Reading Comprehension (van den Broek, et al., 1996) to determine the likely reader perspective based on text comprehension. The findings indicate that the emphasis in SR messaging was not specifically correlated with external events but the themes did follow trends over time. CSR messaging was present in all of the letters but had its strongest presence from 2002- 2006. The most influential nodes included references to respect, people, community citizenship and engagement. The 2007 and 2008 letters focused on CSR, CSP and CSC in equal measure. However, in 2009, the letters emphasized the CSP issues of health, corporate and industry issues, and a global presence along with CSC issues related to the environment, risk, resources and response. From 2010 through 2013, the letters emphasized production risks and positive environmental practices.

Keywords: Social Responsibility messaging, Text Network Analysis, risk perception

An Empirical Study of Social Trust and Social Confidence in the Japanese Government: The Case of Nuclear Power Plants

S. Furuno
Hokkaido University, Sapporo, Japan

This empirical study examined how laypeople estimated the Japanese government in the context of risk management of nuclear power plants. In Japan, a serious accident in Fukushima Daiichi Nuclear Power Plant happened in 2011. Every nuclear power plant has stopped since this disaster as of now. The government now tries to restart nuclear power plants, after reexamining their safety. However, as some public opinion surveys showed, the Japanese public has not accepted to restart nuclear power plants. Thus the present study investigated why the citizens have not accepted risks of nuclear power plants, focusing on estimation of the government by the public. The main aims of this study were to clarify how the public estimation of risk managers influences risk acceptance and to suggest risk communicators how risk managers could do for better risk communication in the context of nuclear power plants in Japan.
The present research focused on social trust and social confidence as the public estimation of risk managers. Many researchers have shown trust in risk regulators influence risk acceptance. In addition, current research found that not only social trust, but also social confidence could affect risk acceptance. According to the previous researches, the difference between trust and confidence is that one relies on others even though one becomes vulnerable. On the other hand, confidence means that one assures something is going to happen as one's anticipation. Having arranged predictors of trust and confidence, the present study hypothesized that 1) social trust and social confidence influence risk acceptance, 2) social trust is affected by value similarity and caring, and 3) social confidence is determined by competence, procedural fairness.
About four hundred undergraduate students participated in a questionnaire. The data was conducted by statistical analysis. Consequently, the hypotheses were supported. The results showed that the citizens accepted the risk if they could trust or have confidence in the government as same as the previous studies. Value similarity and caring predicted trust. Competence and procedural fairness anticipated confidence.
From these results, this study suggested that risk regulators could try to earn the public confidence in the first. This is because it is difficult to earn the public trust again once trust in risk regulators ruined. The government would earn trust easier after the government earns the public confidence firstly. As a limitation, only students participated in the survey. Thus, further study is necessary for precise discussion.

Keywords: risk communication, trust, confidence, TCC model

Symposium: Case studies on risk communication II

Wednesday, 14:00 – 15:30, D 2.221
Chair: Dirk Scheer (Zirius, Stuttgart, Germany)

Evaluating HPV Risk Messaging and Vaccine Adoption by Young Adult Males

S. Grantham
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In 2009 the Center for Disease Control and Prevention (CDCP) updated their HPV vaccine recommendation to include males. This recommendation was a result of the lower than expected vaccination rates among females paired with the increase in head and throat cancers related to HPV.
Previous research has shown that the advertisements for Gardasil and Cervarix focused on the risk of potentially getting cervical cancer if one was not inoculated and the benefit of getting the HPV vaccines along with the implied control one had over reducing this risk. These studies also indicated that the young women were informed by the advertising about the HPV risks but were persuaded primarily by their physicians and parents in their decision to become vaccinated.
This study was conducted at several universities in the Northeastern sector of the United States and explored the adoption of HPV vaccination by both males and females. The results indicate that only 20 percent of the male respondents had been vaccinated while 62 percent of the female respondents had been vaccinated. Overwhelmingly the males reported that neither a physician nor a parent had recommended the HPV vaccines even though in this age group, the respondents would have been required to have a physical before entering college.
There was a significant difference in how males and females viewed advertisements about HPV vaccinations. Females reported a much higher level of agreement that the HPV vaccination advertisements conveyed a sense of empowerment, control, benefit of getting vaccinate and reduction of risk of HPV related diseases. In an open ended section of the questionnaire asking why the respondent did or did not get the vaccines, the males either left the question blank, reported that they had not heard about the vaccines or stated that the vaccines were for women.
The idea that the vaccines were for women may be a result of a combination of factors. First, young men are not being informed about the HPV vaccine by either their physician or parent. Second, the initial HPV vaccine advertisements focused on female protection from cervical cancer. The advertisement structure following CDCP's 2009 recommendation for male vaccination simply now includes a picture of a young man and young woman. There has been little emphasis on the risks to young men from HPV in terms of head and throat cancers in this advertising.

Keywords: HPV vaccine, risk messaging, control, empowerment, risk vs. benefit

Public Information Responses After Terrorist Events (PIRATE)

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The threat western societies face through terrorist attacks became much more apparent than ever before through the attacks of 9/11 (New York and Washington 2001), 11-M (Madrid, March 11, 2004) and 7/7 (London, July 7, 2005). The new quality of those attacks comprised the deliberate attempt to cause as many fatalities as possible and to disrupt economic and social life. Not least the ruthlessness and sophistication of the attacks carried out made the use of radiological or biological substances for attacks conceivable, if not likely. How the public reacts to biological or radiological terrorism will help to determine how extensive the attack's medical, economic and social impacts are. Yet our understanding of what the public is likely to do in case of a radiological and/or biological attack is limited. Will they spontaneously evacuate affected areas? Are they willing to attend mass treatment centers? Will unaffected people demand treatment and monitoring? Will people avoid affected areas even after clean-up operations have been completed? As yet, we do not know. While emergency plans and simulations dealing with these scenarios assume a relatively compliant public with easily understood behaviors, evidence from previous incidents suggests that the reality may be different. As such, a first step to preparing better plans to protect the public is to identify actions they intend to take in the event of one of these scenarios occurring, and to assess how prevalent such intentions are in society.
In this presentation results from a two-year reseach project will be presented, adressing the questions outlined above and comparing them between Germany and the United Kingdom. The presentation will emphasize the question of whether behavioral intentions of the public can be influenced by tailored emergency communication and the satisfaction of public's information needs and what possible differences in the response to terrorist attacks exist between Germany and the United Kingdom.

Keywords: Risk communication, perception

In Silico science for climate policy: How policy-makers process and use carbon storage simulation data

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Knowledge gained from computer simulations in new earth-related technologies is not limited to the scientific community itself but impacts other domains of society such as politics, business and industry, and the public at large. In general business and industry in the oil and gas business are using computer simulations on a daily basis. In this case it is using computer simulations to gain understanding of the risk of a new technology which would affect the subsurface on a large scale and hence in Europe a substantial amount of people. Impacting societal domains, simulations meet two principal functions: they serve as a knowledge instrument as well as a communication instrument at the science-policy interface. Nonetheless, so far science did not consider in depth how processes and circumstances of simulations-based knowledge transfer works. Hence, this study analyses how policy-makers using a case study of geo-scientific carbon dioxide storage modeling process scientific simulation results. To operationalize the leading research question, two tasks were carried out: i) Elaboration of an analytical framework to systematically assess simulation at the science-policy interface. ii) Identification and analysis of empirically backed processing as well as evaluation and use patterns among policy-makers and stakeholders. The empirical results are based on 19 qualitative interviews with decision-makers from politics, business and industry, and society. The empirical results reveal a great variety of co-existing perception, evaluation and use patterns of how decision-makers deal with simulations. The field work reveals that the current state-of-the-art in research literature which emphasizes an overall misperception, misunderstanding and misuse of simulation data by policy-makers is, in general, not backed by the case-study results. However, scientific simulations do leave considerable room for misunderstandings for experts not disposing on specific geo-scientific and simulation expertise.

Keywords: climate change, simulations, policy-making

Flooding in Canada: Risk Perception, Trust in sources of information, Beliefs and Preparedness

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University of Ottawa, Ottawa, Canada

Risk of flooding is recurrent and increasing in the context of meteorological adverse events and changes to built environments. Each year flooding creates significant to severe regional disasters disrupting and negatively impacting various aspects of communities' health, social services, and economy. For example, the recent flooding of Calgary and flash floods in Toronto or the seasonal flooding in Quebec and Manitoba result in the most costly natural disasters in Canada. In order to prevent harm to people, damages and costs, better preparedness and risk communication are required. Government is normally seen as the mandated authority responsible for warnings, alerts and response, yet the pathway to effective risk management is complex and involves many stakeholders or tiers. In some jurisdictions, a shift in flood management towards a more integrated approach has resulted in a greater emphasis on understanding psychosocial aspects of flooding at various levels. Recent empirical studies have focused on understanding flood risk perception as it relates to risk communication and risk mitigation. As part of a multi-component research program aiming to improve flood risk awareness, preparedness and response, this study examined risk perceptions and beliefs in a national representative sample of Canadians in view of preparedness behaviors, beliefs in loci of responsibility and trust in sources of information. Data from a large survey of 3,263 adults from the 10 provinces were first compared on risk perception by socio-demographics and by geocoded localization of flooding zones that provided a risk assessment index. Beliefs about disasters were then submitted to a factor analysis which yielded multiple tiers of responsibility. The 3-factor solution (Self, Government, and Fate) predicted preparedness behaviors when combined with trust in various sources of information. For instance, individuals who believed in the Government tier of responsibility were more likely to comply with evacuation recommendations than those who strongly supported beliefs in Fate; but less likely to uptake preparedness behaviours than those who endorsed that the 'Self' was responsible for disaster risks and issues. High discrepancy groups (between risk perception and risk assessment index) were also compared on these variables. Results are interpreted in view of a multilevel model of agency and highlight targets at the individual, organization, and community levels for more effective risk communication. By tailoring initiatives focusing on cultivating sense of mastery in the public and mobilizing the resources in the community we may achieve a more effective shared governance of flood risk management.

Keywords: risk perception flooding

Organizational risks II

Wednesday, 14:00 – 15:30, D 2.215
Chair: Ragnar Lofstedt (King's College London, London, United Kingdom)

A generic framework for analyzing regulatory value chains

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University of Stavanger, Stavanger, Norway

The purpose of this presentation is to outline a generic framework for comparative analysis of regulatory regimes designed for the public governance of risk. The intention is to combine considerations of applicability, parsimony and complexity in a manner that also satisfy the need for integrating theoretical approaches to risk regulation and facilitating comparative and normative assessments.
The framework introduces the concept of *regulatory value chains*. The concept of value chains has been associated with the delivery of commercial products in a market. As applied to the field of risk regulation and governance, it can be defined as the employment of given (regulatory) policy instruments intended to shape and influence risk management practices in regulated organizations as adapted to the specific features and environments of these organizations. Three dimensions thus serve as constituting the basic components of regulatory value chains: (1) The policy instruments available in regulatory processes (means, tasks and functions), (2) the purposes to be achieved within the context of the regulated organizations (risk management), and (3) the target groups responsible for implementing measures and producing results. The basic logic of the model is that regulatory value chains can be identified by tracing the routes of the available instruments in order to identify which aspects of the enterprise risk management they are intended to influence and how characteristics of these receivers of regulatory instruments in turn influence responses and outcomes. These regulatory trajectories will include also a number of feedback mechanisms.
It takes as a point of departure the traditional perspective of government understood as the exercise (legal) authority legitimized within a political system of democratic decision-making and administrative execution. This perspective implies no disregard for the complex processes of policy implementation and of how these depend on the participation of actors outside government. Clearly, addressing the totality of actors, decisions and interactions constituting any societal domain of governance in its most generic sense can be legitimate and useful. But it can also be overwhelming and challenging in terms of defining and distinguishing roles, drawing lines between subsystems, and in terms of analytical transparency. In terms of regulatory processes, public governance may be less concerned with partnerships and networks involving more or less symmetrical relations between government and actors in a market. Or rather, the concept of public governance, applied to regulation, pinpoints the often delicate relationship between autonomy and authority (and between symmetry and asymmetry) in private-public interactions.

Keywords: Risk regulation, Risk governance, Risk management

Expert based identification of risks to drinking water provisioning, in a climate change scenario: a Swedish case study

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In Sweden, the provision of safe drinking water and the control of its quality is a responsibility of local municipal authorities. Historically, this service through municipally or city controlled water works is part of the 1900th century urban modernization and state governed public health policy. According to the constitution, municipalities have considerable autonomy regarding the organization of provisioning of services and public functions, often regulated by national legislation.
Serving as drinking water supply for 700.000 people Göta Älv river in western Sweden is a water protection area covering 28 square kilometers. This case study focuses on the eight municipalities that use Göta Älv water system as a drinking water supply: Trollhättan, Lilla Edet, Ale, Kungälv, Göteborg, Mölndal, Partille and Öckerö. There is considerable variation among the eight municipalities in terms of administrative solutions and modes of organization of the ways in which safe drinking water is provided to citizens.
In a climate change scenario, the Göta Älv water system presents a situation where a multitude of systemically interrelated severe risk issues are expected to increase, such as flood, landslide, dam failure, and toxic contamination of the environment. Contamination of drinking water due to toxic substances, and infectious biological agents is a serious risk to public health in this scenario.
The study focuses on how different types of experts, depending on their organizational affiliation (academia, government agency, or municipality) perceive risks to drinking water in a scenario of climate change. Based on interviews the research questions address: How do experts understand the causes of unwanted events? How do they identify values at stake? And what actions do they propose to manage risks?

Keywords: risk identification, climate change, safe drinking water

Risk: from Solid to Liquid

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Risk management has become a topic of international relevance after several crises and consequential adjustments that arose in the attempt to stop them. However, the concept of 'risk' has always been problematic, so its management. This paper aims to investigate how paradigmatic positions might have influenced in practical problems related with the implementation of this management tool. We carried out a critical analysis of paradigmatic perspective as well as the epistemological and ontological positions adopted in risk and risk management's literature. We examined contributions and limitations that paradigms, such as positivism and constructionism, have led to this research topic and possible advantages derived from a post-structuralism approach to future researches and the practices of risk management. We observed that the regulatory and financial concept of risk ignores much of the complexity and dynamics present in decision-making processes related with uncertain futures. Thus, this research shows alternatives that could be explored in the implementation and development of this management considering specificities of organisational contexts.

Keywords: Risk. Risk Management. Critical Research. Paradigms. Interdisciplinary.

The concept of Complex Interactive Processes in organisational safety, risks and crises

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Every organisation dealing with complex interactive or tightly coupled processes will be confronted with a critical situation one day. The general reasoning goes that if there are guidelines that indicate the organisation's management how to respond quickly and adequately, damage might be prevented. The overall assumption goes even further in a sense that if an organisation has all its processes in place, and if it communicates these processes in an adequate way before and during a critical situation, mishaps or further damage can be prevented or at least minimised.
The reality proves the opposite. Traditional communication of guidelines and procedures does not often work, as people will interpret information differently to how it was disseminated. Moreover, human beings do not perform their jobs as described in guidelines and therefore the outcomes frequently vary from what was expected, including mistakes. The question, though, is how to deal with this common problem?
This presentation explores the interaction between formal structured processes introduced in organisations and informal unstructured processes at play among all organisational members, and its impact on risk aversive behaviour. It presents a Complex Interactive Processes framework (CIP) that helps to deal with the reality of an organisation by the implementation of formal processes that influence the informal processes, while moving toward the desired goal to diminish potential risks.

Keywords: Risk, crisis, organizational processes

Critical infrastructure

Wednesday, 14:00 – 15:30, D 1.225
Chair: Lars Bodsberg (SINTEF, Trondheim, Norway)

Adapting to Vulnerabilities in the Transportation System's Critical Infrastructure: Drawing Lessons for Risk Governance from the Re-decking of the Macdonald Suspension Bridge in Halifax

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Beginning in August 2015, Halifax Harbour Bridges (HHB) (Halifax, Canada) will undertake an 18-month, $150-million project to re-deck the suspended spans of the Macdonald Bridge. It is the second time in history the suspended spans of a bridge will have been replaced at night and in use during the day. The bridge will be closed to traffic 7 pm to 5:30 am, for 18 months; there will also be at least 10 full-weekend closures. The impact will be significant"'up to 48,000 vehicles, 700 cyclists and 750 pedestrians cross the bridge every day.

What constitutes 'critical infrastructure' (CI) and how we manage it are deeply embedded in social context (Boholm, 2012). The HHB's assumption of control over the project exemplifies a rationalist's bias; there is only a modest degree of community awareness of the project. Yet when re-decking begins, the impact will be felt broadly: people who use the bridge off-peak will be under increased stress, particularly those who work non-standard work hours and disadvantaged groups with the least capacity to adapt, including low-income workers, the ill and elderly; there will be increased media coverage and a broader interpretation of a major CI event that is occurring in plain view in the Halifax Harbour.

Risk governance can be defined as the totality of actors, rules, conventions, processes and mechanisms concerned with how relevant risk information is collected, analyzed and communicated, and management decisions are taken (Renn and Walker, 2008). That different risk traditions exist, use different methods and tools and have different interpretations of events is not new. What is less clear, however, is how these competing rationales are acknowledged, accommodated and reconciled (or rejected). Equally, the model assumes a degree of consistency in the social context; less has been written about how the model can help us to understand a dynamic process in which the key issues are reframed from complex to uncertain to ambiguous (Renn, 2008), and how this re-framing influences human behaviour and risk processes.

We believe this a powerful learning opportunity for those studying the fuzzy concept of 'Smart City.' The first stages of the research, which benchmark risk perception, are already in progress, including a 2,000-person survey, focus groups and semi-structured interviews with CI operators. We will report these initial benchmark results at the SRA Europe and articulate the next steps in our research which will examine people's lived experience as the bridge closures begin.

Keywords: risk governance; critical infrastructure; transportation infrastructure; adaptive capacity; risk perception

Estimating consequences of discharge from potentially polluting shipwrecks

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Shipwrecks on the sea floor around the world contain unknown amounts of hazardous substances that, if released, threaten to harm the marine environment. Shipwrecks deteriorate due to e.g. corrosion and the probability of a potential leakage increases with time. There is today no comprehensive method for assessing the risks of potentially polluting shipwrecks to support decisions on mitigation measures. In such a method, assessment of potential consequences of contamination events has to be included. Possible consequences are e.g. contaminated beaches, degradation of aquatic organisms, and reduced possibilities for fishing and recreational activities, affecting environmental, social and economic aspects of marine life. The purpose of this study was to develop an approach for estimating environmental consequences of potential discharges of hazardous substances from shipwrecks. Consequences are assessed based on the estimated mass flux of hazardous substance (in this case oil) potentially released from the wreck, the type of end-point receptors, and the sensitivity of the end-point receptor. This is done by modelling the contaminant load on specific end-point receptors using the Seatrack Web tool developed by the Swedish Metrological and Hydrological Institute and the sensitivity of the receptor according to information available in the Digital Environmental Atlas of Sweden. The overall sensitivity of a receptor, e.g. a beach area, is a function of ecological sensitivity, resilience and difficulty to decontaminate the receptor. The consequence assessment is part of ongoing work to develop a comprehensive risk assessment model to provide decision support for risk mitigation regarding potentially polluting shipwrecks. A tool for assessing the probability of release of hazardous substances from shipwrecks exists and the consequence assessment is a necessary continuation and thus complements the existing tool.

Keywords: Risk assessment, shipwreck, oil, environmental consequence, decision support

Indicators for Real-time Monitoring of Major Accident Risk in the Petroleum Sector

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To exactly model and quantify the effect on the risk level of all ongoing activities and decisions on an petroleum installation in one common risk model is an extremely complicated task that per today is not considered realistic. This is due to the incompleteness of the current risk models, the complexity, variety and extent of the activities taking place on an offshore installation, lack of various technical and operational input data, and also the fact that human activities are largely unpredictable and therefore difficult to capture inside a risk model. This inability to exactly model and predict the effect on the risk of everyday as well as ad-hoc activities does however imply that alternative and sometimes simplified approaches must be sought to manage the risk. Barriers are in place to control and reduce the risk. The status of these barriers, and the measures implemented in case of degraded barrier, are closely related to the risk level. Therefore, by (1) continuously measuring the status and the availability of these barriers, and (2) establishing a relationship between the status of the barriers and the risk, a good indication of the current risk on the installation can be obtained.
In the paper we will provide examples of suitable indicators for monitoring of major accident risk in the operational phase. The objective has been to reflect how day to day changes to safety barrier status affect risk on an installation, thereby providing the operators with a risk based decision support tool. Real time information of safety barrier status is combined with knowledge from risk analyses and expert judgements to predict changes in current risk picture. The paper is based on several industry case studies focusing on major hazard risks such as process leaks, ship collisions, well leaks / blowouts and loss of containment due to sand erosion and corrosion.

Keywords: Operational Risk management

Energy

Wednesday, 14:00 – 15:30, D 1.227
Chair: Ric van Poll (RIVM, Bilthoven, The Netherlands)

Public authority contract policy requirements and the balance of risk, resilience and transaction costs in upstream offshore petroleum industry

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Developing and operating engineering systems to extract oil and gas offshore requires managing risk and systems resilience in an extreme environment. Engineering challenges of the operating environments are even getting progressively more extreme as the industry moves into greater oceanic depth or further north into Arctic climatic conditions and High North environment. This narrowing of technical and operational margins in increasingly extreme environments confronting the offshore industry and regulatory authorities alike, is unfolding in a context where offshore oil and gas production is experiencing increased competition from the renewable energy production value chains - occasionally even within the same energy firm - and recently falling prices on petroleum products. This translates into more emphasis on cost effectiveness along the value chain from prospecting to consumption of oil and gas, and probably shortening the tolerable capitalization time spans to investors. And finally climate policy issues face the industry , and increasingly so - though debatable with what consequence and within what time span.Contract regimes distribute responsibility between the signatories. In offshore industry this typically regulates responsibility distribution between oil industry service firms' development of a rig, a subsea system, a pipeline etc, and oil companies operating installations. An analysis of the distribution and transfer of knowledge and know-how required between the two parties in a contract regime in order to facilitate safe and cost effective operations is challenging. It seems reasonable to assume that a given distribution of responsibility should be followed by a corresponding distribution and transaction of knowledge and know-how. This is a critical assumption in situations that are not "business as usual". As the oil industries are moving into Arctic regions they are facing new and challenging environmental conditions. This require both structural and operational innovations under tightening financial conditions; this is not "business-as-usual". Increased dependence on and flow of transactions in a contract regime means increased transaction costs, thus stressing the already tightening financial conditions.The paper discuss risk and resilience perspectives in design of contract regimes as the industry moves into more economically, environmental and regulatory demanding situations. In doing so the paper primarily draws arguments from a company perspective. Empirical cases from ongoing development projects in an early development phase like Ivar Aasen, a late development phase like Goliat, and two fields in production, Snøhvit and Ormen Lange will be included and discussed.

Keywords: engineering, global network, regulation, resilience, risk,

Combining risk analysis methods with life cycle assessment to prioritize R&D initiatives for innovative energy technologies

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Research and Development (R&D) roadmaps serve as decisions aiding tools for stakeholders in government, industry, and academia. Roadmaps have been developed to guide research efforts in a variety of topics such as nanotechnology, biofuels, and other technical innovations. Such emerging industries are subject to deep uncertainties from emergent conditions and future scenarios. Deep uncertainties involve structural and qualitative perspectives or trends that are disruptive to priorities and decision-making. A common failure of R&D roadmaps is to consider the impact future uncertainties have on the prioritization of R&D initiatives. This paper will demonstrate an integration of scenario planning with multi-criteria decision analysis for the prioritization of R&D initiatives for developing a roadmap, which identifies robust research efforts. Application of these methods is shown for two energy infrastructure cases, specifically (i) large-scale, government energy infrastructure installments and (ii) the development of aviation biofuel supply chains. Energy R&D portfolios considered include investing in microgrids with monitoring and control software, microturbines with fuel cells, and solar cogeneration of electricity and hot water with battery backup. Aviation biofuel research initiatives include investigation and optimization of bio-feedstock production, aviation biofuel conversion, transportation logistics, and others. Common criteria for these case studies are related to lifecycle cost, emissions, and fossil fuel consumption. Examples of future scenarios that could be disruptive to research priorities for these alternative energy roadmaps including environmental regulations and compliance concerns, national security concerns related to petroleum dependence, technology innovation for the greatest potential widespread adoption, and economic downturns in which there is an emphasis for low cost energy and fuels. Methods such as lifecycle assessment, lifecycle costing, and techno-economical analysis can be used to inform the assessment of how well R&D initiatives meet criteria. The results reveal which R&D initiatives perform best and which are robust under different scenarios. Based on the robustness of initiatives and the disruptiveness of emergent conditions, the results are used to develop R&D roadmaps to guide future research that is in line with stakeholder preferences. These methods can be used for the coordination of research initiatives applicable to various fields that involve diverse stakeholders from government, industry, and academia. Future work will involve the integration of value-of-information analysis and uncertainty analysis to ensure that R&D initiatives significantly contribute to the mitigation of system vulnerabilities.

Keywords: multicriteria decision analysis, research and development, life cycle assessment

A guided ‘walking tour’ through the chemical space of petroleum UVCBs, how changes in composition and mass distribution of an artificial petroleum product affect hazard and risk estimates of PETROTOX and PETRORISK

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Determining the complete molecular composition of petroleum and its refined products is not feasible with current analytical techniques. This complex nature of petroleum products, with their unknown constituents, all of them exhibiting different fate and effect characteristics, merits a dedicated hazard and risk assessment approach.
The underlying assumption of the PETROTOX and PETRORISK tools developed by CONCAWE is that the fate of a total petroleum substance can be simulated based on the physico-chemical properties of representative structures mapped to predefined hydrocarbon blocks (HBs) and on the relative share of each HB in the total mass of the product, commonly known as the Hydrocarbon Block Method (HBM). To test this assumption a series of model simulations were run using an artificial petroleum substance, containing HBs belonging to different chemical classes and molecular weight ranges, but with equal mass assigned to each of them. To this artificial petroleum substance a series of subsequent modifications in mass allocation to a delineated number of HBs belonging to different chemical classes and carbon ranges was performed, in what we perceived as a guided “walking tour”through the chemical space of petroleum substances. We show that the PETROTOX and PETRORISK predictions reflect changes in mass distribution introduced to these selected HBs accurately, affecting hazard and risk estimates in correspondence with what is expected based on physico-chemical properties of individual constituents in the corresponding HBs. These findings illustrate the usefulness of the HBM approach for the environmental hazard and risk characterisation of petroleum substances.

Keywords: Petrotox; Petrorisk; petroleum products; hazard and risk predictions; UVCB’s

Natural hazards

Wednesday, 14:00 – 15:30, D 2.225
Chair: Seda Kundak (Istanbul technical university, Istanbul, Turkey)

The distribution of natural risks: Reconciling efficiency and equity

N. Doorn
Delft University of Technology, Delft, The Netherlands

The focus in this paper is on the distribution of natural risks, for example, flood risks or risks related to seismic activity. In a way, these risks are part of nature and will continue to exist. That is, they are not activities that can be fully regulated by law or other means. However, with the implementation of preventive measures, these risks can sometimes be reduced or redistributed, which poses a distribution problem. Moreover, the management of these risks often also introduces additional risks to the environment.
From an egalitarian ideal, there is an intuitive appeal to distribute risks as equally as possible. If an outcome is considered undesirable, it would be fair to distribute it equitably among the people possibly affected. At the same time, there is also a strong intuitive appeal to distribute the risks as efficiently as possible, minimizing the total amount of risks. The two intuitions may be in conflict: the distribution with the lowest aggregated risk is often not the most equal distribution of risks. The challenge is how to make the trade-off between efficiency and equity.
Since the distribution of risks is distinctly different from the distribution of positive goods, the traditional allocation principles for positive goods cannot straightforwardly applied to risks. In this paper, I develop a hybrid allocation principle based on the sufficientarianism and utilitarianism. By distinguishing between reversible and irreversible risks, this allocation principle allows for a trade-off between equity and efficiency that is not vulnerable to the objections voiced against monistic allocation principles like utilitarianism, egalitarianism, or sufficientarianism. One of the main advantages of this hybrid allocation principle is that the risks do not need to be aggregated into one (monetary) unit, allowing for different risk levels for different types of risks and also including non-tangible loss like environmental harm. The exact risk levels and possible compensation schemes are open questions that still need to be settled. These are political questions that depend on the context at hand and probably on the particular geographical situation as well. However, the allocation principle developed in this paper provides the basic rationale for choosing how to distribute and implement measures to reduce and redistribute natural risks.

Keywords: natural hazards, distributive justice, ethics, irreversibility

Mental models approach towards understanding marine environmental risks: How experts conceptualise ocean acidification

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Attention has begun to turn towards the impacts of climate change on the marine environment as complex risks such as ocean acidification become more evident around the world. The absorption of carbon dioxide and the changes in ocean pH has already affected shellfish hatcheries and fisheries, which are vital livelihoods for some communities. Research in this area has rapidly increased in order to establish the effects and possible responses to ocean acidification, but in order to facilitate effective communications and policy development it is important to determine how this novel risk is understood by lay publics. Although previous studies have shown that expert and lay assessments of climate change risks vary, including their understanding and responses, little research has investigated how the public perceive ocean acidification in particular. We aim to address this knowledge gap by using a mental models approach to compare expert and public risk perceptions of ocean acidification, in order to highlight areas of agreement, important knowledge gaps, and key misunderstandings. Here we report the first phase of the study, in which a literature review and interviews with experts (N = 7) resulted in the creation of an expert model of ocean acidification. We discuss the findings of this review and a thematic analysis of interview data, which show that the cause and chemical process of ocean acidification is uncontroversial, however there are areas of uncertainty such as the overall impacts on organisms and human society. Despite these uncertainties, there is concern about how severe these impacts will be in the future. We then outline the five key areas of an influence diagram, constructed from these analyses, which summarises the causes, impacts, and responses to ocean acidification. The complexity of the risks will be discussed in relation to their implications for effectively engaging the public with this important topic in the future.

Keywords: Ocean acidification, climate change risks, public perceptions, risk communication

Explaining public risk perception of mosquitoes: The role of social norms, place identity, environmental values and concerns

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There is a risk that climate change will cause an increase of mosquito populations in Europe. Due to their nuisance to humans, there are demands to combat mosquitoes, mainly through spraying. These interventions, however, are expensive and associated with uncertainties concerning effects on biodiversity. This poses a dilemma for policy-makers, which makes it important to gain knowledge on what people's discomfort comprises. Qualitative studies show that even where the mosquito prevalence is very high, risk perception can vary within the exposed community, indicating that prevalence is not the only thing that matters. There is, however, a lack of quantitative studies that investigate what these factors are. The aim of this study is to develop a scale for mosquito risk perception and to explore what factors are associated with this risk perception. Theories about place identity, social norms, environmental concern and values were used to identify relevant factors. A questionnaire was distributed to 317 persons in a Swedish community where mosquitoes have increased radically. The items concerning risk perception fell out as a unidimensional scale in a PCA and the internal consistency of the scale was good. First, Pearson correlation analyses were performed. Mosquito risk perception was positively related to place identity, descriptive social norms, and self-oriented environmental concern and negatively related to ecocentric values. Thereafter, the relative importance of the independent factors in explaining mosquito risk perception was investigated in a multiple regression analysis with gender, education and age as control variables. The most important predictor was descriptive social norms, but the other factors and gender - women had a higher level of risk perception than men - also contributed uniquely in explaining risk perception. Results are discussed in relation to the theory of social amplification of risk.

Keywords: mosquito risk perception, biodiversity, social norms, environmental values, social amplification of risk

POSTER PRESENTATION ABSTRACTS

Case study analysis on avoiding duplication of effort in chemical risk assessments in Japan

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In Japan, there are several standard values on chemicals in each regulation (ex. food, river). Food Safety Commission of Japan as a risk assessment organization has conducted approximately 1,400 risk assessments. Recently, there are some cases that the results of chemical risk assessments (in particular, derivation of ADI) are shared with the other regulationsin non-food area. So we analyzed several case studies of such good practices.

Keywords: Chemical, risk assessment, risk management, hazard assessment

Does Urban Planning Education Deal with Risks?

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Urban planning focuses on development of settlements not only due to physical design, but also efficient use of natural resources, enhancing economic growth and reinforcing social structure. Consequently, urban planning education enfolds various disciplines to support students to become professionals. One of the primary purpose of urban planning education is to give the notion and practice of safer settlements against natural and technological hazards. However, not until 1999's devastating earthquakes in Turkey, lectures could find a slot in curriculum. Today, elective courses on risks and disasters are offered in several urban planning departments. In this research, a web-based questionnaire has been set to evaluate urban planning students' perspective on the weight of risk issues in their curriculum and their opinion about the contribution of these courses on the competency in risk reduction in their professional life. The expected output of this research is to bring a critical review on risk issues in urban planning education in Turkey where about 96% of the total land and 98% of the total population face to severe earthquake risk.

Keywords: risk education, urban planning, turkey,

Perceived risks and benefits have a different influence on attitude towards genetically modified organisms when investigated amongst university students, secondary school students and general audience

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Genetically modified organisms (GMOs) continue causing a heated debate in Europe and large-scale studies show Europeans oppose against GMOs. Currently, it is unclear which variables underlie consumers' attitude and buying intention towards GMOs. We investigated the influence of perceived risks and benefits on attitude towards GMOs in three different populations (in Flanders, Belgium): (1) university students, (2) secondary school students, and (3) general audience.
In the first study we proposed a model for understanding and explaining the effects of perceived risks and benefits on attitude and buying intention. Also the influence of knowledge about biotechnology and trust in GMO related information provided by several stakeholders were studied. The descriptive results show that students adopt a positive attitude towards GMOs and are willing to buy GM-derivatives. In contrast to available research evidence, students associate GMOs with high benefits and low risks, however perceived risks and benefits depending on the type of GMO-application. Through structural equation modeling (SEM) the hypothetical model was tested against survey data from Ghent University students. Attitudes are mainly determined by perceived benefits and less by the perceived risks. Both risk and benefits are in turn mainly defined by the information sources they trust, and to a lesser extent by their knowledge.In a second study, similar questionnaires were completed by secondary school students. SEM analysis is ongoing, but based on correlation analysis we find indications that perceived risks associated with GMOs are not linked with younger people's attitude but perceived benefits are.Four thousand Flemish people participated in a third comparable survey. Again, based on the correlation analysis results, we can conclude this general audience sample is rather positive about GMOs and perceive slightly more benefits than risks. The analysis reveals a strong positive relationship between perceived benefits and attitude and a strong negative link between perceived risks and attitude. Data analysis of the three studies show that perceived risks and benefits are not the only factors influencing attitude, but they play a central role in attitude formation. Further, the results imply that clear and accurate communication about GMO benefits and risks is crucial to help consumers making rational choices about GMOs. Given the results involving younger audiences, also objective and proper biotechnology education is important within the decision-making process.

Keywords: Genetically modified organism, risk perception, risk communication, trust

Travel mode attitudes, transport priorities, and travel mode use in a Norwegian public

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The present study aims to identify clusters of transport users, and examine the role of transport priorities, travel mode use attitudes, and car habit strength on travel mode use. An additional aim was to test whether such factors predict intentions to use public transport and reported use of public transport. Data were collected via a self-completion questionnaire survey. A total of 1039 people who were randomly selected from the Norwegian population registry in six urban regions participated. Two clusters of transport users were identified; individuals who primarily use public and health-promoting transport (e.g. public transportation users, bicyclists) and car users. Logistic regression analysis showed that older age, car habit strength and priorities of flexibility (e.g. prioritize that you can choose when on day to travel) increased the odds of car use. Structural Equation Modeling showed that priority of convenience, priority of safety and security, and pro-environmental attitudes about public transport use were positive predictors of intentions to use public transportation, while car use habit strength was a negative predictor of both intentions to use public transportation and reported public transportation use.

Keywords: Travel mode use, travel mode attitudes, transport priorities

Using Life-Cycle Assessment and Risk Assessment to Make Better Decision About Nanotechnologies

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This poster will present ongoing work in the area of using life-cycle assessment and risk assessment for informed decision making in the area of nanomaterials and nanotechnologies. Both life-cycle assessment and risk assessment are two useful tools from which important decision can be made regarding innovation, benefits, sustainability, safety and risk. These tools are often used by different decision makers for different purposes. The complimentary use and possible integration of these two tools is explored more concretely using a specific case study on the development of organic photovoltaics that employ the engineered nanomaterial, fullerene (C60). A prospective cradle-to-gate life-cycle assessment has been completed for an organic photovoltaic cell. This technology was further compared to two traditional silicon (multi-crystalline and amorphous) solar cells as a benchmark comparison. The results of this LCA demonstrate that organic photovoltaics have many potential life-cycle impacts per watt-peak of energy produced, including lower climate change effects for example.

One advantage of organic photovoltaics embodied in this study are the lower amount of materials (i.e. fullerenes) to make the active layer and the lower environmental demands to create those materials during the procurement and production phases.
However, what is not communicated in the results of the life-cycle assessment are the impacts resulting from the fullerenes themselves in terms of human health and/or environmental impacts. To this extent, life-cycle assessment fails to make informed decision for nanotechnologies and is dependent on other tools such as risk assessment to make informed decisions. This relationship will be explored further by completing a qualitative and/or quantitative risk assessment for fullerenes in select life-cycle stages for this case study. The experience and results of the risk assessment will be used to identify ways in which more complete decision making processes can be made for nanotechnologies, including the possibility to integrate these two tools in a meaningful way for decision makers. The authors would like to note that the work on the risk assessment has not yet been completed, however results and data will be available at the time of the conference.

Keywords: Nanomaterials, Human Health Risk Assessment, Life Cycle Assessment

What do the public know about sea-level rise?

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As coastal communities become increasingly exposed to the risks posed by sea-level rise (e.g. flooding, erosion), understanding their beliefs and responses becomes more important; and while studies have identified differences in lay and expert understandings of climate change, little research has investigated how these groups understand the specific risks posed by sea-level rise. This poster presents the results of a mental models study that explored and compared expertand public perceptions of sea-level rise on the Severn Estuary, a threatened coastal environment in the southwest of the United Kingdom. To do this, it compared an 'expert model' with lay perceptions of Estuary residents. In-depth semi-structured interviews with experts (N=11) were followed by interviews with diverse members of the public (N=20) and finally a public quantitative survey (N=359). The use of mixed qualitative and quantitative methods permitted us to triangulate findings, illuminate internal consistencies between data, and explain quantitative findings with qualitative insights. Results show areas of public understanding that are consistent with the expert model, for example most respondents think that sea levels will rise between now and 2050, 2100 and2200, and tend to relate these rising sea levels with risks rather than benefits. Furthermore, public mental models of sea-level rise tend to align with those of experts in that they comprise of climate-induced ice-melt, which causes increased flooding, leading to home and property damage. However, sea-level rise is of low salience amongst the public, who do not feel well informed about the issue; indicating that improved communications are necessary. Additionally, there are a number of differences between expert and public understandings, some of which have important implications for how sea-level rise risks are interpreted. For example, while participants tend to equate ice-melt with sea-level rise, there is less awareness of thermal expansion; and interviewees indicated that this can lead to an underestimation of the risks. Sea-level rise is also seen as a distant, 'creeping' problem, which is not noticeable in our lifetimes. Such perceptions have repercussions for what are perceived as appropriate mitigation and adaption practices, and therefore point to areas upon which future communications should concentrate.

Keywords: climate change, sea-level rise, public perceptions, mixed-methods

Social Psychological Variables in the Formation of Chinese Public Attitude towards Risky Technologies -- Taking GM Rice for Example

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To explore the role of values in the formation of public's attitude towards GM technology, based on sampling survey data, this paper takes GM Rice as an example. It turns out that egoistic, altruistic and biospheric values have different influence on perceived risks, perceived benefits and public's attitude. Moreover, we prove rationality of value-perception-attitude model and necessity of intermediary variable--perception using Structural Equation Model. Results indicate that people with strong egoistic value tend to perceive more benefits of GM rice and then have a more positive attitude towards it, while people who endorse altruistic or biospheric value often perceive high risk of GM rice and are likely to have a cautious attitude. Upon this conclusion, the public's attitude can be adjusted or changed by activating or strengthening their specific value under different circumstances.

Keywords: Public Attitude; Values; Perceived Risks; Perceived Benefits; GM Rice; Risky Technologies

Physical and psychological distance as determinants of perceived risk of terrorism

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The frequency of events classified as of a terrorist nature, has increased in recent years. This phenomenon has consequences in modern societies in particular with regard to risk assessment and risk perception and modification of perceived security needs in directly or indirectly affected societies. Understanding how individuals perceive and respond to such threats before and after the occurrence of specific events, is important for effective preparation and for promoting resilience in individuals and their communities (Slovic & Weber, 2002; Lemyre & Lee, 2009).

This research is mainly focused on studying the role of physical and psychological proximity to risk targets and thus observe the possible perceived differences between residents in large cities versus small towns, and in a country with history of terrorism acts (Spain) versus a country without terrorism history (Portugal). Similarly, it includes moderators of the distance effect such as age, gender, ethnicity, political affiliation, thus implying different responses to different risks, in relation to the distance to the target (Fischhoff, Gonzalez Small & Lerner, 2003; Woods et al, 2008). The study included questions related to the phenomenon, the classification of certain hazards in various scales, in addition to the Terror Risk Perception Questionnaire (TPRQ) (Shiloh, Güvenç & Õnkal, (2007). From this, we expected distance to influence risk perception, with this being higher in geographic locations such as large urban centers and countries with terrorism history such as Spain), compared with small towns and countries with no terrorism history such as Portugal (and therefore, with this threat less cognitively accessible). Emotional and cognitive reactions and moderators of these effects were also explored.

Keywords: Perceived risk of terrorism

NOTES

AUTHORS INDEX FIRST AUTHOR

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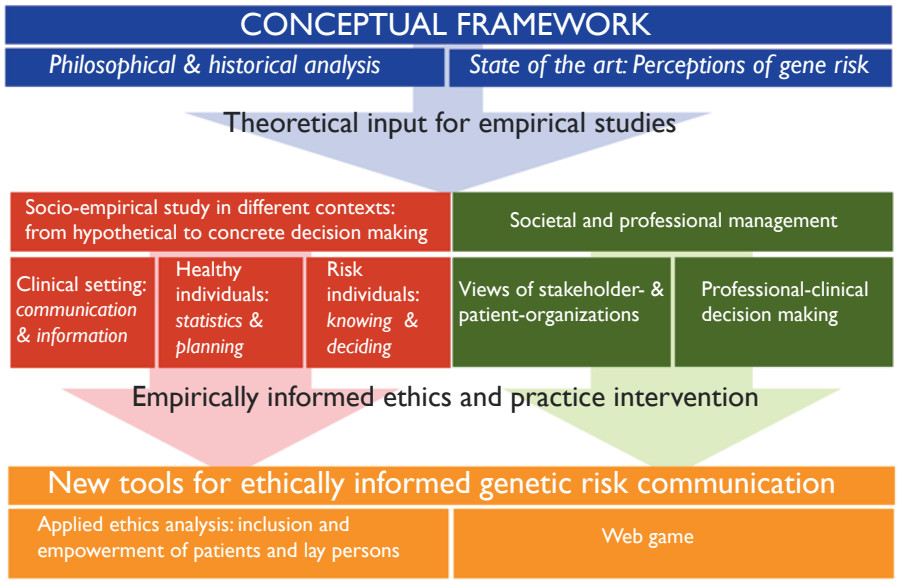

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