3rd iNTeg-Risk Conference

&

20th SRA-Europe Meeting

Stuttgart, 6–8 June 2011

www.sraeurope.org
www.integrisk.eu-vri.eu

EU-VRi iNTeg-Risk SRA EUROPE

BOOK OF ABSTRACTS

3rd iNTeg-Risk Conference & 20th SRA-Europe Meeting

Stuttgart, 6–8 June 2011

www.sraeurope.org
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EU-VRi iNTeg-Risk SRA EUROPE

Local Organizing Committee

- Olivier Salvi, EU-VRi (Chair)
- Aleksandar Jovanovic, EU-VRi (Chair of the iNTeg-Risk Conference)
- Roswitha Kokejl, EU-VRi
- Michael Löscher, EU-VRi
- Daniel Balos, EU-VRi
- Margôt Kuttschreuter, U. Twente (Liaison for SRA Europe Committee)
- Madlen Becker, CONGREX (conference secretariat)
- Martina Längle, CONGREX (conference secretariat)

Welcome

Dear Conference participants,

It is our pleasure to welcome your decision to devote your time and interest to the topics of multiple risk and risk-benefit tradeoffs dealt with by this joint conference. The fact that both SRA Europe (www.sraeurope.org) and iNTeg-Risk project (www.integrisk.eu-vri.eu) have chosen these topics as their main priority in 2011 reflects the great increase in global interest and public attention. The recent events like Fukushima, Gulf of Mexico and volcanic ashes crisis have justified these priorities.

The Local Organizing Committee, O. Salvi (chair), D. Balos, M. Löscher, A. Jovanovic, R. Kokejl and M. Kuttschreuter, supported by CONGREX conference secretariat, has invested a lot of effort to successfully bring together not only the two communities, but also the different approaches (e.g. those more scientific oriented with those move application oriented). The result of this effort is visible in the joint Book of Abstracts for both conferences, in front of you here. We hope that it offers a good insight in the work of the two communities present at the conference.

This joint conference will be an opportunity for each participant to develop her/his network and to learn from experts and practitioners from both groups, not only by attending the joint plenary session but also through having the possibility to freely attend all sessions during the 3-days of the event. The scientific content and the social event will certainly stimulate interesting research ideas, proposals, papers and possible joint projects in the future.

We hope you will find the scientific content of the presentations interesting and that you will benefit from the conference and enjoy your stay in Stuttgart.

Welcome to the 3rd iNTeg-Risk Conference and the 20th SRA-Europe Annual Meeting.

The Local Organizing Committee

Stuttgart, June 2011

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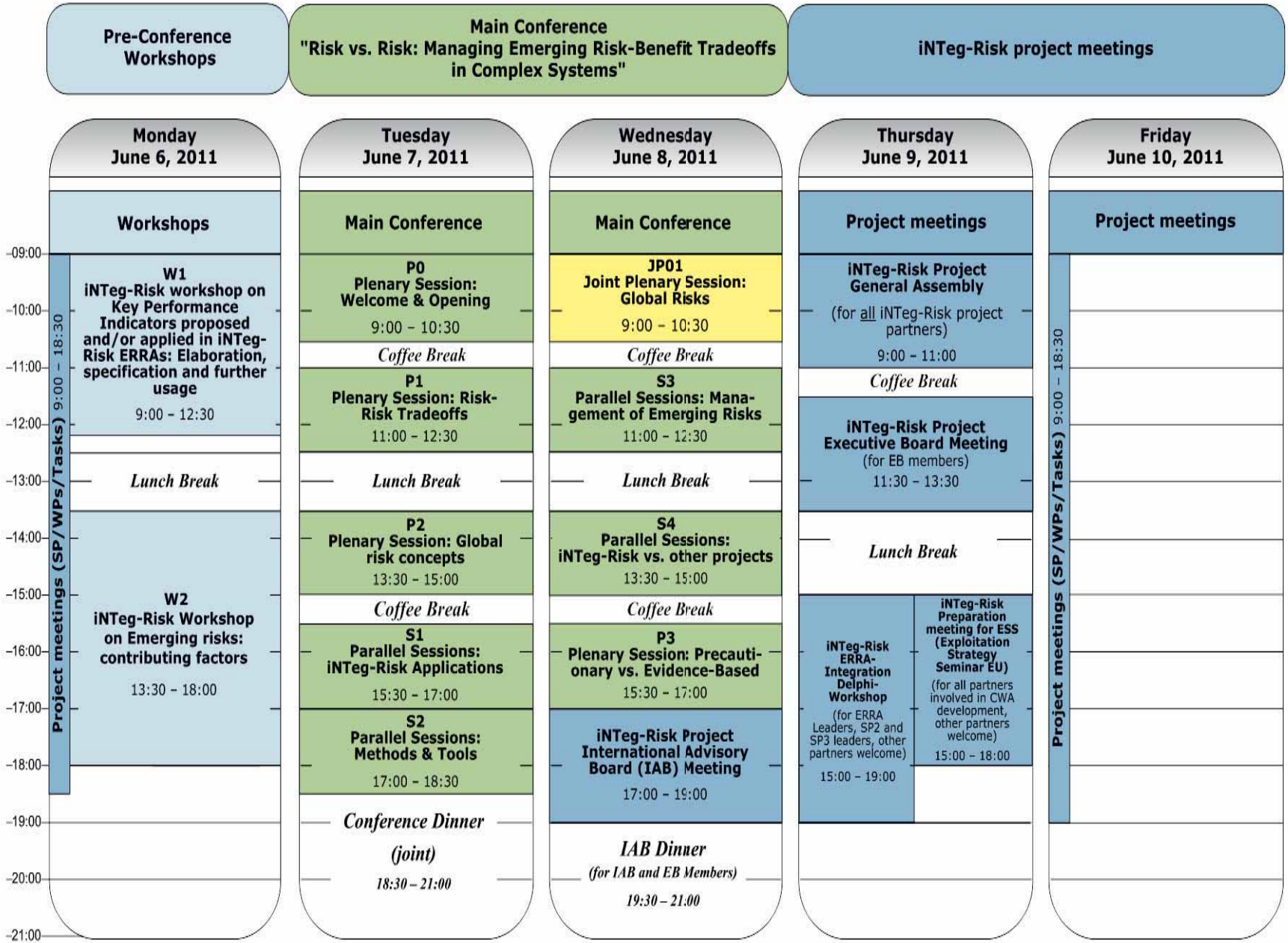
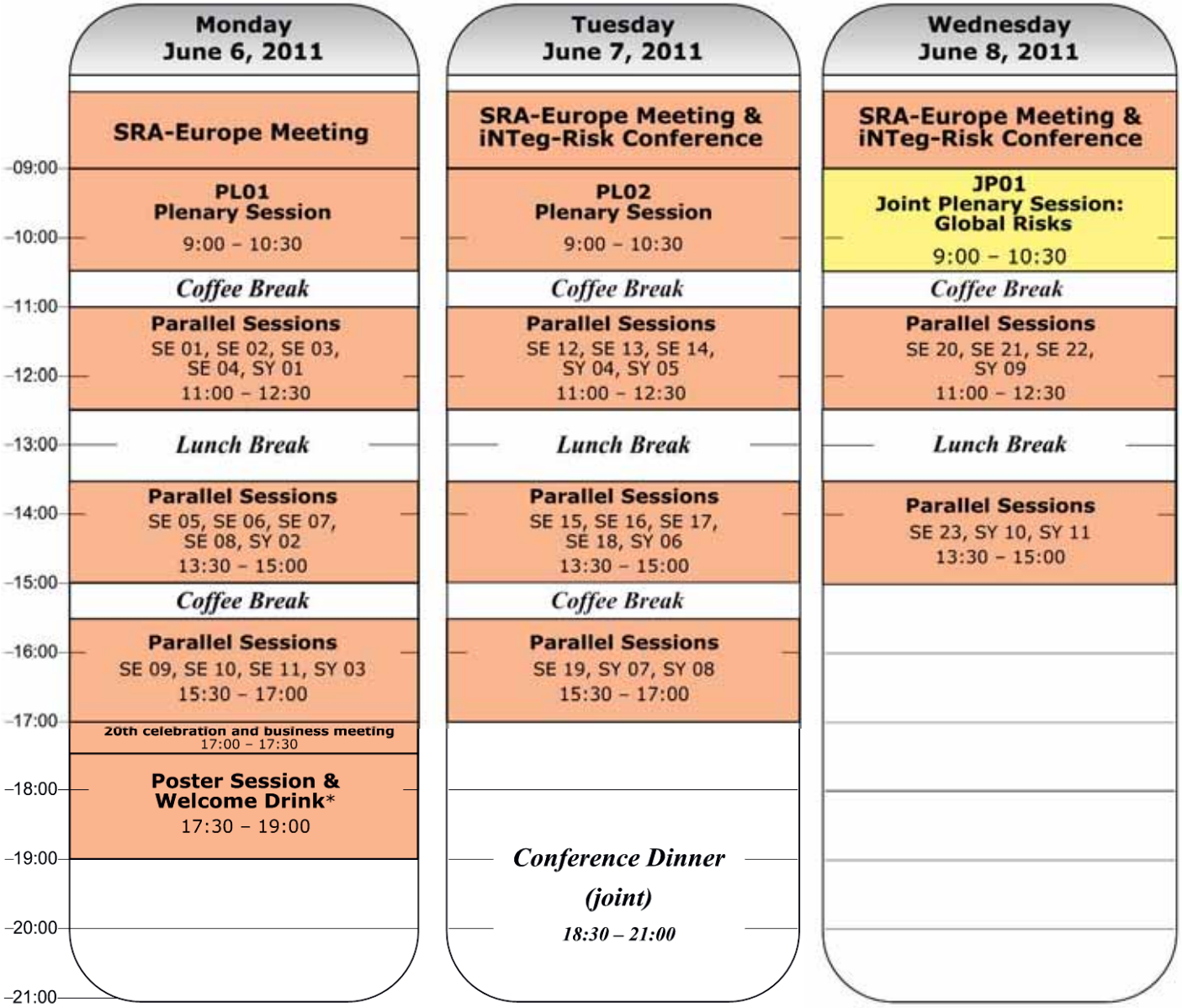
3rd iNTeg-Risk Conference 2011 - Overview



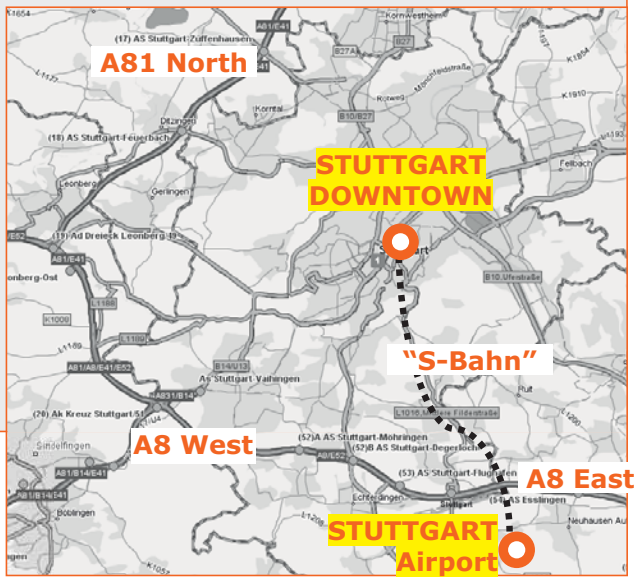
20th SRA-Europe Meeting - Overview



* sponsored by Journal of Risk Research

Venue

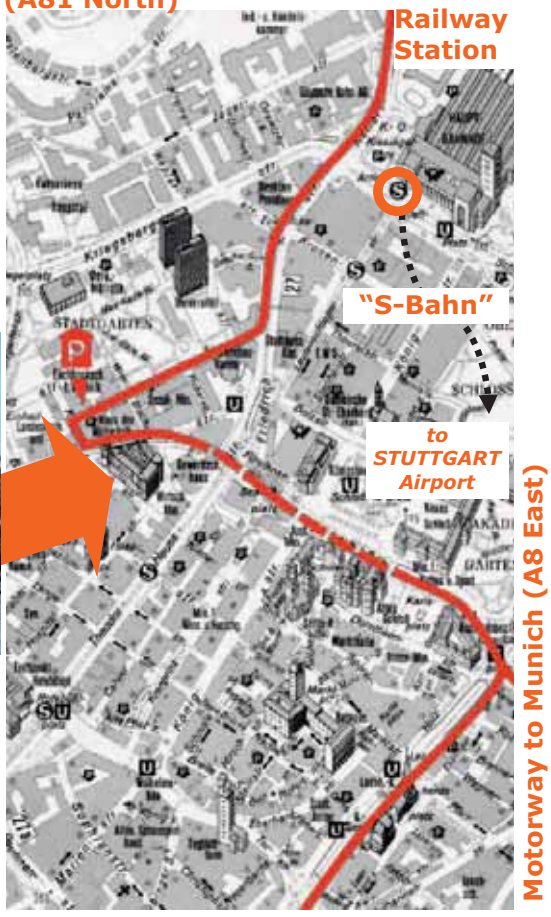
- **Stuttgart, Haus der Wirtschaft**
- **Steinbeis Foundation**
- **Steinbeis Advanced Risk Technologies**
- **EUropean Virtual Institute for Integrated Risk Management (EU-VRi)**



Haus der Wirtschaft,
Willi-Bleicher-Str. 19
70174 Stuttgart, Germany
+49 (711) 1839-5
+49 (711) 1839-781
www.stw.de

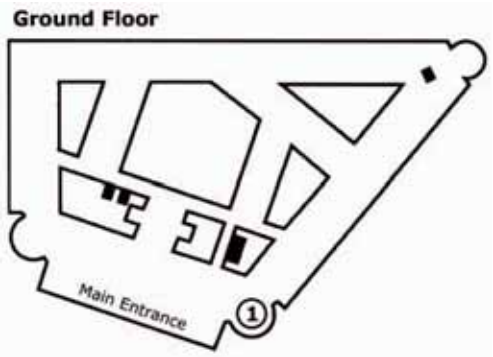
Walking from the main railway station (Hauptbahnhof): Take the main street (Koenigstrasse) for about 500 meters up to the main place Schlossplatz. Between the bookstore WITTWER and the ESPRIT, you have to turn right (kleiner Schlossplatz), go straight ahead, cross the 'Theodor Heuss Strasse' and you will reach automatically the 'Willi-Bleicher-Strasse'.

Public transportation: Take any of the subway lines ("S-Bahn") S1 to S6 (**S2 or S3 from the airport!**) and get off at the main railway station (Hauptbahnhof). Then follow the instructions above. Alternatively: use the tramway (the "U-Bahn") lines U9 or U14 and get off at the stop "Friedrichsbau".

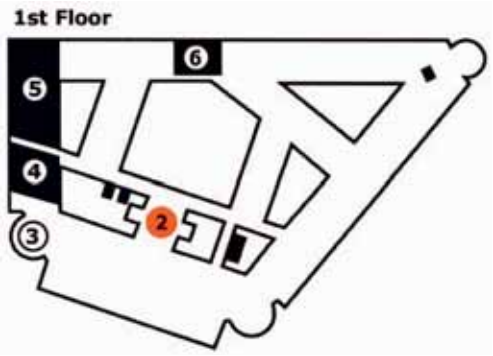


By car: From the main motorways follow always "Stuttgart Zentrum" or "Stuttgart Stadtmitte". Take exits "Degerloch" when coming from Munich (Autobahn A8), exit "Vaihingen" when coming from Karlsruhe (Autobahn A8) or Zurich (Autobahn A81), or Zuffenhausen when coming from Heilbronn (Autobahn A81).
Park at "Hofdienergarage" in front of Haus der Wirtschaft (access to garage from Schellingstraße).

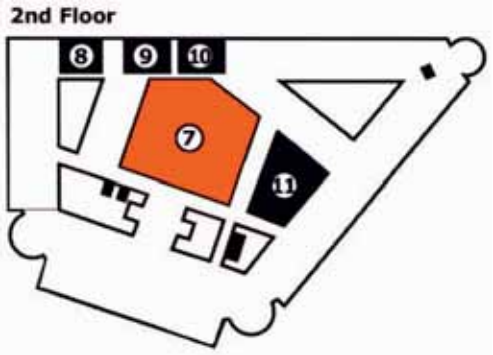
Conference Rooms



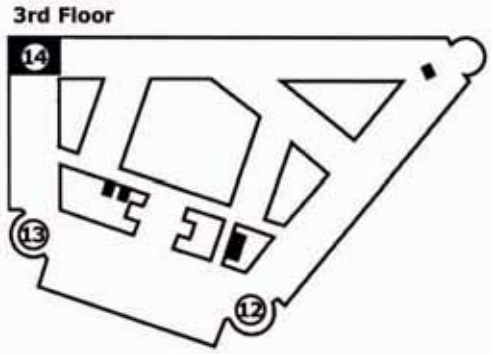
(1) "Konferenzraum Tübingen"



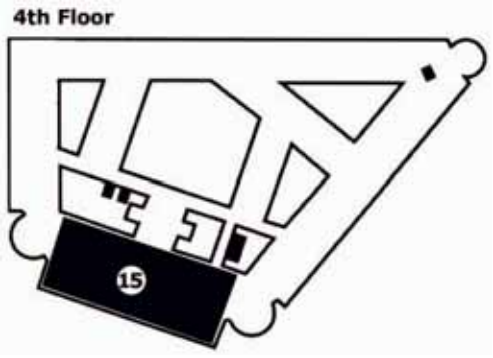
(2) Registration, Information
(3) "Turm A"
(4) "Foyer Bertha-Benz-Saal"
(5) "Bertha-Benz-Saal"
(6) "Konferenzraum Mannheim"



(7) "König-Karl-Halle"
(8) "Konferenzraum Reutlingen"
(9) "Konferenzraum Ulm"
(10) "Konferenzraum Heilbronn"
(11) "Foyer König-Karl-Halle"



(12) "Studio B"
(13) "Studio A"
(14) "Konferenzraum Freiburg"



(15) "Mia-Seeger-Saal"

Sustainable and Integrated Risk Management for Europe

(May 2011)

EU-VRi Founding Members

Bay Zoltán Foundation
(www.bzaka.hu)

Institut National de l'Environnement Industriel et des Risques
(www.ineris.fr)

Steinbeis GmbH & Co. KG für Technologietransfer
(www.stw.de)

Technologica Group c.v.
(www.technologica.org)

ZIRN - Interdisciplinary Research Unit for Risk, Governance and Sustainable Technology, Univ. of Stuttgart (www.zirn-info.de)

EU-VRi Associate Members

AXA *– Group AXA, France*
2B *- Consulenza Ambientale, Italy*
BAM *- Bundesanstalt für Materialforschung und -prüfung, Germany*
Blue Ocean *- Consulting & Software Solution GmbH, Switzerland*
BMILP *- Beijing Municipal Institute of Labor Protection, China*
CEA *- Commissariat à l'Energie Atomique, France*
CNR-IRC *- Istituto di Ricerche sulla Combustione, Italy*
CONPRICI *- Consorzio Interuniversitario per la Prevenzione e la Protezione dai Rischi Chimico-Industriali, Italy*
CrisisTox Consult*, The Netherlands*
D'Appolonia *S.p.A., Italy*
Demokritos *- National Center for Scientific Research, Greece*
DNV *- Det Norske Veritas AS, Norway*
DTU *- Danish Technical University (Risoe National Laboratory), Denmark*
EDF *- Electricité de France, France*
EKON *Modeling Software Systems Ltd. Israel*
ELITE *Foundation, Germany*
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Expert System *SpA, Italy*
Fraunhofer*-Institut für Optronik, Systemtechnik und Bildauswertung, Germany IOSB*
INCDPM *- Institute on Occupational Safety, Romania*
IRGC *- International Risk Governance Council, Switzerland*
ISQ *- Instituto de Soldadura e Qualidade, Portugal*
IVF *- Industrial Research and Development Corporation, Sweden*
JSI *- Jozef Stefan Institute, Slovenia*
LABEIN *- TECNALIA, Spain*
MIT *- Management Intelligenter Technologien GmbH, Germany*
NIS *- Petroleum Industry of Serbia, Serbia*
OECD *- Organisation for Economic Co-operation and Development*
OttoUNI *- Otto-von-Guericke-Universität Magdeburg, Germany*
PROMIS*@Service Sarl, Luxembourg*
SINTEF *- Stiftelsen SINTEF, Norway*
SP *- Technical Research Institute of Sweden, Sweden*
Swiss Re *- Swiss Reinsurance Company, Switzerland*
SWISSI *- Sicherheitsinstitut, Switzerland*
Swissi España *- Instituto para la Promoción de la Seguridad, Spain*
TECNALIA *- Fundacion Tecnalia Research & Innovation, Spain*
TÜV SÜD *Industrie Service GmbH, Germany*
URL *- Universidad Ramon Llull Fundación Privada, Spain*
VŠB *- Technical University of Ostrava, Czech Republic*
VTT *- Technical Research Centre of Finland, Finland*

EU-VRi Honorary Members

CEN *- European committee for standardization, Belgium*
CIOP *- Central Institute for Labour Protection, Poland*
DIN *- Deutsches Institut fuer Normung e.v., Germany*
JRC/EC *- Commission of the European Communities, Joint Research Center, Belgium*
KMM-VIN *- European Virtual Institute on Knowledge-based Multifunctional Materials, Belgium*

The European Virtual Institute for Integrated Risk Management (EU-VRi) is the European organization which provides professional service, consulting, information and education needed in the broad area of modern integrated risk management and, in particular, management of emerging risks.

EU-VRi has been legally established in Nov. 2006 by 5 Founding Members (BZF, INERIS, Steinbeis, Technologica and University of Stuttgart). EU-VRi is organized as a European Economic Interest Grouping (EEIG) and its purpose is to facilitate or develop the economic activities of its members by a pooling of resources, activities or skills, thus yielding new opportunities, not or hardly achievable for members when acting alone. The activities of the EEIG are related to the economic activities of its members and the main goal of the EEIG is to add value to the businesses of the members.

It means that EU-VRi creates new opportunities by:

- providing services to industry, research community and/or public authorities, including stakeholders like EU, OECD, European Parliament - STOA, EU OSHA, CEN...
- connecting industrial companies or networks of companies to the most appropriate research facility – acting as a research broker
- establishing and documenting the state-of-the-art especially in the fields of integrated management of risks related to new industrial technologies
- identifying research and development needs and gaps in the fields of the EU-VRi expertise and activities
- acting as dissemination centre for research results and developments
- facilitating and supporting the mobility of staff (researchers, consultants…)
- supporting creation of consortia to address the R&D and/or industry needs

From 2009, EU-VRi has increased its participation in projects dealing with emerging technologies, such as nanomaterials, biotechnologies and new energies, and the associated risk management.

Members joining EU-VRi are generally motivated by expectations related to:

- providing better business opportunities through pooling the available human and other resources concerning integrated risk management at the European level
- offering opportunities for the members to interact with the EU policy
- contributing to the European research studies and having access to a structured group of partners with a large spectrum of skills in the field of risk management, and who are ready to work together
- improving and making easier management of large EU and industrial projects taken over by EU-VRi as an established and well geared consortium.

In 2011 about 40 companies from the EU and other countries are Associated Members. They come from industry, R&D organizations and academia, governmental and non-governmental/international organizations and SMEs (small and medium enterprises). In 2011 with its 5 years of its existence, EU-VRi has become a recognized provider of innovative solutions and risk-related products and services both EU- and worldwide.

Current priorities and plans for EU-VRi include the following main points:

- preparation for Framework Programme 8 of the EU
- increased emphasis on products (both in terms of material ones and, e.g. services) resulting, e.g. out of the activities in iNTeg-Risk "1StopShop"
- further setting-up industrial projects (e.g. refineries, power plants and other industrial plants, involving more members of EU-VRi as one team) and PPP (public-private-partnership) projects
- future increase of international collaboration and presence: USA, Japan, China, India… - including the activities in SRA and ETPIS as their respective Operating Agent (SRA Europe)
- increased engagement in national projects (emphasis: EUREKA and bilateral and multilateral collaboration brokering, e.g. projects on education in the area of Risk Management)
- increased visibility of EU-VRi and its projects

GENERAL ASSEMBLY

Founding members
Associate members
(voting rights on non-business related issues)
Honorary members
(no voting rights, advisory role)

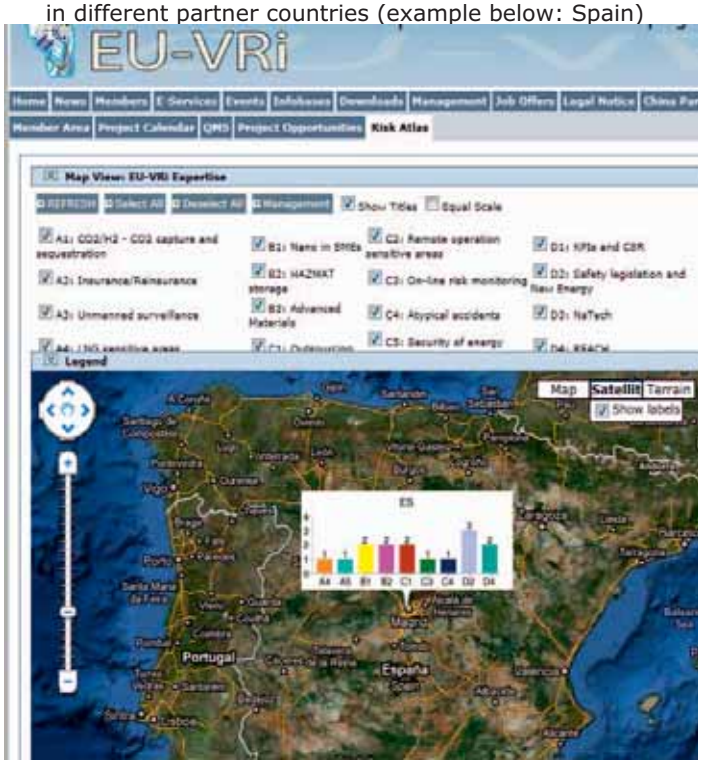
Status: 2011/2012

EXECUTIVE BOARD

Chair:
A. Jovanovic, CEO
Members:
O. Renn, President EU-VRi
O. Salvi, non-executive General Manager
S. Limousin, co-opted Member
(no voting rights)

EU-VRi Members - World/Europe (dot indicate geographical distribution of members)

Mapping of EU-VRi expertise in different areas of risks management (example below: expertise in areas tackled with in iNTeg-Risk project, e.g. nanotechnologies, carbon-capture and/or sequestration, on-line-risk monitoring, etc.) in different partner countries (example below: Spain)



Contact
EU-VRi *European Virtual Institute for Integrated Risk Management*
Haus der Wirtschaft, Willi-Bleicher-Straße 19, 70174 Stuttgart, Germany,
Tel: +49 (711) 1839–781, Fax: +49 (711) 1839-685, www.eu-vri.eu · info@eu-vri.eu
Registered in Stuttgart, Germany, under HRA 720578

Program
(ver. of May 18, 2011)

3rd iNTeg-Risk Conference: New Technologies & Emerging Risks

Focus Topic 2011:

Risk vs. Risk: Managing Emerging Risk-Benefit Tradeoffs in Complex Systems

June 7–8, 2011

Haus der Wirtschaft, Willi-Bleicher-Str. 19
70174 Stuttgart, Germany

www.integrisk.eu-vri.eu

NOTE: The Conference is taking place in conjunction and sharing venue with SRA Europe Conference (June 6-8, 2011)

Conference Committee

T. Bahke, DIN, Germany
F. Bagnoli, D'Appolonia, Italy
H. Behrens, DIN, Germany
A. Boenke, EC DG Enterprise and Industry, EU
A. Cipollaro, EC DG Research, EU
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C. Duval, EDF, France
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M. Hailwood, Landesanstalt für Umwelt, BW, Germany
U. Haug, Steinbeis Int., Germany
C. Huang, Beijing Normal University, China
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V. Laflèche, INERIS, France
G. Lenkey, BZF, Hungary
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K. Maile, MPA Stuttgart, Germany
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R. Nomen, Univ. Ramon Llull, Spain
O. Renn, Univ. of Stuttgart, Germany
W. Ressel, Univ. Stuttgart, Germany
E. Rial Gonzáles, European Risk Observatory EU-OSHA, EU
O. Salvi, EU-VRi, Germany
R. Schneider, Swiss Re, Switzerland
P.-A. Schieb, OECD, France
H. Trasch, Steinbeis, Germany
P. Van Gelder, Delft Univ. of Technology, The Netherlands
G. Uguccioni, D'Appolonia, Italy
H. Wenzel, VCE, Austria
M. Zarea, GDF SUEZ, France

European Virtual Institute for Integrated Risk Management
Stuttgart 2011


European Virtual Institute for Integrated Risk Management www.eu-vri.eu
EU-VRi
5 Years
EU-VRi
2006 - 2011
5 Founding members:
Bay Zoltán Foundation
(www.bzaka.hu)
INERIS
Institut National de l'Environnement Industriel et des Risques
(www.ineris.fr)
stw
Steinbeis GmbH & Co. KG für Technologietransfer
(www.stw.de)
TECHNOLOGICA Group
Technologica Group c.v.
(www.technologica.org)
ZIRN - Interdisciplinary Research Unit for Risk, Governance and Sustainable Technology, University of Stuttgart
(www.zirn-info.de)
5 Honorary members:
OECD
CEN
CIOP PIB
JRC
DIN
5 main fields of activities in the area of sustainability, emerging risk and integrated risk management
Project & services
Products & tools
Coordination & networking
Support to EU harmonization & standardization
R&D
Contact:
EU-VRi
European Virtual Institute for Integrated Risk Management
Haus der Wirtschaft, Willi-Bleicher-Straße 19
70174 Stuttgart, Germany
Tel.: +49 711 1839 701
Fax.: +49 711 1839 605
www.eu-vri.eu
E-Mail: info@eu-vri.eu
The 50 Members of EU-VRi in 2011
AXA – Group AXA, France
2B - Consulenza Ambientale, Italy
BAM - Bundesanstalt für Materialforschung und -prüfung, Germany
Blue Ocean - Internet Content Consulting & Software Solution GmbH, Switzerland
BMILP - Beijing Municipal Institute of Labor Protection, China
BZF - Bay Zoltán Foundation, Hungary
CEA - Commissariat à l'Energie Atomique, France
CEN - European committee for standardization, Belgium
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CNR-IRC - Istituto di Ricerche sulla Combustione, Italy
CONPRICI - Consorzio Interuniversitario per la Prevenzione e la Protezione dai Rischi Chimico-Industriali, Italy
CrisisTox Consult, The Netherlands
D'Appolonia S.p.A., Italy
Demokritos - National Center for Scientific Research, Greece
DIN - Deutsches Institut fuer Normung e.v., Germany
DNV - Det Norske Veritas AS, Norway
DTU - Danish Technical University (Risoe National Laboratory), Denmark
EDF - Electricité de France, France
EKON Modeling Software Systems Ltd. Israel
ELITE Foundation, Germany
Erasmus University Rotterdam, Netherlands
Expert System SpA, Italy
Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung, Germany IOSB
INCDPM - Institute on Occupational Safety, Romania
INERIS - Institut National de l'Environnement Industriel et des Risques, France
STW – Steinbeis GmbH & Co. KG für Technologietransfer, Germany
IRGC - International Risk Governance Council, Switzerland
ISQ - Instituto de Soldadura e Qualidade, Portugal
IVF - Industrial Research and Development Corporation, Sweden
JRC/EC - Commission of the European Communities, Joint Research Center, Belgium
JSI - Josef Stefan Institute, Slovenia
KMM-VIN - European Virtual Institute on Knowledge-based Multifunctional Materials, Belgium
LABEIN - TECNALIA, Spain
MIT - Management Intelligenter Technologien GmbH, Germany
NIS - Petroleum Industry of Serbia, Serbia
OECD - Organisation for Economic Co-operation and Development, France
OttoUNI - Otto-von-Guericke-Universität Magdeburg, Germany
PROMIS@Service Sarl, Luxembourg
SINTEF - Stiftelsen SINTEF, Norway
SP - Technical Research Institute of Sweden, Sweden
Swiss Re - Swiss Reinsurance Company, Switzerland
SWISSI - Sicherheitsinstitut, Switzerland
Swissi España - Instituto Suizo para la Promoción de la Seguridad, Spain
TECNALIA - Fundacion Tecnalia Research & Innovation, Spain
Technologica -Technologica Group c.v., Belgium
TÜV SÜD Industrie Service GmbH, Germany
URL - Universidad Ramon Llull Fundación Privada, Spain
VŠB - Technical University of Ostrava, Czech Republic
VTT - Technical Research Centre of Finland, Finland
ZIRN - Interdisciplinary Research Unit for Risk, Governance and Sustainable Technology, University of Stuttgart, Germany

3rd iNTeg-Risk Conference: New Technologies & Emerging Risks

annual topic
"Risk vs. Risk – Managing Emerging Risk-Benefit Tradeoffs in Complex Systems"

Stuttgart June 7-8, 2011

As in the preceding years, the main purpose of the Conference is to provide a forum at which partners involved in the EU "flagship project" iNTeg-Risk ("Early Recognition, Monitoring and Integrated Management of Emerging, New Technology Related, Risks", www.integrisk.eu-vri.eu), will openly and thoroughly discuss the results obtained in the project, both among themselves and with all other interested parties. We expect 92 papers/presentations which is a respectable number for a single project conference, even for a project as large as iNTeg-Risk. The Conference is a great opportunity both for project partners to communicate their results to the "outside world" and for those, not participating in the project, to learn about the project results.

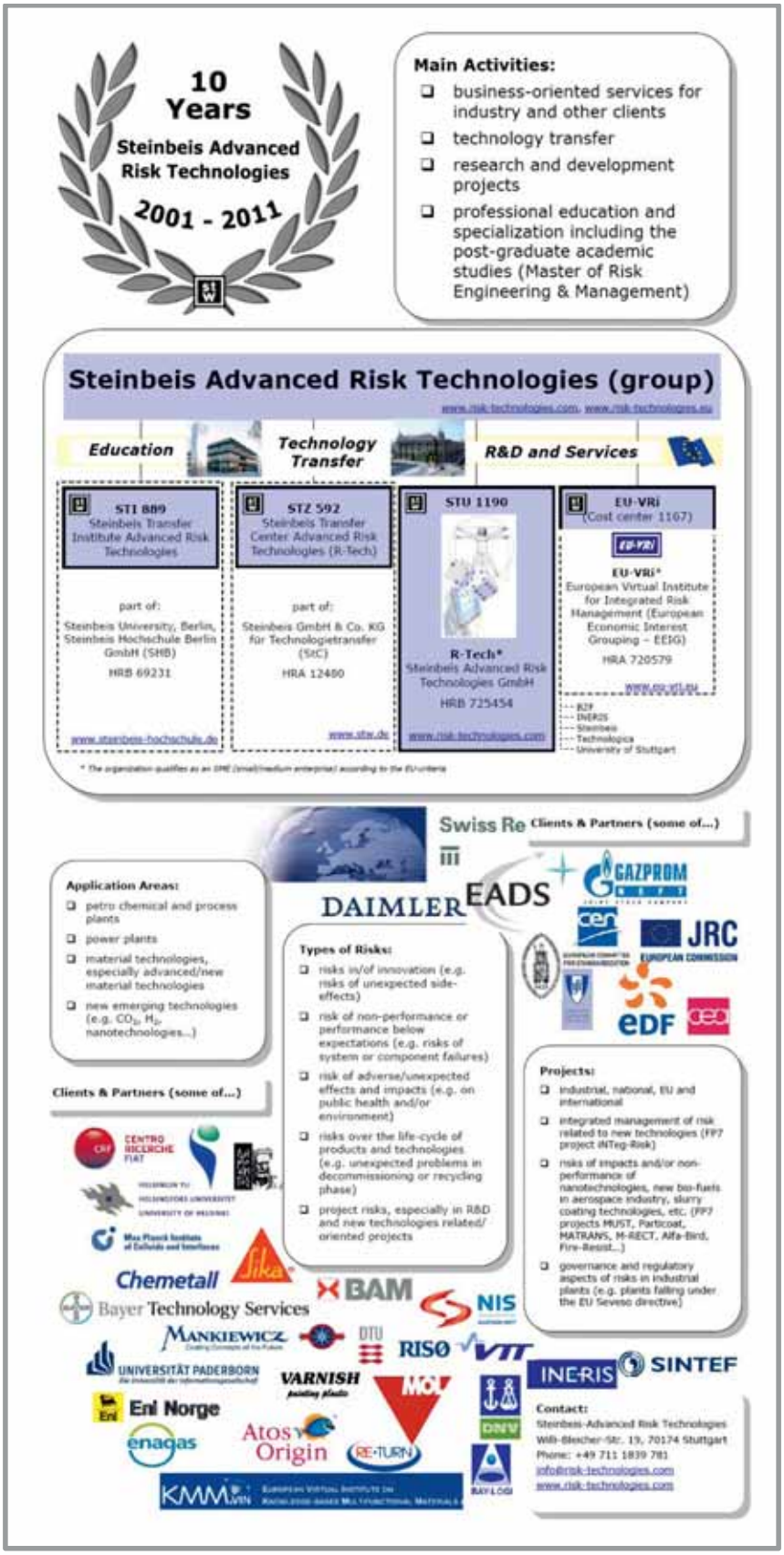
This year, the Conference will be focused on to the issues dealing with risk-risk tradeoffs, multiple and interconnected emerging risks of New Technologies and presentation of the current iNTeg-Risk results: iNTeg-Risk early warning system RiskEars, emerging risk mapping (RiskAtlas of iNTeg-Risk), emerging risk management framework (iNTeg-Risk ERMF), emerging risk communication, methods and tools for emerging risk analysis. The Conference will be accompanied by 2 specialized workshops and will take place in conjunction with the SRA Europe Annual Meeting conference. This will be an additional opportunity for the entire risk community to share sessions on risk governance, communication, analysis and management and to enjoy the pleasant ambience of Haus der Wirtschaft in Stuttgart.

Last but not least, the Conference will take place in the 5th year of existence of EU-VRi what will be appropriately noted.

Welcome to Stuttgart!

(A. Jovanovic, iNTeg-Risk Project Coordinator, CEO EU-VRi)

(O. Renn, President EU-VRi)


10 Years
Steinbeis Advanced Risk Technologies
2001 - 2011
Main Activities:
business-oriented services for industry and other clients
technology transfer
research and development projects
professional education and specialization including the post-graduate academic studies (Master of Risk Engineering & Management)
Steinbeis Advanced Risk Technologies (group)
www.risk-technologies.com, www.risk-technologies.eu
Education
Technology Transfer
R&D and Services
STI 889
Steinbeis Transfer Institute Advanced Risk Technologies
part of:
Steinbeis University, Berlin, Steinbeis Hochschule Berlin GmbH (SHB)
HRB 69231
www.steinbeis-hochschule.de
STZ 592
Steinbeis Transfer Center Advanced Risk Technologies (R-Tech)
part of:
Steinbeis GmbH & Co. KG für Technologietransfer (StC)
HRA 12400
www.stw.de
STU 1190
R-Tech*
Steinbeis Advanced Risk Technologies GmbH
HRB 725454
www.risk-technologies.com
EU-VRi
(Cost center 1167)
EU-VRi*
European Virtual Institute for Integrated Risk Management (European Economic Interest Grouping – EEIG)
HRA 720579
www.eu-vri.eu
IDP
INERIS
Steinbeis
Technologica
University of Stuttgart
* The organization qualifies as an SME (small/medium enterprise) according to the EU-criteria
Application Areas:
petro chemical and process plants
power plants
material technologies, especially advanced/new material technologies
new emerging technologies (e.g. CO2, H2, nanotechnologies...)
Clients & Partners (some of...)
Swiss Re
DAIMLER
EADS
GAZPROM
JRC
EUROPEAN COMMISSION
EDF
Types of Risks:
risks in/of innovation (e.g. risks of unexpected side-effects)
risk of non-performance or performance below expectations (e.g. risks of system or component failures)
risk of adverse/unexpected effects and impacts (e.g. on public health and/or environment)
risks over the life-cycle of products and technologies (e.g. unexpected problems in decommissioning or recycling phase)
project risks, especially in R&D and new technologies related/ oriented projects
Projects:
industrial, national, EU and international
integrated management of risk related to new technologies (FP7 project iNTeg-Risk)
risks of impacts and/or non-performance of nanotechnologies, new bio-fuels in aerospace industry, slurry coating technologies, etc. (FP7 projects MUST, Particoat, MATRANS, M-RECT, Alfa-Bird, Fire-Resist...)
governance and regulatory aspects of risks in industrial plants (e.g. plants falling under the EU Seveso directive)
Clients & Partners (some of...)
CENTRO RICERCHE FIAT
Chemetall
Sika
BAM
NIS
Bayer Technology Services
MANKIEWICZ
DTU
RISØ
VTT
UNIVERSITÄT PADERBORN
VARNISH
INERIS
SINTEF
Eni Norge
enagas
Atos Origin
RE-TURN
DNV
KMM VIN
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Steinbeis-Advanced Risk Technologies
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Phone: +49 711 1839 781
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www.risk-technologies.com

Program

PRE-CONFERENCE WORKSHOPS (details on workshops will follow in due course)
June 6, 2011

W 1. iNTeg-Risk workshop on Key Performance Indicators proposed and/or applied in iNTeg-Risk ERRAs: Elaboration, specification and further usage
W 2. iNTeg-Risk workshop on Emerging risks: contributing factors

NOTE:
The pre-conference workshops are intended for groups of 15-80 people with presentations from different authors and collegial discussions. The workshop coordinators may, but need not necessarily be the chairpersons and moderators.

MAIN CONFERENCE
June 7-8, 2011

We expect a strong presence of high-level representatives from government, regulatory agencies and standardization brokers, EU directorates, industry and other organizations. The conference will take place in conjunction with SRA Europe 20th Annual Meeting providing the delegates with an opportunity to share their experiences and knowledge with participants attending the SRA Europe meeting. The two conferences will have joint plenary meetings on Tuesday and Wednesday allowing the participants to attend some of the SRA sessions and vice-versa.

ACCOMPANYING EVENTS (iNTeg-Risk project internal)
June 6-10, 2011

- **Project meetings** for single project activities (Workpackage and Task meetings)
  June 6 & 10, 2011
- **International Advisory Board** (IAB) Meeting
  June 8, 2011, 17:00 – 19:00
- **Project General Assembly** (GA)
  June 9, 2011, 9:00 – 11:00
- **Project Executive Board** (EB) Meeting
  June 9, 2011, 11:30 – 13:30
- **ERRA-Integration Delphi-Workshop**
  June 9, 2011, 15:00 – 19:00
- **Preparation meeting for Exploitation Strategy Seminar for iNTeg-Risk project**
  June 9, 2011, 15:00 – 18:00

SPONSORS/SUPPORT

- **Stiftung Umwelt- und Schadensvorsorge** (Foundation for Environmental and Damage Prevention, www.stiftung-schadenvorsorge.de)
- **EU, DG RTD**, through iNTeg-Risk project

Pre-Conference Workshops

iNTeg-Risk Workshop on

Key Performance Indicators proposed and/or applied in iNTeg-Risk ERRAs: Elaboration, specification and further usage

June 6, 2011
9:00 – 12:30

Stuttgart
Haus der Wirtschaft, Room Bertha-Benz-Saal
Willi-Bleicher-Strasse 19, 70174 Stuttgart

About the workshop

The workshop will focus on Key Performance Indicators (KPIs) provided as part of the project result coming from 17 case studies - so called Emerging Risk Representative industrial Applications (ERRAs) - that were carried out in the first two years of iNTeg-Risk project.

More details available under: http://www.eu-vri.eu/fwlink/?LinkID=318

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iNTeg-Risk Workshop on

Emerging risks: contributing factors

June 6, 2011
13:30 – 18:30

Stuttgart
Haus der Wirtschaft, Room Bertha-Benz-Saal
Willi-Bleicher-Strasse 19, 70174 Stuttgart

About the workshop

This workshop will begin by describing the twelve factors and the importance of understanding them from a systems perspective. Such a perspective is especially relevant when considering complex systems, and it is from complex systems that emerging risks often arise. Examples will be given to help put the factors into context and demonstrate their impact on some past 'emerging' risks, as well as their relevance to the iNTeg-Risk project. Further discussion will centre on how the concept of contributing factors can be turned into concrete guidance for overcoming obstacles to emerging risk anticipation and response and what practitioners can learn from these IRGC tools.

More details available under: http://www.eu-vri.eu/fwlink/?LinkID=319

Agenda

Main Conference

June 7, 2011

08:30 – 09:00	**Registration and getting together** (Coffee and refreshments)

P 0. iNTeg-Risk Plenary Session: Opening of 3rd iNTeg-Risk Conference
(König-Karl-Halle; Chair: W. Gerhardt, A. Jovanovic, O. Renn)

09:00 – 10:30	***Welcome and organizational introductory remarks**, A. Jovanovic* "***5 years EU-VRi– Awarding the EU-VRi Medals of Merit"**, O. Renn* *An initiative to reward the outstanding contributions of individuals to activities and organization of EU-VRi has been started by EU-VRi Founding Members; 3 medals will be awarded honoring exceptional excellence, commitment and dedication.* **Welcome EU** - A. Cipollaro, Project Officer European Commission – Directorate General RTD, Directorate G (Industrial Technologies - New Generation of Products) P 0.1. **Future Global Shocks: can we cope with the challenges?** – P.-A. Schieb, OECD Organisation For Economic Co-Operation And Development, France P 0.2. **From Emerging Risk Perception to Action** – R. Schneider, Swiss Reinsurance Company, Zurich, Switzerland
10:30 – 11:00	**Coffee break**

P 1. iNTeg-Risk Plenary Session 1: Risk-Risk Tradeoffs
(König-Karl-Halle; Chair: P. A. Schieb, R. Schneider, H. Trasch)

11:00 – 12:30	P 1.1. **Welcome Steinbeis:** Safe Innovation as a guarantee for long-term sustainability - H. Trasch, President Steinbeis, Germany P 1.2. **Risk-Risk Tradeoffs** - Wiener, Jonathan, Duke University, Schools of Law, Environment, and Public Policy, United States P 1.3. **Dealing With Tradeoffs Between Target and Ancillary Risks of New Technologies in iNTeg-Risk Project** – A. Jovanovic, EU-VRi, Germany
12:30 – 13:30	**Lunch (buffet)**

P 2. iNTeg-Risk Plenary Session 2: Global risk Concepts on the Regional, Local and Company levels
(König-Karl-Halle; Chair: U. Haug, O. Salvi, J. Wiener)

13:30 – 15:00	P 2.1. **Safety Culture Development at BASF** – W. Gerhardt, BASF, Germany P 2.2. **Use of the Environmental Information System Baden-Württemberg for Risk Assessment Tasks – Opportunities and Constraints** – R. Ebel, LUBW, ITZ, Germany; R. Mayer-Föll, Ministry of the Environment, Nature Conservation and Transport, UVM, Germany; Th. Usländer, Fraunhofer IOSB, Information Management, Germany P 2.3. **iNTeg-Risk Project: An Overview of the Results of 17 Emerging Risk Representative Applications** – B. Debray, INERIS, France; M. Zarea, GDF Suez, France; K. Øien, SINTEF, Norway; R. Rota, Politecnico di Milano - CMIC Dpt, Italy; A. Jovanovic, EU-VRi, Germany
15:00 – 15:30	**Coffee break**

S 1. iNTeg-Risk Parallel Sessions – Emerging Risk Representative Applications

15:30 – 17:00	**Session 1.1. Emerging Risks in New Technologies** (König-Karl-Halle; Chair: B. Debray, M. Zarea) S 1.1.1. Overview of ERRA A1 on Carbon Capture and Storage – J. Wilday, J. Buston, Health and Safety Laboratory, United Kingdom; R. Farret, INERIS, France; L. Breedveld, 2B, Italy; N. Paltrinieri, Health and Safety Laboratory, United Kingdom S 1.1.2. Addressing Emerging Risks related to LNG regasification Terminals – G. Uguccioni, S. Benucci, D'Appolonia SpA, Italy; R. Rota, V. Busini, M. Derudi, E. Marzo, Politecnico di Milano, Italy; A. Tugnoli, V. Cozzani, Università di Bologna, Italy; O. Aneziris, NCSR Demokritos, Greece; I. Vela, BAM - Bundesanstalt für Materialforschung und –prüfung, Germany S 1.1.3. Evacuation of a Complex Underground Facility – M. Wietek, VSH, Switzerland; J. Hugosson, SP, Sweden; F. Leismann, STUVA, Germany;F. Fouillen, INERIS, France **Papers presentation 25' each, 15' Discussion**

	Session 1.2. Emerging Risks in New Material and Products (Studio A; Chair: U. Krause, R. Zöllner) S 1.2.1. Dust Explosions as a Destructive Threat to Solids Handling Industries: Case Studies of Hazards and Means and Measures to Avoid Injuries and Losses – S. Penno, Index e.V., Germany S 1.2.2. A Generic Approach for Hazard Prevention in Large Storages of Combustible Wastes – I. Vela, U. Krause, BAM, Germany S 1.2.3. Method to Management of the Emerging Risks Connected with the Introduction Of Advanced Engineering Materials – J. Trebicki, K. Dolinski, IPPT, Poland S 1.2.4. Easy-to-use Nano Control Banding Tool for Risks Related to Working with Nanomaterials: Stoffenmanager Nano – A. Pronk, S. Spaan, B. Duuren-Stuurman, E. Tielemans, W. Fransman, TNO, Netherlands; H. Heussen, K. Verbist, Expert Centre for Chemical Risk Management, Arbo Unie, Netherlands **Papers presentation 20' each, 10' Discussion**
	Session 1.3. ERs in New Production Technologies and Production Networks (Heilbronn; Chair: H. B. Andersen, L. van Wijk) S 1.3.1. Safety challenges from subcontracting - Review – J. Thommesen; H. B. Andersen, DTU, Management Engineering, Denmark S 1.3.2. On-line risk monitoring and assessment methodology and techniques for emerging risk in petrochemical plants – G. Lenkey, P. Rózsahegyi, E. Bodnár, R. Somogyvári, Bay Zoltan Foundation, Hungary S 1.3.3. Risk issues and good practices related to subcontracting - Interview study - J. Thommesen; H. B. Andersen, DTU, Management Engineering, Denmark S 1.3.4. How Can Emerging Risk Areas Learn from a Consideration of Past "Atypical Events"? – J. Buston, G. Atkinson, N. Paltrinieri, Health and Safety Laboratory, United Kingdom; N. Dechy, INERIS, France; E. Salzano, IRC-CNR, Italy; L. van Wijk, JRC Ispra, Italy **Papers presentation 20' each, 10' Discussion**
15:30 – 17:00	**Session 1.4. Emerging Risks and Related Policies** (Tübingen; Chair: J. Larrañeta , E. Salzano) S 1.4.1. The ERRA D2 Tool: A New Approach to Support Emerging Risks Management in Energy Sector Companies – J. López de Ipiña, I. Padillo, J. Rubio, TECNALIA, Spain; A. Moreno Ucelay, J. L. Lirón, Iberdrola SA, Occupational Safety Area, Spain; J. Goitia, L. Azpiazu, Iberdrola Distribución SAU, Spain S 1.4.2. Human Risk Assessment of Single Exposure in Chemical Incidents - P. Bos, K. Mahieu, RIVM, Netherlands; M. Ruijten, Crisistox Consult, Netherlands; U. Gundert-Remy, Bundesinstitut für Risikobewertung, Germany; S. Bull, Health Protection Agency, United Kingdom; E. Nielsen, Danish Technical University, Denmark; S. Tissot, J.-M. Vincent, INERIS, France; M. Wood, Joint Research Center, Italy; G. Cassel, P. Leffler, Swedish Defence Research Agency, Sweden; D. Russell, Health Protection Agency, United Kingdom; A. Zitting, T. Santonen, M. Heinälä, Finnish Institute of Occupational Health, Helsinki, Finland S 1.4.3. A New Set of KPIs and a New Methodology for NATECH (Natural-Technological) Risk Assessment – E. Krausmann, JRC, Italy; E. Salzano, Istituto di Ricerche sulla Combustione, CNR, Italy; V. Cozzani, R. Rota, CONPRICI, Italy; O. Aneziris, DEMOKRITOS, Greece; A. Vallee, B. Affeltranger, M. Reimeringer, Ch. Mazri, INERIS, France S 1.4.4. Integrated, multilingual Management for Operations and Maintenance: 2 ways how Europe can support SMEs to recognise and manage existing and emerging risks - C. Berbenni-Rehm, PROMIS@Service Sarl, Luxembourg; R. Gowland, United Kingdom **Papers presentation 20' each, 10' Discussion**
	Session 1.5. GRUNDTVIG (Bertha-Benz-Saal; Chair: O. Renn, University of Stuttgart, ZIRN) S 1.5.1. "Save Your Energies" - Designing Energy Concepts for Reducing Risks of Climate Change - Session for the lifelong learning partnership GRUNDTVIG – **Moderator: O. Renn**, University of Stuttgart, Germany, **Panelists**: • Roger Strand (University of Bergen, Norway) • Gisela Wachinger (Dialogik, Germany) • Päivi Tirkkonen (University of Jyväskylä, Finland) • William Leiss (University of Ottawa, USA)

S 2. iNTeg-Risk Parallel Sessions 2 – Dealing with Emerging Risk: Methods and Tools

17:00 – 18:30	**Session 2.1. Framework and Paradigm for Emerging Risk Management** (Bertha-Benz-Saal; Chair: V. Cozzani, C. Duval) S 2.1.1. Development of An Integrated Risk Analysis Method in Order to Treat the Different Sides of the ERMF – C. Duval, Y. Dien, EDF-R&D, France S 2.1.2. An Assessment Framework for Risk Communication Challenges – K. Øien, SINTEF, Safety Research, Norway S 2.1.3. Obstacles to Emerging Risk Anticipation – W. North, Stanford University, USA; M. V. Florin, IRGC, Switzerland; other authors, Steering Committee of the IRGC project on Emerging Risks, Switzerland S 2.1.4. iNTeg-Risk Framework for Emerging Risks Management - A. Jovanovic, EU-VRi, Germany; O. Renn, ZIRN Uni Stuttgart, Germany; R. Schneider, Swiss Re, Switzerland; D. Balos, R-Tech, Germany **Papers presentation 20' each, 10' Discussion**

17:00 – 18:30	**Session 2.2. Risk-Risk Tradeoffs & Early Warning Signals** (Tübingen; Chair: A. Kishimoto, E. Rosa) S 2.2.1. Resolving Risk-Risk Dilemmas by Reframing Objectives and Options: Lessons from 'Smart-Wear' – T. Assmuth, Finnish Environment Institute, Environmental Policy Centre, Finland S 2.2.2. Bridging Silos: Risk Governance and Cross-Domain Risks – E. Rosa, Washington State University, United States S 2.2.3. Risk Tradeoff Analysis of Substance Substitution: Scope, Framework and Metrics – H. Kajihara, A. Kishimoto, National Institute of Advanced Industrial Science and Technology, Research Institute of Science for Safety and Sustainability, Japan S 2.2.4. The Atypical Incident Scenarios: Longstanding Issues Commonly Disregarded as Improbable and New Issues Due To Emerging Technologies – N. Paltrinieri, V. Cozzani, Università di Bologna, Dipartimento di Ingegneria Chimica, Mineraria e delle Tecnologie Ambientali, Italy; E. Salzano, Consiglio Nazionale delle Ricerche, Istituto di Ricerche sulla Combustione, Italy; N. Dechy, IRSN – Institut de Radioprotection et de Sûreté Nucléaire, France; J. Buston, J. Wilday, Health and Safety Laboratory (HSL), Fire & Process Safety Unit, United Kingdom **Papers presentation 20' each, 10' Discussion**
	Session 2.3. Key Performance Indicators and Risk Perception (Heilbronn; Chair: K. Grieger, H. Pacaiova) S 2.3.1. A Communicative Approach to Understanding the Association Between Procedural Performance and the Legitimacy Of Outcomes – Th. Webler, SERI, United States S 2.3.2. Advantages and Disadvantages of KPI in Risk Management Process – H. Pacaiova, A. Nagyova, J. Namesanska, Technical University of Kosice, Department of Safety and Quality Production, Slovakia S 2.3.3. Emerging Nanotechnologies and Risk Perception – K. Grieger, H. B. Andersen, Technical University of Denmark, Denmark **Papers presentation 25' each, 15' Discussion**
	Session 2.4. Methodologies for Dealing with Emerging Risks I (Freiburg; Chair: Y. Malmén, M. Ström) S 2.4.1. Qualitative vs. Quantitative Data Quality Objectives for Complex Multi-pathway Risk Assessments — What Should Reasonable People Who are Not Statisticians Do? – K. Butler, Ch. Lambert, R. Countway, McDaniel Lambert, Inc., United States S 2.4.2. On the Way to a UML Model Of Handling Of Risks Related To Emerging Technologies – M. Ström, Swerea IVF AB, Operations Development, Sweden; D. Andersson, Swerea IVF AB, Electronics Production, Sweden S 2.4.3. 3DHaz — Emerging Hazard Analysis Using 3D Plant Models - Y. Malmén, K. Virolainen, VTT Technical Research Centre of Finland, Finland; T. Keskitalo, Pöyry Finland Oy, Finland S 2.4.4. Managing Emerging Risk Trade-Offs along the Life-Cycle: the Case of CCS – L. Breedveld, 2B, Italy; J. Wilday, HSL, United Kingdom; M. Cordella, M. Löscher, A. Jovanovic, EU-VRi, Germany **Papers presentation 20' each, 10' Discussion**
	Session 2.5. Special Issues in Management of Emerging Risks (Ulm; Chair: S. Kovacs, G. Lenkey) S 2.5.1. Smart Grids Risk - on a Non-Classic Information Measure – I. Purica, FCCEA, Romania S 2.5.2. Risk, the End is Nigh? – A. G. Hessami, Vega Systems & University of East London, System of Systems Engineering, United Kingdom S 2.5.3. Managing Emerging Risks New Bottles for a New Wine... and for Old Wine as Well! – Y. Dien, C. Duval, EDF - R&D, Management of Industrial Risks, France S 2.5.4. Evaluate Possible Technologies for e-Learning / Web-Based Courses for the iNTeg-Risk European Master on Emerging Risks – P. Lerena, Swiss Safety Institute, Switzerland **Papers presentation 20' each, 15' Discussion**

Posters first conference day (König-Karl-Halle; Coordinator: M. Löscher; the time table of presentations will be indicated at each poster)

09:00 – 18:00	The following posters will be presented throughout the day in König-Karl Halle PO 1. Rapid Fingerprinting Technique of Oil Spill Based on the Concentration-Synchronous-Matrix-Fluorescence Spectroscopy and Chemometrics – Ch. Wang, W. Ren, M. Tang, J. Zhang, Beijing Normal University, China PO 2. A Comparative Study of the Main Existing Methods and Software Tools for Analysis and Modeling of Domino Effects – F. Kadri, Université de technologie de Troyes, Institut Charles Delaunay, UMR CNRS, France PO 3. Integrated Technologies For Improving Atmospheric Risk and Impact Assessment Models And Studies – N. Ajtai, Z. Török, H. Stefănie, A. Ozunu, Babes-Bolyai University, Environmental Sciences and Engineering, Romania

18:30 – 21:00	**Conference Dinner (joint dinner with SRA Europe Conference)**

June 8, 2011

JP 1. iNTeg-Risk/SRA Europe Joint Plenary Session

09:00 – 10:30	**Global Risks: A Broader Perspective** (König-Karl-Halle; Chair: W. Leiss, J. López de Ipiña, K. Øien) *"**Best Graduate Student / Young Scientist Award"**, A. Jovanovic* *Two special prizes, 1,000 € in total, financed by Stiftung Umwelt- und Schadensvorsorge (Foundation for Environmental and Damage Prevention, www.stiftung-schadenvorsorge.de) will be awarded to 2 outstanding iNTeg-Risk Conference papers or posters, authored by graduate students or young scientists.* JP 1.1. **Welcome Baden-Württemberg International:** Provider of New Technologies and related services for economic development and international cooperation – H. Neuland, Baden-Württemberg International, Germany JP 1.2. **Global Systemic Risks with Catastrophic Potential** – W. Leiss, University of Ottawa, McLaughlin Centre for Risk Assessment, Canada JP 1.3. **To Count or to Judge?** – E. Rosa, Washington State University, United States JP 1.4. **Risk governance deficits in the multiple risk situation: the Great East Japan Earthquake, Tsunami, and Fukushima nuclear accident** – A. Kishimoto, RISS, AIST, Japan
10:30 – 11:00	**Coffee break**

S 3. iNTeg-Risk Session 3 (parallel) – Management of Emerging Risks

11:00 – 12:30	**Session 3.1. Early Warnings and Risk Mitigation (Tools)** (König-Karl-Halle; Chair: A. Jovanovic, L. van Wijk) S 3.1.1. Infrastructure for Spatial Information in Europe (INSPIRE) – Towards Interoperability of Data Sets for Risk Prevention and Management – M. Tuchyna, A. López Alós, P. Smits, R. Tomas, Institute for Environment and Sustainability, JRC, EC, Italy S 3.1.2. The RiskClock: A way to improve monitoring of emerging risks related to New Technologies – A. Jovanovic, P. Klimek, D. Balos, EU-VRi, Germany; R. Schneider, Swiss Re, Switzerland S 3.1.3. Software Interoperability in Risk Analysis: A Possible Way Forward? – L. van Wijk, S. Contini, V. Matuzas, European Commission, Joint Research Centre, Italy; M. Binda, THS Informatica, Italy S 3.1.4. An Agent-Based Model Tool for Analyzing Perception of Emerging Risks – P. Klimek, A. Jovanovic, R. Lim, EU-VRi, Germany; R. Schneider, Swiss Re, Switzerland **Papers presentation 20' each, 10' Discussion**
	Session 3.2. Findings from iNTeg-Risk Related Projects (Ulm; Chair: R. Hutter, H. Wenzel) S 3.2.1. VALUESEC - Mastering the Value Function of Security Measures – Ch. Blobner, Fraunhofer Institute for Factory Operation and Automation IFF, Logistics and Factory Systems, Germany; R. Hutter, CESS GmbH Centre for European Security Strategies, Germany S 3.2.2. Comprehensive Assessment of Traffic, Environmental and Financial Impacts of Tramway Extension Using Intelligent Multi-agent Simulator MATES – H. Fujii, S. Yoshimura, H. Uchida, The University of Tokyo, Dep. of Systems Innovation, Japan S 3.2.3. Results of the IRIS Project with Relevance to iNTeg-Risk – H. Wenzel, VCE Holding GmbH, Austria S 3.2.4. Architecture, Interfaces and Standards of Environmental Information Systems – How to Integrate them into Risk Management Applications – M. Schenk, M. Rudolf, Fraunhofer IOSB, Information Management, Germany **Papers presentation 20' each, 10' Discussion**
	Session 3.3. Risk Management and Standardization (Heilbronn; Chair: H. Behrens, S. Jovanovic) S 3.3.1. Standardization in Risk Management – S. Limousin, V. Laflèche, INERIS, France S 3.3.2. Standardization Activities within the iNTeg-Risk Project – H. Behrens, DIN Deutsches Institut für Normung e.V., R&D Phase Standardization, Germany S 3.3.3. NanoRef: Coordination of standardization activities for Safety Related To Nanoparticles – O. Salvi, EU-VRi, Germany; S. Engel, BASF, Germany; E. Fréjafon, O. Le Bihan, INERIS, France; S. Jovanovic, R-Tech, Germany; N. Babcsan, Bay Zoltan Foundation, Hungary **Papers presentation 25' each, 15' Discussion**
	Session 3.4. Natural Hazard Management and Insurability (Mannheim; Chair: O. Renn) S 3.4.1. Invited Lecture: Combining Risk and Responsibility Perspectives – J. Brinkmann, Norwegian School of Management, Norway **Moderator: O. Renn**, University of Stuttgart, Germany, **Panelists:** E. Rosa, V. Schetula, H. Kosow, S. Kjellgren, J. Brinkmann
12:30 – 13:30	**Lunch (buffet)**

S 4. iNTeg-Risk Session 4 (parallel) – iNTeg-Risk Project Liaisons to Other Projects & Activities

13:30 – 15:00	**Session 4.1. Near Misses & Knowledge Discovery** (Heilbronn; Chair: N. Allan, S. Ansaldi) S 4.1.1. Discussing Near Misses to Revive the "Sleeping" Knowledge – S. Ansaldi, P. Agnello, P. Bragatto, INAIL, Italy S 4.1.2. Dynamic Knowledge Management (DKM) – B. Debray, INERIS, France, E. Kon, EKON, Israel S 4.1.3. An Evolutionary Approach to Identifying Emerging Risk in Complex Adaptive Systems Using Phylogenetic Analysis – N. Allan, University of Bristol, Systems Centre, United Kingdom; Y. Yin, University of Bath, School of Management, UK **Papers presentation 25' each, 15' Discussion**
	Session 4.2. Methodologies for Dealing with Emerging Risks II (Ulm; Chair: M. Gerbec, Y. Malmén) S 4.2.1. Experience and the Unexpected: Risk and Mitigation Issues For Operating Underground Storage Silos for Coal Fired Power Plant – Y. Malmén, P. Auerkari, A.-M. Heikkilä, VTT, Finland; J. Sipilä, Helsingin Energia, Finland; U. Krause, BAM, Germany S 4.2.2. Two-Stage Stochastic Mixed Integer Linear Programming – J. Cui, TU Dortmund, Germany S 4.2.3. Effective Key Performance Indicators on Integration of Risk Related Information into Land Use Planning Process – D. Kontić, M. Gerbec, B. Kontič, Jozef Stefan Institute, Slovenia **Papers presentation 25' each, 15' Discussion**
	Session 4.3. Benchmarking (Tübingen; Chair: L. Breedveld, D. Leonte) S 4.3.1. Comprehensive Ex-Ante Evaluation of New Emerging Technologies/Risks and Their Approval – B. Kontić, D. Kontič, M. Gerbec, Jozef Stefan Institute, Slovenia S 4.3.2. An Exposition into the Diversity of Risk Applications and Implications for their Integrated Management in Organizations – D. Leonte, NICNAS, Australian Department of Health and Aging, Australia S 4.3.3. Benchmark Study on International Functional Safety Standards – F. Massé, INERIS, France; R. Tiennot, LigeronFrance; J.-P. Signoret, Total, France; Ph. Blancart, PSA Peugeot Citroën, France; G. Dupin, RATP, France; L. Marle, IMdR, France **Papers presentation 25' each, 15' Discussion**
	Session 4.4. Uncertainties and Systemic Risks (König-Karl-Halle; Chair: P. Bragatto, Ch. Huang) S 4.4.1. Estimation of Uncertainty for Emerging Technologies and Implications to Risk Management – F. Markert, I. Kozine, Technical University of Denmark, Management Engineering, Safety, Reliability & Human Factors, Denmark S 4.4.2. Some Issues on Experimental Riskology – Ch. Huang, Beijing Normal University, Academy of Disaster Reduction and Emergency Management, China S 4.4.3. Inspection Planning of Pressure Vessels in Service – P. Bragatto, INAIL, DIPIA, Italy; C. Delle Site, INAIL, DCC, Italy; A. Faragnoli, C-ENG, Italy **Papers presentation 25' each, 15' Discussion**
15:00 – 15:30	**Coffee break**

P 3. iNTeg-Risk Plenary Session 3 – Panel Discussion Precautionary vs. Evidence-Based Approaches
(König-Karl-Halle)

15:30 – 16:50	P 3.1. Precautionary vs. Evidence-Based Approaches when Dealing with Emerging Risks – **Moderator: O. Renn**, University of Stuttgart, Germany, **Panelists**: • J. Wiener (US vs. Europe) • R. Löfstedt (Implications for European and US Policy Making) • E. Rosa (Application of Precaution to Climate Change) • Th. Webler (Citizen preferences for risk management approaches) • A. Jovanovic (Precautionary principle and evidence-based approach in the iNTeg-Risk framework) • P.A. Schieb (Precautionary principle in the future)
16:50 – 17.00	**Closure of the conference** (O. Renn, Jovanovic)

Posters second conference day (König-Karl-Halle; Coordinator: D. Balos)

09:00 – 15:30	The following posters will be presented throughout the day in König-Karl Halle PO 4. Human Erroneous Action Context Monitoring by Two HRA Methods – G. Petkov, Technical University of Sofia, Thermal and Nuclear Power Engineering, Bulgaria PO 5. Using Human Key Performance Indicators Together with Expert Rationing Processes in Order to Understand and Cope with New and Emergent Risks – S. Kovacs, G. Apostol, I. Iorga, INCDPM, Romania; E. Doval, Spiru Haret University, Romania PO 6. Reliability Analysis and RBI Planning for Industrial Heating Vessels – A. Kozak, Office of Technical Inspection, Poland PO 7. Reducing Airbag Induced Injuries – A. Dávila, M. Nombela, IDIADA Automotive Technology, Passive Safety, Spain

Hotels

The special prices conditions are arranged with CONGREX.
Please use the contact details provided at registration (http://www.eu-vri.eu/fwlink/?LinkID=315)!

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For further hotel and/or other information consult http://www.stuttgart-tourist.de/ENG/hotels/hotels_buchen.htm. No special conditions would apply to these hotels.

Registration/Fees

Registration for the Main Conference is open at:

http://www.eu-vri.eu/fwlink/?LinkID=315

Registration Fees:

Conference fees (+ VAT if applicable):

- 350 €, for iNTeg-Risk partner and members of the International Advisory Board
- 430 €, for other full delegate
- 230 €, for student delegates.

The registration includes handouts, coffee breaks, lunches, the conference reception and the conference dinner on June 7, 2011. Having registered either for SRA-Europe Meeting (June 5–8, 2011) or for 3rd iNTeg-Risk Conference (June 7–8, 2011) gives free access to both events on June 7–8, 2011.

Workshops fees (per workshop, + VAT if applicable):

- 150 €, for project partners and IAB members
- 250 €, for other participants.

The registration includes handouts and coffee breaks.

Registration:

- KPI Workshop: http://www.eu-vri.eu/fwlink/?LinkID=317
- IRGC Workshop: http://www.eu-vri.eu/fwlink/?LinkID=316

Abstracts

P 0.1. Future Global Shocks: can we cope with the challenges?

Pierre-Alain Schieb
OECD Organisation for Economic Co-operation and Development, France

This presentation will cover a particular class of large scale disasters or catastrophes: those which reach a global or near-global scale. This is not to say that local, national or regional disasters cannot have huge damaging consequences but that a „global" shock is a different animal. Perhaps, as an emerging class, global shocks deserve special attention since they are frequently confused with large scale disasters as soon as characterization, frequencies, propagation, impacts or key policy challenges are discussed. The OECD International Futures Programme has just completed a two year project on Future Global Shocks with active contributions of eight governments, the private sector and the research community in order to provide clarification, views on the future and a better understanding of policy challenges and policy options. During the course of the Project, a number of dimensions have been covered: knowledge base about potential shocks (typology of shocks, data and models), assessment of a sample of potential global shocks such as pandemics, financial crisis, cyber security, social unrest, geomagnetic storms; discussion on available tools, regulatory gaps, policy options. Questions about frequency, drivers, direct or indirect impacts, role of models, access to resources, interoperability of instruments, role of actors and many others were raised. Eventually, the question of „commonalities" between potential threats as opposed to idiosyncrasies is key when it comes to policy options; are there priorities that governments, the private sector and society should endorse whatever the case? It can be argued that to a large extent the answer is yes. Of course, each potential case, in its own right, can justify specific measures in line with more general principles. The presentation is meant to provide the analytic basis for the conclusions, key messages and policy options derived from the project.

P 0.2. From Emerging Risk Perception to Action

Reto Schneider
Swiss Reinsurance Company, Switzerland

Since 2006 the World Economic Forum's Global Risk Reports have been published providing an overview about the current top global risks including some new and emerging risks. Other high level projects like OECD Future Global Shocks are focused on interdependencies. However, perception and identification of new Risks is just the start of a successful risk management process. Mapping new risks is a prerequisite to understand the characteristics and allows recognizing their complex and sometimes critical connections. Next steps must include active risk mitigation. Therefore the newest add on is the WEF Forums Risk Response Network. It will combine most important insights with top decision makers and with most relevant tools and services. The plan is there but now we need the tools and services to enact the plan. This is where the iNTeg-Risk Project fills the gap. iNTeg-Risk builds a bridge between risk originators, owners, corporations, regulators in charge of protecting public health by providing tools for analysis and management of emerging risks (e.g. early warning system, the Risk Atlas, the set of risk management tools, the emerging risk related knowledge base, etc., all part of the iNTeg-Risk „1-Stop-Shop").

P 1.1. Safe Innovation as a Guarantee for Long-Term Sustainability

Heinz Trasch
Steinbeis Foundation, Germany

The paper highlights the concept of „safe innovation" as a guarantee of success through acceptance of new technologies and innovation in general. The concept has been adopted and deployed by Steinbeis since its foundation, but has been increasingly gaining importance in the recent years: Steinbeis has several units having risk assessment and management in the core of their activities and the concept of „safe innovation" embedded into virtually all activities of the Foundation. This is of particular importance for the small and medium enterprises (SMEs) to which Steinbeis provides the necessary high-level support for their safety and risk-related activities and, thus, increases their competitiveness at the market, shortens time to innovation and ensures sustainability of final products.

P 1.2. Risk-Risk Tradeoffs

Jonathan Wiener
Duke University, United States

This presentation will review the intellectual and policy history of Risk-Risk Tradeoffs since the publication of the book Risk vs. Risk: Tradeoffs in Protecting Health and the Environment (J.Graham & J.Wiener, eds., Harvard University Press 1995). It will assess debates over the use of risk-tradeoff analysis; appraise the application of risk-tradeoff analysis to important policy topics (such as chemicals, food, health care, climate change, and terrorism); examine the role of risk-tradeoff analysis in regulatory oversight systems; and offer recommendations for the future.

P 1.3. Dealing with tradeoffs between target and ancillary risks of New Technologies

Aleksandar Jovanovic
EU-VRi, Germany

After having successfully accomplished its second year of work, the iNTeg-Risk project (www.integrisk.eu-vri.eu) continued yielding its tangible results. This first part of the paper provides an overview of the project main goals and the main results delivered so far, focusing on t he iNTeg-Risk framework and the work on „iNTeg-Risk 1-Stop-Shop" (the platform for integrating project results) and its main elements — the Risk Atlas, the early warning system RiskEars and the work on key performance indicators). In the second part of the deals with the recognized need to systematically manage risk tradeoffs in modern risk management. These risk tradeoffs have been often downplayed as „side effects" or „unintended consequences" - and, even more often, poorly examined, let alone quantified or managed. The paper proposes a concept/framework of dealing with the tradeoffs of risks both in space and time: from early notion and indications up to a fully developed system of risk governance covering all technical, human, regulatory and communication aspects. The tradeoffs have been quantified primarily by means of indicators (KPI/SPI — key performance/safety indicators) and are built into the iNTeg-Risk framework takes into account the ideas proposed by IRGC, ISO 31000, Basel/Solvency and other reference documents in the field.

P. 2.1 Safety Culture Development at BASF

Wolfgang Gerhardt
BASF SE, Germany

Protection of Environment, Health and Safety is a corporate core value of BASF group. The company has set ambitious global goals for 2020 to promote continuous EHS improvement. For occupational safety, BASF is targeting a reduction of the global lost-time injury rate by 80 % compared with 2002. Management systems are setting the basis for the best possible protection of safety and health of the employees. BASF relies on comprehensive precautionary measures, promotes and monitors safety at work through risk assessments, safety rules, training courses and audits.

In addition, BASF started the safety culture initiative "Safety Champions" in September 2008 globally. The initiative aims at developing a shared attitude and is based on four pillars: visible leadership (lead on), individual responsibility (look out), open dialogue (speak out), and employee involvement (join in). The safety culture is developed in phases. Thus initially, the company needed to interactively raise awareness for safety and motivate everybody to create and further develop a shared safety attitude. Therefore it was core to actively involve employees and leadership! Subsequently, instruments have been introduced to support implementation of the success factors into daily working life. External partners are being included in the activities. Employee and leadership feedback and the resulting corrective actions are essential for roll-out and success of the initiative.

Today more than 16,000 employees and contractors at over 50 sites around the world developed specific proposals for improvement of the safety culture.

The presentation will give an insight into the development of an improved safety culture – and will show that BASF is successfully establishing a 'Safety first!' mindset throughout the group!

P 2.2. Use of the Environmental Information System Baden-Württemberg for Risk Assessment Tasks – Opportunities and Constraints

Renate Ebel [1]; Thomas Usländer [2]; Roland Mayer-Föll [3]
[1]LUBW, Germany; [2]Fraunhofer IOSB, Germany; [3]Ministry of the Environment, Nature Conservation and transport, Germany

Environmental Information Systems (EIS) play a key role in environmental monitoring and environmental risk management tasks. They provide information about the past, current and future status of environmental phenomena, e.g. the chemical or biological quality of a water body, and thus contribute to our understanding of the environmental situation. EIS are associated with sensors and/or environmental models that deliver measured or calculated observations about environmental phenomena. The integrated EIS of the German federal state of Baden-Württemberg (EIS-BW) has been conceived and is operated in partnership by state and municipal administrations. Based on a Service Oriented Architecture it provides environmental data from multiple disciplines to a multitude of users using a variety of interfaces, tools and formats, including Web portals, sophisticated search engines and standard Web services. In the last years the EIS-BW has been opened up to a wide spectrum of users, from employees in environmental agencies to politicians in ministries and up to the citizen. This trend was driven by the increasing demand of public and private stakeholders but also requested by legislation such as the European Directive on Public Access to Environmental Information, the Water Framework Directive or the German Act for Implementing the INSPIRE directive. However, public authorities also must obey data protection regulations as environmental data is typically either geo-referenced or associated with other personal data. Hence, some of the data may only be published in a spatially and/or temporally aggregated form. Furthermore, it must be ensured that published environmental data has been validated and annotated with declarative and validity information (e.g. comprehensible legends in maps) in order to avoid misinterpretation and misuse. This presentation discusses the opportunities but also the constraints of the EIS-BW as a source of data for the management of Emerging Risks.

P 2.3. iNTeg-Risk Project : An Overview of the Results of 17 Emerging Risk Representative Applications

Bruno Debray [1]; Mures Zarea [2]; Knut Øien [3]; Renato Rota [4]; Aleksandar Jovanovic [5]
[1]INERIS, France; [2]GDF Suez, France; [3]SINTEF, Norway; [4]Politecnico di Milano - CMIC Dpt, Italy; [5]Eu-Vri, Germany

iNTeg-Risk has adopted a pragmatic yet unusual approach for the development of a new integrated emerging risk management framework. The project started with 17 emerging risk representative applications (ERRAs), each of them attempting to solve a series of specific emerging risk issues. In parallel, the project started developing and integrating its main concepts and methodological frameworks. An initial analysis had confirmed that the sum of the emerging risk issues addressed in the ERRAs was covering the main aspects of integrated risk management as described in the IRGC risk governance framework. The objective was to develop a series of specific innovative solutions applying good risk management principles and then elaborate more generic and integrated solutions based on this initial set of good innovative practices. Two years after the beginning of the project, the ERRAs have achieved their initial objective. This paper presents a summary of their main results. These results are organized and interpreted in view of the main methodological and conceptual results of the project. The paper explores the definitions of emerging risk adopted by the ERRAs. Then it illustrates the various steps of the risk governance process with example solutions developed in the ERRAs. At last, an analysis of the various types of KPI developed by the ERRAs and their possible use in the Emerging risk management is proposed.

S 1.1.1. Overview of ERRA A1 on Carbon Capture and Storage

Jonathan Buston [1]; Jill Wilday [1]; Regis Farret [2]; Leo Breedveld [3]; Nicola Paltrinieri [4]
[1]Health and Safety Laboratory, United Kingdom; [2]INERIS, France; [3]2B, Italy; [4]Health and Safety Laboratory, United Kingdom

The iNTeg-Risk ERRA A1 on carbon capture and storage will be described with a focus on the aspects which can be generalised to other emerging risks. This includes two new methodologies which were trialled by the ERRA (the DyPASI methodology for identifying atypical events which was developed in ERRA C4; and life-cycle approaches using the iNTeg-Risk LCA guidance). It also includes a new methodology which was developed in ERRA A1 for including the time dimension in a risk assessment. Other generalisable aspects of the work done in the ERRA will also be included, for example work which has been done on risk communication for CCS, knowledge gaps, and KPIs. Knowledge gaps relevant to the regulation of CCS will be particularly covered. The work will also be put in the context of the iNTeg-Risk ERMF.

S 1.1.2. Addressing Emerging Risks related to LNG regasification Terminals

Uguccioni Giovanni [1]; Rota Renato [2]; Busini Valentina [2]; Derudi Marco [2]; Marzo Enrico [2]; Tugnoli Alessandro [3]; Benucci Stefania [1]; Aneziris Olga [4]; Valerio Cozzani [3]; Iris Vela [5]
[1]D'Appolonia SpA, Italy; [2]Politecnico di Milano, Italy; [3]Università di Bologna, Italy; [4]NCSR Demokritos, Greece; [5]BAM - Bundesanstalt für Materialforschung und –prüfung, Germany

ERRA A4 in iNTeg-Risk has explored emerging risks of LNG regasification terminals. Even if the technology is rather consolidated emerging risk issues are evidenced recently, mainly related to growing public concerns that are causing serious and spreading local oppositions causing delays or withdrawal of projects that could contribute to a cleaner and more reliable energy supply. One of the issues of this increased concern is external threats, that are assuming an important role after September 11th. In addition to this, offshore terminals are proposed to answer onshore plant issues such as land use and interaction with other industries, introducing a second issue of emerging risks, related to the adoption of a proven onshore technology in an offshore environment. The activities of this task have been developed by 14 partners (Academia, Industry and Research institutions) from 5 Countries. The results are made available in a book where the present status of the knowledge on the risk identification and modeling, a gap analysis and new or improved models and tools to address the issues are described. The paper presents the main results of the task, in particular related to the steps of hazard identification and consequence modeling. Hazard identification addresses emerging risks issues using existing methods (DyPasi, Hazid) modified to better address hazards of external origin. Consequence modeling is a constantly in progress part of the risk analysis. The increased concerns and the need to address non conventional scenarios (e.g. releases by external threats) requires more detailed and realistic methods and tools to be developed, able to obtain a wide consensus as suitable assessment tools by the population. The paper will present the main results of the survey and of the gap analysis performed in the task, that has allowed to identify the recommended methods among those available, as well as the theoretical and experimental work done to improve some of these models.

S 1.1.3. Evacuation of a complex underground facility

Maximilian Wietek [1]; Jonatan Hugosson [2]; Frank Leismann [3]; Fabien Fouillen [4]
[1]VSH, Switzerland; [2]SP, Sweden; [3]STUVA, Germany; [4]INERIS, France

RING! RING! ... 'Fire in the facilities of Hagerbach Test Gallery! I have hit a vessel with some liquid with the fork lift. I am slightly injured and not really sure abou- .....'
Safety and security of underground facilities are to be seen in a new context since we are able to go deeper and deeper with facilities for passenger transportation and services related to convenience goods. In the frame of ERRA task A5 — 'Safety and Security of underground hubs', and together will the annual main training event of the public volunteer first responders of the region Flums, Switzerland, an evacuation exercise was organized in the facilities of Hagerbach Test Gallery. Involved parties included the Rescue Service Center of Sankt Gallen, both Heads of the regional Fire and Police Departments as well as two groups of visitors and the ERRA A5 partners. For the iNTeg-Risk partners, the main objective of the exercise was to prove and evaluate the Emerging Risk Issues which have been defined in the first phase of ERRA A5:
• ERI 1 — Passenger volume
• ERI 2 — Escape routes
• ERI 3 — Ventilation
• ERI 4 — Orientation
• ERI 5 — Communication
In general, the evacuation exercise happens in two separate settings. The first one is the external, where persons are alerted, communicate and try to understand and react on a specific situation of emergency which happens in the second, the internal setting — the location of the complex facility. During the exercise, some activities or involved persons may change from the external to the internal setting or location. Consequently, they have access to other information and face problems different to the ones they had before. As a conclusion, all Emerging Risk Issues were proven through the evacuation exercise. In addition, criteria for the development of Key Performance Indicators have been identified as a result of the work done in ERRA A5 and the evacuation exercise. ERRA A5 partners include VSH Hagerbach Test Gallery (Switzerland, Task leader), SP (Sweden), STUVA (Germany) and INERIS (France).

S 1.2.1. Dust Explosions as a destructive Threat to Solids Handling Industries: Case Studies of Hazards and Means and Measures to avoid injuries and losses.

Stefan Penno
Index e.V., Germany

This lecture focuses on hazards and accidents caused by dust explosions. All kind of industries that are handling solids and bulk material are subject to the risk of explosions caused by combustible dust. In comparison to a fire, an explosion is a rapid burning event, causing high temperatures and massive pressure built up within milliseconds. There are no means to escape from such an event or to react to such. In order to prevent from such disasters happening, responsible persons in industry (safety, executive, process engineers) have to be trained and made aware of the risks they might face. There is also legislation in force all over Europe (ATEX) and also manufacturers of safety equipment are adapting to economic and efficient devices to make sure the damage by an explosion is at least reduced and controllable. This lecture gives an overview of accidents happened including some interesting analysis of incidents that took workers lives. Further to that a more practical approach introduces the audience to the standards and guidelines that are available in order to make industrial processes safe against explosions. And last but not least there is also a touch of technology within that shows solutions in terms of products and services plant operators shall use to make their factory a safe place to work.

S 1.2.2. A generic approach for hazard prevention in large storages of combustible wastes

Iris Vela ; Ulrich Krause
BAM, Germany

Long-term storage of industrial and municipal wastes can undergo complex chemical conversions most of which are exothermal and gradually increase the temperature inside the deposit. This can result in a so called runaway reaction which is an uncontrolled increase in temperature and often leads to a fire which can have multiple harmful effects on humans and on the environment. Especially the large amounts of flue gases may contain carcinogenic and mutagenic substances which are dispersed across the environment by wind. A methodology is presented to assess the hazard of thermal runaway and subsequent fire propagation due to the unwanted chemical reactions. This methodology combines event tree analysis and deterministic prediction of consequences and includes both experimental and theoretical investigation of the accident scenarios: - of long-term thermal and chemical stability of the stored material by using methods of thermal analysis. The output parameters are onset temperatures for unwanted chemical reactions and kinetic data for the lump reaction effect. - prediction of the long-term thermal stability of the deposit which comprises a mathematical analysis attempting to predict the temperature evolution with time within the deposit based on a balance of heat production (by the exothermal reactions) and heat transfer to the environment.

S 1.2.3. Method to management of the emerging risks connected with the introduction of advanced engineering materials.

Jerzy Trebicki ; Krzysztof Dolinski
Institute of Fundamental Technological Research, Polish Academy of Science, Poland

In the presentation we propose a consistent approach named Advanced Materials Emerging Risk Assessment (AMERA) to management of the emerging risks connected with the introduction of advanced engineering materials such a composite materials and nano-materials into new generation of products. The development of advanced/novel materials is always accompanied by new desired and non-desired mechanical and chemical behavior. The behavior cannot be predicted ahead. In principle, only the „global" chemistry and the desired composition are known, while side reactions and mechanical and structural properties of these materials are unknown. In the last years the structural properties of the advanced materials have gained more attention because the structural dimensions were shifted to the nanometer scale. This obviously introduces a second parameter to the more general questions of direct toxicity and side products that needs to be considered. The side products can either be fixed on the surface or be free particles in powdered form or fume. It is clear, that physical and chemical properties of advanced materials have significant implications for emerging risks. AMERA is an extension of the PHA (Preliminary Risk Analysis) and RRR (Rapid Risk Ranking) methods. AMERA takes into account such aspects as:

- development of an inventory of Emerging Risk Issues (ERIs) and Key Performance Indicators (KPIs) related to advanced materials and their applications.
- monitoring of the production and use of advanced/novel materials.
- considering trends in engineering new materials production and use including identification of industry sectors and specific establishments producing.

AMERA consists of ten distinct steps. It is designed for iterative use as development advances and new information becomes available.

S 1.2.4. Easy-to-use nano control banding tool for risks related to working with nanomaterials: Stoffenmanager Nano

Anjoeka Pronk [1]; Henri Heussen [2]; Suzanne Spaan [1]; Wouter Fransman [1]; Koen Verbist [2]; Birgit Duuren-Stuurman [1]; Erik Tielemans [1]
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Background Control banding tools are needed to support companies with their risk assessment of working with manufactured nano objects (MNO). The goal was to build an easy-to-use web based control banding tool, using accessible and obtainable data on hazard and exposure parameters and resulting in a risk prioritization score and subsequent control. Methods Based on scientific literature, relevant parameters on hazard and exposure were selected and included in a conceptual model. A peer review of the model by a scientific advisory panel (SAP) and discussions with national and international stakeholders resulted in a final conceptual model covering four general source domains of the complete supply chain. Subsequently the model was converted into an online tool (http://nano.stoffenmanager.nl) that was tested and reviewed by some 15 companies, resulting in the release of version 1.0 March 2011. Result Stoffenmanager Nano is a control banding tool that prioritizes occupational risks related to working with MNO. It determines hazard potential (band A-E) based on particle size, solubility, fiber-like-properties and classification of nano- or parent material. Exposure potential (band 1-4) is determined using handling categories adjusted to the life-cycle of nanomaterials. The final risk prioritization (class I-III) can be iterated by selecting control measures. Conclusion Stoffenmanager Nano is a 'continuous development' tool reflecting the current knowledge on risks related to working with nanomaterials. This tool is limited by the lack of specific scientific data, e.g. exposure data or dose-response relationships. To fill in knowledge gaps until more scientific data become available, we will redesign the ad-hoc expert judgement of the SAP into a expert elicitation procedure to gather and combine new information on exposure, hazard and risk in a transparent way. The new knowledge will be implemented in subsequent versions of Stoffenmanager Nano.

S 1.3.1. Safety challenges from subcontracting - Review

Jacob Thommesen ; Henning Boje Andersen
DTU, Denmark

This paper presents a literature review of safety problems related to subcontracting and outsourcing. The review emphasizes five different types of problems and corresponding countermeasures identified in the literature. Selection of subcontractors are often based on price alone without regard for safety, and selection can be improved by including safety measures in the bid, considering the subcontractor's past safety performance based on available indicators, and by creating long-term relationships and accumulating knowledge about known subcontractors. Once selected, a subcontractor is often inclined to sacrifice safety when under pressure from rigid incentive schemes in the contract, problems that can be countered by including dynamic safety indicators in the contract or instead by creating long-term relational contracts. There are specific challenges from using small subcontractors less inclined to make dedicated safety investments or to comply with formalized safety rules, and this may require outsourcing companies to assist such small companies in preparing safety measures, and authorities to adapt their approach normally oriented towards larger companies. Subcontractor may respond to problems with allocating staff among different projects and clients by sending staff with less than adequate safety competences and using temporary employees, and this will require better control of individual by the outsourcing company as well as providing means for training and supervision. Finally, subcontracting requires a fragmentation of work processes with increasing challenges to coordination and communication between employees from different companies and with differences in safety culture, and this situation calls for a clearer allocation and negotiation of management responsibility on multi-employer worksites.

S 1.3.2. On-line risk monitoring and assessment methodology and techniques for emerging risk in petrochemical plants

Gyöngyvér B. Lenkey [1]; Peter Rózsahegyi [1]; Emese Bodnár [1]; R. Somogyvári [2]
[1]Bay Zoltan Foundation for Applied Research, Hungary; [2]

The objective of our work was to develop methodology for on-line risk monitoring of emerging risks in petrochemical plants, based on IRGC principles. Our work was based on the need of operators of petrochemical plants, considering all organisations within the company, dealing with not only technical, but human and organisational aspects of risk.
The following main needs of plant operators were identified:
- to have a method and tool which can provide warning indicators if the risk is changing or new risk is appearing,
- to have a method and tool to identify and measure the changing/emerging risk continuously,
- to have a method and tool which can help to identify the root cause of changing of the risk and operation performance.

According to this we have developed a new approach for „on-line" aspect of risk monitoring:
- Any significantly shorter time period — whenever the information for risk calculation is up-dated - can be considered as „on-line"
- Thus the interpretation of „on-line" aspect was:
  - Based on real-time monitoring of any parameter in a plant (e.g. T ,p ,etc.), and/or
  - Based on off-line information:
- that are measured and upgraded frequently: within a significantly shorter period than the time-scale of the potential change of the parameter and the damage process , and
- which are stored and available on-line in any company database.

Based on this approach a methodology and a pilot tool have been developed. The basis of the methodology is the identification of ERIs and the definition of relevant Risk Factors and KPIs. The results of this work will be presented in the paper.

S 1.3.3. Risk issues and good practices related to subcontracting - Interview study

Jacob Thommesen ; Henning Boje Andersen
DTU, Denmark

This paer describes the results of an interview study. Based on a structured catalogue of issues and challenges an interview study has been conducted with safety management representatives of companies that have a wide experience with the safety management of subcontracting arrangements. The purpose of the interviews was to capture risk issues and good practices related to outsourcing and subcontracting. Interviews were conducted with selected companies across different safety-critical industries (oil & gas, construction, rail, shipbuilding, chemical, energy), and from different European countries. The selected companies are known to have initiated specific programmes to deal with outsourcing threats, and the interviews inquire about practical application of existing measures in unforeseen situations, as well as about new practices. Several companies maintained a shortlist of approved contractors, thus using the company's own experience with contractors to guide selection among bidders, and in some case building relations beyond mere contractual agreements. Interviews revealed mixed experience with using safety incentives to counterbalance production incentives: while employed by some companies, others had experienced negative consequences, e.g. for incident reporting and for general willingness to share knowledge about safety. The interview study also revealed issues related to the planning and coordination of projects with a large number of contractors performing interdependent tasks. Use of contractors represent an additional challenge to project management, especially if individual contracts are focused on particular deliveries (e.g. deadline), which can make it difficult to adjust safely to unanticipated changes. Interviews provided examples of countermeasures to such challenges, such as: adjusting contracts, more flexible plans, and involving contractors more directly in project planning.

S 1.3.4. How can emerging risk areas learn from a consideration of past „Atypical Events"?

Jonathan Buston [1]; Graham Atkinson [1]; Nicola Paltrinieri [1]; Nicholas Dechy [2]; Ernesto Salzano [3]; Lorenzo van Wijk [4]
[1]Health and Safety Laboratory, United Kingdom; [2]Ineris, France; [3]IRC-CNR, Italy; [4]JRC, Italy

Some of the key points from iNTeg-Risk ERRA C4 will be described, with an emphasis on what points can be generalised to emerging risk in general. These will cover two main facets: The first line of discussion covers how many times does an „atypical event" need to occur before it is no longer considered „atypical", and how does one then convince an established industry to change it's view? A succession of vapour cloud explosions are used to illustrate this point. The second part will look at a range of atypical events and examine common threads among the „contributing factors" that often are seen with „atypical" events. Managing these factors would be a starting point for managing generic unknown or emerging risks.

S 1.4.1. The ERRA D2 Tool: A new approach to support emerging risks management in energy sector companies

Jesús M López de Ipiña [1]; Antonio Moreno [2]; Juan Luis Lirón [2]; Javier Goitia [3]; Luciano Azpiazu [3]; Imanol Padillo [1]; Jokin Rubio [1]
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As a result of the research activities carried out within the framework of the FP7 iNTegRisk project and the ERRA D2 specific task, a new tool to support emerging risks management in companies of the European energy sector has been developed (ERRA D2 tool). The ERRA D2 tool allows: 1) the emerging risks assessment, 2) the generation and geo-location of specific emerging risk indicators displaying Facility, Occupational, Environmental and Security risk levels (FOES traffic lights), 3) FOES risk communication by using Tablet PC and worker's mobile devices, 4) the interaction with risk sensors implemented at facilities (e.g. EMF sensors) and finally, 5) the generation and monitoring of customized Key Performance Indicators (KPI's). A case study was conducted in a selected area of the Basque Country (Spain) to test and validate the tool. This paper also emphasizes the capabilities of the ERRA D2 tool to be generalized for other companies, industrial sectors and emerging risk typologies, allowing at the same time an integrated management of conventional risks. Issues such us the applicability of the tool for SMEs and subcontracted companies are also dealt.

S 1.4.2. Human risk assessment of single exposure in chemical incidents

Peter Bos [1]; Marc Ruijten [2]; Ursula Gundert-Remy [3]; Sarah Bull [4]; Elsa Nielsen [5]; Sylvie Tissot [6]; Maureen Wood [7]; Gudrun Cassel [8]; David Russell [4]; Karin Mahieu [1]; Per Leffler [8]; Antti Zitting [9]; Jean-Martin Vincent [6]; Tiina Santonen [9]; Milla Heinälä [9]
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The release of chemicals from their containment, either accidentally or initiated by an intentional act, is one of the most relevant risk scenarios in Europe. The ability to perform a human health risk assessment is a prerequisite for effective chemical incident prevention, preparedness and response. At present, no European consented guidance is available for risk assessment, risk management and risk communication purposes for these scenarios. Such an assessment requires the prediction of possible health effects at increasing levels of health impact. A review of legislation, existing or currently under revision, suggests that a basis for such guidance is not to be expected in the short term. Through a web-based survey the availability of European consented and harmonized Acute Exposure Reference Values (AERVs) was considered to be an important need. An increasing number of European countries are developing their own procedures to assess human health risk of chemical incident scenarios. The AERVs thus produced serve different purposes and are not interchangeable, even though they are often used in practice as if they are, leading to inconsistencies and inaccuracies in the chemical incident risk assessment. Lack of international harmonization seriously hampers a harmonized response in chemical emergencies with trans-boundary effects within and beyond the EU, will hamper multinational companies to make consistent risk assessments worldwide and will hinder consistent and transparent assessment, management and communication of risks by the different stakeholders. Emerging chemical incident risk scenarios and risk drivers have been identified. It is recommended to monitor more frequently for new trends in chemicals, scenarios and risks from chemical incidents at an early stage. A specific need for an approach to deal with single exposure to mixtures of chemicals was identified, as well as for specific guidance to adequately protect professional first responders.

S 1.4.3. A new set of KPIs and a new methodology for NATECH (Natural-technological) risk assessment

Mathieu Reimeringer [1]; Bastien Affeltranger [1]; Chabane Mazri [1]; Agnes Vallee [1]; Ernesto Salzano [2]; Valerio Cozzani [3]; Renato Rota [3]; Olga Aneziri [4]; Elisabeth Krausmann [5]
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Natural-technological accidents, or NATECHs, reveal a particular exposure and vulnerability of industrial facilities to natural hazards and disasters. NATECH is seen as an emerging risk due to 3 main Emerging Risk issues:

- ERi 1 : Industry development in areas exposed to natural hazards or disasters : higher hazard potential, higher frequency of accidents;
- ERi 2 : Growing complexity of the industrial system : higher dependency on vulnerable networks (telecom, transport, utilities, lifelines);
- ERi 3 : Climate change is believed to induce more severe/intense natural disasters, with subsequently growing impacts on industrial facilities.

Within the iNTeg-Risk project, several tasks were dediated to investigate the NaTech issue (T1.5.3 - ERRA NATECH, and T2.5.4). ERi 1 and 3 were mainly considered within the work carried out. However, the (un)availability of safety barriers should be considered when establishing event trees and failure trees (accident risk; so-called bow-tie approach, etc.)

In the paper, the developments made in the ERRA-NATECH are presented: A new risk analysis methodology for NATECH events and a set of new KPIs are discussed and showed. The handbook of good practices for NATECH mitigation will be a main output of the ERRA participants. A preliminary application of the results to a case-study was also carried out.

S. 1.4.4. Integrated, multilingual Management for Operations and Maintenance: 2 ways how Europe can support SMEs to recognise and manage existing and emerging risks.

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There is a well known phenomenon in the industry sector commonly known as Small and Medium Enterprises (SMEs) where resources for creating and managing efficient systems for Quality, Occupational Safety, Process Safety and Environmental Risk are limited. SME engagement with bodies which could help, such as universities, research institutions and professional or industry associations is rather rare. The reason for this is the fact that SMEs need Knowledge; knowledge and methods to support them in better managing their daily operations and maintenance.

While in the past offering content was perceived as a service consisting of predefined and pre-structured information, now society and the market require respecting human tacit and explicit Knowledge.

With PROMIS (www.promis.eu) we have decided to "go against the stream" and build upon the fact that a partnership between SME managers, subject matter experts, and associations, derive the needs of their customers and members, therefore they are well placed to do the job of structuring existing content and knowledge offered by universities and public bodies.

The innovation of PROMIS® as highly intuitive integrated compliance management framework is raising the interest in several European countries. However, the main barriers to enter these markets are the need for translation and localisation of the broad range of PROMIS® services, and also the lack of semi-intelligent ICT tools to support structuring, filtering and optimizing data and content in a way that SMEs can communicate in their own language and get answers to their needs online 'at a fingertip' in the same language. PROMISLingua objectives are the translation, localisation and rollout of the existing PROMIS® online service in 9 (nine) languages in order to deliver a cost-efficient and easy-to-use Internet based service enabling SMEs to sustain and extend their business cross-border into European markets and to comply thereby with all Safety, Health, Environment and Quality Regulations.

Examples will be shown: (a) PROMIS® Maintenance solution and Chemical Process Safety Pyramid containing the elements for Process Safety Management and Risk Assessment which are valuable in meeting operator and regulator needs for hazardous facilities. The aim is to have a progressive system which ensures that the larger risks receive the most study and as a result, control.

S 1.5.1. „Save Your Energies" - Designing energy concepts for reducing risks of climate change - Session for the life long learning partnership GRUNDTVIG

Ortwin Renn
University of Stuttgart, Germany

A variety of technical concepts to conserve energy have been developed with the purpose to reduce climate gas emissions. These developments, however, are heavily focused on technological fixes and supply strategies. The other side of the equation, the demand side has often been neglected. For example, almost all efficiency gains in the use of electric energy have been overcompensated by increased consumption (Rebound effect or Jason paradox). In addition to consumer behaviour, the session will look into the issue of acceptance and tolerance of infrastructure changes that are required for the transition towards a carbon-free economy. Crucial questions here are: How will new technologies change my personal life? How will I use these new technologies? Am I willing to tolerate major changes in infrastructure in exchange for a more renewable and efficient energy future? How should I design better communication programs to align the new supply options with demand? The interactions with the consumers and the stakeholders on all political levels are a necessary condition for implementing the required changes towards climate protection. In this multidisciplinary session paper will be presented focussing on theoretical approaches as well as case studies on the local and regional level. In addition, lessons for communication and participation, including the use of WEB2 tools, will be discussed.

S 2.1.1. Development of an integrated risk analysis method in order to treat the different sides of the ERMF

Carole DUVAL; Yves DIEN
EDF-R&D, France

The Emerging Risk Management Framework is the core of the whole iNTeg-Risk project. It provides the basis for integration of the research and management activities in the area of emerging risks. With its four dimensions „Technical", „Human/organisational", „Communication" and „Regulatory", it implies that methods have to be developed to integrate several of these aspects in order to ensure risk management. Thus EDF has been developing a new method to be able to take into account technical, environmental, human and organisational aspects in a risk analysis: an integrated risk analysis approach. It consists in: introducing in the bow tie representation of the technical risk model as it was developed in the ARAMIS European project (ARAMIS, 2004) the impacts of environmental hazards, which influence the failure frequencies of components, human actions (component replacement, surveillance and conducting actions) which efficiencies depend on characteristics (delegation, training, experience, collective handling and team dynamics,...) under the influence of the organisation depicted using Pathogenic Organisational Factors (POFs) in reference to James Reason (Reason, 1990; Reason 1997) (Dien & Duval, 2010). We will describe the way these different types of risks are taken into account in an integrated risk analysis process. The main difficulty consists in aggregating in the same risk model inputs issued from the experimental feedbacks and others issued from expert judgement, skipping from an ordinal view of this inputs to a quantitative representation of the risk model which will be exploited to reach a priorization of these risks. The presentation will focus on ways to include in a same risk model these different kinds of inputs, to represent the overall risk model using Bayesian Belief networks and the different types of results in support decision making in risk management in the technical area but in the human and organisational ones as well.

S 2.1.2. An assessment framework for risk communication challenges

Knut Øien
SINTEF, Norway

An assessment framework for risk communication challenges is described. It is based on work on risk governance deficits (IRGC, 2009) and risk communication and stakeholder participation (Renn & Sellke, 2009). Altogether 17 risk communication challenges have been indentified and structured according to the IRGC framework. This is also illustrated by locating each deficit or challenge to the corresponding phase or sub-phase in the IRGC framework. In the IRGC risk governance deficit report (IRGC, 2009) risk governance deficits have been identified and divided in two parts; A and B, corresponding to the left side and right side of the IRGC framework, respectively. In the risk communication assessment framework (RICAF) we have i) selected the risk governance deficits addressing risk communication challenges, ii) structured them according to the IRGC framework phases and sub-phases (i.e. not only A and B, but the exact location/phase). Five risk communication challenges (three of type A and two of type B) were identified and selected. From the work of Renn and Sellke (2009), altogether 12 risk communication challenges were identified. These were denoted type C, in order to distinguish them from the IRGC work (IRGC, 2009). Also these 12 risk communication challenges were structured and located according to the IRGC framework phases and sub-phases. This framework (RICAF) was used during an interview on the risk communication process in the Goliat project (Goliat oil field in the Barents Sea). It could be used in any emerging risk situation; before, during or after the risk communication process, and it has the potential to become a common approach included in the iNTeg-Risk framework for dealing with emerging risks.

S 2.1.3. Obstacles to emerging risk anticipation

Marie Valentine Florin [1]; Warner North [2]; IRGC other authors [3]
[1]International Risk Governance Council, Switzerland; [2]Stanford University, USA; [3]Steering Committee of the IRGC project on Emerging Risks, Switzerland

As a follow-up to its work on contributing factors to risk emergence, IRGC is working on how to overcome obstacles to emerging risk anticipation. A prominent subject that is unavoidable and consistently implicated in emerging risk management is the influence of what could be called the „human factor", or people's propensity to be affected by personal interests, emotions, heuristics or cognitive biases. Insight into human decision-making processes is thus a valuable asset for organisational managers and acquiring such an insight should be a priority when considering how to improve organisational performance dealing with emerging risks. Working within a general context of complexity and human limitations, IRGC has identified a number of 'themes' that are often problematic for organisations when faced with emerging risks, with a view to explain why they are problematic, and to offer suggestions for improvement.

S 2.1.4. iNTeg-Risk Framework for Emerging Risks Management

Aleksandar Jovanovic [1]; Ortwin Renn [3]; Reto Schneider [3]; Daniel Balos [4]
[1] EU-VRi, Germany; [2] ZIRN Uni Stuttgart, Germany; [3] Swiss Re, Switzerland; [4] R-Tech, Germany

The paper presents the main elements and features of the ERMF (Emerging Risks Management Framework) developed in iNTeg-Risk project. The starting point of the definition of the framework has been the analysis of the preceding frameworks, such as those of IPCS - Integrated Risk Assessment and Occupational Exposure (EU 2001-2011), WHO – Infectious diseases (2002, 2004, 2010), IAEA – Nuclear safety (1993), FAO/WHO – Food safety (2003), OECD/IFP – Emerging risks (2003, update FGS 2011), UN - Framework for Disaster Risk Reduction (2004), standards AS/NZS 1999 - Australian/New Zealand Standard on Risk Management, ECHA SEA (2009/2010), FERMA (2002/2004), ISO/IEC Guide 73 (ISO 2002), ENISA Framework & Guidelines – extension: Guidelines new, 2010), the IRGC Framework including its extensions 2010/11 and ISO 31000 (2010). The ISO 31000 and the IRGC respective frameworks, with some elements of ENISA have been used as the basis. The new work on the iNTeg-Risk ERMF has covered the issues of practical definition of emerging risks, specification of the main requirements, introduction of the „risk vs. opportunity" approach, definition of „emergence" of emerging risks and about 30+ factors influencing (imminence, persistency, trends, character of unknowns…) and risk maturation. The maturation has been modeled by introducing the concept of risk notions, emerging risk issues (ERIs), emerging risks applications (ERRAs) and the „super ERRAs" (WEF, the global challenges). The aspects of communication, life cycle of emerging risks, risks over the life cycle of a technology, multiple risks and their overlaying, linking and interaction, emerging risk monitoring („risk clock") have been introduced in order to indicate the way towards practical application of the framework. The application has been illustrated by selected examples from or relevant to iNTeg-Risk project, including the embedding of the concept into the iNTeg-Risk deliverables such as RiskAtlas, RiskEars and Safetypedia.

S 2.2.1. Resolving risk-risk dilemmas by reframing objectives and options: Lessons from 'smart-wear'

Timo Assmuth
Finnish Environment Institute, Finland

Resolving competition and conflicts between risks as well as benefits, being the other side of risks is an essence of life but is made more important and more difficult by the multiplicity, complexity (including connectedness), uncertainty and resultant contestedness of risks. This is accentuated with new technologies and with realizations that risks need to be accounted for more fully, yet practicably. This is exemplified by the risks associated with chemicals in textiles, directly and indirectly, including old and new types of risks and risk agents and factors, notably in what is called smart-wear utilizing advanced materials (including nanomaterials), technologies and societal functions. Textiles pose special challenges to risk governance e.g. by the globalized, heterogeneous and high-turnover nature of the products, their positions in crossroads between environmental, health, safety and trade policy, as well as their strong cultural and psychological connotations, including both necessity and luxury consumption. It is argued that a contextualized and flexible (reflexive) reframing of objectives and options is often advisable to make sense of such risk-risk dilemmas, including questioning and redefinitions of core concepts and values. It is shown that from narrow and conditioned views or risks and benefits among actors (including sector regulators, industries, CSOs and media), new opportunities or, at least, new insights can thus be found in a collective learning process of deliberation, dialogue and negotiation. It is further suggested that in order to resolve risk-risk or risk-benefit dilemmas and to avoid both paralysis and panic action (to new technologies as well as away from them), especially raising the question of necessity is important, but without rigidly normative and moralistic overtones, and rather by redefining more multi-dimensionally and pluralistically what might be profoundly 'smart', from various perspectives and on various value systems.

S 2.2.2. Bridging Silos: Risk Governance and Cross-Domain Risks

Eugene Rosa
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Two converging trends have provided unprecedented challenges to risk characterization and assessment: the inherent features of contemporary risks themselves and the character of the variety of domains - spheres of public decision making - where these features are found. Both elements of contemporary risks challenge the dominant, conventional approaches to risk analysis and management. The cross-domain challenge is the need to develop frameworks for the disciplined, comparison of risks, across spheres of society that are not compared in conventional approaches. The inherent features of many risks - especially systemic risks - that make them so challenging are deep uncertainty, complexity, and ambiguity. An approach to deal with these risk features is risk governance, a proposed paradigm change in risk assessment and management. It is an organized strategy that subsumes conventional risk assessment within a larger orientation of social and ethical considerations. Missing from the strategy is a foundation for governance across risk domains. This paper seeks to contribute to that foundation with a logical structure derived from the literature in population modeling.

S 2.2.3. Risk tradeoff analysis of substance substitution: scope, framework, and metrics

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Although the level of visible risk factors has decreased, invisible and uncertain ones continue to emerge, such as climate change and possible risks arising from emerging technologies. As a result, the costs involved in reducing risk have risen considerably and a number of unintended counter-risks have also become apparent. Research Institute of Science for Safety and Sustainability (RISS) at the National Institute of Advanced Industrial Science and Technology has started to tackle these issues several years ago. One project is called „Development of Methodologies for Risk Trade-off Analysis toward Optimum Chemical Substance Management", in which we conducted case studies of substance substitutions of the industrial cleaners, flame retardants and common heavy metals as well as developed individual elemental techniques to resolve risk tradeoff problems. In a typical case, one chemical substance for a certain purpose is substituted for another for reasons such as a fear of potential toxicity. We showed that switching from a carcinogen to a non-carcinogen could increase loss of life-years of the general public. Although the general framework including cost considerations has been developed, the scope of this project is still basically within human health chronic effects from exposure to chemical substances. Another project dealing with the choice of new refrigerant for air conditioners compared several alternative refrigerants from multiple risk perspective. The scope was enlarged and we considered not only human health risks but also explosion risks, global warming potential, ecological effects. We developed a procedure useful for selecting the appropriate refrigerants according to the policy needs. In parallel with tackling these projects, we are considering the framework of the general risk tradeoff analysis and also preparing the evaluation axis to measure the progress of risk assessment practices toward the multiple risk society.

S 2.2.4. The atypical incident scenarios: longstanding issues commonly disregarded as improbable and new issues due to emerging technologies

Nicola Paltrinieri [1]; Ernesto Salzano [2]; Nicolas Dechy [3]; Jonathan Buston [4]; Jill Wilday [4]; Valerio Cozzani [1]
[1]Università di Bologna, Italy; [2]Consiglio Nazionale delle Ricerche, Italy; [3]IRSN – Institut de Radioprotection et de Sûreté Nucléaire, France; [4]Health and Safety Laboratory (HSL), United Kingdom

Several severe accidents in the chemical and process industry were caused by „atypical scenarios", which may be defined as unexpected scenarios which are not identified by conventional hazard identification processes. In that regard several European directives have been issued over the years, nevertheless, atypical accidents keep occurring such as the accidents occurred at Toulouse and Buncefield, respectively in 2001 and 2005. Another latent risk can be represented by the incident scenarios related to new and emerging technologies, which are not still properly identified or studied and may remain unconsidered until are experienced. An example of this is the field of Liquefied Natural Gas (LNG) regasification, where alternative technologies are being defined and the scale and extent of LNG handling is set to increase dramatically, thus a lack of substantial operational experience may lead to difficulties in identifying accurately the hazards associated with that process. Hence these new and emerging hazards may enter into the definition of atypical previously expressed. From the examples mentioned, it appears evident that there is a continuous need of reviewing HAZID processes in order to comprehensively identify both these new and disregarded risks. This can be carried out exploiting the information given by the early warnings in a context of a better knowledge management. The present contribution will give a general overview of atypical incident scenarios in different sectors of industry, showing related examples of early warnings and how they could be considered in the HAZID processes through a more effective horizon scanning. To this aim, results coming from 3 different ERRAs of the iNTeg-Risk project (A1-CCS, both technical and governance risks, A4-LNG regasification in sensitive areas, C4-Atypical major hazards/ scenarios) will be used and general lessons drawn from the specific cases.

S 2.3.1. A communicative approach to understanding the association between procedural performance and the legitimacy of outcomes

Thomas Webler
SERI, United States

Making decisions in a democratic society about controversial topics usually ends up displeasing some interest groups while pleasing others and yet, without widespread acceptance, decisions can be stalled in court or stymied outright. The research literature suggests that a „fair process" effect may be the answer. A small amount of evidence suggests that people who believe a decision making process was fair, are more willing to accept the outcome of the process, even if their interests are negatively impacted. To improve democratic acceptance of decisions, regulatory bodies strive to broadly involve the interested and affected parties in dialogue and incorporate their input. In this project, we explore the fair process hypothesis in several case studies of environmental decision making. One case study has been completed to date. In that case we found evidence of a fair process effect AND a competent process effect. In other words, people's decision acceptance was positively related to their perceptions of the fairness of the process and the competence of the process to reach sound understandings. Because we measured specific qualities of the communication within this process, we are able to draw conclusions about how government agencies can better satisfy the expectations and needs of interested and affected parties and, thereby, produce decisions with higher democratic legitimacy.

S 2.3.2. Advantages and Disadvantages of KPI in Risk Management Process

Hana Pacaiova ; Anna Nagyova ; Jana Namesanska
Technical University of Kosice, Slovakia

One of the basic requirements of presented systems is Process Performance Measurement. Process Performance Measurement is a strong tool for Change Management in organization, which supports process improvement. This definition includes all activities, which present objective and detailed information about process performance. Therefore is necessary to set Key Performance Indicators - KPI, which can objectively described process effectiveness. In organization are mostly used indicators as Amount of production, Amount of Non-conformity of Financial Indicators. This paper presents the major advantages and disadvantages in building processes of KPI, especially in Management Processes. It compares different using of KPI in several industry areas and highlights gaps in methodology of KPIs building and theirs Management according to monitored processes and activities. The aim of this contribution is to create fundamental framework for KPI Identification in processes of Risk Management related to known processes in several industry enterprises.

S 2.3.3. Emerging nanotechnologies and risk perception

Khara Grieger ; Andersen Henning Boje
Technical University of Denmark, Denmark

The potential health and environmental risks associated with engineered nanomaterials (NM) remains largely unknown. At the same time, the number of products and applications containing NM continues to increase at a face pace. Given the early stage of knowledge pertaining to these novel materials, understanding and assessing various risk perceptions of NM is central to ensuring their responsible development. We therefore present an overview of current knowledge regarding risk perception of nanotechnology and NM as viewed by a range of stakeholders. This information is critical to better understanding risk communication and governance challenges involving NM. The presentation will furthermore discuss the results of our review within the context of the overall Integrisk framework.

S 2.4.1. Qualitative vs. Quantitative Data Quality Objectives for Complex Multi-pathway Risk Assessments — What should reasonable people who are not statisticians do?

Katherine Butler ; Charles Lambert ; Rebecca Countway
McDaniel Lambert, Inc., United States

Traditionally the recommended approach to the data quality objectives process includes statistical justification for sampling design. However in practice, data collection as part of the risk assessment process is often conducted based on experience and best professional judgment in order to collect representative data with adequate reporting limits. Using a case study of a human health risk assessment for a 95-acre site on the California central coast, the effectiveness of both quantitative and qualitative approaches to data quality objectives are discussed. In this case study, several qualitative measures were taken to ensure that data collection met risk assessment goals: (1) qualitative data quality objective statements to guide soil and soil gas sampling efforts, (2) a formal data usability analysis that included spatial representation of the data, and (3) a qualitative data quality assessment to validate sampling objectives. In addition to the qualitative steps taken, a quantitative data quality assessment was conducted retrospectively to verify that sufficient data were collected through statistical sample size calculations. Ultimately, both qualitative and quantitative approaches strive to answer same the question: are there adequate data to make defensible risk management decisions? The benefits and limitations of each approach are reviewed, as well as the challenges presented by complex multi-pathway risk assessments.

S 2.4.2. On the way to a UML model of handling of risks related to emerging technologies

Mikael Ström ; Dag Andersson
Swerea IVF AB, Sweden

This paper is a description of the work to create a variant of UML to describe risks related to emerging technologies and the handling of such risks. The purpose of the paper is to serve as means of communication within the iNTeg-Risk project regarding approach and strategy of the work. The purpose of the UML variant is to serve as an extra layer of abstraction when detecting, assessing and handling risks related to emerging technologies. The graphical syntax of UML together will with its process and information modelling capabilities add a new representation of a case expressing features in a different way than a traditional textual representation. The 3rd iNTeg-Risk Conference is a great opportunity to communicate within the iNTeg-Risk project and also disseminate information to the rest of the society.

S 2.4.3. 3DHaz — emerging hazard analysis using 3D plant models

Yngve Malmén [1]; Kimmo Virolainen [1]; Tuomo Keskitalo [2]
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In the process industries, Hazard and operability study (HazOp) is the method of choice for many risk analysts. HazOp guide words work well as long as we are considering deviations that do not include loss of containment or happen during maintenance or other similar operational phases. HazOp studies rely on two-dimensional drawings. On these, many relationships between various parts of a process plant are not shown. This affects the completeness of the study and some types of hazards might go unnoticed. For instance, HazOp studies do not consider domino effects or fires in a systematic way. Nowadays computerised 3D plant models are developed. These are periodically reviewed by various specialists groups, including process safety personnel. This paper will present a new hazard identification method, 3DHaz, which is based not on 2D drawings but on a 3D model of the plant. 3DHaz, as developed in the iNTeg-Risk project, is designed to be a complement to HazOp studies. 3DHaz allows hazardous situations not easily detected by examining 2D drawings to emerge. 3DHaz is carried out at two stages of a plant design project. At the plant layout and conceptual design stage, a 3DHaz study is possible as soon as a 3D model showing main buildings, main equipment, etc. is available. The aim of the 3DHaz study at this stage is to identify major issues related to the layout of the site. At the detail design stage, a HazOp study is first carried out. This is complemented with a 3DHaz study. The aim of the 3DHaz study at this stage is not to identify deviations that are best identified based on a P & I Diagram, but to focus on the identification of hazardous scenarios, which at least to some parts happen outside the process equipment and can be identified by studying a detailed 3D plant model.

S 2.4.4. Managing emerging risk trade-offs along the life-cycle: the case of CCS

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[1]2B, Italy; [2]HSL, United Kingdom; [3]EU-VRi, Germany

The iNTeg-Risk project endorses, through its LCA guidance document, LCA as a complementary tool to contribute to an improved management of emerging risks in the European context. The combination of Life Cycle Assessment (LCA) and Risk Assessment (RA) enriches the discussion on a new safety paradigm and through its concept of life cycle stages induces a radical change in health and safety management. Future changes in risk management will need to address the life-cycle concept, broadening its scope to questions like: what are the critical life cycle stages of the product system in term of hazards, risks and impacts? What are the opportunities for upstream or downstream improvements? Do trade-offs occur between life-cycle stages and how can the overall performance be optimised over the entire life-cycle? How can LCA contribute to a better understanding of emerging risks and impacts, and consequently their prevention and control? Answers to these questions contribute to more proactive assessments of emerging technologies in order to guarantee that their future materials and products will not result in adverse effects on health, safety and environment. Within the iNTeg-Risk project, LCA has been applied to Carbon Capture and Storage (CCS, ERRA A1). LCA is particularly relevant because it facilitates the quantitative consideration of options to reduce CO2 emissions. It can therefore help in addressing the risk of climate change by identifying which risk management options are most effective. The LCA of CCS quantified both pros and cons, visualising environmental trade-offs of emerging risks in complex systems such as the CCS chain.

S 2.5.1. Smart Grids Risk based on a non classic information measure

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FCCEA, Romania

The emerging smart grids (as just an example of complex system) with increasingly numerous protections and over-protections as well as programmed reactions, are perceived by the operator as a set of possible situations rather than a yes/no (true/false) event occurrence. If the control and reaction electronic systems have a bivalent logic, at the level of the system's interaction with the human operator, the perception is switching to a multi-valued logic where true and false are only two limit values in a set of possible states. The gain of information by the operator of such a system is associated to the regions of a Mynkovski space and a specific Lorentz transform. This approach allows the identification of a deterministic region, a stochastic one and a region where the observer perceives more information from the system than his experience makes him expect. Associated to such system behavior one may define uncertainty as the time spent between pure true or pure false and risk as the distance from false indicating loss of functionality. This is raising a whole new discussion regarding the measurement of operator system interaction in the case of complex systems.

S 2.5.2. Risk, the End is Nigh?

A G Hessami
Vega Systems & University of East London, United Kingdom

Most rational and purposeful activities in life are undertaken with a positive personal or collective goal in mind. These range from the pursuit of activities in fulfillment of needs such as food, shelter, comfort, security, progression and happiness to adventure, discovery, recognition and enlightenment. In all these endeavors, the immediate focal point is the achievement of a desirable outcome in physical or intangible form. The potential gain and purpose is therefore often the driver and motive force only countered by the degree of sacrifice and loss which the undertaking may entail within the context of a value system. Against a purposeful and positive general framework, mere focus on the possibility of loss at the expense of a richer picture is paradoxical and at odds with reality. Whilst prudence implies anticipation and preparedness for these, a degree of dynamic balance between loss and gain is the more worthwhile and realistic aim. In this setting, gain and loss resemble the Taoist's polar opposites which inherently co-exist to varying degrees requiring optimal balance, which is considered acceptable by the individual or group pursuing a goal. Whilst risk is technically indicative of a future gain or loss, the common parlance and usage tends to view it largely as an undesirable and negative outcome. To remedy this, a systems framework is proposed to ensure a transparent and balanced perspective is taken into account in forecasting future outcomes in any context. This is based on equitable consideration of two fundamental influencing factors: - Risks & - Rewards. It is only realistic to consider the outcome of an endeavor after all significant risks and rewards are assessed and the net balance is estimated. In this paper, we explore the philosophical underpinnings and develop a systems framework for a more balanced and holistic approach to assessment of outcomes than currently portrayed by the risk based paradigm.

S 2.5.3. Managing Emerging Risks New bottles for a new wine... and for old wine as well!

Yves Dien ; Carole Duval
EDF - R&D, France

Debates about reality of the „zero risk" concept are meaningless, since „zero risk" is a myth (Bergogne, 2001). We can claim that to admit risks does not mean to accept occurrence of major events: in that sense, main goal of risks management is to prevent occurrence of (major) events or to avoid unacceptable consequences of an event. Industries have to cope with new and emerging risks. It is not obvious that usual methods used for management of „conventional" risks are relevant enough for emerging risks. Therefore, new methodological approaches have to be considered to address issue of emerging risks. Can management of „conventional" risks feed the new approaches? Can we learn from the past and specially from „errors" so that we do not reiterate them? These past decades, domain of risks management improved both in methods and in tools. Nevertheless, in spite of unquestionable improvements, industries still experienced major events which are symptoms of flaws in current risks management. Studies of industrial accidents showed some repetitive factors as root causes of events occurrence (Dien, 2006). These factors, hardly quantifiable, are called „pathogenic organisational factors" in reference to James Reason' works (Reason 1990, 1997). They can be detected „on-the-spot" thanks to signs and markers (Dien & Llory, 2006). In the paper, we will demonstrate that new approaches for managing emerging risks need to take account of social features in addition to technical features. In other words, we will support the switch started in the iNTeg-Risk project from a technical epistemology influenced by an outsider and mechanistic vision to an integrated one including a socio-technical epistemology influenced by a „comprehensive vision. So, we will suggest that effort to include these aspects should be strengthen to tackle the new paradigm for emerging risks but are also useful for managing „conventional" risks.

S 2.5.4. Evaluate possible technologies for e-learning / web based courses for the Integrisk European Master on Emerging Risks

Pablo Lerena
Swiss Safety Institute, Switzerland

The aim of this presentation is to evaluate possible technologies for e-learning / web based courses for the Integrisk European Master on Emerging Risks. A systematic web- based research was performed in order to identify which are the most relevant technologies presently available and evaluation reports comparing these technologies. The number of Learning Management Systems (LMS) and Course Management Systems showing good capabilities is high and will be constantly growing, consolidating and improving. The evaluation made presently for a LMS to be used by the Integrisk European Master on Emerging Risks may change up to the end of the project. Some systems emerge as being widely used in universities as Moodle, Blackboard or Sakai. Many institutions and universities participating in Integrisk already have their own LMS. It is possible to import contents from one system to another as long as they comply to the same standards. Moodlee is proposed as a preliminary choice.

PO 1. Rapid Fingerprinting Technique of Oil Spill Based on the Concentration-Synchronous-Matrix-Fluorescence Spectroscopy and Chemometrics.

Chunyan Wang ; Weiwei Ren ; Mingming Tang ; Jinliang Zhang
Beijing Normal University, China

It is urgently required to develop a rapid and effective fingerprinting technique of petroleum-related samples due to the frequent occurrence of oil spill accidents. In this paper, Concentration-Synchronous-Matrix-Fluorescence Spectroscopy(CSMF) was applied to characterize the chemical fingerprint information more comprehensively. To build up an effective model for classification of petroleum-related samples, Principal component Analysis (PCA) and Partial least square(PLS) were used for feature extraction, and supported vector machine (SVM) and artificial neural network (ANN) were used for pattern recognition. The comparison of these chemometrics methods indicate the PCA can divide the samples to different oil types in the principal components space, while PLS can give a better classification of the closely-related source of petroleum-related samples due to its ability to find the multi-dimensional direction in the measurement matrix space that explains the maximum direction in the response vector space. The results also show that SVM is more appropriate than ANN for these small data sets study. 2 sample sets and leave-one-out cross-validation were used for testifying the validity of these method. The CSMF-based fingerprinting technique combined with suitable chemometrics presented here is sensitive and selective enough to be used for site oil spill identification.

PO 2. A Comparative Study of the Main Existing Methods and Software Tools for Analysis and Modeling of Domino Effects

Farid Kadri
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Despite the fact that the principle of domino effects has been used largely in the understanding of several industrial disasters, several aspects of this field remain unexplored. Very often the domino effect principle is applied to particular cases (simples most of the time) without any possibility to take into account different factors of different nature simultaneously. Thus one find in the literature large number of models applied to particular fields separately. An inventory of the past domino accidents, reveal that explosions are the most frequent cause of the domino effect (57%), followed by fires (43%). Also, a recent study provides a historical analysis of 261 accidents involving domino effects. This analysis shows that, in addition to the causes of mechanical failures and external events, the frequency of domino accidents caused by human factors are relatively high (21%). It is therefore essential to integrate human and organizational factors in the study of cascading accidents. Moreover, domino effect modeling still investigated on a very low level, the available methodologies in the literature are based on very simplistic assumptions. Although the literature abounds in several studies on domino effects, it is necessary to deepen their analysis, and pay more attention to their modelling. The objective of this article is to present a comparative study of the main existing methods and software tools for analysis and modelling of domino effects. After defining and presenting the main characteristics of domino effects, the second part of this article is devoted to a comparative study of these methods and software. This analysis enables a classification along three axes, applications field (as inputs), the principles and limitations of these methods and the outputs. This work helps to give some perspectives on the possibilities of federations and evolutions of these methods taking into account more adequately human factors and organizational.

PO 3. Integrated technologies for improving atmospheric risk and impact assessment models and studies

Nicolae Ajtai ; Zoltán Török ; Horatiu Stefãnie ; Alexandru Ozunu
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Scientific research into the causes, consequences, and mitigation of environmental changes is essential for informed policy-making. Also, the development of process industries had determined the increase of technological disasters causing massive environmental pollution. Environmental Impact Assessment studies and Risk Assessment studies represent very important and useful tools in the prevention of environmental pollution and technological disasters. A serious limitation in modelling of atmospheric dispersions is due to the unavailability of data describing the vertical structure of the atmosphere, therefore the calculation of the mixing layer is possible only through rough approximations. Point monitoring systems also measure concentrations only at local level, but the vertical distribution of concentrations of pollutants is not provided. These shortcomings can be overcome by using LIDAR systems for the measurement of vertical distribution of aerosols, and also with the use of high performance UV and IR cameras for optical determination of gas particle concentrations in the atmosphere. On-site measurements of vertical concentration distribution can also be used for validation of the models currently used, and also for development of new ones. We are proposing a 3D approach both for gases and aerosols monitoring in order to assess the important volume processes. The point monitor instrumentation for gases (O3, CO, CO2, NOX, SO2) and aerosols (particles, concentration and size distribution) or meteorological parameters are completed by total column apparatus as the sun tracking photometer (aerosols optical depth and water vapor column) and finally by aerosols LIDAR which will profile up to the tropopause the regional atmosphere. This synergy of point monitoring - total column and profiles supplemented by modeling tools and satellite data are the dataset’s main strength, giving a unique potential for advanced impact and risk assessment.

JP 1.1. Baden-Württemberg: Provider of New Technologies and related services for economic development and international cooperation

Herbert Neuland
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The State of Baden-Württemberg is one of the most active business locations for the development and deployment of New Technologies worldwide. Business, science and research — these are just some of the areas in which Baden-Württemberg can look back not only onto a long track record of development of New Technologies and cooperation with foreign partners, but also onto a sustainable investment into safety of these New Technologies. Baden-Württemberg International is tasked with fostering and expanding all these aspects of international cooperation for the state's business, education, and research communities and these activities include supporting international cooperation through programs which promote Baden-Württemberg as a center of business, education, and research.

JP 1.2. Global Systemic Risks with Catastrophic Potential

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University of Ottawa, Canada

A pioneering 2007 study co-sponsored by the U. S. National Academy of Sciences and the Federal Reserve Bank of New York, published under the title „New Directions for Understanding Systemic Risk," offered what is arguably the first in-depth, synthetic analysis of the concept of systemic risk. A unique feature of this study was its bringing together of perspectives from specialists in engineering, epidemiology, ecosystems, and the financial sector under the common framework of analyzing large-scale „complex adaptive systems" of two types, that is, natural and human-created. The global financial crisis that emerged in the period 2007-2008, which has had enormous and ongoing adverse consequences for many nations, gave new urgency to the need — which cannot be satisfied as yet — to be able to predict vulnerabilities in complex systems and, hopefully, to mitigate their potential catastrophic impacts by taking precautionary actions. The seriousness of the ongoing risk in the global financial sector is indicated by the results of simulation studies showing that catastrophic collapse in this sector can appear suddenly, unpredictably, and without warning. This defines the need for urgent further attention, since the balance sheet of advanced economies (the debt-to-GDP ratio) has been severely weakened by the 2007-8 crisis, thus limiting severely the ability of those nations to respond effectively to new global crises. This paper will (1) summarize the findings of my own study in this area, in a book entitled „The Doom Loop in the Financial Sector and Other Black Holes of Risk" (October 2010), (2) report on the latest published contributions to this literature (notably the article published in „Nature" in January 2011, by A. Haldane and R. May, entitled „Systemic Risk in Banking Systems," and (3) offer suggestions for further research and analysis that is urgently needed.

JP 1.3. To Count or to Judge?

Eugene A. Rosa
Washington State University, United States

The risks produced by new technologies or relevant new scientific findings (e.g. the ozone hole that came as a surprise to scientists) are characterized by their deep uncertainty, often deepened further by their embeddedness in complex systems. A contrast between actuarial and precautionary management practices, in this context, is a false dichotomy. Both will be involved in decision making. It would be useful to develop an adaptive management program where the appropriate assessment is determined by the placement of a given risk in the Funtowicz and Ravetz post-normal risk schematic. Within this schema the adaptive process the goal would be to move risks from the area of post-normal science to applied science.

JP 1.4. Risk governance deficits in the multiple risk situation: the Great East Japan Earthquake, Tsunami, and Fukushima nuclear accident

Atsuo Kishimoto
National Institute of Advanced Industrial Science and Technology, Japan

The Great East Japan Earthquake and the following Tsunami in March 11 took more than 25,000 lives. However, more than 90 % of the dead died from drowning. Since pacific coasts of Japan have experienced such a big Tsunami a number of times in the past, some regions successfully passed down past experience in various ways, but others could not. As a result of "unexpected" height of Tsunami, the cooling systems of Fukushima Daiichi nuclear power plant failed and released a lot of radioactive substances, which caused another social and economic chaos. I will discuss the cultural background of the failure of preparing and managing the emergency. As I live in Ibaraki prefecture next to Fukushima prefecture, I have experienced the great earthquake on 11th March and continue to have many aftershocks since then and the distance from the Fukushima nuclear power stations is about 170 km, having faced real-time risk management situation. I will present our experience, lessons and implications for the future risk research learned from the multiple risk disaster both personal and social perspectives.

S 3.1.1. Infrastructure for Spatial Information in Europe (INSPIRE) – towards interoperability of data sets for Risk Prevention and Management

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Directive 2007/2/EC of the European Parliament and of the Council of 14 March 2007 establishing an Infrastructure for Spatial Information in the European Community (INSPIRE) entered into force on the 15th May 2007. INSPIRE lays down general rules to establish an infrastructure for spatial information in Europe for the purposes of Community environmental policies, and policies or activities which may have an impact on the environment. One of the aspects that INSPIRE regulates is the interoperability and harmonization of spatial data sets and services for 34 so-called data themes that are laid down in the three Annexes to the INSPIRE Directive. These include Natural Risk Zones, Production and Industrial Facilities and Energy Resources. An open and transparent process for stakeholder participation has been set-up in order to draw-up the draft specifications for the Natural Risk Zones, Production and Industrial Facilities and Energy Resources data themes, which in 2012 are expected to become Implementing Rules Legal Acts. The aim of this article is to stress the importance of stakeholder participation in the development and testing of, and feedback on the draft Implementing Rules Legal Acts that will affect communities involved on Prevention and Management of Risk caused by natural or human process or activities. The remainder of this article is organized as follows. Section 2 focuses on the type of documents produced by the INSPIRE process. Section 3 describes the process and timeline of stakeholder participation and the main actors. Section 4 describes the thematic scope of INSPIRE, with a particular focus on Natural Risk Zones, Production and Industrial Facilities and Energy Resources. Section 5 summarizes and concludes the article.

S 3.1.2. The RiskClock: A way to improve monitoring of emerging risks related to New Technologies

Aleksandar Jovanovic [1]; Reto Schneider [2]; Peter Klimek [1]; Daniel Balos [1]
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Monitoring of emerging risks related to development, deployment and use of New Technologies requires the use of methods and tools which, at the same time, will be able to (a) match the complexity of the technical and other problems related to the above development, deployment and use of New Technologies, and (b) be flexible and transparent enough to convey the message about the „state-of-the-risk". It is of particular importance for time as one of the major components related to the „emergence" of the emerging risks. Therefore, in the development of the emerging risk management framework in iNTeg-Risk project, the concept of the RiskClock has been introduced and afterwards applied in other tasks of the projects (e.g. in the RiskEars part of the iNTeg-Risk 1-Stop-Shop). It allows to understand the background of the maturation process of an emerging risk, to construct the „risk-maturation trajectory" in time (in terms of risk significance and trends in the change of this significance for different stakeholders) and to visualize it easily in order to improve the communication aspects.

S 3.1.3. Software Interoperability in Risk Analysis: a possible way forward?

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The problem of software interoperability in the area of risk analysis would provide all different stakeholders involved in the risk analysis process with indisputable advantages. A point to note is that there is not a unique and consolidated way of conducting such a type of analysis. There are indeed different approaches that can all be considered as potentially valuable. This clearly implies that different software tools are available to implement models which are conceived to address certain aspects of the risk analysis process. In addition, databases developed on different platforms, are used concerning e.g. accidents' frequency data, components' reliability data, etc. However, independently of the applied approach many data are common as they clearly refer to the same phenomena. Thus, most of these data are commonly used independently of the methodologies, models or software used to conduct the risk analysis. For this reason the use of a common data exchange format is a first step toward interoperability. The present paper presents a first example of prototype of a common exchange data format for risk analysis purposes. This work, together with the common exchange format for Fault trees and Event trees developed by the OPEN-PSA initiative shows the feasibility to develop in the future a framework to achieve the full software interoperability in risk analysis. Clearly this result can be fully achieved only after consultation and with the involvement of all relevant stakeholders (i.e. European Committee for Standardization, EU safety authorities, industry representatives, software and model developers, etc.). The paper will cover different aspects of the interoperability problem in risk analysis, e.g. the advantages for all stakeholders, the current state of the art, the results of the study carried out by the authors and suggestions on a possible way forward.

S 3.1.4. An agent-based model tool for analyzing perception of emerging risks.

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Risks of emerging technologies are not only to be assessed along technical, chemical or biological dimensions, but also along social categories. This is especially the case in scenarios where the use of this technology may infringe privacy rights or raise other ethical or moral concerns. As a concrete example the paper considers the use of Terahertz technology at airports, (whole body scanners, one of the „Emerging Risk Issues" in iNTeg-Risk project), which is currently hotly debated throughout the media. A poll conducted shortly after a terrorist attack revealed that 80% approve the use of body scanners, one year later this figure reversed to 60% rejecting it. These huge opinion swings bring about the risk of a complete public rejection of the widespread deployment of Terahertz technology at airports. This may have dramatic consequences for manufacturing and other industry, airport authorities, regulators and insurance industry, as well as the society as a whole. As of now, this risk is hard or impossible to quantify. The paper describes the proposed solution based on a web tool, deploying an agent based model of the public opinion formation process. This tool allows risk analysts to study both long time behavior and specific scenarios of opinion dynamics in a quantitative way. As a case study an application of this tool to the public approval of Terahertz technology is presented and the use of online opinion mining as a data source for and as empirical validation of the model discussed.

S 3.2.1. VALUESEC - Mastering the Value Function of Security Measures

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VALUESEC is a project funded in the European Commission's 7th Framework Program. It addresses an area of often conflicting interests between public decision makers, technology providers and citizens. Its objective is to support and enhance the decision making process in the sense that security measures should reflect the interests of all stakeholders. Decisions need to be based on transparent decision criteria and on rigorous economic analysis, which allows for a methodological-based cost-benefit-analysis, incorporating social, cultural and ethical implications in the overall economic analysis.
VALUESEC brings together an interdisciplinary team of researchers and end-users to generate a knowledge base of the current state and trends in theory and in practical applications of methods of economics, applied to security decision making. The project's task will be defining, context modeling, weighting and quantifying attributes of costs and benefits, advantages and disadvantages of security measures, and the demonstration of the approach through a software tool to support the decision making process.
VALUESEC's great challenge will be to combine economical factors and societal effects of security measures into a „value function" to establish a basis for a cost-benefit approach, allowing for trade-off along different dimensions. In effect, the project will bring together quantitative and qualitative information and combine it in a common methodological framework and integrate it into a decision support tool.
VALUESEC ensures the applicability of the developed approach and the subsequent software tool through validation in realistic use cases. These use cases will be built around typical scenarios for decisions in a security context. These use cases will be developed in close cooperation with end-users and external stakeholders to guarantee maximum relevance.
VALUESEC aims to provide strategies for balancing security, policy and economic objectives.

S 3.2.2. Comprehensive Assessment of Traffic, Environmental and Financial Impacts of Tramway Extension Using Intelligent Multi-agent Simulator MATES

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Recently global warming issues have been discussed all over the world. 20% of the total amount of CO2 emitted in Japan is occupied by a transportation sector. In the sector, its 90% is owing to road traffic. It must be reduced drastically so as to realize a low-carbon society. Various measures are discussed for this purpose, and typical one is promoting utilization of public transportation. To evaluate its effectiveness, it is strongly desired to estimate its CO2 reduction effect quantitatively. We attempt to estimate precisely the amount of vehicle emission using an advanced traffic simulator based on an intelligent multi-agent approach, which is named MATES (Multi-Agent-based Traffic and Environment Simulator). In MATES, we model any individual element appearing in traffic systems as an intelligent agent, and then model the whole traffic phenomena through the interaction among numerous intelligent agents. By matching MATES output information to the exhaust gas database which indicates correspondence between precise driving profile data and the amounts of exhaust gases, the amounts of momentary emission of gases from each car can be estimated. The total amount of emission in a particular region of a city or the emission history of a particular car running in the city can be calculated from the momentary emission. In this study, we apply our simulator and methods to assess a tramway extension plan in Okayama, Japan as an actual example, and precisely discuss its impact on current traffic flows, global environment as well as finance of the city.

S 3.2.3. Results of the IRIS Project with relevance to iNTeg-Risk

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A new risk paradigm has been developed in IRIS which enables us to quantify industrial risks. A major issue in last year's development has been the quantification of uncertainties and methods to improve prediction using sophisticated monitoring results. A generic lifecycle methodology has been developed which can be applied cross over the industrial sectors. A CEN Workshop on this results has been started. The intention of the contribution is to highlight the most important developments and to offer exchange, collaboration and joint development. Furthermore the feasibility of joint demonstration shall be explored.

S 3.2.4. Architecture, Interfaces and Standards of Environmental Information Systems — How to integrate them into Risk Management Application

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From the technological point of view Environmental Information Systems (EIS) are information systems that deal with geospatial information and services with a reference to a location on the Earth. They allow the user to store, query and process environmental information and visualize it in thematic maps, diagrams and reports. EIS are associated with heterogeneous sensors and/or environmental models that deliver measured or calculated observations about environmental phenomena. From the point of view of system theory EIS are autonomous modules with a high level of inner cohesion. They provide a restricted view upon the environment which is limited by temporal, spatial and thematic boundaries. Hence, the integration of EIS into other software applications results in a system-of-systems approach whose actual configuration is dependent upon the environmental question to be answered. These system requirements are best met by the principles of Service-oriented Architectures (SOA): - SOA principles enable the sharing of geospatial information and services and their composition to higher-level resources across organizational and administrative boundaries in a loosely-coupled but controlled manner. - Effective and flexible interactions between EIS require an agreement within the developer community about the syntax and semantics of service interfaces and information models. Here, ISO standards about geographic information and the recommendations of the Open Geospatial Consortium (OGC) have to be considered. Geospatial Web services and information models play a key role. This presentation gives an overview about the technical capabilities and constraints for the online access to environmental data for the purpose of assessing Emerging Risks in the context of the iNTeg-Risk project. As a first-hand example we consider the architecture, the structure and the content delivered through the Web-based interfaces of the EIS of the German federal state of Baden-Württemberg.

S 3.3.1. Standardisation in risk management

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Standardization is the most adequate solution to quickly capitalize and disseminate knowledge and have it implemented in the industry to guarantee sustainable competitiveness and operation according to the state of the art and to reference documents. Not everything can be standardized, the priorities need to be defined. In particular, it seems to be important to develop standardization aspects related to health, safety and environment issues in relation with new industrial technologies. The standardization context is evolving very quickly under the impulsion of the DG Enterprise and Industry, and with the support of CEN-CENELEC. To ease access to standardization is one of the implementation priorities of the EU 2020 Strategy. Standardization and related certification is becoming more flexible. The Express report as well as the STAIR approach clearly demonstrate this evolution. The Express report introduced the possibility to give access to consortia to standardization to develop pre-normative documents at EU-Level that can easily be transformed in CEN standards or ISO standards. CEN has launched the STAIR initiative (An Integrated Approach for Standardization, Innovation and Research) that is encouraged to be applied to research projects dealing with emerging technologies. According to the STAIR approach, standardization does not come as an afterthought but is built into a project proposal right at the start. This introduces significant benefit potential for the project itself and for any actions after the project's life-time. With this flexibility pre-standard documents can be prepared quicker and therefore better answer the needs that are either to disseminate good practices or to build trust between the producers/industry and the client/consumer when it concerns new industrial technologies. This appears to be a great opportunity for EU-VRi and for the projects where EU-VRi is playing a leading role such as iNTeg-Risk.

S 3.3.2. Standardization activities within the iNTeg-Risk Project

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DIN Deutsches Institut für Normung e.V., Germany

The iNTeg-Risk standardization activities are carried out within the framework of a CEN Workshop, the secretariat of which is held by DIN.
The goal of this CEN Workshop is to summarize and implement the results of the iNTeg-Risk project in 6 CEN Workshop Agreements (CWAs) covering
1.) general guidelines for the emerging risk management framework
2.) iNTeg-Risk findings/solution packages on emerging risks in new technologies
3.) iNTeg-Risk findings/solution packages on emerging risks in new materials and products
4.) iNTeg-Risk findings/solution packages on emerging risks in new production and production networks
5.) iNTeg-Risk findings/solution packages on emerging risk policies
6.) emerging risks due to uncertainties in testing procedures.

The CWAs are intended to make iNTeg-Risk project results widely useable and competitive in EU and elsewhere. All of the CWAs are to be completed by July 2013.
The development process of the CWA is divided into the phases Initiation, Kick-off, Drafting/Adoption, CWA and Check.
Currently, the standardization process is in the initiation phase which involves the preparation of the business plan.
In one of its resolutions CEN/BT decided that when a CWA includes management systems, the proposers of the workshop are asked to prepare a justification in accordance with ISO Guide 72. By this means CEN/CENELEC avoids the multiple development of management system standards (MSS). Due to the fact that the CWAs in the iNTeg-Risk project are dealing with MSS, the ISO Guide 72 with its justification criteria has to be taken into account.

S 3.3.3. NanoRef: Coordination of standardization activities for safety related to nanoparticles

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The European Technology Platform on Industrial Safety (ETPIS), Nanodevice, Nanofutures and several other initiatives such as Nanosafe or Saphir projects have similar objectives on the improvement of the management of the risks related to nanoparticles and the sharing of best practices using standardization. The standardization appears to be a key valorization and output of collaborative research, especially of the research performed on emerging technologies. It enables to share knowledge and good practices in an effective way, in particular giving the access of the information to SMEs and contributing to effective, clear and transparent governance. CEN has launched the STAIR initiative (An Integrated Approach for Standardization, Innovation and Research) that is encouraged to be applied to research projects dealing with emerging technologies. Regarding nanotechnologies CEN has started standardization work on (i) classification, terminology and nomenclature (ii) metrology, measurement and characterization (including procedures for calibration), (iii) health, safety and environmental issues; and (iv) nanotechnology products and processes. Recently, CEN accepted a mandate M/461 requesting to develop the standardization deliverables listed in its Annex I - Characterization of and exposure from nanomaterials and Annex II - Health, Safety, and Environment of the mandate. The CEN/TC 352 Nanotechnologies was asked to take care of this mandate which recommends that the work to be performed should take into account on-going pre-normative R&D. Conscious of the needs and the opportunities for the European innovative industry, a group of persons, coming from Nanodevice, ETPIS & Nanofutures, have decided to write this paper to start an initiative aiming at capitalizing the results from several European and national projects into standardization documents, and providing proposals to address the mandate M/461. This group invites other experts to join and achieve effective results.

S 3.4. Combining Risk and Responsibility Perspectives – Drafting a Pilot Project about Scandinavian Insurance Customers' Risk and Responsibility Awareness

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The presentation will try to inspire an interdisciplinary dialogue about the dialectics of risk and responsibility, conceptually and empirically. Some first steps for combining risk and responsibility perspectives conceptually have been suggested in a previous paper already. As a next step, this presentation suggests a discussion about how one best could map insurance customers' risk and responsibility awareness empirically. In other words, the aim is to build a bridge between risk perception research and descriptive consumer ethics research, departing from the development of research questions and online pilot survey questions.

S 4.1.1. Discussing near misses to revive the "sleeping" knowledge

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In mature industries, huge knowledge about safety is hidden inside standard codes, good practices, procedures, operating instructions and experience records. Every technical issue has been already studied and understood, so accidents happen just because the safety knowledge is forgotten, misunderstood, misapplied, in other words it is „sleeping". This may be due to the continuous personnel turnover. The study of near misses, required in the safety management systems SMS, may be used to revive this knowledge. Internal proprietary knowledge (i.e. procedures) and external public domain knowledge (i.e. good practices and codes) have to be discriminated. A software tool, NOCE, has been implemented, as part of a software suite for the SMS. It allows safety managers to discuss non conforming events, find out and tag the „sleeping" pieces of proprietary or public knowledge. The problem has been divided into separate issues: retrieve documents managed by SMS and browse into the public domain system. They correspond to two separate work sessions, which adopt distinct methodologies. For the proprietary knowledge the right pieces of procedures or operational instructions involved are searched through a backward path along safety digital model, which is able to represent all the links between equipment and safety documents, within the SMS. For the formal external knowledge, a semantic search has been adopted. Safety matter has been organized into „ontologies" used both to find the key words in the near miss report and to match them within the complex system of public documents. The product has been used in a few test sites. It has stimulated the safety managers to reduce the entropy of the internal documents, linking documents and equipment, according to the proposed method. Thanks to NOCE, the external knowledge has been, in a better way, understood and transferred to the personnel.

S 4.1.2. Dynamic Knowledge Management (DKM) ABSTRACT Espen Kon, Bruno Debray

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The INTeg-Risk project is creating a huge quantity of information in an innovative conceptual framework supporting a new risk management paradigm. Providing access to this information beyond a mere collection of texts is a challenge. Several tasks of the project are dedicated to the elaboration of tools for an enhanced access to data. Technologies of the semantic web are foreseen as a key to introduce order and guide the risk management scientist into this knowledge jungle. This article will present a concept developed in the iNTeg-Risk project, which evolved from the need to have dynamic data structure, capability to query for both qualitative and quantitative data, and last but not least, the desire to find ways to emerge new knowledge about risk. Throughout this article we will explore the principle of Semantic Web, compared to standard relational data structures. By doing so, we will describe the capabilities of a Dynamic Knowledge Management system implemented as a possible solution for the management of the project results. Hence, DKM as been inspired by Semantic Web, it was implemented using a unique dynamic database structure. Both the knowledge structure, in the form of ontology of the integrated risk management concepts, and technical solutions for handling the data will be described. Last section, but not least section of this article will deal with a variant of reasoning. This variant of reasoning is sourced in the exploration of relations. By that we mean seeking relations between classes and instances which create channels. Channels could be defined as class and instances related to each other, and those may enlighten us with overseen relations and impacts. Examples of channels and their practical interpretation in terms of reasoning will be given.

S 4.1.3. An Evolutionary Approach to Identifying Emerging Risk in Complex Adaptive Systems Using Phylogenetic Analysis

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Risk systems that involve human interaction are classified and behave as complex adaptive systems. One of the key signatures of complex adaptive systems is that they evolve, and therefore a detailed understanding of the evolution of a system's risk should reveal the nature, future likely emergence and adaptation of risks in that system. In order to operationalise such an approach, a methodology is proposed in this paper that draws on phylogenetic approaches that have been successfully developed for biological and language evolution. The technique and process provide an insight into the lineage, pace and impact of external conditions on the evolution of risks. They also provide a unique and rational classification of risks in that complex system which can be used to optimize risk management resources. An example using complex project risks characteristics, available from the RAMP (Risk Analysis and Management of Projects) report, is used to illustrate the approach. A full interpretation of the evolutionary tree, the nature of the new emerging risks and an analysis of their connectivity is given. In addition a critic will be given of the freely available software tools for the phylogenetic emerging risk methodology.

S 4.2.1. Experience and the unexpected: risk and mitigation issues for operating underground storage silos for coal fired power plant

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Observed autoignition events and extinguishing the resulting smoldering fires in an underground storage system of a coal fired power plant has provided insight into the array of contributing variables, and some experience on quantifying the risk with alternative scenarios of event initiation, progress and potential mitigation. Although the first attempts to quantify the risk suggest high sensitivity to the sequence of action taken after fire alarm, and no similar storage sites really exist, some recommended preventive, corrective and other mitigating activities can be at least partly defined and improved by using the cumulative experience and parallel efforts in other closed or underground storage sites. However, there are also so-called black (or at least gray) swans: unexpected events for which the facility may be poorly prepared for. In the case of the underground storage silos, such an event was experienced when incoming cold coal during a harsh winter season froze the sewer system that normally protects the stored coal from seepage water. With blocked normal bypass, the seepage water found its way to the coal silos and created large clumps of icy coal that blocked the coal conveyors. Although freezing weather is not unusual at high-latitude power plants, the common methods to combat freezing of coal are mainly useful for open storage sites and above-ground transport. Options for mitigation are discussed, as well as the event chain leading to an event that had never previously occurred. The case is discussed from the point of view of options to prepare for rare or unforeseen events.

S 4.2.2. Two-stage stochastic mixed integer linear programming

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In the real-world situation, the uncertainties and the decision process are stochastic due to their evolution over time. Two-stage stochastic mixed integer linear programming with recourse (2S-MILP) is one of the most promising methods to model this dynamic stochastic process. In this contribution, a novel dynamic 2S-MILP formulation for the evolving multi-period multi-uncertainty (MPMU) is developed and a corresponding method, a rolling horizon strategy (RHS) is proposed. In order to reduce the computation effort, the immediate future with the known probability distributions is modeled by a tree of scenarios of various uncertainties within a time horizon I1 whereas the distant future is represented by the expected values (EVs) within a time horizon I2. Both I1 and I2 are rolling along the unlimited time axis due to the evolution of MPMU. When all the parameters of MPMU are the same in every rolling step, the RHS is preferred to be called moving horizon strategy (MHS). The underlying approaches are implemented to a a real-world medium-term production planning problem of a multi-product batch plant and numerical simulations show the performances for different combinations of uncertainties and their the value of the stochastic solution (VSS).

S 4.2.3. Effective Key Performance Indicators on integration of risk related information into Land Use Planning process

Marko Gerbec ; Davor Kontic ; Branko Kontic
Jozef Stefan Institute, Slovenia

Land-use planning (LUP) and siting decisions are mechanisms to protect human health, the environment and property, including prevention of inappropriate development (e.g., new housing or public buildings) near hazardous installations. However, hazard, threat or risk analysis considerations are rarely involved early enough in the LUP process as to successfully achieve these goals. This is the cause for most risk-related LUP problems. The paper covers the introduction of KPIs into LUP process, which will serve as means for identifying, supporting and evaluating the inclusion of ERRA related risk information into LUP, and which is expected to result into an early identification and elimination of risk-related LUP conflicts. The inclusion of these specific KPIs is intended through monitoring of the process/progress of all activities and goals achievements related to ERRAs in terms of spatial planning and licensing. Identification of, and dealing with, drivers and barriers in the entire process of hazardous industrial installation evolution (planning, construction, operation) on one hand, and assessing the utility and efficiency of integrating risk assessment (RA) into land-use planning & licensing on the other, are the foci of this KPI system. The research and development on this KPI work has been performed in Task 2.4.2 within the iNTeg-Risk project.

S 4.3.1. Comprehensive ex-ante evaluation of new emerging technologies/risks and their approval

Davor Kontic ; Marko Gerbec ; Branko Kontic
Jozef Stefan Institute, Slovenia

The paper is a result of work on T2.5.6 Environmental impact assessment: strategic and project/technology level; Sustainability assessment of the iNTeg-Risk project. The problem which is treated is a lack of integration of risk assessment results into all levels/types of environmental assessment, spatial/land-use planning and licensing, which in turn serve as an important source of information for justification of selected new emerging technology alternative or other component of the ERRA. Additional tools like cost-benefit analysis (CBA), decision-expert (DEX), and comparative assessment of alternatives are suggested to be used in such a comprehensive evaluation. The paper provides a brief overview of the guidelines on how this overall evaluation integration could be achieved, however without details on how specific evaluation method should be applied.

S 4.3.2. An exposition into the diversity of risk applications and implications for their integrated management in organisations

Daniela Leonte
Risk Analytics Group, Australia

We review definitions and components of risk, and how these are reflected in different risk metrics for finance, insurance, health and environmental applications. We highlight the exogenous nature of risk analysis efforts, which focus on procedures by which these metrics are calculated and the resulting risk measures evaluated in each application. We contrast risk assessment with risk treatment, which is concerned with making decisions about how risks should be modified. Unlike risk analysis, risk treatment is an endogenous process, heavily influenced by heuristics that lead to decision biases and to the creation of new risks. The creation of these new risks is driven by organisational factors such as risk culture, and personal factors such as ethics and risk attitude. The exogenous/endogenous nature of risk analysis/risk treatment is highlighted as a challenge for organisations wishing to develop and implement an effective enterprise risk management framework.

S 4.3.3. Benchmark study on international functional safety standards

François Massé [1]; Romain Tiennot [2]; Jean-Pierre Signoret [3]; Phillippe Blancart [4]; Gilles Dupin [5]; Leïla Marle [6]
[1]INERIS, France; [2]Ligeron, France; [3]Total, France; [4]PSA PEUGEOT CITROËN, France; [5]RATP, France; [6]IMdR, France

International functional safety standards are becoming a major reference for the development and validation of safety related systems. Thus, the quality of these standards and the way they are applied are particularly critical. That is why different partners (Total, PSA, RATP, INERIS) decided to realize a study on this subject in the framework of the IMdR. This study was realized by Ligeron. The motivations and the main results are given in this paper.
Various industrial sectors have developed their own standards by taking into account sector-based practices and constraints and without reference to a common state of the art. Consequently, there are strong disparities between the standards and often important inconsistencies with the state of the art in safety and reliability engineering.
Each standard defines its own multiple degree qualification scale like SIL for the IEC 61508, ASIL for the ISO 26262, DAL for DO 178, Category for machines. Each one introduces its specificities and leans on different hypotheses. Different semantics and definitions are in use and similar terms are used with different meanings. Furthermore the principles, the underlying hypotheses or the simplifications introduced are sometimes ambiguous or scientifically questionable.
In front of those difficulties of interpretation and use, it appears necessary to list the standards, make a critical analysis and compare them in order to identify the convergences, the main differences and the possible weaknesses.
The study was split in 4 steps:
• Identification of existing functional safety standards
• Feedback on standards application
• Standards comparison and critical review
• Vocabulary status
The results of the identification and analyze of standards provide:
• Vocabulary comparison and analysis
• Main qualification criteria
• Conditions for standards applicability
• Benefits and limitations of each standard
• Relevance of each standard with regards on technologies and operation philosophy.

S 4.4.1. Estimation of Uncertainty for emerging Technologies and Implications to Risk Management

Frank Markert ; Igor Kozine
Technical University of Denmark, Denmark

Since the mid 1990's risk management has become increasingly important as it developed from being a part of management control to be a measure of the governance quality for many organisations covering policy, business and regulatory issues. The growing interest on risk management are caused by the many reported failures, scandals, and disasters suggesting a picture of the world which is out of control, which in turn gives the political need to maintain perceptions of control and manageability. Thus many institutions have been challenged in their ability to organize safety aspects in the presents of uncertainty. How are uncertain events predicted and how are uncertainties treated within risk management and governance? One answer is the application of risk assessment (RA) on a known technical installation or the manufacturing of a product. In order to evaluate these findings acceptance criteria are needed that are widely accepted in society, e.g. the Individual Risk (product of probabilities for failure frequency and extend of damage). One could think of a number of other criteria that could be important to people, the environment and properties as a certain level of injuries, damage to the environment etc. According to some authors this would provide a more holistic concept for evaluating and managing risks. Risk assessment will normally give good predictions with reasonable uncertainty for well known installations, but how to estimate the involved degree of uncertainty for emerging technologies? All these measures include varying measures of uncertainty and the paper discusses a possible evaluation methodology and prediction of the degree of uncertainty leading to different concepts of risk management and governance.

S 4.4.2. Some Issues on Experimental Riskology

Chongfu Huang
Beijing Normal University, China

Risk is a scene in the future associated with some adverse incident. The task of risk analysis is to help us discover the scene. Any risk assessment is to model some aspects of the scene for risk. Different aspects for assessment lead to different scenes. Different analysts would give difference assessments. There are many models to assess risks. However, nobody saw any risk scene in the future. It is necessary to set up a new discipline, experimental riskology, to result the problem. To do that, some issues would require more study. (1) Riskology is to discovery and study essential laws in risk phenomena, rather than coding something with so-called models; (2) Riskology maturity is not only based on having been mathematically, but also on experimentally; (3) The current experiments on risk issues are the same as the experiments used in the fields related to the issues; (4) Referencing some general experimental platforms in other fields, such as control and management, it is possible to develop a general experimental platform for riskology; (5) The platform can be employed to model a simple pseudo risk, a probability risk, a fuzzy risk and uncertain risk; (6) The results from the experiments would verify the reliability of a model which can be used to assess a risk.

S 4.4.3. Inspection planning of pressure vessels in service

Paolo Bragatto [1]; Corrado Delle Site [1]; Angelo Faragnoli [2]
[1]INAIL, Italy; [2]C-ENG, Italy

Risk-Based Inspection can be now considered as an integral part of the plant's work process. Thanks to use of RBI methodology is possible to have an optimization of time intervals of inspections compared with fixed frequencies. Furthermore thanks to a RBI approach it is possible to minimize equipment and structural failures. In this paper we discuss the role of RBI in the Italian legislation concerning service of pressure equipment (Ministerial Decree 329/04). In particular a „Best Practice" to have variable time-intervals of inspection - compared with fixed frequencies of Italian Ministerial Decree 329/04 - is discussed. In fact, UNI (Italian Organization for Standardization) in collaboration with CTI (Italian Thermo-Technical Committee) is working on a guideline regarding „Inspections Planning on Pressure Equipment through RBI Methodology" aimed at extending the time-interval of mandatory inspections. The guideline is based on an algorithm which takes into consideration the results of previous inspections; the acceptance criteria is a function of probability of failure, consequence of failure, risk category, equipment reliability and economic aspects. The discussion is supported by several case-studies applied to real items of in-service pressure equipment for which the possibility of extending the time interval for inspection is assessed by a RBI approach. A particular reference to SEVESO plants is made.

P 4.1. Precautionary vs. Evidence-Based Approaches when Dealing with Emerging Risks

Ortwin Renn
University of Stuttgart, Germany

Panelists:
- J. Wiener (US vs. Europe)
- R. Löfstedt (Implications for European and US Policy Making)
- E. Rosa (Application of Precaurion to Climate Change)
- Th. Webler (Citizen preferences for risk management approaches)
- A. Jovanovic (Precautionary principle and evidence-based approach in the iNTeg-Risk framework)

The precautionary principle has been adopted in a variety of forms at international, European Union and national level. It is applied across an increasing number of national jurisdictions, economic sectors and environmental areas. In particular, as Article 174(2) in the EC Treaty of 2002 specifies, precaution now constitutes a key underlying principle in European Community policy. Furthermore, the stated objectives of the EU regulation (Directive 2001/18/EC and Regulation 1829/2003) incorporate protection of human and animal health, consumer interests and environmental quality, while ensuring the effective functioning of the European market.

The meaning of the precautionary principle is highly debated among analysts and policymakers. To understand the debate, it is helpful to distinguish two positions toward risk analysis:

- Evidence-based approach. Within the first frame of scientific risk analysis, risk management relies on the best scientific estimates of probabilities and potential damages and uses a combination of probability and damage as the main yardstick to judge the tolerability of risk as well as to design risk reduction measures that are cost-effective, proportional to the threat, and fair to the affected population. In this frame, precaution may best be interpreted as being conservative in making risk judgments and choosing cautious assumptions when calculating exposure or determining safety factors (of 10, 100, or more) to cover inter-individual variability.
- „Precautionary" approach. Within the frame of „precaution", the concept of risk is seen from the perspective of pervasive uncertainty - and even ignorance. Precautious risk management means ensuring prudent handling of decision options in situations of high uncertainty about causes and effects and where high vulnerability of the population under risk is present. Instruments of precaution include minimization requirements such as ALARA (as low as reasonably achievable) or ALARP (as low as reasonably practicable), diversification of risk agents, containment in time and space, and close monitoring. In severe cases a ban of the activities may be warranted, It is interesting to note that the first data-driven approach has been widely adopted by the official U.S. regulatory bodies, while the precautionary approach has been widely advocated by the EU regulatory bodies. There are, however, numerous elements of precautionary approaches interspersed into the actual practices of U.S. regulatory agencies, just as there are science-based judgments about magnitudes of risk in the actual practices of regulators in the EU. A strict dichotomy between „precautionary" in Europe and „evidence based" in the United States is therefore too simple to describe actual practice.

This debate is particularly relevant for emerging technological risks and innovation. Approval and licensing processes are often based on authorization granted on conclusive scientific evidence, but as a result tend to be often arbitrary, politically biased and premature. They do not reflect a detailed analysis of socio-economic, environmental or health impacts. „Conclusive scientific evidence" is, of course, missing in most parts of the innovation process, since the risks are still unknown. Improving the authorization processes and practices by a strategy of „gradual authorization" and providing stimuli for new evidence are some of the key concepts to promote innovation and still act on a precautious trajectory. The Panel will explore the possibilities to define new concepts and paths to combine evidence-based and precautionary approaches. The panelists will highlight the different application contexts in the US and Europe, discuss the role of stakeholder involvement and provide improved methodological tools for making the combination work. The Panel discussion will be a highlight of the entire conference and will conclude the 3rd iNTeg-Risk Conference.

PO 4. Human Erroneous Action Context Monitoring by Two HRA Methods

Gueorgui Petkov
Technical University of Sofia, Bulgaria

The immense quantity of experimentally established facts and qualitative descriptions now allows for a quantitative description of behavior of humans in their contact with the external world, and machines, in particular. As is well known from natural sciences, the quantitative approach to macroscopic systems is based on the calculation of the number of the accessible states. A study of human behavior in emergency situation is mainly connected with the assignment of human error probability that is one of objectives of human reliability analysis (HRA). In order to obtain this probability, the „abstract" operator influence factors are combined. Usually the operator's performance is „fragmented" into separate actions in view of their presentation in the event and fault trees models. However, it is possible to employ a more realistic approach based on emergency context monitoring of human erroneous actions. Adequate treatment of human interactions in probabilistic safety analysis (PSA) studies is a key to the understanding of accident sequences and their relative importance in overall risk. Human interactions with machines have long been recognized as important contributors to the safe operation of nuclear power plants (NPP). Human interactions affect the ordering of dominant accident sequences and hence have a significant effect on the risk of NPP. Context dependent HRA models, such as the Holistic Decision Tree (HDT) and Performance Evaluation of Teamwork (PET) methods, are the so-called second-generation HRA techniques. The paper presents two HRA techniques for calculation and monitoring of post-accident human erroneous actions context and error probability. The spectrum of accident scenarios are designed for WWER-1000 computer-based simulator. The error probability of post-accident actions are calculated by means of each investigated technique based on training archives.

PO 5. Using Human Key Performance Indicators Together with Expert Rationing Processes In Order To Understand And Cope With New And Emergent Risks

Stefan Kovacs [1]; Ionel Iorga [1]; Elena Doval [2]; George Apostol [1]
[1]INCDPM „Alexandru Darabont", Romania; [2]Spiru Haret University, Romania

Following previous research we found that through definition and monitoring of human Key Performance Indicators (or HKPI) there could be established a number of significant indicators- like Key Performance in Learning (KPL) or Key Performance in Risk Assessment at a new workplace (KPRA) that could define, together, a Key Performance Profile(KPP)- for a specific employee. New and emergent risks are met-before the safety systems in place- by the employee- the human operator at the workplace where such a risk may occur. Protection against such a risk is depending — over 75% -by his behavior — once the risk is identified. In this respect, using expert rationing- in the form of If... Then... Else production rules- as the dynamic part of the knowledge that could describe the risk action, together with HKPI-considered as the static part of the knowledge — would offer a knowledge based risk management instrument- useful in order to define and pursue risk scenarios that could cope towards an efficient prevention. The paper describes such a safety system, based on HKPI and expert rationing that is currently under test in the Romanian oil industry.

PO 6. Reliability Analysis and RBI Planning for Industrial Heating Vessels.

Andrzej Kozak
Office of Technical Inspection, Poland

The open fire heated pressure vessels for steam or hot water generation are widely used in the process industry to heat endothermic reactors, tanks, pipes and devices. A medium time to failure (MTBF) of the vessels is usually lower then the others process apparatus especially in petrochemical industry. This same problem exists in district heating system during the winter period. There is no economical sense to stop a plant to make maintenance or stop heating city! How to manage a plant vessel's reliability? Based on the UDT-own data base of failure for the different type of vessels, UDT helps customers to rank and analyze the risk, reduce the risk elements and optimize the life cycle cost.

PO 7. Reducing Airbag Induced Injuries

Arturo Davila ; Mario Nombela
IDIADA Automotive Technology, Spain

The objective of this project was to develop an evaluation tool capable of predicting injuries to the face. The project was designed because previous research shows that injuries occur at velocities that wander the limits of Activation/No Activation from each manufacturer ($\Delta V < 48$ km/h). The most common injuries are facial, ocular and skin abrasion. The noise level produced by an activating airbag is generally over the safe limit for a person, and can cause permanent damage to the internal ear. The chemical reaction of gases during explosion may also produce intoxication or skin injury. The project focused on the development of an evaluation tool that predicts injuries resulting from activation and contact with the airbag. This was accomplished through a special mask that measures applied pressure to selected points of the face: nose tip, eyes, eyebrows, jaw. To estimate the risk of auditory injury, a modified dummy head uses special microphones to measure sound and pressure levels inside the cabin during airbag activation in static and dynamic tests. For intoxication and skin injuries, a protocol and tool to measure toxic gases released during explosion was developed. The most relevant toxic gases were selected and the adequate instrumentation established.

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iNTeg-Risk Info Sheet Nr. 3 (May 2011)

iNTeg-Risk

Early Recognition, Monitoring and Integrated Management of Emerging, New Technology Related Risks

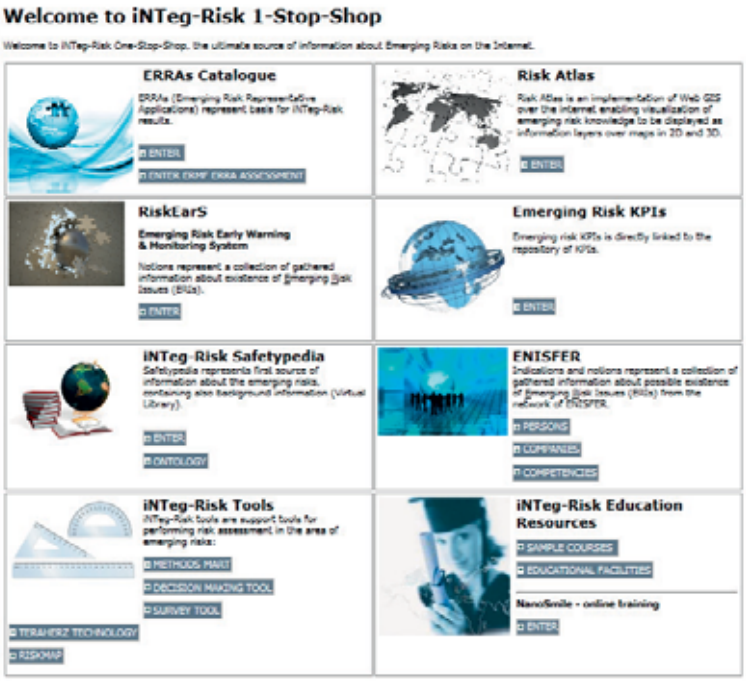
FP7/NMP –Grant no. CP-IP 213345-2

Coordination: EU-VRi European Virtual Institute for Integrated Risk Management EEIG, A. Jovanovic
Contact: integrisk@eu-vri.eu / www.integrisk.eu-vri.eu
Start/End: Dec. 1, 2008 to May 31, 2013
Budget: ~ 19.3 million €

Partners*

Main Beneficiaries" (60, EU-VRi indicates an EU-VRi member):

1 EU-VRi **EU-VRi** European Virtual Institute for Integrated Risk Management, Germany
2 EU-VRi **EDF** Electricité de France, France
3 **GDF SUEZ** France
6 EU-VRi **MERL** Materials Engineering Research Lab. Ltd, UK
7 EU-VRi **TÜV** SÜD Industrie Service GmbH, Germany
9 EU-VRi **R-Tech** Steinbeis Advanced Risk Technologies GmbH, Germany
10 **Iberdrola** S.A., Spain
11 **Atos Origin** Sociedad Anónima Española, Spain
12 **Eni Norge** Eni Group, Norway
13 EU-VRi **D'Appolonia** S.p.A., Italy
14 EU-VRi **MIT** Management Intelligenter Technologien GmbH, Germany
15 EU-VRi **DNV** Det Norske Veritas AS, Norway
16 **COWI** A/S, Denmark
17 **Pöyry** Forest Industry Oy, Finland
18 **MOL Plc.** MOL Hungarian Oil and Gas Public Ltd Company, Hungary
19 **VSH Hagerbach** Test Gallery Ltd, Switzerland
20 EU-VRi **Swiss Re** Swiss Reinsurance Company, Switzerland
21 EU-VRi **NIS** Petroleum Industry of Serbia, Serbia
22 **Saipem** Energy Services S.p.A., Italy
23 EU-VRi **Technologica** Group - European Joint Venture cv, Belgium
24 **Eurogas-GERG** The European Association of the Natural gas Industry, Belgium
26 **Enagás** S.A., Spain
27 EU-VRi **INCDPM** Alexandru Darabont, National Research and Development Institute on Occupational Safety, Romania
28 EU-VRi **SWISSI** Swiss Institute for the Promotion of Safety and Security, Switzerland
29 EU-VRi **KMM-VIN** European Virtual Institute on Knowledge-based Multifunctional Materials AISBL, Belgium
30 EU-VRi **INERIS** Institut National de l'Environnement Industriel et des Risques, France
31 EU-VRi **CEA** Commissariat à l'Energie Atomique, France
32 EU-VRi **BAM** Ba. für Materialforschung und -prüfung, Germany
33 EU-VRi **USTUTT** Universität Stuttgart (ZIRN), Germany
34 EU-VRi **Tecnalia** Fundacion Tecnalia Research & Innovation, Spain
37 EU-VRi **TU Crete** Technical University of Crete, Greece
39 EU-VRi **SINTEF** Stiftelsen, Norway
40 EU-VRi **DTU** Technical University of Denmark, Denmark
41 EU-VRi **VTT** Technical Research Centre of Finland, Finland
42 EU-VRi **BZF** Bay Zoltan Foundation for Applied Research, Institute for Logistics and Production Systems, Hungary
43 EU-VRi **Demokritos** National Center for Scientific Research, Greece
44 EU-VRi **IVF** Swerea IVF AB, Sweden
45 EU-VRi **VSB-TUO** Sc. Technicka Univerzita Ostrava , Czech Republic
46 EU-VRi **JSI** Jozef Stefan Institute, Slovenia
47 **HSE-HSL** Health and Safety Executive, UK
48 EU-VRi **JRC** Commission of The European Communities Directorate General Joint Research Centre, Belgium



iNTeg-Risk Project

iNTeg-Risk is a large-scale integrating project aimed at improving the management of emerging risks, related to "new technologies" in European industry. This is being achieved by building new management paradigm for emerging risks as a set of principles supported by a common language, agreed tools & methods, and Key Performance Indicators, all integrated into a single framework. The project aim is to reduce time-to-market for the lead market EU technologies and promote safety, security, environmental friendliness and social responsibility as a trademark of the EU technologies. The project goal is to improve early recognition and monitoring of emerging risks and decrease reaction times if major accidents involving emerging risks happen.

The project involves leading EU industries and renowned R&D institutions. It is coordinated by the European Virtual Institute for Integrated Risk Management, the dedicated EEIG guaranteeing the sustainability of results after the project.

Project structure and main planned achievements

The iNTeg-Risk solution is based on the analysis of 17 individual applications of new technologies, the so-called iNTeg-Risk ERRAs - Emerging Risk Representative Applications in EU Industry, involving e.g. nanotechnologies, H_2 technologies, underground storage of CO_2, new materials. The solutions from these single applications have been generalized and have been used for the definition of the iNTeg-Risk framework.

The solution is being made available to the users in the form of the iNTeg-Risk "one-stop shop". The solution includes issues of early recognition and monitoring of emerging risks, communication, governance, pre-standardization, education & training, dissemination, as well as new tools such as Safetypedia, Atlas of Emerging Risks, Reference Library, etc.

The subprojects in iNTeg-Risk, listed below, reflect the approach described above:

Subproject 1: Technology cases - Identifying specific emerging risks and developing solutions for iNTeg-Risk framework

Subproject 2: Creating an integrated scientific & technology framework for analysis and management of emerging risks

Subproject 3: Verifying SP2 results and validating the whole method

Subproject 4: iNTeg-Risk integrated EU solution, the "iNTeg-Risk one-stop-shop" for solutions addressing emerging risks

Subproject 5: PROJECT MANAGEMENT & MORE: Managing iNTeg-Risk and creating its "post-project" infrastructure

49 CEN European Committee for Standardization , Belgium
50 RIVM Rijksinstituut voor Volksgezondheid en Milieu, The Netherlands
52 vfdb German Fire Protection Association, Germany
53 ARPC Agenzia Regionale Protenzione Civile - Emilia Romagna, Italy
55 ARMINES Association pour la Recherche et le Développement des Méthodes et Processus Industriels, France
57 TUKE Technical University of Kosice , Slovakia
58 FTN University of Novi Sad, Serbia
59 EKON Modeling Software Systems Ltd., Israel
62 SP Technical Research Institute of Sweden , Sweden
63 STUVA Studiengesellschaft. für unterirdische Verkehrsanlagen e. V., Germany
64 UNIBO Alma Mater Studiorum Università di Bologna, Italy
65 UNIPD University of Padua, Italy
66 POLIMI Politecnico di Milano, CMIC Dpt, Italy
67 UNIRM Dipartimento Ingegneria Chimica Materiali e Ambiente, Sapienza Università di Roma, Italy
68 CNR-IRC CNR Istituto di Ricerche sulla Combustione, Italy
69 UNIPI University of Pisa, Italy
70 IQS, Institut Químic de Sarrià, Spain
71 *TU Braunschweig, Technische Univ. Braunschweig, Germany
72 *Trimble, Trimble GmbH, Germany

"Article 10 partners" (23):

2B, 2B Consulenza Ambientale, Italy; **SHB**, Steinbeis Hochschule Berlin GmbH, Germany; **EUR**, Erasmus University Rotterdam, Netherlands; **OttoUNI**, Otto-von-Guericke-Universität Magdeburg, Germany; **BristolUNI**, University of Bristol, UK; **STC**, Steinbeis Technologie-transfer GmbH & Co. KG, Germany; **ELITE**, European Laboratory for intelligent Techniques Engineering, Germany; **DIN**, German Institute for Standardization e. V., Germany; **CrisisTox**, CrisisTox Consult, Netherlands; ***Fraunhofer**, Fraunhofer-Gesellschaft zur Foerderung der angewandten Forschung e.V., Germany, ***BlueOcean**, Blue Ocean Semantic Web Solutions GmbH, Switzerland, ***Expert System**, Expert System S.P.A., Italy, ***Allianz**, Allianz Global Corporate & Specialty AG, Germany, **IMIM**, Institute of Metallurgy and Materials of Polish Academy of Sciences, Poland; **IPPT**, Instytut Podstawowych Problemow Techniki Polskiej Akademii Nauk, Poland; **IMR SAS**, Institute of materials research, Slovak Academy of Sciences, Slovakia; **MCL**, Materials Centre Leoben Forschung GmbH, Austria; **UK HPA**, UK Health Protection Agency, UK; **FOI**, Swedish Defense Research Agency, Sweden; **FIOH**, Finnish Institute of Occupational Health, Finland; **BfR**, Bundesinstitut für Risikobewertung, Germany; **ENSMP**, Ecole Nationale Supérieure des Mines de Paris, France, ***Swissi España**, Instituto Suizo para el fomento de la seguridad-Swissi España, S.L.U., Spain

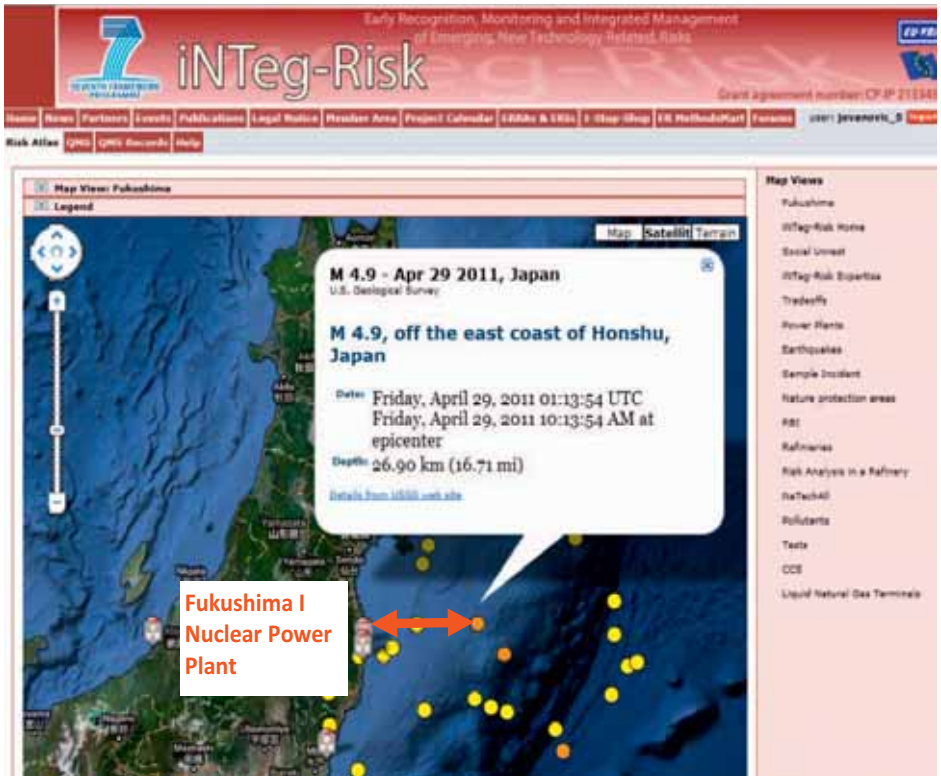
* - new members acc. to Amendment No. 4 to the GA 213345

Main achievements as in May 2011

In spring 2011 the project entered the second half of its planned duration. This has been marked by the following main results achieved:

- All 17 ERRAs accomplished and consolidation of their results started
- More than 160 so-called ERIs (Emerging Risks Issues, risk scenarios) within ERRAs have been identified and described
- More than 900 early warnings (iNTeg-Risk "notions") acquired and partly processed
- More than 200 iNTeg-Risk specific KPIs (key performance indicators) identified and described
- Integration works on ERRAs started or partly accomplished (e.g. Delphi workshops)
- iNTeg-Risk Paradigm defined and final report submitted
- iNTeg-Risk Framework defined and the final report drafted
- iNTeg-Risk system for acquisition and monitoring of early warnings RiskEars with the above mentioned approx. 900 notions, ERIs and ERRAs developed and four main ways of entering notions opened: from the company employees, from the project partners, from public and from the web-based searches
- iNTeg-Risk KPI Library with the above 200+ iNTeg-Risk KPIs and other approx. 2,000 relevant KPIs stored
- the development of iNTeg-Risk Safetypedia started
- iNTeg-Risk system for mapping of emerging and other risks (RiskAtlas) with over 200 layers of data related to hazards and vulnerabilities – e.g. earthquakes, hazardous materials, industrial plants (refineries, power plants, nuclear power plants), nature protection areas, carbon caption and sequestration plants, etc.; the emerging risks can be "recognized" by calculating the risk indicators for hazard-vulnerability pair from the points in the respective layers
- several innovative methods have been used for emerging risk identification and the tools for their application developed in the project: agent-based methods (e.g. for terahertz technology), intelligent fuzzy clustering and self-organizing networks (e.g. for emerging risk notions), ...

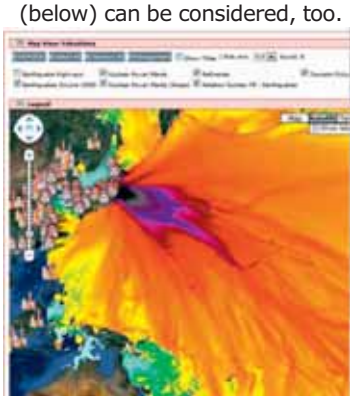
Fukushima & iNTeg-Risk



The example (left) shows a critical vulnerability-hazard pair (nuclear power plant Fukushima and epicenter of an earthquake) in **RiskAtlas**; the risk indicator takes into account

- nominal power of the power plant
- magnitude of the earthquake
- age of the power plant
- distance between the hazard and the vulnerability

Other factors, such as tsunami (below) can be considered, too.



20th SRA-Europe Meeting

Stuttgart, 6–8 June 2011

www.sraeurope.org
www.integrisk.eu-vri.eu

Technical Programme Committee

- Margôt Kuttschreuter
- Julie Barnett
- Lars Bodsberg
- Ann Enander
- Michael Siegrist

Welcome to Stuttgart 2011!

As the 20th Annual Meeting of the Society for Risk Analysis Europe, this year´s event marks something of a milestone. Since the European gatherings first started over 20 years ago, the significance of the issues addressed by risk researchers and practitioners together with the need for a forum to meet, discuss and learn from one another have become ever more evident. So it is in many ways fitting that the special theme for this conference, "Multi-risk analysis in a global world", clearly reflects the complexity of our shared concerns also at the global level.

As the SRA-E meetings move between countries and hosting organizations one of the charms – and challenges! – lies in preserving the traditions and familiar elements of these events with the unique possibilities of each venue and host. This year we are particularly happy to have a tandem event in close cooperation with the iNTeg-Risk conference, providing delegates with a great opportunity both to join old friends and to meet with new faces and ideas.

Organizing a conference such as this is dependent on the expertise and dedication of a great number of people. Our warmest thanks are due to all the individuals and organizations who have helped bring about this event through their hard work and generous support. Thank you all! And a warm welcome to all participants. Wishing you a fruitful and enjoyable conference in the well-established tradition of the SRA-E community.

Society for Risk Analysis (SRA) Europe

What is the Society for Risk Analysis ?

The Society for Risk Analysis (SRA), founded in 1981, represents the leading platform for interdisciplinary academic risk research. 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. The Charter of SRA-E which sets out all the aims of the organisation can be found on our website at **www.sraeurope.org**.

To foster strong and healthy relations between SRA-Europe and SRA International there is a "Memorandum of Understanding" that describes key principles of good practice and support. 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. Most recently SRA-E has been developing a Framework Agreement for Cooperation with the Risk Analysis Council of China Association for Disaster Prevention.

What are the activities of SRA-Europe ?

The SRA-E encourages and facilitates the communication among experts in all risk domains via general conferences and target focus meetings. The annual conference of SRA-E offers academics, 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. Furthermore, SRA-Europe provides its members with risk related information with regard to activities & initiatives on scientific, political and industrial level. SRA-E offers also the platform for working groups on particular risk issues which need to be developed and enhanced.

How is SRA-E organized ?

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

Why to become a member ? What are the benefits ?

Membership of SRA-Europe carries automatic membership of the international Society for Risk Analysis, founded in 1981, with over 2000 members worldwide. SRA-Europe has around 300 members. Being a member of SRA-Europe 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 quarterly Newsletter of SRA informs all members four times a year about what's going on in the Society. In addition, SRA-Europe regularly provides Europe specific risk related information to its members. All members receive the journal Risk Analysis as part of their membership privileges and also 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 or helping us with organizing a conference. You can contact the Executive Committee members directly or through emailing the secretariat, **secretariat@sraeurope.org**.

SRA Europe Executive Committee

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Studentship Scholarship Award

The SRA-Europe Conference Studentship Scholarship (worth €500) has been awarded to:

Nicolai Bodemer
Max Planck Institute for Human Development Center for Adaptive Behavior and Cognition, Harding Center for Risk Literacy

Risk communication during a pandemic: The benefit of disclosing uncertainty
Bodemer, N., Feufel, M., & Garcia-Retamero, R.
(Session 20: Emerging threats to health)

Awards committee: Julie Barnett (Chair), Margôt Kuttschreuter

Plenary session I

Ellen Peters

Dr. Peters graduated magna cum laude from the University of Pennsylvania in 1989 with dual degrees in engineering and marketing. She received her M.S. and Ph.D. from the Psychology Department of the University of Oregon in 1994 and 1998, respectively. In 1998, she joined Decision Research as a Research Scientist and was promoted to Senior Research Scientist in 2006. She joined the faculty of the Psychology Department at The Ohio State University in 2010 as an Associate Professor. She has also worked extensively with the National Cancer Institute and the Food and Drug Administration to advance the science of human decision making as it applies to health and health policy.

Research Areas

Dr. Peters conducts basic and applied research in judgment and decision making. She has been principal investigator on numerous grants from the federal government. In her research, Dr. Peters focuses on 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 research. First, her research interests in decision making include number processing and the study of individual differences in numeracy and an intuitive sense of numbers. 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 in decisions. 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. 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.

Plenary session II

Terje Aven

Terje Aven is Professor of Risk analysis and Risk Management at University of Stavanger, Norway. He is also a Principal researcher at International Research Institute of Stavanger (IRIS). He has been Professor II (adjunct professor) in reliability and safety at University of Trondheim (Norwegian Institute of Technology) 1990-1995 and Professor II in reliability and risk analysis at University of Oslo 1990-2000. He has also many years of experience from the industry (Statoil) and DNV.

He has published a large number of papers in international journals on risk and safety, and he is the author of several books in the field, most recently Misconceptions of Risk (Wiley, 2010), Risk Management and Governance (Springer 2010, co-author O. Renn) and Quantitative Risk Assessment – the Scientific Platform (Cambridge University Press, 2011).

In recent years his research has focused on foundational issues, related to topics such as how to understand and describe risk, how to treat uncertainties in risk assessments, the role of the cautionary and precautionary principles in risk management, and the use of cost-effectiveness analysis and cost-benefit analysis to support decision-making under risk and uncertainties. He received his Master's degree (cand.real) and Ph.D (dr. philos) from University of Oslo in 1980 and 1984, respectively.

See also: http://www.uis.no/research/risk_management_and_societal_safety

Charles Vlek

Charles Vlek is professor emeritus of environmental psychology and decision research at the University of Groningen, the Netherlands.

Originally triggered by the rise of economic decision theory, he has a long history of research and teaching about probability judgment, risk appraisal and social decision-making. Gradually moved into environmental psychology, his current (part-time) work is focussed on the behavioural causes of environmental problems and on various policy strategies for behaviour change to reduce collective risks.

Agenda

Main Conference

June 6, 2011

08:00 – 09:00	**Registration**

09:00 – 10:30 **König-Karl-Halle**	**Plenary Session 01** (Moderator: Michael Siegrist) 09:00 **Welcome** – Michael Siegrist, moderator 09:05 **Welcome** – Olivier Salvi, chair of the local organising committee 09:10 **Welcome** – Margôt Kuttschreuter, president-elect of SRA-Europe PL 01.1. **Numeracy and risk** 09:15 Peters, Ellen Ohio State University, Columbus, United States 10:10 **Questions and discussion,** led by moderator

10:30 – 11:00	**Break**

11:00 – 12:30	**Session 01 Communication and dialogue: the risk of nanotechnology** (Freiburg; Chair: Anne Dijkstra) SE 01.1. 11:00 Different weights, same processes? Testing for consistent predictors in nanotechnology risk perception across applications Palma-Oliveira, José Manuel[1]; Gaspar, Rui[2] [1]University of Lisbon, Faculty of Psychology, Lisbon, Portugal; [2]Centre for Psychological Research & Social Intervention (CIS), ISCTE - Lisbon University Institute, Lisbon, Portugal SE 01.2. 11:20 Integration of the risk perception of laymen and experts into a risk communication strategy using the example of Nanotechnology Lohmann, Mark; Epp, Astrid; Boel, Gaby-Fleur Federal Institute for Risk Assessment, Risk Communication, Berlin, Germany SE 01.3. 11:40 Analyzing a dialogue about risks of nanotechnology in Dutch Science Cafés: a qualitative and quantitative analysis Dijkstra, Anne University of Twente, Faculty of Behavioural Sciences, Enschede, Netherlands
	Session 02 Communicating risks of electromagnetic fields (Studio A; Chair: Diana van Dongen) – not yet confirmed SE 02.1. 11:00 Communication on electromagnetic fields and health risks; content analysis of Dutch national and regional newspaper articles and websites Claassen, Liesbeth[1]; Smid, Tjabe[1]; Woudenberg, Fred[2]; Timmermans, Danielle[1] [1]EMGO Institute for Health and Care Research, VU University Medical Centerter, Public and Occupational Health, Amsterdam, Netherlands; [2]Municipal Health Service, Amsterdam, Netherlands SE 02.2. 11:20 Measurement Supported Information Series Concerning Potential Health Risks of Mobile Communication Wiebusch, Dagmar; Menzel, Karsten Informationszentrum Mobilfunk e.V., Berlin, Germany SE 02.3. 11:40 Health complaints, attribution, and perceived health risks of electromagnetic fields among participants with and without self-reported electro hypersensitivity. van Dongen, Diana[1]; Smid, Tjabe[2]; Timmermans, Danielle[1] [1]VU University Medical Centre/ EMGO Institute for Health and Care Research, Department of Public and occupational health, Amsterdam, Netherlands; [2]VU University Medical Centre/ EMGO Institute for Health and Care Research/ KLM health Services, Department of Public and occupational health, Amsterdam, Netherlands
	Session 03 Risk governance and management (Studio B; Chair: Olivier Salvi) SE 03.1. 11:00 Risk from product counterfeiting and the resilience of legitimate supply chains Busby, Jerry; Stevenson, Mark Lancaster University, Department of Management Science, Lancaster, United Kingdom SE 03.2. 11:20 Environmental Forensics: A New Field for an Expertise Driven in a Project Management Mood French Perspective David, Jean-Francois Compagnie Nationale des Experts de Justice en Environnement, Garches, France SE 03.3. 11:40 Claims prevention within home insurance: Insights from insurance customers Skorna, Alexander[1]; von Watzdorf, Stephan[2]; Paefgen, Johannes[1] [1]University of St.Gallen, Institute of Technology Management, St. Gallen, Switzerland; [2]ETH Zurich, D-MTEC, Chair of Information Management, Zurich, Switzerland SE 03.4. 12:00 Biogas safety and regulation: the EU situation Salvi, Olivier[1]; Delsinne, Samuel[1]; Evanno, Sébastien[2] [1]EU-VRi, Stuttgart, Germany; [2]INERIS, Verneuil-en-Halatte, France

11:00 – 12:30	**Session 04 Multi-risk analysis I** (Ulm; Chair: Atun Funda)	
	SE 04.1. 11:00	Assessing the risk(s) of a resilient system operating in a complex and dynamic environment Grøtan, Tor Olav SINTEF Technology and Society, Safety Research, Trondheim, Norway
	SE 04.2. 11:20	Socio-economic factors affecting physical vulnerability Kundak, Seda[1]; Atun, Funda[2]; Minucci, Guido[2] [1]Istanbul Technical University, Urban and Regional Planning, Istanbul, Turkey; [2]Politecnico di Milano, Dipartimento di Architettura e Pianificazione, Milano, Italy
	SE 04.3. 11:40	Developing health risk assessment training in Europe - the Risk ASSETs Project Capleton, Alexander[1]; Duarte-Davidson, Raquel[1]; Thomas, Eirian[1]; Nieuwenhuijsen, Mark[2]; Czerczak, Slawomir[3]; Gromiec, Jan[3]; Palaszewska-Tkacz, Anna[3]; Lumens, Mieke[4]; Ravazzani, Paolo[5] [1]Health Protection Agency, Chilton, OX11 0RQ, Didcot, United Kingdom; [2]Centre for Research in Environmental Epidemiology, Barcelona, Spain; [3]Nofer Institute for Occupational Medicine, Lodz, Poland; [4]Institute for Risk Assessment Sciences, Utrecht University, Utrecht, Netherlands; [5]Centro Interuniversitario per lo Studio delle Interazoni fra Campi Elettromagnetici e Biosistemi, Milan, Italy
	SE 04.4. 12:00	Improvement of complex transportation systems against disasters Atun, Funda Politecnico di Milano, Department of Architecture and Planning, MILANO, Italy
	Symposia 01 Latest developments in Risk Regulations (Heilbronn; Chair: Alberto Alemanno)	
	SY 01.1. 11:00	From the "Neurotic" to the "Rationalising" State: Risk and the limits of governance Rothstein, Henry[1]; Borraz, Olivier[2]; Huber, Michael[3] [1]King's College London, Department of Geography, London, United Kingdom; [2]Sciences Po, Paris, France; [3]University of Bielefeld, Bielefeld, Germany
	SY 01.2. 11:20	Disaster risk management and standard-based regulation in the EU regulatory framework Simoncini, Marta University of Pisa, Pisa, Italy
	SY 01.3. 11:40	The Emergence of EU Risk Regulation: towards a EU Risk Regulatory State? Alemanno, Alberto HEC Paris, Fentange, Luxembourg
12:30 – 13.30	**Lunch (buffet)**	
13:30 – 15:00	**Session 05 Perceiving and communicating risks of H1N1** (Freiburg; Chair: Ann Enander)	
	SE 05.1. 13:30	H1N1: perceived risks and decisions across healthcare occupations Elmieh, Negar[1]; Nicol, Anne-Marie[2]; Astrakianakis, George[2]; Hurrell, A. Christie[2] [1]Quest University Canada, Squamish, Canada; [2]University of British Columbia, School of Environmental Health, Vancouver, Canada
	SE 05.2. 13:50	Communicating swine flu in the food safety context Revuelta, Gema[1]; Cugat, Gloria[2]; Escurriol, Verònica[1]; Gosalbez, Patricia[2] [1]Universitat Pompeu Fabra, Science Communication Observatory, Departament de Comunicació, Barcelona, Spain; [2]Agència Catalana de Seguretat Alimentària, Barcelona, Spain
	SE 05.3. 14:10	Trust in Canadian pandemic H1N1 risk messages: Manitoba Metis Perspectives Driedger, S. Michelle[1]; Jardine, Cindy[2]; Furgal, Chris[3]; Cooper, Elizabeth[1] [1]University of Manitoba, Community Health Sciences, Winnipeg, Canada; [2]University of Alberta, School of Public Health, Edmonton, Canada; [3]Trent University, Indigenous Environmental Studies Program, Peterborough, Canada
	SE 05.4. 14:30	Risk perception, trust and behaviours among the Swedish population during the 2009 outbreak of A(H1N1) influenza Börjesson, Marcus; Enander, Ann Swedish National Defence College, Karlstad, Sweden
	Session 06 Medicine and Pharmaceuticals: Risk perspectives (Studo A; Chair: Chris Bennett)	
	SE 06.1. 13:30	Stakeholders would Protect Aquatic Ecosystems from Risks of Pharmaceuticals: a Hospital Case Study Lienert, Judit; Schuwirth, Nele Eawag: Swiss Federal Institute of Aquatic Science and Technology, Siam: System Analysis, Integrated Assessment and Modelling, Duebendorf, Switzerland
	SE 06.2 13:50	What does risk transparency mean for pharmaceutical regulators? Bouder, Frederic[1]; Lofstedt, Ragnar[2] [1]Maastricht University, Technology and Society Studies, Maastricht, Netherlands; [2]King's College London, King's Centre for Risk Management, London, United Kingdom
	SE 06.3 14:10	Training Courses for Medical Professionals on Potential Health Risks of Mobile Communication Wiebusch, Dagmar; Menzel, Karsten Informationszentrum Mobilfunk e.V., Berlin, Germany

	SE 06.4 14:30	Multiple hazards and hierarchies of risk: the contribution of staff prioritisation of perceived risk to the aetiology of adverse events in hospitals Bennett, Chris Kings College London, Kings Centre for Risk Management, London, United Kingdom
	Session 07 Perspectives on disaster and crisis communication (Studio B; Chair: Richard Eiser)	
	SE 07.1. 13:30	What should be a good crisis communication? Gaultier-Gaillard, Sophie[1]; Cros, Michel[2] [1]Université Paris 1 Panthéon Sorbonne, management, Paris, France; [2]Formations militaires de la Sécurité Civile, Asnières, France
	SE 07.2. 13:50	The Influence of Risk Perception on the Purchase of Compulsory Earthquake Insurance in Turkey Taylan, Arzu Selçuk University, City and Regional Planning, Konya, Turkey
	SE 07.3. 14:10	Changing perception from disaster to pre-disaster. The effects of the August 1999 Kocaeli Earthquake in the legal system of Turkey Atun, Funda Politecnico di Milano, Architecture and Urban Planning, Milano, Italy
	SE 07.4. 14:30	Integrated research on disaster risk Eiser, J. Richard University of Sheffield, Department of Psychology, Sheffield, United Kingdom
	Session 08 Multi-risk analysis II (Ulm; Chair: Guido Minucci)	
	SE 08.1. 13:30	"How Is My Drive?" - Risk Mitigation Through Technology-enabled Behavioral Change in the Motor Insurance Industry Paefgen, Johannes F. R.[1]; Skorna, Alexander C. H.[1]; Tulusan, Johannes[2] [1]University of St. Gallen, Institute of Technology Management, St. Gallen, Switzerland; [2]ETH Zurich, Department of Management, Technology and Economics, Chair of Information Management, Zurich, Switzerland
	SE 08.2. 13:50	Prevention as element of a differentiation strategy for cargo insurance companies: risk management vs. risk avoidance Skorna, Alexander[1]; Bode, Christoph[2] [1]University of St. Gallen, Institute of Technology Managment, St. Gallen, Switzerland; [2]ETH Zurich, D-MTEC, Zurich, Switzerland
13:30 – 15:00	SE 08.3. 14:10	Consequence, Time and Interdependency-based Risk Assessment in the Field of Critical Infrastructure Prezelj, Iztok[1]; Žiberna, Aleš[2] [1]University of Ljubljana, Faculty of Social Sciences, Defense Research Centre, Ljubljana, Slovenia; [2]University of Ljubljana, Faculty of Social Sciences, Centre for Methodology and Informatics, Ljubljana, Slovenia
	SE 08.4. 14:30	Water user conflicts and drought risk in the Province of Varese Minucci, Guido Politecnico di Milano, Architecture and Planning Dept., Milan, Italy
	Symposia 02 Food Risks and Benefits I (Heilbronn; Chair: Julie Barnett)	
	SY 02.1. 13:30	Developing a framework for conceptualising the communication of food risks and benefits Barnett, Julie[1]; McConnon, Aine[2]; Rutsaert, P.[3] [1]Brunel University, Department of Information Systems and Computing, Uxbridge, United Kingdom; [2]University College, School of Public Health, Physiotherapy, & Population Science, Dublin, Ireland; [3]Ghent University, Department of Agricultural Economics, Ghent, Belgium
	SY 02.2. 13:50	Stakeholders perceptions of communicating food risks and benefits Guzzon, Antonella; Bucchini, Luca Hylobates Consulting srl, Rome, Italy
	SY 02.3. 14:10	Consumer perspectives on the communication of food risks and benefits: Insights from a multiple sorting procedure Regan, Áine; McConnon, Áine; Wall, Patrick University College Dublin, School of Public Health, Physiotherapy, & Population Science, Dublin, Ireland
	SY 02.4. 14:30	Understanding responses to food risk governance: a secondary analysis of 2010 Eurobarometer data Gaspar, Rui; Lima, Luisa; Seibt, Beate Centre for Psychological Research & Social Intervention, CIS – ISCTE – Lisbon University Institute, Lisbon, Portugal
15:00 – 15:30	**Break**	

15:30 – 17:00	**Session 09 A new look at nuclear power** (Freiburg; Chair: Corinne Moser)	
	SE 09.1. 15:30	Opinions on potential nuclear waste repositories - There is more than the extremes Seidl, Roman; Stauffacher, Michael; Krütli, Pius; Moser, Corinne; Scholz, Roland W. ETH Zurich, Institute for Environmental Decisions (IED), Natural and Social Science Interface (NSSI), Zurich, Switzerland
	SE 09.2. 15:50	Is knowledge important? Empirical research on risk communication regarding nuclear risks in two countries. Perko, Tanja[1]; Železnik, Nadja[2] [1]Belgian Nuclear Research Centre SCK·CEN, Institute for Environment, Health and Safety, Nuclear Science and Technology Studies, Mol, Belgium; [2]Agency for Radwaste Management, Planning and development section, Ljubljana, Slovenia
	SE 09.3. 16:10	Nuclear power stations put in a new jacket? Examining an explanatory model of laypeople's acceptance of nuclear power Visschers, Vivianne; Keller, Carmen; Siegrist, Michael ETH Zurich, Institute for Environmental Decisions, Consumer Behavior, Zurich, Switzerland
	SE 09.4. 16:30	The influence of cyclical and linear temporal representations on risk perception and discounting of negative consequences: The case of nuclear waste Moser, Corinne; Stauffacher, Michael; Krütli, Pius; Scholz, Roland W. ETH Zürich, Institute for Environmental Decisions (IED), Natural and Social Science Interface (NSSI), Zürich, Switzerland
	Session 10 Understanding risk decisions (Studio A; Chair: Catrinel Turcanu)	
	SE 10.1. 15:30	Explaining risk controversies: a social sciences review of wireless communication technology Hermans, Marijke Maastricht University, Department of Technology and Society Studies, Maastricht, Netherlands
	SE 10.2. 15:50	Exploratory Risk Modeling Schwehm, Markus ExploSYS GmbH, Interdisciplinary Institute for Exploratory Systems, Leinfelden-Echterdingen, Germany
	SE 10.3. 16:10	Complex roles and mixed norms - a dilemma for safety inspections? A case study from the Norwegian offshore oil and gas industry Lindoe, Preben Hempel; Engen, Ole Andreas University of Stavanger, Media, Culture and Social Science, Stavanger, Norway
	SE 10.4. 16:30	Decision making for installations with risks: who wants to be involved? Turcanu, Catrinel[1]; Perko, Tanja[2] [1]Belgian Nuclear Research Centre SCK•CEN, MOL, Belgium; [2]University of Antwerp, Faculty of Social and Political Science, Antwerp, Belgium
	Session 11 Liability and risk regulation (Ulm; Chair: Maria Lee)	
	SE 11.1. 15:30	Liability of firms that may cause environmental disasters Attanasi, Giuseppe[1]; Hiriart, Yolande[2]; Popova, Vera[3] [1]Toulouse School of Economics, Toulouse, France; [2]Université de Franche-Comté (CRESE), Besançon, France; [3]Max Planck Institute, Jena, Germany
	SE 11.2. 15:50	Liabilities, GMOs and the Regulatory Settlement Lee, Maria University College London, Laws, London, United Kingdom
	SE 11.3. 16:10	Can Science Tame Politics: A History of a Failure Paskalev, Vesco European University Institute, Law, Florence, Italy
	Symposia 03 Food Risks and Benefits II (Heilbronn; Chair: Julie Barnett)	
	SY 03.1. 15:30	Seeking information on food risks and benefits: cognitive and affective instigators Kuttschreuter, Margôt; Meijer, Annelies University of Twente, Psychology of Conflict, Risk and Safety, Enschede, Netherlands
	SY 03.2. 15:50	A SWOT analysis of the use of social media for food risk and benefit communication Rutsaert, Pieter; Pieniak, Zuzanna; Verbeke, Wim Ghent University, Department of Agricultural Economics, Ghent, Belgium
	SY 03.3. 16:10	Risk Communication: Managing a real time crisis in the social media age: observations from the recent EU dioxin contamination Moss, Adrian[1]; Fitzhenry, Robert[2]; Wills, Josephine[2] [1]Focus Business Communication, Southampton, United Kingdom; [2]European Food Information Council, Brussels, Belgium
	SY 03.4. 16:30	European food safety experts' perspectives: a comparative analysis of the uses of classical and new social media in risk and benefit communication Lores, Monica; Lozano, Natalia; Farre, Jordi Universitat Rovira I Virgili, Tarragona, Spain
17:00 – 17:30	**20th Celebration and Business Meeting**	

17:30 – 18:30	**Poster 01 Poster Session 20th SRA-Europe Meeting** Mia-Seeger-Saal	
	PS 01.1.	Socio-cultural analysis of vulnerability production and community responses to flash flooding: a Mexican case study Frida, Guiza; Simmons, Peter; Burgess, Jacquie University of East Anglia, Environmental Sciences, Norwich, United Kingdom
	PS 01.2.	- Abstract withdrawn from the programme -
	PS 01.3.	Integration of risk and benefit assessment models, risk-benefit assessments and validation within the PlantLIBRA project Guzzon, Antonella[1]; Bucchini, Luca[1]; Leino, Olli[2]; Tuomisto, Jouni[2] [1]Hylobates Consulting srl, Rome, Italy; [2]National Institute for Health and Welfare, Kuopio, Finland
	PS 01.4.	What Makes Risk Politics: Political Base in Risk Perception about Mad-Cow Disease Kim, Seoyong[1]; Gwak , Ji-ung[1]; Ra, Hui-mun[2] [1]Ajou University, Suwon, Republic of Korea; [2]Sungkyul University, Anyang, Republic of Korea
	PS 01.5.	Again Nuclear Energy But!: The Level and Determinant about Acceptance of Nuclear Energy in the Age of Energy Crisis and the Green Jung, Juyong[1]; Joo , Jae-bok[2]; Kim, Seoyong[3] [1]Chungju National University, Chungju, Republic of Korea; [2]KRILA, Seoul, Republic of Korea; [3]Ajou University, Suwon, Republic of Korea
	PS 01.6.	Is It Connected?: Exploring the Linkage between Societal Risk and Technological Risk Joo, Jae-Bok[1]; Jung, Seok-Chang[2]; Kim, Seoyong[3] [1]KRILA, Seoul, Republic of Korea; [2]Institute of Governmental Studies, Korea Univ., Seoul, Republic of Korea; [3]Ajou University, Suwon, Republic of Korea
	PS 01.7.	Accept or Not!: Exploring the Effect of Government's Persuasion Strategies in Risk Conflict Issues Kim, Seoyong[1]; Ra, Hui-mun[2]; Chunghun, Park[3] [1]Ajou University, Suwon, Republic of Korea; [2]Sungkyul University, Anyang, Republic of Korea; [3]GRI, Suwon, Republic of Korea
	PS 01.8.	Who Are the Vulnerable?: The Test of Vulnerability Hypothesis in Risk Perception Studies Park, Hae-yug[1]; Chung, Jaejin[2]; Kim, Seoyong[3] [1]KRILA, Seoul, Republic of Korea; [2]GRI, Suwon, Republic of Korea; [3]Ajou University, Suwon, Republic of Korea
	PS 01.9.	The Comparative Study of Structure of Science-Technology Acceptance across 34 Countries Choi, Sang-ok[1]; Kim, Seoyong[2] [1]Center for Public Administration and Policy, Blacgksbur, United States; [2]Ajou University, Suwon, Republic of Korea
	PS 01.10.	The Comparative Studies of Determinants of Risk Judgment about Five Diseases Park, Cheonhee[1]; Park, Hae-yug[2]; Kim, Jiyeon[3] [1]Ajou University, Suwon, Republic of Korea; [2]KRILA, Seoul, Republic of Korea; [3]Gyeonggi Research Institute, Suwon, Republic of Korea
	PS 01.11.	Four Competing Paradigms: Exploring the Catalytic Determinants for Energy Conservation Behavior Gwark, Ji-ung[1]; Joo, Jae-Bok[2]; Wang, Jaesun[1] [1]Ajou University, Suwon, Republic of Korea; [2]KRILA, Seoul, Republic of Korea
	PS 01.12.	Who's and What's Emotional?: The Specification of Varieties of Emotion and Its Determinants in Judging the Nuclear Power Song, You-Geun[1]; Jung, Juyong[2]; Seoyong, Kim[1] [1]Ajou University, Suwon, Republic of Korea; [2]Chungju National University, Chungju, Republic of Korea
	PS 01.13.	The Specification of Social Trust in Judging Food-Related Risk Kim, Jiyeon[1]; Park, Cheonhee[2]; Ra, Hui-mun[3] [1]Gyeonggi Research Institute, Suwon, Republic of Korea; [2]Ajou University, Suwon, Republic of Korea; [3]Sungkyul University, Anyang, Republic of Korea
	PS 01.14.	From Nuclear Weapons to Nuclear Terrorism: Qualitative Analysis about Changing History of Concept of Nuclear Risk Kim, Jaesung Ajou University, Graudate Student in M.A. Course, International Politics, Suwon, Republic of Korea
	PS 01.15.	Risk assessment in global raw material procurement Pudlas, Sascha; Werner, Ute Karlsruhe Institute of Technology, Institute for Finance, Banking and Insurance, Karslruhe, Germany

17:30 – 18:30	PS 01.16.	Expert mental model on comprehensive climate change risks and adaptation in agriculture and food production in Japan Suda, Eiko[1]; Kubota, Hiromi[2]; Baba, Kenshi[3]; Hijioka, Yasuaki[1]; Takahashi, Kiyoshi[1]; Hanasaki, Naota[1]; Harasawa, Hideo[1] [1]National Institute for Environmental Studies, Ibaraki, Japan; [2]Central Research Institute of Electric Power Industry, Chiba, Japan; [3]Central Research Institute of Electric Power Industry, Tokyo, Japan
	PS 01.17.	Risk and memory: Recognition and forgetting Assmuth, Timo; Lyytimäki, Jari Finnish Environment Institute, Environmental Policy Centre, Helsinki, Finland
	PS 01.18.	Risk Attitude and Willingness-to-Pay for Uncertain Events: Impacts of Climate Change on Wastewater Infrastructures Chawla, Fabienne[1]; Veronesi, Marcella[2]; Maurer, Max[1]; Lienert, Judit[3] [1]Eawag, Urban Water Management, Dübendorf, Switzerland; [2]ETH Zürich, Institute for Environmental Decisions, Zürich, Switzerland; [3]Eawag, System Analysis, Integrated Assessment and Modelling, Dübendorf, Switzerland
	PS 01.19.	Which Information is the truth: Trust and cultural theory in risk communication? Kim, Gong Rok[1]; Lee, Hyun Jung[2] [1]Yonsei Univerisy, Department of Public Administration, Doctoral Candidate, Seoul, Republic of Korea; [2]Korea Univeristy, Department of Public Administration,, Doctoral Candidate, Seoul, Republic of Korea

June 7, 2011

08:30 – 09:00	**Registration and getting together** (Coffee and refreshments)	
09:00 – 10:30 **Bertha-Benz-Saal**	**Plenary Session 02** (Moderator: Nick Pidgeon	
	9:00	**Welcome** - Nick Pidgeon, moderator
	PL 02.1. 9:05	**Foundational issues in risk assessment and risk management. Misconceptions of risk** Aven, Terje University of Stavanger, Norway
	PL 02.2. 9:35	**Uncertain risk: threat or challenge? On the rational balancing of precaution and venture, but when, why and how?** Vlek, Charles University of Groningen, Netherlands
	10:05	**Questions and Discussion**, led by moderator
10:30 – 11:00	**Coffee break**	
11:00 – 12:30	**Session 12 Tools and approaches for risk communication** (Freiburg; Chair: Michael Siegrist)	
	SE 12.1. 11:00	Effective risk communication: The effect of risk level, format and numeracy on people's concerns Dohle, Simone; Siegrist, Michael ETH Zürich, Institute for Environmental Decisions (IED), Consumer Behavior, Zürich, Switzerland
	SE 12.2. 11:20	The Tick Talk: Design, Dissemination, and Evaluation of a Novel Risk Communication Product Nicol, Anne-Marie[1]; Bartlett, Karen[1]; Henry, Bonnie[2] [1]University of British Columbia, School of Environmental Health, Vancouver, Canada; [2]BC Centre for Disease Control, Vancouver, Canada
	SE 12.3. 11:40	Nanotechnology Labeling Influences Risk Perception Siegrist, Michael ETH Zurich, Zurich, Switzerland
	Session 13 Risk, governance and policy making (Studio A; Chair: Henry Rothstein)	
	SE 13.1. 11:00	Multi risks in a globalised world: Integrative risk management concept Ammann, Walter J.; Stal, Marc; Corina, Sutter Global Risk Forum Davos, Davos, Switzerland
	SE 13.2. 11:20	Risk Assessment within the European Union - The Role of Scientific Committees and Agencies Kofler, Barbara Institute for European and Public International Law, Leopold-Franzens-University, Innsbruck, Austria
	SE 13.3. 11:40	Scientific decision-making and stakeholder consultations: The case of scientific advisory body for nutrition (SACN) Timotijevic, Lada[1]; Raats, Monique[1]; Barnett, Julie[2]; Brown, Kerry[1]; Shepherd, Richard[1] [1]University of Surrey, Psychology, Guildford, United Kingdom; [2]Brunel University, Department of Information Systems and Computing, Uxbridge, london, United Kingdom
	SE 13.4. 12:00	Crystal balls or Christmas Baubles? Risk-Based Policymaking and the Institutional Modulation of Risk Rothstein, Henry[1]; Downer, John[2] [1]King's College London, Geography, London, United Kingdom; [2]Stanford University, Stanford, United States
	Session 14 Multi-risk analysis and expert elicitation (Ulm; Chair: Tommy Norberg)	
	SE 14.1. 11:00	Effects of Uncertainties within the "Impact Pathway Approach" on Ranking of Technologies included in an Energy System Preiss, Philipp[1]; Friedrich, Rainer[1]; Zenié, Alexandre[2] [1]Universität Stuttgart, Institut für Energiewirtschaft und Rationelle Energieanwendung, Technikfolgenabschätzung und Umwelt, Stuttgart, Germany; [2]European Commission, Joint Research Centre, Institute for Health and Consumer Protection, Physical and Chemical Exposure Unit, Ispra, Italy
	SE 14.2. 11:20	Applying multicriteria decision aid methodology for the interpretation of qualitative uncertainty characterisation results Zenié, Alexandre[1]; Urli, Bruno[2] [1]European Commission's Joint Research Centre, Institute for Health and Consumer Protection, Ispra (VA), Italy; [2]Université du Québec à Rimouski, Département des Sciences de Gestion, Rimouski (Québec), Canada

11:00 – 12:30	SE 14.3. 11:40	Expert elicitation on risk perceptions in integrated assessments: an MCA approach Devilee, Jeroen; Van Poll, Ric; Knol, Anne; Lebret, Erik National institute for public health and the environment, Environmental health research, Bilthoven, Netherlands
	SE 14.4. 12:00	On the value of expert information in a multi-criteria context Norberg, Tommy[1]; Rosen, Lars[2]; Norrman, Jenny[2]; Lindhe, Andreas[2] [1]Chalmers University of Technology and University of Gothenburg, Gothenburg, Sweden; [2]Chalmers University of Technology, Gothenburg, Sweden
	Symposia 04 Volcanic ash crisis (Heilbronn; Chair: Alberto Alemanno)	
	SY 04.1. 11:20	Lessons Learned in Trust and Risk Communication from the Volcanic Ash Crisis Chakraborty, Sweta University of Oxford, Oxford, United Kingdom
	SY 04.2. 11:40	Beyond the volcanic ash crisis. Towards the development of standard - based regulation in disaster management Simoncini, Marta University of Pisa, Pisa, Italy
	Symposia 05 Climate change I (Studio B; Chair: Pia-Johanna Schweizer)	
	SY 05.1. 11:00	Climate change and social amplification of risk Renn, Ortwin University of Stuttgart, ZIRN - Interdisciplinary Research Unit on Risk Governance and Sustainable Technology Development, Stuttgart, Germany
	SY 05.2. 11:20	A perspective on governance issues for climate change: Can this problem become tractable? North, Warner NorthWorks, Inc., Belmont, Canada
	SY 05.3. 11:40	Risk Communication and Climate Change Governance: An Institutional Proposal Pidgeon, Nick[1], Fischhoff , Baruch[2] [1]Cardiff University, School of Psychology, Cardiff, United Kingdom; [2]Carnegie Mellon University, Social and Decision Sciences, Pittsburgh, United States
12:30 – 13:30	**Lunch (buffet)**	
13:30 – 15:00	**Session 15 Understanding affect and trust** (Freiburg; Chair: Mathew White)	
	SE 15.1. 13:30	The Affect Heuristic, Mortality Salience, and Risk: Domain-Specific Effects of a Natural Disaster on Risk-Benefit Perception Västfjäll, Daniel[1]; Peters, Ellen[2]; Slovic, Paul[1] [1]Decision Research, Eugene, United States; [2]Ohio State University, Columbus, United States
	SE 15.2. 13:50	Salient Values, Trust and Public Protest Potential in the Case of CCS Wallquist, Lasse; Visschers, Vivianne H.M.; Dohle, Simone; Siegrist, Michael ETH Zurich, Institute for Environmental Decisions, Consumer Behavior, Zurich, Switzerland
	SE 15.3. 14:10	The Importance of Multiple Performance Criteria for Understanding Trust in Risk Managers White, Mathew[1]; Johnson, Branden[2] [1]University of Plymouth, Psychology, Plymouth, United Kingdom; [2]New Jersey Department of the Environment, Trenton, United States
	Session 16 Uncertainty, dialogue and decision making (Studio A; Chair: Robert Flynn)	
	SE 16.1. 13:30	Enhancing acceptance of social decisions by procedural fairness and trust, the moderating role of issue importance Ohtomo, Shoji[1]; Nonami, Hiroshi[2]; Hirose, Yukio[3]; Ohnuma, Susumu[4]; Midden, Cees[5] [1]Konan Women's University, Faculty of Human Sciences, Department of Psychology, Kobe, Japan; [2]Kwansei-Gakuin University, Graduate School of Sociology, Kobe, Japan; [3]Nagoya University, Graduate School of Environmental Studies, Nagoya, Japan; [4]Hokkaido University, Graduate School of Letters, Sapporo, Japan; [5]Eindhoven University of Technology, Department of Industrial Engineering & Innovation Sciences, Eindhoven, Netherlands
	SE 16.2. 13:50	Uncertainty, precaution and risk governance van Asselt, Marjolein; Janssen, Anne-May Maastricht University, Technology and Society studies, Maastricht, Netherlands
	SE 16.3. 14:10	Chatting with the experts: Exploring the impact of new information on citizen acceptance of novel food technologies Greehy, Gráinne[1]; McCarthy, Mary[1]; Henchion, Maeve[2]; Dillon, Emma[2]; McCarthy, Sinéad[2] [1]University College Cork, Department of Food Business and Development, Cork, Ireland; [2]Teagasc Food Research Centre Ashtown, Dublin, Ireland

	SE 16.4. 14:30	Ambiguity, complexity and uncertainty in Hydrogen energy: citizen panels' deliberations about risk and safety Flynn, Robert[1]; Ricci, Miriam[2]; Bellaby, Paul[1] [1]University of Salford, Centre for Social Research, School of ESPaCH, Salford, Greater Manchester, United Kingdom; [2]University of West of England, Centre for Transport and Society, Faculty of Environment and Technology, Bristol, United Kingdom
	Session 17 Climate change (Studio B; Chair: Nicholas Smith)	
	SE 17.1. 13:30	Addressing climate change: Determinants of consumers' willingness to act and to support policy measures Tobler, Christina; Visschers, Vivianne; Siegrist, Michael ETH Zuerich, Institute for Environmental Decisions (IED), Consumer Behavior, Zuerich, Switzerland
	SE 17.2. 13:50	Public perception of geoengineering - knowledge, risk and acceptability Pidgeon, Nicholas[1]; Parkhill, Karen[1]; Corner, Adam[1]; Spence, Alexa[2]; Butler, Catherine[1]; Poortinga, Wouter[1] [1]Cardiff University, Cardiff, United Kingdom; [2]Nottingham University, Nottingham, United Kingdom
	SE 17.3. 14:10	How do We Ensure Linkage between Climate Change Adaptation and Disaster Risk Reduction to Make Cities Resilient? Implications from Analysis on Perception Gap between the Experts and the General Public Kenshi, Baba[1]; Eiko, Suda[2]; Hiromi, Kubota[3]; Yasuaki, Hijioka[2]; Mitsuru, Tanaka[4] [1]Central Research Institute of Electric Power Industry, Socio-economic Research Center, Tokyo, Japan; [2]National Institute for Environmental Studies, Ibaraki, Japan; [3]Central Research Institute of Electric Power Industry, Chiba, Japan; [4]Hosei University, Tokyo, Japan
	SE 17.4. 14:30	Global warming and American evangelicalism: exploring attitudes, beliefs, risk perceptions and policy preferences Smith, Nicholas; Leiserowitz, Anthony Yale Project on Climate Change Communication, Yale University, New Haven, United States
13:30 – 15:00	**Symposia 06 Natech** (Heilbronn; Chair: Elisabeth Krausmann)	
	SY 06.1. 13:30	Quantitative Risk Analysis of Refinery Losses Using Bayesian Networks Petrissa, Eckle[1]; Burgherr, Peter[1]; Pannatier, Yvan[2] [1]Paul-Scherrer-Intistitute, Villigen PSI, Switzerland; [2]Swiss Reinsurance Company Ltd., Zurich, Switzerland
	SY 06.2. 13:50	Quantitative assessment of loss of containment induced by lightning impact Cozzani, Valerio[1]; Antonioni, Giacomo[1]; Renni, Elisabetta[1]; Krausmann, Elisabeth[2] [1]Università di Bologna, Dipartimento di Ingegneria Chimica, Mineraria e delle Tecnologie Ambientali, Alma Mater Studiorum, Bologna, Italy; [2]European Commission, Joint Research Centre, Institute for the Protection and Security of the Citizen, Ispra (VA), Italy
	SY 06.3. 14:10	Development of a methodology for Natech risk mapping: basic principles Girgin, Serkan; Krausmann, Elisabeth European Commission Joint Research Center, Institute for the Protection and Security of the Citizen, Ispra, Italy
	SY 06.4. 14:30	Updating seismic design guidelines for transmission pipelines with regard to the evolution of the French legislation Bourgouin, Laurent; Zarea, Mures; Fernandez, Charles GDF SUEZ, Research and Innovation Department, Saint-Denis, France
	Session 18 Theoretical perspectives on risk communication (Ulm; Chair: Peter Modin)	
	SE 18.1. 13:30	Bridging between political communication and risk communication: An adaptation of the Receive-Accept-Sample model Perko, Tanja[1]; Turcanu, Catrinel[1]; Carlé, Benny[2]; Thijssen, Peter[3] [1]Belgian Nuclear Research Centre SCK CEN, Society and Policy Support, Mol, Belgium; [2]Belgian Nuclear Research Centre SCK CEN, Mol, Belgium; [3]University of Antwerp, Faculty of Social and Political Science, Antwerp, Belgium
	SE 18.2. 13:50	A literature review on the perception and communication of flood risks Kellens, Wim[1]; Terpstra, Teun[2]; Schelfaut, Kristien[3]; De Maeyer, Philippe[1] [1]Ghent University, Gent, Belgium; [2]HKV Lijn in Water, Delft, Netherlands; [3]Soresma nv / Ghent University, Gent, Belgium
	SE 18.3. 14:10	More insights about the communicative turn in risk communication Gonzalo, Jan[1]; Espluga, Josep[2]; Prades, Ana[3]; Farré, Jordi[4] [1]URV, Communication Studies Department, Tarragona, Spain; [2]UAB, Sociology, Cerdanyola del Vallès, Spain; [3]CIEMAT, Socio-technical Research Centre (ISOC), Barcelona, Spain; [4]Universitat Rovira i Virgili, Communication Studies Department, Tarragona, Spain
	SE 18.4. 14:30	Dimensions of success in risk communication Modin, Peter KTH (Royal Institute of Technology), Philosophy, Stockholm, Sweden

15:00 – 15:30	**Coffee break**	
15:30 – 17:00	**Symposia 07 Reach** (Freiburg; Chair: Tessa Fox)	
	SY 07.1. 15:30	Risk regulation via EU agencies The role of EMA, EFSA and ECHA in authorization procedures Versluis, Esther; Klika, Christoph; Kim, Jinhee Maastricht University, Political Science, Maastricht, Netherlands
	SY 07.2. 15:50	REACH Europe's ambitious chemicals legislation: Challenges and opportunities Briese, Livia ECHA- European Chemicals Agency, Helsinki, Finland
	SY 07.3. 16:10	Hazard v Risk in EU chemicals regulation Kristina, Nordlander Sidley Austin Brown & Wood LLP Brussels, Brussels, Belgium
	SY 07.4. 16:30	Regulating the use of Bisphenol A in baby and children's products in the European Union: Current developments and scenarios for the regulatory future. Fox, Tessa Maastricht University, Technology and Society Studies, Maastricht, Netherlands
	Session 19 Emerging threats to health (Ulm; Chair: Jens Zinn)	
	SE 19.1. 15:30	Risk communication during a pandemic: The benefit of disclosing uncertainty Bodemer, Nicolai[1]; Feufel, Markus[1]; Garcia-Retamero, Rocio[2] [1]Max Planck Institute for Human Development, Harding Center for Risk Literacy, Berlin, Germany; [2]Universidad de Granada, Facultad de Psicologia, Granada, Spain
	SE 19.2. 15:50	Microbiological risk assessment for listeriosis associated with smoked fish products: a Belgian scenario Vásquez, Germán Andrés[1]; Busschaert, Pieter[2]; Devlieghere, Frank[3]; Van Impe, Jan[2]; Uyttendaele, Mieke[3]; Geeraerd, Annemie[4] [1]Katholieke Universiteit Leuven, Department of Biosystems, Division of Mechatronics, Biostatistics and Sensors (MeBioS), Heverlee-Leuven, Belgium; [2]Katholieke Universiteit Leuven, Department of Chemical Engineering, Heverlee-Leuven, Belgium; [3]Universiteit Gent, Department of Food Safety and Food Quality, Gent, Belgium; [4]Katholieke Universiteit Leuven, Heverlee-Leuven, Belgium
	SE 19.3. 16:10	The Megacity Project: risk of infectious diseases predicted by a spatially and age-structured model Bengtsson, Göran[1]; Schwehm, Markus[2] [1]Lund University, Department of Ecology, Lund, Sweden; [2]ExploSYS GmbH, Interdisciplinary Institute for Exploratory Systems, Leinfelden-Echterdingen, Germany
	SE 19.4. 16:30	Establishing a Global Social Science Knowledge Source to Improve Understanding and Management of Risk - A Case Study on 'Swine Flu' Zinn, Jens University of Melbourne, Melbourne, Australia
	Symposia 08 Climate change II (Studio B; Chair: Pia-Johanna Schweizer)	
	SY 08.1. 15:30	Climate change, public discourse and the problem of governance Grundmann, Reiner Aston University, Birmingham, United Kingdom
	SY 08.2. 15:50	Governance of Climate Change Schweizer, Pia-Johanna University of Stuttgart, Stuttgart, Germany
	SY 08.3. 16:10	Governance and Climate Change: Governing What? Rosa, Eugene A. Washington State University, Woods Institute for the Environment, Washington, United States
18:30 – 21:00 **Mia-Seeger-Saal**	**Conference Dinner (joint dinner with iNTeg-Risk Conference)**	

June 8, 2011

09:00 – 10:30 **König-Karl-Halle**	**JP 1. iNTeg-Risk/SRA Europe Joint Plenary Session** **Global Risks: A Broader Perspective** (Chair: W. Leiss, J. López de Ipiña, K. Øien) ***"Best Graduate Student / Young Scientist Award"**, A. Jovanovic* *Two special prizes, 1,000 € in total, financed by Stiftung Umwelt- und Schadensvorsorge (Foundation for Environmental and Damage Prevention, www.stiftung-schadenvorsorge.de) will be awarded to 2 outstanding iNTeg-Risk Conference papers or posters, authored by graduate students or young scientists.* **JP 1.1. Welcome Baden-Württemberg International:** Provider of New Technologies and related services for economic development and international cooperation – H. Neuland, Baden-Württemberg International, Germany **JP 1.2. Global Systemic Risks with Catastrophic Potential** – W. Leiss, University of Ottawa, McLaughlin Centre for Risk Assessment, Canada **JP 1.3 To Count or to Judge?** – E. Rosa, Washington State University, United States **JP 1.4. Risk governance deficits in the multiple risk situation: the Great East Japan Earthquake, Tsunami, and Fukushima nuclear accident** – A. Kishimoto, RISS, AIST, Japan
10:30 – 11:00	**Coffee break**
11:00 – 12:30	**Session 20 Risk perception of technology** (Freiburg; Chair: Choong-hoon Park) SE 20.1. 11:00 Understanding barriers to consumer acceptance of new food technologies Lindner, Line Friis ICCR, Vienna, Austria SE 20.2. 11:20 Risk Perception of Pesticide Residues in Food — Results from a Representative Survey in Germany Epp, Astrid[1]; Lohmann, Mark[1]; Boel, Gaby-Fleur[1]; Michalski, Britta[2]; Banasiak, Ursula[2] [1]Federal Institute for Risk Assessment (BfR), Risk Communication, Berlin, Germany; [2]Federal Institute for Risk Assessment (BfR), Chemical Safety, Berlin, Germany SE 20.3. 11:40 Changes of the public risk perception and opinion about science and technology in Japan Kosugi, Motoko Central Research Institute of Electric Power Industry, Komae, Japan SE 20.4. 12:00 The causes and limitations of Koreans' low level risk perception of nuclear power Park, Choong-hoon Korea University, Department of Public administration, Seoul, Republic of Korea **Symposia 09 The World Trade Organization as a global risk regulator** (Studio B; Alberto Alemanno) SY 09.1. 11:00 Risk Assessment under WTO law: Workable Requirement or Probatio Diabolica? Alemanno, Alberto[1]; Gruszczynski, Lukasz[2]; Peel, Jaqueline[3] [1]HEC Paris, Fentange, Luxembourg; [2]Polish Academy of Science, Warsaw, Poland; [3]Melbourne Law School, Melbourne, Australia SY 09.2. 11:20 Scientific Experts and Adjudicators in the WTO Dispute Settlement Practice — Lost in Translations? Gruszczynski, Lukasz Institute of Law Studies, Polish Academy of Sciences, Department of International Law, Warsaw, Poland SY 09.3. 11:40 Of Apples and Oranges (and Hormones in Beef): Science and the Standard of Review under the WTO SPS Agreement Peel, Jacqueline University of Melbourne, Melbourne Law School, Melbourne, Australia SY 09.4. 12:00 What implications for the involvement of experts in SPS dispute settlement and Codex standardization from the legitimacy of expert processes? Herwig, Alexia University of Antwerp, Faulty of Law, Antwerp, Belgium **Session 21 Risk Perception: conceptual considerations** (Tübingen; Anna Olofsson) SE 21.1. 11:00 Risk Perception as a Process of Mitigation Kundak, Seda Istanbul Technical University, Urban and Regional Planning, Istanbul, Turkey SE 21.2. 11:20 That's Synergistic!: Measuring Perceptions of Synergistic Risks Dawson, Ian; Johnson, Johnnie; Luke, Michelle University of Southampton, Centre for Risk Research, Southampton, UK SE 21.3. 11:40 An intersectional analysis of risk perception Olofsson, Anna Risk and Crisis Research Center, Östersund, Sweden

	Session 22 Mobile phones (Studio A; Peter Wiedemann)	
	SE 22.1. 11:00	"Do pecautionary messages tend to heighten public concerns about health effects of mobile phones?" Wiedemann, Peter FZ Juelich, Berlin, Germany
	SE 22.2. 11:20	Mobile Phone Risk Assessment and Policy Response: Recent French Experience Poumadere, Marc Institut Symlog de France, Paris, France
	SE 22.3. 11:40	EMF-Risk Management by Means of a Voluntary 'Self-Commitment' Made to the German Federal Government Dr. Menzel, Karsten; Wiebusch, Dagmar Informationszentrum Mobilfunk e.V., Berlin, Germany
	SE 22.4. 12:00	What happens if you inform about precautionary measures? Wiedemann, Peter[1]; Schütz, Holger[2]; Börner, Franziska[3] [1]KIT, ITAS, Berlin, Germany; [2]FZJ Jülich, INM8, Juelich, Germany; [3]University of Alberta, School of Public Health, Edmonton, Canada
12:30 – 13:30	**Lunch (buffet)**	
13:30 – 15:00	**Session 23 Environment and sustainability** (Studio A; Silvia Bruzzone)	
	SE 23.1. 13:30	Governing and assessing sustainability within public organizations Merad, Myriam; Marcel, Frédéric INERIS, Verneuil-en-Halatte, France
	SE 23.2. 13:50	Managing vulnerability: the implementation of risk reduction measures Neuvel, Jeroen; Rodenhuis, Wilbert Saxion, Centre for Urban and Enviromental Development, Enschede, Netherlands
	SE 23.3. 14:10	Perceptions of environmental health risks: citizens' and policy makers' van Poll, Ric[1]; Bröer, Christian[2]; Moerman, Gerben[2]; Spruijt, Pita[1] [1]RIVM National Institute for Public Health and the Environment, Bilthoven, Netherlands; [2]University of Amsterdam, Amsterdam, Netherlands
	SE 23.4. 14:30	Managed-retreat as form of adaptation to climate change. How a "new issue" encounters local practices of land use. Bruzzone, Silvia Curapp-CNRS, Amiens, France
	Symposia 10 Property rights and Lifestyle risks (until 15:10) (Studio B; Enrico Bonadio)	
	SY 10.1. 13:30	Lifestyle Risk: The Challenging Marriage of Two Thorny Concepts Giorgi, Liana Freelance, Vienna, Austria
	SY 10.2. 13:50	Consumer Protection and Online Gambling Services Littler, Alan Tilburg Law School/Tilburg Law and Economics Center, Tilburg, Netherlands
	SY 10.3. 14:10	"Nudging" Smokers: the Law and Science of Plain Packaging Alemanno, Alberto[1]; Bonadio, Enrico[2] [1]HEC Paris, Fentange, Luxembourg; [2]City University London, London, UK
	SY 10.4. 14:30	Trade Secrets and dual-use nanotechnologies Dsilva, Joel Leuven, Belgium
	SY 10.5. 14:50	On patent pools, risks and rewards in the public health arena – should we abandon the traditional way of patenting? Pugatch, Meir Perez[1]; Bonadio, Enrico[2] [1]University of Haifa, School of Public Health, Tel-Aviv, Israel; [2]City University London, City Law School, London, United Kingdom
	Symposia 11 Pachelbel (Freiburg; Ana Prades)	
	SY 11.1. 13:30	Introducting project PACHELBEL: overview and methodology Prades, Ana[1]; Horlick-Jones, Tom[2] [1]CIEMAT-CISOT, Barcelona, Spain; [2]Cardiff University, Cardiff, United Kingdom
	SY 11.2. 13:50	Developing Policy around Sustainability: Policy Assumptions about Lay Behaviour Barnett, Julie Brunel University, Uxbridge, United Kingdom
	SY 11.3. 14:10	Citizen engagement for climate change policies: A Spanish case study on Agenda21 Espluga, Josep[1]; Prades, Ana[2]; Boso, Alex[3] [1]Universitat Autònoma de Barcelona, Department of Sociology, Institute of Government and Public Policies, Bellaterra (Barcelona), Spain; [2]CIEMAT, Sociotechnical Research Centre, Barcelona, Spain; [3]Universitat Autònoma de Barcelona, IGOP, Bellaterra, Spain
	SY 11.4. 14:30	The importance of assumptions about human behaviour for climate policy: the example of the German regional "Climate Protection Concept 2020 Plus" initiative Konrad, Wilfried Dialogik, Stuttgart, Germany

Abstracts

PL 01.1 Numeracy and risk

Ellen Peters
Ohio State University, United States

Numeric information is ubiquitous in decisions about environmental risks, personal finances, and health. Although such decisions often rely on basic mathematical understanding, little research has examined theoretical mechanisms of the influence of number skills on risk perceptions and decisions. In my talk, I will focus on the influence of numeracy in the processing of numeric and non-numeric sources of information about risks.

PL 02.1 Foundational issues in risk assessment and risk management. Misconceptions of risk

Terje Aven
University of Stavanger, Norway

In spite of the maturity reached by many of the methods used in risk assessment and risk management, broad consensus has not been established on fundamental concepts and principles. The risk fields still suffer from a lack of clarity on many key scientific pillars. Some perspectives have been subject to strong criticism in the scientific literature; nonetheless, many of these have a strong position in applications and frequently we see such perspectives being adopted in papers published in recognised scientific journals. The aim of this talk is to point to this situation using some illustrating examples, and provide some ideas for how we can make improvements and enhance the risk fields.

PL 02.2 Uncertain risk: threat or challenge? On the rational balancing of precaution and venture, but when, why and how?

Charles Vlek
University of Groningen, Netherlands

In real life, probabilistic risk is the exception, uncertain ‘risk’ (a reasonable suspicion of harm?) is the rule. Without uncertainty no new discoveries, no unexpected achievements, no path-breaking innovations. In recent times, however, precaution has gained popularity. Society proves to be vulnerable, many things are uncertain, and shouldn’t we therefore all be more vigilant, anticipative and cautious? This depends on what is at stake and who is effectively responsible. How helpful is worst-case thinking? What about best-case thinking? Rational decision theory tells us that precaution versus venture relates to major asymmetries in the risky-decision situation. Protection-motivation theory holds that risk is a dual concept (outside and inside), implying that safety also is double-edged. Such frameworks are useful for clarifying and eventually improving precautionary versus venturous reasoning. For point sources as well as diffuse sources of uncertain risk, practical examples may surprisingly reveal oppressing pessimism or irresponsible optimism. Rational management of ‘reasonable suspicions of harm’ demands prudent balancing, as always.

SY 01 Latest developments in Risk Regulation

Alberto Alemanno
HEC Paris, Luxembourg

Amid contemporary preoccupations with risks, managing threats to society has become one of the central tasks of governments. As a result, risk-based regulations have emerged as a central organizing concept for regulation. Yet, risks are on the one hand global, as they increasingly call for global governance solutions, and, on the other, they are culturally constructed, socially contested, and differently perceived not only across societies but also across time and space. This poses governments the challenge to rationalize decision-making and urgently call them to coordinate their regulatory actions. As will be illustrated in this symposium, any model of risk regulation has to come to terms with issues such as: selecting the risks deserving regulatory attention, feeding the best scientific advice into decision-making, deciding in situations of scientific uncertainty, defining the role of non-scientific values, ensuring an open and participative form of decision-making, calculating the costs and benefits of regulation as well as their distributional and equity effects. As a result, optimization tools, such as economic analysis and sound science, dominate the risk regulatory process across the industrialized world and are spreading also among developing countries today. Yet - although on the rise - sound science and economic analysis often lead to sub-optimal results for society.

SY 01.1 From the «Neurotic» to the «Rationalising» State: Risk and the limits of governance

Henry Rothstein [1]; Olivier Borraz [2]; Michael Huber [3]
[1]King's College London, United Kingdom; [2]Sciences Po, France; [3]University of Bielefeld, Germany

In recent years, risk has become a central organising concept for regulation in many countries. By taking account of probability as well as potential damage, risk-based regulation has been promoted as an economically rational decision-making instrument for managing the uncertainties that are inherent in any regulatory intervention. As such, «risk-based» decision-making appears to offer a universal foundation for the governance of collective dangers. Yet cursory observation suggests that «risk-based» logics of regulation provide a far from universally accepted rationale for decision-making across policy domains and national settings. Instead, the spread and practice of risk-based approaches appears to be institutionally patterned, across countries, and between and within regimes, in at least two ways. First, as this paper will show, risk-based approaches to regulation have become institutionalised across a wide array of policy domains in the UK, yet in France and Germany the language of risk tends to be confined to traditional policy domains such as the environment, nuclear energy, and health and safety. And second, different regulatory logics can co-exist within different parts of the same regulatory regime; for example, risk-based logics may inform the framing of evidence, but policymaking and rule enforcement may be shaped by entirely different rationales. This paper, therefore, considers the factors shaping the spread of risk-based logics of regulation, taking the examples of the UK, France and Germany. The paper suggests that far from risk being a universal foundation for governance, understandings of, and responses to, ideas of risk are processed and filtered through established institutional rules, settings, instruments and cultures of governance. The paper argues that the adoption or otherwise of risk-based regulation, is shaped, in particular, by the way in which regulators are called to account for their decisions and actions.

SY 01.2 Disaster risk management and standard-based regulation in the EU regulatory framework

Marta Simoncini
University of Pisa, Italy

This presentation aims at investigating the European strategy against disasters, focusing on the development of standard-based regulation as a methodology of risk reduction. Catastrophes are highly uncertain risks that cannot be ignored because of the severity of the possible effects of their occurrence. Hence public response should be justified on rational basis, so that uncertain events cannot unreasonably become regulatory priorities. Standard-based regulation assesses levels of protection in correspondence to specific scales of alert, finding a balance between the absence of any precaution against risks and the will to tackle them in the management of the period that separates the current time from a possible emergency. In the attempt to preserve the legal order's ordinary route from the materialisation of a catastrophe, this model of protection tackles the (measurable) uncertainty by trying to strike the right balance between the reasons of precautionary action and the need to protect civil liberties. This means that the impact of both natural and man made disasters should be mitigated to the extent the ordinary legal relations must be institutionally guaranteed. In EU regulation the analysis of sector-specific models of prevention (as pollution control and flood risk) shows that the system of standards is at the core of the EU approach to catastrophic risks. On the same premise EU is developing a general framework of catastrophic risk regulation, which is based on the recognition that only a supranational action can achieve the effectiveness of the protection. From a legal perspective, the focal point of this analysis concerns the standard setting procedure and the manners of its implementation. Actually, the construction of a resilient system should be developed on public and private interactions in the regulatory process; therefore synergies should be exploited in order to achieve the most effective levels of protection.

SY 01.3 The Emergence of EU Risk Regulation: towards a EU Risk Regulatory State?

Alberto Alemanno
HEC Paris, Luxembourg

Although not originally foreseen in the founding Treaty, the EU has over the last two decades witnessed the enactment of a vast body of legislation to protect the environment as well as individuals' health and safety. Collectively, this large body of legislation is known as «risk regulation» and represents today the most important and widespread form of EU regulation in the internal market. Yet, interestingly enough, EU Risk Regulation is not up until now an organised field of legal scholarship or practice as compared to other specific areas of substantive policy such as Competition or Tax Law. In part this is due to its fragmented legal nature, both at institutional and substantive level, to its sector-specific development and also to its inherent interdisciplinary character. Although the field is not easy to define or confine within manageable boundaries, this article seeks to capture the defining features of this emerging area of EU law. Rather than providing an analysis of existing vertical risk regulation legal frameworks, such as those dealing with plant protection products, chemicals or food safety, it offers a detailed analysis of its privileged toolbox for decision-making: risk analysis and regulatory impact assessment.

SY 02 Communicating Food Risk — and Benefit (I and II)

Julie Barnett
Brunel University, United Kingdom

The challenges of sequentially or simultaneously communicating the risks and benefits of certain foods are apparent. FoodRisC (an FP7 project: Food Risk Communication - Perceptions and communication of food risks/benefits across Europe: development of effective communication strategies) explores how consumers acquire and use information about food risks and benefits with a view to developing targeted and effective communication strategies. In the symposia the first 4 presentations will present an overall framework for conceptualising food risk and benefit communication and report empirical data from across Europe exploring consumer and stakeholder perspectives on food risk and benefit communications. This includes an analysis of the recent Eurobarometer which focused on food related risks. The second 4 presentations will explore the role of information seeking with a particular focus on the role of social media in communicating risk and benefit and how this compares with the use of classical media. As part of this we will explore the implications of tracking a real time crisis - the recent EU dioxin contamination – using social media.

SY 02.1 Developing a framework for conceptualising the communication of food risks and benefits

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Moving on from a singular focus on risk, in recent years the food risk literature has begun to address the question of the challenges presented by the need to simultaneously or sequentially communicate both the possible risk and the benefit of particular foods. Maintaining this focus on the communication of both risk and benefit, this paper will present a framework for considering several risk and benefit communication 'configurations'. We recognise that risk and benefit relationships are complex and multi-faceted and this has implications for the communication of both risk and benefit. This paper will describe the development of a framework which provides a comprehensive structure in which different food risk/benefit configurations can be situated. The starting point of this framework is examination of the discourse surrounding the food issue. The framework initially seeks to characterise the 'current' discourse (i.e. the discourse at an identifiable point in time) and then linking this to the nature of any prior discourse and to subsequent discourses of response — thus characterising the different stages of the risk communication sequence. The nature of the issue, i.e. crisis vs. non-crisis or «chronic» issues, is central to the framework. Other factors that we propose may characterise particular risk/benefit communication configurations include the nature and degree of scientific uncertainty, the visibility in the media of both public and expert views, the degree of expert consensus, and the strength of vested interests. A number of specific risk/benefit communication configurations are presented – examples of which are explored in later presentations in this symposia. The advantages of a framework that considers the impact of a risk benefit discourse on the reception of a subsequent or synonymous risk discourse (or vice versa) are suggested. The implications for further research and for how such a framework might usefully guide risk communication practice are discussed. The research leading to these results has received funding from the European Union Seventh Framework Programme (FP7/2007- 2013) under grant agreement n° 245124.

SY 02.2 Stakeholders perceptions of communicating food risks and benefits

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Communication of food risks and benefits, including communication during crises in Europe, is a key concern of authorities and food sector stakeholders. Patterns of communication appear to vary from country to country, with differences in each country among categories and organizations belonging to food sector (i.e. experts, stakeholders, consumers). The focus of this study is the communication patterns of risk and benefit among private and NGO stakeholders, and the underlying conceptualization of risk and benefits, in contrast with public sector experts. Study design includes in-depth interviews in a sample of stakeholders and experts from five European countries (Belgium, Ireland, Italy, Spain, The Netherlands) and from the international arena. Topics include the stakeholders' and experts' conceptualization and perception of food risk and benefit, as well as of crises, and their relevance for their own organization, their communication strategies and perceived barriers. Data analysis includes exploring the variability in the conceptualization of food risk and benefit and of their communication among stakeholders representing different steps of the food chain (food processors, large retail distribution, consumers organizations, etc.) and among experts from different institutions. The outcome of stakeholders interviews will then be compared with that of experts to assess differences in the perception of communicating food risk and benefit in the two categories interviewed. The identification of perceived parameters of food risk and benefit and how these are communicated will contribute to the understanding of the current food and risk communications models in Europe and, potentially, to the development of one or more common approaches for communicating food risk and benefit to consumers, and to the provision of useful tools also for the stakeholders and experts involved. The research leading to these results has received funding from the European Union Seventh Framework Programme (FP7/2007- 2013) under grant agreement n° 245124.

SY 02.3 Consumer perspectives on the communication of food risks and benefits: Insights from a multiple sorting procedure

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The framework proposed in Paper 1 of this symposium views the risk/benefit relationship as complex and multi-faceted. Little is known about the public's perception of this relationship and how they may respond to the communication of food risks/benefits. The current paper uses a multiple sorting procedure (MSP) to elucidate consumers' perceptions of food risk/benefit issues and their reactions to the communication of such issues with a view to identifying factors which may be contributing to the complexity of the food risk/benefit relationship. Consumers (n = 100) from five European countries were provided with 12 food risk/benefit scenarios and a number of sorts were completed. Exploratory «free sorts» were first carried out to examine consumers' initial reactions to a number of different food risk/benefit scenarios. Two further «structured sorts» were carried out, with the first sort investigating whether people tend to focus on the risks associated with a food issue, over and above the benefits and the factors which may influence them to do so. The second structured sort looked at the different needs elicited by a number of risk/benefit scenarios in order to develop an understanding of what consumers need, information or otherwise, when encountering a food risk/benefit situation. This paper also considers the results from parallel sorting exercises carried out with both stakeholders (n = 30) and experts (n = 20) from five European countries. The traditional risk communication literature suggests that experts and consumers differ in their perceptions of food risks. Therefore, the results will be compared to examine how experts/stakeholders and the public respond to the communication of both risks and benefits. Use of the MSP provides an innovative means of exploring risk/benefit situations. The way in which the findings offer a solid foundation from which to further develop an effective strategy for communicating food risks/benefits to consumers will be discussed. The research leading to these results has received funding from the European Union Seventh Framework Programme (FP7/2007- 2013) under grant agreement n° 245124..

SY 02.4 Understanding responses to food risk governance: a secondary analysis of 2010 Eurobarometer data

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One of the aims of the FoodRisC project is to «characterize consumers and the ways in which they respond to information about food risk/benefit, taking into account gender and other relevant socio-demographics». Accordingly, the present paper uses a secondary analysis of the special Eurobarometer (354) data on food-related risk to characterize consumers and their responses. Facets relating to food risk governance were considered in detail: confidence in risk information sources, worries and perceptions associated with the food safety climate. An example from the risk perception literature shows that in general women have higher risk perceptions and worries than men (Gustafson, 1998) and trust less the government and institutions (Frewer, 2000). Accordingly, the eurobarometer data showed women as more worried about most food risks (e.g. BSE) and less confident in European institutions, national government and information found on the internet, as sources of risk information. However, these results changed when «responsibility in caring for younger children» (<10 years old) was included in a cluster analysis. From this a profile with 3 cluster groups emerged: 1) younger women and men with younger children; 2) older women and 3) older men, both without younger children. Women were more worried with food-related risks than men, but only within the older group without younger children. Young men and women with younger children were grouped together, presenting higher levels of worries than the older parents and for example had less confidence in information found on the internet. In addition to «responsibility», the importance of psychological variables such as self-efficacy (confidence in personal ability to avoid risks) and others that the risk perception literature (e.g. Lofstedt, 2006) reported as predictors of risk/benefit communication responses, are investigated. Implications for the importance of tailoring specific risk/benefit messages to population subgroups. The research leading to these results has received funding from the European Union Seventh Framework Programme (FP7/2007- 2013) under grant agreement n° 245124.

SY 03.1 Seeking information on food risks and benefits: cognitive and affective instigators

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Models, such as the Risk Information Seeking and Processing Model (RISP), are being put forward to describe the conditions under which people will engage in information seeking behaviour, and the factors that determine this behaviour. To what extent these conditions and factors are also relevant in the case of food-related information is yet unknown. This is the more so, in view of the diversity in configurations of risks and benefits in food products (cf. paper Barnett et al.) and the wide range of available communication channels (cf. paper Lores et al.). This presentation reports on a study on the individual's information seeking strategies in five European countries (Netherlands, Belgium, Ireland, Italy, Spain). The focus of the study lies with the level of the consumer's information need, his perception regarding the availability of information in which (s)he is interested, and the consumer's preference in channels use. In this context, four configurations of food-related information were distinguished: food risk, food crisis, food benefit, and food risk and benefit combined in one product. Semi-structured in-depth interviews were conducted among a stratified sample of consumers (n=100). Questions were formulated to tap the variables distinguished in the Risk Information Seeking and Processing Model (RISP) that are presumed to affect information seeking behaviour. In particular, participants were questioned regarding their interest in food-related information, the relevance of food safety in their lives, trust in companies and risk regulation, their perceptions regarding information channels and their information seeking behaviour in food-related issues. The data are analysed and interpreted in the context of the individual's specific situation. Similarities and differences between individuals from different countries, socio-demographic and family constitutions will be assessed. The results will be discussed in reference to other papers within the symposium. The research leading to these results has received funding from the European Union Seventh Framework Programme (FP7/2007-2013) under grant agreement n° 245124.

SY 03.2 A SWOT analysis of the use of social media for food risk and benefit communication

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Although considerable progress has been made in understanding the determinants of risk perception and in identifying the necessary components of effective food risk communication, this has not been matched with the development of efficient and appropriate communication tools. Very little work has been done examining the implications of the explosion of new media and web technologies for food risk/benefit communication. The online environment evolved from a world in which users could search and read information (Web 1.0) to a world where they are able to generate the information themselves (Web 2.0). The term social media, also referred to as consumer-generated media, covers a wide range of online word-of-mouth for example forums including blogs, forums, social networking sites, product rating websites, video, music and photo sharing sites. The growth in new social media tools offers particular potential for improving the communication of food risks and benefits. Based on literature review and in-depth interviews with consumers (n=100), stakeholders (n=30) and experts (n=20) from five different European countries, this paper will discuss the strengths and weaknesses of social media and the opportunities and threats of social media for food risk and benefit communication in both crisis and non-crisis situations. The research leading to these results has received funding from the European Union Seventh Framework Programme (FP7/2007- 2013) under grant agreement n° 245124.

SY 03.3 Risk Communication: Managing a real time crisis in the social media age: observations from the recent EU dioxin contamination

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The growth of new media tools has altered the communication landscape and redefined the consumers' choice of information source during a food crisis. During the 2008 dioxin contamination of pork in Ireland, 2881 online blogs were published linking dioxin and pork resulting in a peak in online communication. Little is understood about the role of new media communication during a food crisis. Our objective is to study a crisis in real-time using various media analytical tools and as a result provide guidelines on assessing and communicating via new media sources. On 27th December 2010 the German government informed the European Commission's Rapid Alert System for Food and Feed (RASFF) that dioxin-contaminated fat had been mixed with fat used for feed. This feed was fed to laying hens. The public became informed of the dioxin contamination on 3rd January 2011. Due to previous cases of dioxin contamination of food, and strong public interest, we began to analyse new media content related to this case. Within 7 days of the announcement, analysis of online news and social media sources across Europe showed there were over 30,000 mentions and growing daily. Using a range of tools such as Meltwater News and Radian6, we analysed blogs, Twitter, forums and on-line news sites. This provides insights into the challenges of selecting and using social and online media tracking and analysis tools in a multi-language environment. We will examine what use can be made of such large real-time datasets in terms of the information sources online communities refer to and how data is onward communicated. We also consider if and how National Food Safety Authorities used new and traditional media (print/broadcast) to communicate information. The research leading to these results has received funding from the European Union Seventh Framework Programme (FP7/2007- 2013) under grant agreement n° 245124.

SY 03.4 European food safety experts' perspectives: a comparative analysis of the uses of classical and new social media in risk and benefit communication

Monica Lores ; Natalia Lozano ; Jordi Farre
Universitat Rovira i Virgili, Spain

The way consumers seek and find information has undergone considerable change since the appearance of the Internet and more specifically, of social media tools. This requires the reformulation of communication strategies of a large number of private and public organisations. The field of food safety is no exception. The main aim of this paper is to examine and compare the opinions of European information supplier experts in relation to the communication of food risks and benefit information among the European population. This comparative study will mainly analyse the use and the role that food safety public agencies attribute to classical and new social media when they communicate with the different actors (e.g. consumers, the media...). This paper also seeks to identify if there are distinctive communication strategies pursued between providing risk versus benefit information using these media. It seeks to identify the perception and the incidence of use of social media tools when communicating with consumers. Where applicable, these questions will be addressed using discourse analysis of 20 in-depth interviews with national and European food safety and health promotion agencies from five different European countries (Belgium, Ireland, Italy, Netherlands and Spain). The research leading to these results has received funding from the European Union Seventh Framework Programme (FP7/2007- 2013) under grant agreement nÂ° 245124.

SY 04 Assessing, managing and communicating Emergencies Beyond the European Volcanic Ash Crisis

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HEC Paris, Luxembourg

The recent Iceland volcanic ash crisis epitomizes the general problem of emergency response in a world of uncertain manufactured and natural risks. A cloud of volcanic ash preventing travelling across an entire continent probably did not feature in the risk-management scenarios of many firms. The ash crisis is not the first or the only such problem to have occurred. It is one of a series of recent real or potential catastrophes - natural disasters, terrorism, pandemic - that have taken by surprise globalised firms and regulators. The proposed symposium will discuss the ash crisis as a case in point of the challenges posed by emergency regulation to all analytical steps of risk analysis. The questions that it raises should concern a wide variety of scholars, regulators and industry analysts whose normal areas of concern are far removed from aviation and volcanoes.

SY 04.1 Lessons Learned in Trust and Risk Communication from the Volcanic Ash Crisis

Sweta Chakraborty
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The Iceland volcanic ash crisis, like real transnational catastrophes of the past (ie: swine flu, terrorism, etc) has serious implications for the communication of actual risks to a global public. Particularly, how should the risks posed be communicated and by whom? Basic emergency risk communication strategies suggest conveying clear and accurate scientific information from a neutral source. However, there are several caveats to such a seemingly straightforward approach. While previous research in the field of risk communication has found that people want to know the facts, it has also found that people can only absorb them a bit at a time. Further, the lay public does not intuitively understand the cumulative effects of risk exposure and are subject to inherent heuristics and biases that can influence their decision making. Additional factors, such as levels of trust in the risk communicators, can also play a significant role as to how information is perceived by recipients and must be taken into consideration before a communication is released. These lessons have been learnt over decades of risk perception and communication research, and while many of these guidelines may be applied to the volcanic ash crisis, it is important to remember that even the most experienced risk communicators cannot fully predict how risk communications will be interpreted, or the human behaviours that will result. For this reason, the ash crisis provides a provocative new case study to the discipline of risk communication. It also allows for the study of how previous lessons have or have not been applied, and what this means for the robustness of existing emergency risk communication guidelines.

SY 04.2 Beyond the volcanic ash crisis. Towards the development of standard - based regulation in disaster management

Marta Simoncini
University of Pisa, Italy

This presentation analyses the role played by standards of protection in the management of the volcanic ash crisis and the contribution that standard-based regulation can provide in the prevention of catastrophes. Moving from the decision of EU Ministers of Transport to bargain for a European response, it aims at showing how the standardisation of protection is going to become an ordinary method to manage uncertain risks. Establishing three different regulatory zones of increasing risk depending on the degree of contamination from volcanic ash, the ministers settled fitting countermeasures in correspondence to specific risk characterizations. The emergency management of the case is in line with EU sector-specific models of disaster prevention and the developing EU framework strategy against catastrophic risks and it shows that the formulation of standards of protection is going to become the key issue of regulation. Actually, the case points out the necessity to fix the level of protection by assessing the different (public and private) interests at stake in the management of uncertain risks and the following need to arrange such decision on a coordinated basis, in order to promote the effectiveness of the measures. Moreover, the research of a European integrated approach to air traffic management (through SES) shows that the national level cannot be the suitable dimension to manage uncertain risks of catastrophic impact, because it cannot provide coordination in the protective action and in the balance of the precautionary reasons with the airlines' economic concerns and the passengers' interest in the supply of the public service. Hence, the paper compares the emergency response with the regulatory process that could have prevent the general block of flights, paying special attention to the role that airlines played and, instead, could have played and the ways regulatory science has been formulated and, on the contrary, could have been defined.

SY 05 Global Governance of Climate Change I

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Climate change is one of today's major challenges to science and society. The Intergovernmental Panel on Climate Change (IPCC) has produced a powerful scientific consensus about the physical transformation occurring to the world's climate. Human influences on this transformation are significant. Although the physical science basis of climate change is complex, the anthropogenic effect on climate change is beyond scientific dispute. But there is no comparable consensus – no single perspective or vantage point – which allows us to understand what climate change means for individual and institutional actors today and in the future. Engaging with climate change takes societies well beyond the physical transformations that are observed, modelled and predicted by natural scientists and assessed by the IPCC. One major issue is equity: The greatest share in the anthropogenic effect on climate change is caused by industrial countries due to the use of fossil fuels and agricultural practices. The impact of climate change on vulnerable systems such as ecology and economy are mainly borne by developing countries. Furthermore, the responses to the challenges of climate change depend on adequate international governance structures and procedures that help people worldwide to understand the phenomenon of climate change and to make sense of the many different meanings attached to the idea of climate change as it circulates and mutates around the globe. The symposium will explore the space for effective, equitable and feasible governance models for dealing with climate change focusing on human and institutional perception of climate change, issues of equity and fairness, differences in coping capacity and institutional requirements for handling these complex issues.

SY 05.1 Climate change and social amplification of risk

Ortwin Renn
University of Stuttgart, Germany

The social experience of risk is not confined to the technical definition of risk, i.e., the product of probability and magnitude. What human beings perceive as threat to their well-being and how they evaluate probabilities and magnitudes of unwanted consequences is codetermined by values, attitudes, social influences, and cultural identity. This paper introduces the social amplification of risk framework (SARF) and applies it to climate change. The social amplification of risk framework is based on the thesis that events pertaining to hazards interact with psychological, social, institutional, and cultural processes in ways that can heighten or attenuate individual and social perceptions of risk and shape risk behaviour. Drawing upon the concept of social amplification of risk, the paper investigates the mechanisms of amplification and attenuation in the climate change debate: it focuses first on the micro-sociological and psychological literature on amplification and attenuation of individual responses (including behaviour) in relation to climate change; and second on the application of functional resonance and common pool concepts to the intensity of societal concern and action, interpreted in the light of the SARF.

SY 05.2 A perspective on governance issues for climate change: Can this problem become tractable?

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Concern over global climate change began with a few visionary scientists in the 1960s, and by 1990 resulted in comprehensive assessments for the U.S. Government and then a series of such assessments by the Intergovernmental Panel on Climate Change (IPCC). But progress in establishing institutions for governance of this global threat has been meager. The author will present reflections based on the activities of the International Risk Governance Council (IRGC) and a report from the U.S. National Research Council, Public Participation in Environmental Assessment and Decisions Making (2008). These reflections motivate increased transparency and peer review for the science, and more discussion and outreach to stakeholders, both within countries and in international dialogue.

SY 05.3 Risk Communication and Climate Change Governance: An Institutional Proposal

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Avoiding dangerous climate change is currently a top priority policy issue. Tough emission reduction goals have been set by various legal frameworks, particularly in European countries. However, societies will have to undergo major transformations to meet these goals, and must also explicitly face several major challenges involving risk and uncertainty. We outline these challenges and also discuss why public framing of climate change is crucially important to meeting them, as well as reviewing what is known about public attitudes and communicating climate change risks. We argue that, given the stakes, society needs a strategic approach to climate risk communication involving two primary elements: strategic listening and strategic organization. The institutional framework for such an approach is also outlined.

SY 06 Natech risk management — The protection of chemical critical infrastructures against natural hazards

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Natural hazards pose a threat to chemical facilities and critical infrastructures (e.g. oil and gas storage, pipelines) where they can lead to hazardous-substance releases. Chemical accidents triggered by natural events, e.g. earthquakes, floods, lightning etc. are called "Natech" accidents. Studies within the EU Seveso CCA and the OECD WGCA to assess the status of Natech risk reduction show that some countries consider selected natural hazards in the design and operation of their industrial facilities. However, due to the limited data on the frequency and dynamics of Natech accidents only minimal prevention or mitigation measures are usually present. Moreover, there are only few Natech-specific tools (mainly for earthquakes) for the industrial risk assessment process available. Consequently, Natech events continue to occur. Natech risk is expected to increase in the future due to climate change. This and the continued occurrence of Natech accidents highlight the need for the development of tools to assist in the analysis of Natech risk in chemical installations and infrastructures. The multidisciplinary nature of Natech risk requires the characterisation of the natural event, and the assessment of the industrial facility under natural-event loading. The EC's JRC and DPRI will organize a specific session on this topic. The session will describe the status of methodological development in the field of Natech risk reduction by providing some concrete examples on Natech hazard/risk analysis and mapping.

SY 06.1 Quantitative Risk Analysis of Refinery Losses Using Bayesian Networks

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The energy sector is both a critical infrastructure and provider of a key resource for the economy. Accidents in the energy sector affect people's health and/or property, the supply of economic goods and services, and might also contribute to the degradation of ecosystems and their functions. Accidents with severe consequences such as fatalities or large oil spills usually cannot be attributed to a single cause; instead a variety of contributing factors can be identified ranging from triggers such as natural events or technical failures to safety culture issues such as organizational environment and maintenance. An analysis of the relative contributions of these factors is important when calibrating risk models for single installations as well as for providing the basis for cost effective measures to reduce the risk of severe accidents. We will present results of a joint project between PSI and the reinsurer Swiss Re analyzing accidents in refineries worldwide. Our analysis is based on historical accidents that were drawn from the PSI database ENSAD (Energy-related Severe Accident Database). ENSAD comprehensively covers accidents in all energy chains worldwide. To establish a reliable data basis for this analysis, accidents from the entire world were taken into account from 2000-2008. The data includes information on location and owner of the refineries, units found in the refineries, accident triggers, type of accident such as explosion or fire and consequences such as fatalities, injured and spill volumes. The data is analyzed with a Bayesian Network constructed directly from the dataset. Bayesian networks allow to analyze the strength of influence of the contributing factors to the number of accidents as well as to analyze the correlation in the severity of the accidents. In addition the network can be used as a tool to investigate the resulting risk under specific circumstances.

SY 06.2 Quantitative assessment of loss of containment induced by lightning impact

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A recent survey of industrial accident databases showed that lightning is the most frequent cause of NaTech accidents (Natural events triggering technological disaster). Fires are the most common final scenario associated to such events. In spite of protection codes, lightning strikes that hit equipment and storage or process vessels with flammable materials caused devastating accidents at refineries, storage tank farms and other facilities. Scarce attention is given in the literature to the quantitative assessment of lightning risk at industrial facilities. The present study aims at developing an approach for the quantitative assessment of these events within the common framework for the quantitative assessment of risk due to external hazard factors in chemical and process plants. Accidents were reviewed to identify the main equipment categories involved in this type of accident. The first step of the methodology was the assessment of the frequency and severity of the lightning. The standard parameter for the frequency is the isokeraunic number given by meteorological studies. The lightning severity was quantified by the parameters current intensity and strokes number. Distribution functions for lightning intensity were used to assess the frequency and severity of lightning. Specific attention was given to damage models. In particular, criteria to assess the expected damage intensity and subsequent severity of loss of containment were developed. Quantitative data relating the lightning energy and the damage severity were developed. Thus, different damage states were defined, and damage probability functions were derived. Standard models for consequence analysis allowed the assessment of the physical effects of the final scenarios. Individual and societal risk figures were calculated using the conventional risk recomposition procedure.

SY 06.3 Development of a methodology for Natech risk mapping: basic principles

Serkan Girgin ; Elisabeth Krausmann
European Commission Joint Research Center, Italy

Natural-hazard triggered technological accidents (Natechs) involving the releases of hazardous substances, fires, and explosions at critical chemical infrastructures have been recognized as an emerging risk. Natech risks are expected to increase in the future due to the growing number of critical infrastructures, more natural hazards due to climate change, and the vulnerability of the society which is becoming more and more interconnected. To be able to prevent and prepare for Natechs, authorities need to identify Natech prone areas and determine risk levels and their possible consequences on safety of the society and the environment. This requires knowledge of natural hazards, chemical hazards within natural hazard areas, and their interrelations. A recent study has shown that hardly any Natech risk maps exist within the EU or OECD. Furthermore, existing maps are usually created by simply overlaying natural and technological hazards, without considering site specific features, such as expected release scenarios under natural disaster conditions and existing safety measures. In order to bridge this gap a study has been launched to assess the interrelation of natural and technological hazards at industrial facilities for creating Natech scenarios, and in particular to develop a unified methodology for Natech risk mapping for selected natural hazards. This methodology will be implemented as a tool in a GIS environment for rapid and efficient application. The methodology will be validated using case studies in EU Member States and Candidate Countries. In this presentation, first an overview of existing Natech risk mapping approaches will be given. Then, the basic approach and principles of the intended unified Natech risk mapping methodology will be explained.

SY 06.4 Updating seismic design guidelines for transmission pipelines with regard to the evolution of the French legislation

Laurent Bourgouin ; Mures Zarea ; Charles Fernandez
GDF SUEZ, France

Any type of infrastructure built in France has to fulfill seismic design requirements as prescribed by the law. Due to their specific features, i.e. running over hundreds or thousands of km, and not governed by inertia, buried transmission pipelines were not clearly addressed in the seismic regulations until today. An AFPS (French Association for Seismic Design) working group composed of French seismologists and pipeline operators, led by GDF SUEZ, had therefore developed in 2000 a methodology to verify pipelines' resistance to earthquakes along with a set of associated practical design guidelines. The work consisted of various parametric studies based on numerical models evaluating pipelines resistance to seismic loads and in particular to Permanent Ground Displacement (PGD). The approach also widely used feedback from pipelines behavior in past major seismic events. The resulting technical guidelines were validated by the French regulator and were furthermore adapted to the European context. However, French seismic regulations are currently evolving for two reasons:
- compliance with the new European standards «Eurocode»;
- introduction of a new seismic zoning based on a probabilistic approach.
Pipelines are affected by these new regulations in several ways: the new zoning defines more extensive zones of non negligible seismicity and higher ground accelerations are imposed in each zone. Pipeline operators are now required to update their methodology and guidelines to be consistent with both the new legislation and the principles of Eurocode 8 — 4. This update includes:
- Redefining the PGD associated with the new seismic loads in each zone.
- Updating the criteria for liquefaction and fault displacements.
- Recalculating the influence of vibrations.
- Re-running all models with updated input parameters as defined above
- Taking into account feedback from the behavior of pipelines during major earthquakes between 2000 and today.

SY 07 Risk Regulation under REACH

Tessa Fox
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The first registration deadline of the REACH regulation has just passed: Substances in high quantities and CMR substances had to be registered by 1 December 2010- and two deadlines will follow until 2018. During the SRA 2011 Annual meeting in Stuttgart, it will be exactly four years ago that REACH entered into force on June 1, 2007. The Regulation, Evaluation, Authorisation of Chemicals (REACH) Regulation (EC/1907/2006) came about because of the need to improve the protection of human health and environment from chemicals while also enhancing the competitiveness of the European Union (EU) chemicals industry. By the REACH deadline of 1 December 2010, 24,675 registration dossiers have been successfully submitted for 4,300 substances, thereby accumulating to one of the largest risk regulation dossiers within the EU. A lot has been written about REACH and after 4 years first experiences can be shared. It is therefore important to understand the scope, challenges and implications of REACH for risk regulation. Risk research has thus far contributed to understanding this framework by analysing impacts for both supranational and national legal cultures including trade law implications (Fisher, 2008), global implications (Bowman, 2006) and the way risk and uncertainty are used in the REACH context (Nordlander, 2008 (a.o) After 4 years, it is time to share experiences, insights and analyses of REACH from different disciplinary backgrounds. Questions that will be addressed by this symposium are: What are the challenges and opportunities of REACH? What is the role of the regulatory agency ECHA in this process and how does it cope with the many challenges? What has been the impact of REACH on industry and on risk regulation practices in general? The symposium aims to understand the dynamic of REACH as a practice of risk regulation.

SY 07.1 Risk regulation via EU agencies
The role of EMA, EFSA and ECHA in authorization procedures

Esther Versluis ; Christoph Klika ; Jinhee Kim
Maastricht University, Netherlands

The authorization of risk related products such as pharmaceuticals, foodstuffs and chemicals is more and more delegated to agencies in the European Union (EU). While we gain more and more insight into questions related to the legitimacy, accountability and autonomy of these European agencies, we know relatively little about how they are de facto functioning on a daily level. As the EU agencies are officially advisory bodies and the decisions for marketing authorizations are made by the Commission and the Standing Committees in Comitology, it is necessary to gain more insight into who actually decides at the European level. Who decides whether products with potentially harmful risks are eventually authorized to be placed on the market? Are national representatives in comitology committees decisive (decisionist governance), or do we see a shift to technocratic governance where the Commission and/or experts in agencies are the ones dominating the authorization procedure? Based on empirical analysis of case studies in each of the three agencies, we aim to analyze to what extent the formal restrictions imposed on the principals in the decision-making procedure, and the procedural legitimacy of regulatory agencies in the post-delegation phase can help us explain the role of agencies in risk regulation in the EU.

SY 07.2 REACH Europe's ambitious chemicals legislation: Challenges and opportunities

Livia Briese
ECHA- European Chemicals Agency, Finland

Four years ago, on 1 June 2007, the Regulation, Evaluation, Authorisation of Chemicals (REACH) Regulation (EC/1907/2006) entered into force. REACH was introduced as a response to a clear need: to improve the protection of human health and environment from chemicals while also enhancing the competitiveness of the European Union (EU) chemicals industry. By 30 November 2010, companies in Europe had to register all their chemicals produced in volumes of at least 1,000 tonnes a year and carcinogens, mutagens or reprotoxins (CMRs) produced in volumes of more than one tonne a year, has passed. With 25,000 dossiers covering approximately 4,300 substances, the European Chemical Agency (ECHA) is now the custodian of a unique set of information on the chemical substances used in Europe, thereby representing one of the largest risk regulation dossiers within the EU and possibly the world. The abundance of information on substances has a number of very significant implications for the protection of human health and the environment. REACH has demonstrated that European industry has taken up the challenge to bring about the aims of the legislation: to gradually replace the most dangerous chemicals with safer alternatives. The presentation shall discuss the challenges and opportunities that transpire after the registration deadlines in 2010 and 2011.

SY 07.3 Hazard v Risk in EU chemicals regulation

Nordlander Kristina
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Hazard is the potential of something to cause harm; risk is the likelihood of harm occurring. Chemicals regulation is largely focused on minimising risks of chemicals to humans and the environment while maintaining the benefits to society of chemical substances — and rightly so. There is, in theory, a clear division between the EU chemicals rules that relate to hazard and those that focus on risk. However, in practice, the regulatory decisions that are supposed to assess the risks of chemicals and products frequently rely solely or primarily on identified intrinsic hazards, without an actual assessment of risk that fully takes exposure into account. Despite a major revamp of EU chemicals legislation in recent years (including the introduction of REACH and the CLP Regulation), there are still many automatic and direct links between the classification of chemicals based on hazard and downstream product regulation, without any (or sometimes only a limited) evaluation of exposure and risk. The real-world negative market consequences of inclusion on the REACH Candidate List solely due to a hazard classification is one such worrying example. Hazard-based regulation can lead to undesirable consequences, such as restrictions on the use of safe products, substitution towards less safe products, and disincentives to innovate. Such hazard-based regulation tends to be at odds with World Trade Organisation rules and has raised significant concern with EU trading partners. There are significant hurdles in bringing legal challenges in the EU courts to hazard-based regulation, including measures taken under REACH. The Lisbon Treaty's new standing test for «regulatory acts without implementing measures» may make it easier to get to court in future (although there is to date no ruling on the meaning of «regulatory act»). However, the limited standard of review applied by the EU courts to complex technical or scientific issues is in practice a significant challenge to bringing a successful case. One area where recent case law developments are promising is transparency. Recent court rulings mean that there are now far greater rights of access to the documents of technical committees and even the internal inter-service opinions of the European Commission.

SY 07.4 Regulating the use of Bisphenol A in baby and children's products in the European Union: Current developments and scenarios for the regulatory future.

Tessa Fox
Maastricht University, Netherlands

Parents of newborns and small children recently have been confronted with labels indicating that their purchases of a baby bottle, teethers or sippy cups are now «Bisphenol A-free» (BPA) Bisphenol A, a synthetic chemical used in the production process of polycarbonate (plastics), is currently making headline news in the US and the EU. Its questioned safety in food plastics, baby bottles and children's toys has turned plastics into a political issue as it is systematically framed as a risk in media coverage. Besides regulatory exposure limites (Tolerable Dailiy Intake levels (TDI), Bisphenol A was not subject to any restrictions in use. However, expectations were that with the REACH framework (Registration, Evaluation, Authorization of Chemicals), a new regulatory framework for EU's chemical policy in place since June 2007, these exposure limits were up for review eventually and BPA would face regulatory action. However, despite EFSAs opinion of October 5, 2010 to not modify current TDIs in place after having reviewed over 800 articles on BPA, the Commission announced its ban by March 2011, based on a «sudden» comitology decision November 26, 2010. This decision evoked questions by industry, EFSA and member states, who all felt the decision had been rushed and a scientific base is lacking. This article aims to analyze the regulatory process of Bisphenol A in the EU as an example of an uncertain risk dossier. On the basis of document and media analysis and interviews, the main aim is to gain an understanding of how uncertain risks are being regulated in the European Union. What are the current regulatory tools in place? What is the role of REACH? What do the developments in the controversy around BPA mean for the REACH framework? The paper concludes by presenting four scenarios that illustrate the dynamics of the case and its possible regulatory outcomes.

SY 08 Global Governance of Climate Change II (continuation of SY 05)

SY 08.1 Climate change, public discourse and the problem of governance

Reiner Grundmann
Aston University, United Kingdom

Media attention in western countries has seen an exponential rise after 2005, leading up to the Copenhagen summit of 2009. In most countries this surge of attention was led by advocates of stringent climate policies, focussing on CO2 mitigation targets. Most opinion polls indicate broad public support for climate policies. However, climate policies have often been used in a partisan way (especially in the US but also elsewhere). As a result, parts of the population are alienated from climate policies.
Climate science acts as an agenda setter. The IPCC has a central role not only in assessing the available knowledge but in co-ordinating knowledge claims and government representatives. Arguably, it also has developed a political outlook based on a frame which mainly focuses on CO2. There has been an ever more dramatic tone of its assessments. However, a strategy of dramatizing in order to get political support is not sustainable, as the dramatic drop in media attention after 2009 exemplifies. We do not have the global governance institutions to make international climate treaties a realistic prospect in the near future. National interests are too far apart and CO2 abatement comes at an economic cost. The development needs of many poorer countries will mean a vastly increased energy need over the coming decades.
An alternative approach is presented. It takes into account that climate change is not a problem that can be solved but a wicked problem with many facets. As a result, climate change can only be (more or less well) managed. This approach differentiates between short-term and long-term policies. In the short term, existing institutions should be addressing problems such as tropical forest husbandry, black carbon or HFCs. This can be done by extending their remit. In the long term, technological innovation on a large scale will be needed in order to provide the energy needs of the globe. This could be achieved by building cross partisan coalitions aiming at the development of abundant, clean and cheap energy sources.

SY 08.2 Governance of Climate Change

Pia-Johanna Schweizer
University of Stuttgart, Germany

Governance of climate change has to reconcile diverse interests. Science, civil society, the economy and the political system — to name but a few — are subsystems of society which deal with the challenges of climate change in different ways. Communication about climate change proceeds according to rules and rationalities which are specific for each social subsystem. These specific semantics account for many of the difficulties experienced in the governance of climate change. Effective, equitable and feasible governance models for dealing with climate change will have to take these semantics into account.

SY 08.3 Governance and Climate Change: Governing What?

Eugene A. Rosa
Washington State University, United States

One of the famous quotes of the late distinguished climate scientist, Steve Schneider, was a play on a remark by American humorist Mark Twain. Schneider's version was: Everyone does something about the weather but no one talks about it. But recently, many people are talking about the weather — and some are demanding that governments and other legal entities do something about the unequivocal anthropogenic sources of greenhouse gases (GHGs). Proper action first requires proper knowledge of what anthropogenic drivers are the leading causes of GHGs. The drivers are identified with a robust model whose effectiveness is demonstrated with a body of consistent empirical findings.

SY 9 The World Trade Organization as a global risk regulator

Alberto Alemanno [1]; Lukasz Gruszczynski [2]; Jaqueline Peel [3]
[1]HEC Paris, Luxembourg; [2]Polish Academy of Science, Poland; [3]Melbourne Law School, Australia

The panel analyzes various features of an adjudication system that was established within the World Trade Organization (WTO) in order to settle international trade disputes relating to national risk regulatory decisions. In the last years the organization proved to be an important element in the global governance of health and environmental risks. It had a direct impact on the design of national regulatory frameworks for genetically modified organisms and administration of growth promotion hormones to animals in the farming processes. this growing importance of the WTO was accompanied by the increased criticism coming from different circles. The organization have been accused of being biased in favour of free trade at the expense of other values such as legitimate concerns of citizens or cultural differences. Its dispute settlement system was criticized for not being sufficiently transparent. The panel intends to address some of the above concerns. In particular it will analyze problems poses by specific substantive requirements imposed on WTO Members, the extent of investigative authority enjoyed by WTO dispute settlement bodies, interactions that take place between such bodies and scientific experts providing technical assistance and whether recently proposed evaluation standards for the legitimacy of health and safety measures, such as cost-benefit analysis, may provided a valid alternative to the current regime. This discussion should allow delimiting more precisely the role played by the WTO in a system of global governance of risk.

SY 09.1 Risk Assessment under WTO law: Workable Requirement or Probatio Diabolica?

Alberto Alemanno
HEC Paris, Luxembourg

In an effort to eliminate protectionism and unnecessary non-tariff barriers, the WTO/SPS agreement embraced science as a privileged tool for distinguishing between legitimate and illegitimate Member States' measures inspired by public health reasons. However, in adjudicating disputes involving the scientific basis of trade-restrictive measures, the judicial bodies of the WTO have struggled to turn the SPS scientific discipline into a workable (risk assessment) requirement. As a result, defending Members have lost all major SPS cases to date because of their failure to comply with the required scientific justification discipline. At a time when the risk assessment requirement seems to have been converted into a probatio diabolica, this paper examines, in the light of 15 years of judicial application of the SPS Agreement, whether its scientific discipline is still a workable requirement, effectively enabling the interpreter to filter protectionism out of SPS measures. Although time and the judicial practice developed under the SPS have partly tarnished science's promise of value-neutrality, this paper ventures to suggest, in the absence of any less arbitrary criterion, some recommendations for turning risk assessment into a workable requirement.

SY 09.2 Scientific Experts and Adjudicators in the WTO Dispute Settlement Practice — Lost in Translations?

Lukasz Gruszczynski
Institute of Law Studies, Polish Academy of Sciences, Poland

Involvement of scientific experts has become a characteristic feature of contemporary decision-making and adjudication. Scientists perform here a dual function: they identify and characterize risks, but they also validate possible solutions to control risks. Their participation is seen as contributing to legitimacy of adopted decisions. The prominent role that is played by scientific experts is not limited to national level but also becomes increasingly important at the international niveau. The legal system created by the WTO is a good example. Number of WTO agreements (particularly the Sanitary and Phytosanitary Agreement) requires, implicitly or explicitly, recourse to scientific expertise in order to assess legality of national measures that have an impact on trade between WTO Members. Thia paper is located in this context, as it intends to analyse interactions that take place between WTO panels and scientific experts providing assistance in settlement of such disputes. In particular, it focuses on the process of information exchange between these actors. With respect to experts, I am interested in the following issues: how the legal logic, reflected in questions asked by the adjudicators, fit the scientific logic of experts; to what extent misunderstandings of legal concepts by experts have consequences for final legal decisions; how experts respond to trans-scientific questions. A parallel set of questions will be asked with respect to adjudicators: how panellists understand answers of experts; how they resolve problems of contradicting opinions; how they establish minimal epistemic value of scientific evidence. My inquiry will be based on the analysis of the transcripts from the meetings with experts as well as factual determinations included in the final reports (e.g. EC — Biotech Products, Australia — Apples). This should allow me to identify both strengths and weaknesses of the current legal practice.

SY 09.3 Of Apples and Oranges (and Hormones in Beef): Science and the Standard of Review under the WTO SPS Agreement

Jacqueline Peel
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The WTO Sanitary and Phytosanitary (SPS) Agreement has attracted academic interest and political controversy since its conclusion. The Agreement contains novel, science-based requirements that function as the principal mechanism for distinguishing genuine health and quarantine risk regulatory measures from other trade measures presumed to be motivated by protectionism. While many found the first SPS dispute reassuring given the efforts made by the Appellate Body (AB) to articulate a flexible notion of risk assessment, these rulings evolved in later decisions in a direction that gave a large role to science (and experts advising panels) in evaluating the legality of SPS measures. In 2008 the AB articulated new requirements around the standard of review to be applied by panels in evaluating the scientific basis and adequacy of a Member's risk assessment. Commentators have generally seen this decision as an indication of the pendulum swinging back in favour of greater deference to the scientific judgment of domestic authorities in SPS risk regulation. On 29 November 2010 the AB issued a ruling in the case of Australia - Apples. The Australian appeal squarely raised the question of whether the panel applied the correct standard of review in evaluating the relevant risk assessment. The AB's interpretation of its findings EC Hormones - Continued Suspension suggests that despite the articulation of a new standard, its application is likely to vary little at least in the context of disputes raising quarantine risk issues. What the Australia - Apples rulings highlight are problems with treating all SPS risk situations alike. Instead this paper argues the need for an approach that differentiates risk situations according to the parameters of associated levels of uncertainty and social concern, applying different stringencies of review accordingly. This approach could prove more coherent and effective in achieving the balance sought by the SPS Agreement.

SY 09.4 What implications for the involvement of experts in SPS dispute settlement and Codex standardization from the legitimacy of expert processes?

Alexia Herwig
University of Antwerp, Belgium

This contribution focuses on the legitimacy of involving experts in in the regulation of the risks that fall under the WTO's SPS Agreement. After a section on the legitimacy of expert processes in general, the contribution assesses the legitimacy of expert consultation specifically in a transnational context. It will be argued that expert consultation is auxiliary for, rather than determinative of, the decision to regulate. Experts can help in the qualitative assessment of the 'complete regulatory risk' by providing information on what further consequences are likely and thus highlighting the normative trade-offs that must be made. This implies a need for broadening the type of expertise to include the non-natural sciences in appropriate cases. It also gives experts a unique legitimizing role in the transnational context where disagreement about the qualitative dimensions of risk will often be prevalent. Third, this highlights that expert assessment and normative (or qualitative) evaluation share similar but not identical criteria of objectivity. In the third part, this contribution will review recent developments in SPS case law. It will be submitted that the less intrusive standard of review in Continued Suspension is an appropriate development but that subsequent panels did not follow that guidance correctly. The decision on Article 5.5 in EC — Poultry will be criticized as it reduces the qualitative assessment of risk to its immediate adverse effect and hollows out the right of WTO members to determine their level of protection autonomously. Finally, the contribution will think through the implications of involving a broader range of experts in WTO dispute settlement and the Codex Alimentarius Commission and the need for adaptive interpretation of the SPS Agreement.

SY 10 Property Rights and lifestyle risks

Property Rights – Risks to Health and the Environment: the Role of Intellectual Property Rights

Enrico Bonadio
City University London, United Kingdom

The proposed Panel aims at bringing together young academics and professionals interested in exploring the crossing points between intellectual property (IP) regimes and risky activities, especially medical and industrial activities that have strong health and environmental impacts. After analysing how and to what extent IP policies and regimes really stimulate scientific and technical progress and are capable of minimizing the risks to health and/or the environment posed by on-going industrial development, the proposed Panel intends to shed light on alternative tools of IP exploitation: i.e. new IP-related initiatives capable of stimulating R&D activities that are useful to reduce risks, especially in the public health sector. Some of the issues the proposed Panel will deal with have recently been debated (or will be in the near future) by the above panelists in the European Journal of Risk Regulation (EJRR).

A second aim of the symposium is to identify the main features of lifestyle risks and discussing their inherent fundamental questions. While the first two papers broadly conceptualise lifestyle risks (Planzer, Giorgi), the following papers discuss selectively specific manifestations of lifestyle risks (Burgess, Bonadio, Littler, Pieterman). A characteristic element of lifestyle risks are choices. Rising incomes in developing countries have led to increasingly prevalent opportunities for individual choices. This raises the highly relevant philosophical question of the role of state intervention in the form of regulation. The symposium discusses theories that may justify risk regulation beyond a minimalistic libertarian level while illustrating these theories with practical case studies. For a more thorough description of the symposium topic we refer to Planzer's abstract as it serves as the conceptual starting point of the symposium. Co-Chair Dr Alberto Alemanno HEC Paris, editor of the European Journal of Risk Regulation (moderator) Simon Planzer University of St.Gallen, co-responsible for the section on lifestyle risks in the European Journal of Risk Regulation (coordination of speakers' presentations) Speakers Simon Planzer, University of St.Gallen Lifestyle Risks: Conceptualisation of an Emerging Category of Research Dr Liana Giorgi, The Interdisciplinary Centre for Comparative Research in the Social Sciences (ICCR), Vienna Lifestyle Risk: The Challenging Marriage of Two Thorny Concepts Dr Adam Burgess, University of Kent There is an Option Between Regulation and Doing Nothing: The UK Experiments with the Behavioural «Nudge» Alternative to Regulation and the Market Dr Enrico Bonadio, City University London «Nudging» Smokers: the Law and Science of Plain Packaging Dr Alan Littler, Tilburg University Consumer Protection and Online Gambling Services Dr Roel Pieterman, Erasmus University Rotterdam Holistic Policy Making: the Case of the Dutch Overweight Covenan.

SY 10.1 Lifestyle Risk: The Challenging Marriage of Two Thorny Concepts

Liana Giorgi
Freelance, Austria

Lifestyle and risk. These concepts are today so commonplace and popular that we tend to take their meaning for granted. This is a mistake since none of them are value-free. Bringing them together is therefore bound to raise questions regarding the definition of boundaries. If lifestyle is about the way one lives and we recognize that this is not alone a matter of agency but also a question of structure; and, if risk is not just about determining incidents of risk but rather about establishing the contexts within which negative outcomes are more likely to happen, then we are confronted with the challenge of how to approach the subject of lifestyle risk without falling prey to the rather strong temptation to impose normative expectations and, subsequently, standards on various lifeworlds. This article takes issue with some of the ideas advanced in the article by Planzer and Alemanno published in EJRR 4/2010 by considering the framing of the concept of lifestyle risk. The emergence of the concept of lifestyle risk is symptomatic of the more general trend to re-emphasize individual responsibility for social welfare, what Planzer and Alemanno refer to as «financial solidarity». Yet how to effect this is neither obvious nor uncontested. Accordingly, the notion of «lifestyle risk» is likely to become one of the battlegrounds for determining the scope of state intervention whereby one of the principal questions will be what gets classified as «lifestyle risk» and what not. The paper will present a thought experiment to this effect by considering the implications of the inclusion of technologies within the scope of «lifestyle risk». Two types of technologies will be considered: those associated with behavior which is susceptible to addiction and which may also entail public health or developmental risks ; and medical technologies stylized as lifestyle choices, such a PGD, but entailing difficult ethical choices.

SY 10.2 Consumer Protection and Online Gambling Services

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Consumers of online gambling services inherently engage in a risky activity; in the absence of any risk that their stake could be lost in its entirety many players would cease to find a degree of excitement. Whilst traditional bricks and mortar gambling involves the risk that individuals may play beyond their financial means or become addicted, the nature of online gambling may carry an additional risk of facilitating excessive play and heightening the potential magnitude of such excess. Different jurisdictions maintain different regulatory approaches as attempts to protect consumers from such dangers. Although online gambling is a globalised activity strong regulatory preferences emerge when consumer protection practices are compared between jurisdictions, even within a relatively homogeneous transnational market like the European Union. Between EU Member States stark differences are apparent in the degree of state intervention into the freedom of a player to choose if, and how much, to gamble online. Some jurisdictions seek to eliminate the individual's freedom of choice whilst others seek to create a regulated environment within which informed decisions can be made. Yet, even where freedom of choice gains the upper hand paternalistic tendencies are not distant since more liberally regulated markets frequently seek to protect the most vulnerable within society. This paper will begin by briefly offering some ideas as to why online gambling could be considered a lifestyle risk. It will then illustrate the aforementioned differences between jurisdictions in terms of individual liberty and state paternalism as embodied in regulation whilst questioning the effectiveness of consumer protection measures in achieving nationally defined tolerable levels of risk. Consideration will then be given to how such consumer protection measures and national preferences as to the tolerable level of risk are affected by pressures from trade liberalisation in the EU and WTO contexts.

SY 10.3 «Nudging» Smokers: the Law and Science of Plain Packaging

Alberto Alemanno [1]; Enrico Bonadio [2]
[1]HEC Paris, Luxembourg; [2]City University London, United Kingdom

This presentation is devoted to plain packaging of cigarettes, i.e. a new tobacco control tool which has been considered in recent times by several governments throughout the world (Australia might be the first country adopting such measure in 2012). By removing all the logos and trademarks from cigarettes boxes and thus standardizing their appearance, plain packaging aims to make all packs look unattractive and above all render health warnings (eg, «smoking kills») more prominent. Indeed, supporters of plain packaging believe that the right of consumers to make informed and educated choices and decisions should be ensured by public powers. In their views, it is the duty of governments to inform their citizens and consumers in general about the risky consequences their lifestyle choices could have. The declared purpose of this marketing measure is the reduction of what is considered by many as a pathological form of consumption (i.e., smoking) and thus the protection of human health. In particular, this presentation will highlight (i) how the public health effectiveness of such measure is often challenged, mainly because of the lack of evidence proving that generic packaging makes cigarette boxes less attractive to consumers and health warnings and information more visible and as a result induces smoking cessation; (ii) that such measure could even have a «boomerang» effect, i.e. it could increase smoking uptake as companies would be prompted to compete only on cigarette prices, making tobacco cheaper; (iii) that plain packaging might be considered by national and international courts as capable of encroaching tobacco majors' trademarks (thus triggering a commercial dispute at the WTO) and even facilitate the counterfeiting of tobacco products.

SY 10.4 Trade Secrets and dual-use nanotechnologies

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[1]Independent Legal Researcher, Belgium; [2]The University of Melbourne, Australia

Trade Secrets and dual-use nanotechnologies: An investigation of the potential benefits and risks posed by the development of nanotechnologies within the defence sector The last decade has seen a steady increase in the number of nano-based patents filed within jurisdictions such as the United States and the Europe Union. While it is generally accepted that the current intellectual property regime is being challenged by new technologies like nanotechnologies, it does however provide the inventor with a bundle of rights which they can protect and exert in relation to their invention. In exchange for such legal rights, the patent must be published and available to the world at large. Where a competitive edge may be lost through this disclosure, the inventor may choose instead to rely on the protections provided by the intellectual property rights framework for trade secrets. Such regimes have therefore been traditionally employed by the defence sector in preference to patent law regimes due to the perceived higher level of protection and also the competitive advantage they may offer. In this paper, we explore nanotechnology-based research and development (R&D) activities within the defence sector, with a focus on the potential dual use applications that are likely to arise out of investment in this area. Given that such R&D activities have the potential not to trigger oversight by traditional regulatory agencies, we explore the potential challenges that may be posed by use of trade secret regimes instead of patent law regimes.

SY 10.5 On patent pools, risks and rewards in the public health arena – should we abandon the traditional way of patenting?

Meir Perez Pugatch [1]; Enrico Bonadio [2]
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The creation of patent pools as a way of promoting and facilitating innovation in essential medicines is a relatively new idea and one that is currently under debate. Patent pools are a very specific arrangement, involving the cross-licensing of patents and other intellectual property (IP) by participants with the goal of accessing essential technologies for particular products. In the past, patent pools have been successfully applied to IT, high technology and other industries requiring a high volume of patents. However, the question remains if they should be utilised in the pharmaceutical and biotechnology industries in the same way. The aim of this presentation is to empirically investigate whether patent pools and related arrangements are effective in actually promoting R&D. Patent pools fall under a broader approach to research and development (R&D) that promotes the needs for «collaborative and open innovation». Since currently there are only two known patent pools in the pharmaceutical and biotechnology industry, this presentation would go a step further to look at other initiatives that are not patent pools per se, but represent the general tendency toward this approach. This presentation will examine seven existing collaborative initiatives, including patent pools, looking at whether there are visible outputs and the extent to which these are related to facilitating access to existing medicines rather than promoting innovation. Finally, the presentation would provide some broad policy considerations into the extent to which patent pools may (or may not) provide a viable alternative to the research and development of innovative treatments and medicines, especially in the fields of neglected diseases.

SY 11 Symposium proposal Project PACHELBEL: Learning about, and supporting, policy-making for sustainability in Europe

Ana Prades [1]; Tom Horlick-Jones [2]; Julie Barnett [3]; Willi Konrad [4]; Josep Espluga [5]
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Within Europe there exists a multiplicity of policy initiatives which seek to promote sustainable consumption of commodities and services. Significantly, such interventions now tend to take a more sophisticated form than being simply about «public education». Typically, they include elements of communication, advertising, incentives and engagement. These policy tools include assumptions about human behaviour, some of which draw upon research studies. How policy-makers draw upon different sources of knowledge about human behaviour in developing policy to promote sustainable consumption is not well understood. There is a need to better understand these processes, and to develop tools that support this work and promote more effective use of available sources of knowledge. This symposium introduces project PACHELBEL, which forms part of the EC Framework 7 Environment Programme (www.pachelbel.eu), and the project's early findings. It seeks to promote dialogue between the PACHELBEL team and conference participants interested in a range of research issues, including: sustainability, policy-making, governance, risk perception and communication, environment and behaviour, and citizen engagement. The central objective of PACHELBEL is the development and operationalisation of a tool called STAVE, which will be designed to support the work of policy-making for sustainability in real-world settings. The tool will support processes of knowledge brokerage, promoting the appropriate application of existing research findings, and the generation of new knowledge, focused on specific policy objectives. Members of the project team are working closely with a range of policy-making organisations in six European countries to address active real-world problem issues. This mode of research engagement seeks to generate insights 'from the inside out' into policy-making practices and processes, and the ways in which assumptions about human behaviour are incorporated into policy-making.

SY 11.1 Introducting project PACHELBEL: overview and methodology

Ana Prades [1]; Tom Horlick-Jones [2]
[1]CIEMAT-CISOT, Spain; [2]Cardiff University, United Kingdom

This paper will introduce the symposium concerned with project PACHELBEL. It will first provide a brief overview of the structure and design of the project, and what it seeks to achieve. It will then concentrate on discussing how the project's design and methodology draws upon a range of research themes, including: action research, organisational ethnography, consumer behaviour, risk perception and communication, citizen engagement, and knowledge management.

SY 11.2 Developing Policy around Sustainability: Policy Assumptions about Lay Behaviour

Julie Barnett
Brunel University, United Kingdom

What assumptions are evident in the approach of policy officials to human behaviour around sustainability? This question is being addressed across 5 European countries in a series of ethnographic studies. This is the method of choice as it is being used in order to uncover the assumptions about human behaviour that are evident in the everyday practical world of making policy rather than by simply using accounts of this world that are solicited after the event. Each of 5 project partners has worked closely with a particular set of policy officials located within national or local government bodies in their country. They have reported on the substance of their interactions with policy officials from conversations, observing meetings and other interactions as well as accessing relevant documentation. This paper is based on a thematic analysis of the first 4 such reports submitted by each country and will explore the nature of the main assumptions about lay behaviour that are made. It will focus on two themes in particular. First, and common to a heterogeneous set of policy contexts, a common theme was the identification of catalysts for changing lay behaviour. The nature of these catalysts varied between country with the strongest triggers for change being through economic incentives and the shaping effects of technology. Moral reasoning and choice were also identified as mediators of behaviour change. The second theme concerns the place that was assigned to engagement with the public in making policy around sustainability. In some instances no value or importance was attributed to understanding public perspectives. Elsewhere it was planned that public views would be captured simply as part of evaluating the implementation of a particular initiative. In closing we will reflect on the implications of these assumptions as well as upon the distinctive value that ethnographic work with policy officials provides.

SY 11.3 Citizen engagement for climate change policies: A Spanish case study on Agenda21

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Public policies to address climate change include strategies to promote behavioural changes amongst citizens and organizations. A classical tool to this end is the Agenda21 with a participative approach to, firstly, diagnosing key environmental vectors (i.e., pollution, mobility, energy and water consumption patterns, waste generation, etc.), and, secondly, elaborating proposals for corrective measures to advance towards sustainability. This paper presents the analysis of a case study based on the implementation of Agenda21 in the city of Barcelona (Spain). It aims to provide understanding on the following questions: Why did organizations agree to sign the Agenda21? What did it imply in practical terms? And what were the main barriers organizations faced when implementing specific measures towards sustainability? A three-fold methodological approach was applied in this regard: document analysis of the texts generated by the City Council throughout the whole process; 20 in-depth interviews with the organizations involved in it; and ethnographical work at the technical office of the Agenda21 in the City of Barcelona. Results illustrate the difficulties that a public institution has to face when trying to generate shared definitions of both the risk and the expectations entailed in this process, even from a participative approach. The case study presented here is part of PACHELBEL Project (EU-FP7) (www.pachelbel.eu).

SY 11.4 The importance of assumptions about human behaviour for climate policy: the example of the German regional «Climate Protection Concept 2020 Plus» initiative

Wilfried Konrad
Dialogik, Germany

Climate protection has become one of the most important policy issues affecting all levels from local to global governance. In order to reduce greenhouse gas emissions there is a need for shifting the energy system to CO2-poor power technologies and to establish new less energy intensive production and consumption patterns. The latter addresses lay people and their behaviour in various fields of everyday life like nutrition or mobility. This raises the question how policy makers can influence citizens' energy use in an attempt to tackle energy-intensive consumption patterns. It is to be supposed that behaviour-oriented climate policies to some extent will be based on assumptions policy makers make about lay peoples' everyday lives. Using the example of the recently created «Climate Protection Concept 2020 Plus» of the German federal state of Baden-Württemberg the presentation will show some empirical evidence as to policy makers' assumptions about human behaviour and their impacts on climate policy. The empirical work was based on an ethnographic approach of observing policy people in their own working environment. By «shadowing» them while interacting with colleagues and other contacts it was possible not just to get to know opinions about human behaviour, but to detect their views on these issue as they were directly related to policy making in the field of climate protection. This ethnographic fieldwork was complemented by an analysis of various kinds of documents like informal papers or official publications. The presentation will on the on hand provide findings regarding e.g. how policy makers understand the nature of lay behaviour, how they conceptualize environment-friendly behaviour, or what they think are effective means to trigger changes in behaviour. On the other hand it will be pointed out how these assumptions have been affecting the approach and the contents of a concrete climate policy strategy, namely the «Climate Protection Concept 2020 Plus».

SE 01.1 Different weights, same processes? Testing for consistent predictors in nanotechnology risk perception across applications

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Differences in the determinants of nanotechnology risk perception across different nanotechnology applications were studied through a web-based questionnaire. This aimed to assess if differences in risk perceptions between these applications were explained by the influence of different predictors or if there was consistency in the predictors found. Two theoretical-methodological approaches were used. First, measures of psychosocial predictors - affective evaluation, trust, knowledge and perceived benefits - that have been found in the literature to determine nanotechnology risk perceptions were applied. This was done for nanotechnology development and application in general and for five specific sectors - food, medical, clothes, telecommunications and military. Second, respondents evaluated eight qualitative risk dimensions for the same applications, based on the psychometric paradigm. Results for both approaches showed that factors with a strong affective component (affective evaluation and dread) were consistent predictors of risk perception across different applications. Other psychosocial factors (e.g., trust and knowledge) were demonstrated to be more inconsistent in their influence on risk perceptions. Results suggest that a basic process of nanotechnology risk perception might include consistent psychosocial predictors across applications, as well as more inconsistent and contextually dependent predictors. Implications for nanotechnology risk management and the risk perception literature are discussed.

SE 01.2 Integration of the risk perception of laymen and experts into a risk communication strategy using the example of Nanotechnology

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In order to determine how nanotechnology is currently seen by laymen and experts in Germany, the German Federal Institute for Risk Assessment (BfR) conducted a research project focusing on the application of different types of survey methods and the investigation whether these methods are suited to become routinely integrated into risk perception analysis. To pre-structure the technology area, nanotechnology, on the basis of potential risks through the involvement of various social groups a Delphi Expert Survey of the use of nanomaterials in food and consumer products was carried out by the involvement of 100 national experts. Since risk communication should also base on a participatory dialogue, a consumer conference which resulted in an official vote coming from trained laity was additionally initiated. Further information gathered by a representative population survey as well as an analysis of 501 contributions from online forums and weblogs in German-language gave a coherent picture of factors influencing the perception of people, which social dynamics in nanotechnology are significant and in which direction the public opinion could develop nanotechnology. It was also the goal to examine whether nanotechnology in media coverage is tackled more from the angle of risks or benefits and how the topic is played down, expanded on and blown up in media coverage. The overall evaluation of the corresponding surveys reveals that the consumer's acceptance for daily use of nano products is expected to be high except for products offered in the food sector. The combination of nanotechnology and food seems to fan fears and demands beside a transparently discussion labeling regulations as well as product control by independent bodies. The mass media response is mainly scientifically orientated and highlights putative advantages for normal course of life whereas in internet discussions the assessment is more negative due to an expected low value of benefit.

SE 01.3 Analyzing a dialogue about risks of nanotechnology in Dutch Science Cafés: a qualitative and quantitative analysis

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It is now widely agreed that it is beneficial for experts and policy-makers to involve citizens and consumers in discussions about possible scientific and technological innovations and their associated risks (Flyn et al, 2009). Also, the need for dialogue, public participation and «upstream engagement» is emphasized in recent studies on social aspects of nanotechnology (Pidgeon & Rogers-Hayden, 2007; Wilsdon & Willis, 2004). Others argue as well that it is time to pay attention to risks and the consequences of nanotechnology for society (cf. Royal Society, 2004). However, dialogue and upstream engagement are difficult to accomplish since the public does not always participate in science and technology issues. In this study, we analysed aspects of the public dialogue about nanotechnology in Dutch science café meetings. In 2009, the Dutch government started a public dialogue about nanotechnologies. Goals were to engage the Dutch public into developments and to discuss in a wider circle of stakeholders possible risks and benefits of nanotechnology applications. Within this framework, a collaboration of Dutch science cafés organized a series of five debates — the Nanotrail — about nanotechnology and its possible applications. In addition, a research study was carried out. For the study we applied a mixed methodology with a qualitative analysis of the meetings and a quantitative analysis of results of questionnaire data of a group of science café participants (N=251) compared to a second sample of respondents interested in science and technology but who did not visit the meetings (N=378). Results show that both groups hold positive perceptions and attitudes towards nanotechnology. Qualitative data confirmed these positive attitudes, but also showed that people preferred attention for both risks and benefits of nanotechnology. Furthermore, a minority of the respondents participated in meetings and discussions. Both groups regard citizen participation as important.

SE 02.1 Communication on electromagnetic fields and health risks; content analysis of Dutch national and regional newspaper articles and websites

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Background
There is public concern that the growing exposure to electromagnetic fields (EMF) constitutes a health hazard. People's perceptions of EMF may be influenced by the way health risks of EMF are portrayed in the media. In this study, we evaluated the content of information on EMF and health in Dutch media.
Method
To indentify relevant media content on EMF and health, a systematic search was performed on the archives of three national and two regional newspapers (from March 2008 to March 2010), and the internet (in April 2010). Content analyses included the categorisation of main topics, information sources and dominant content frame (scientific-technical, precaution and concern, conflicting interests, blame and outrage).
Results
The search resulted in the identification of 155 newspaper articles and 24 websites. In 42% of newspaper headlines a negative relation between EMF and health was suggested. Most articles used «precaution and concern» as dominant frame. National papers frequently mentioned research on EMF but study details were rarely provided. Regional papers predominantly featured conflicts around the placing of base stations, frequently citing government spokesmen and lay people. Identified websites were set up by different sources (research and advise, n=7; government information, n=6; interests groups, n=8; energy and telecom companies, n=3). They generally inform about possible health effects, including research, and public responses and predominantly used a «scientific-technical» or «precaution and concern» frame. Detailed information about research, technical aspects, biological mechanisms and regulation is lacking.
Conclusion
Dutch media often mention negative health effects of EMF and conflicts around the placing of EMF sources. Details about effects and regulations are rarely mentioned. This may shape the public perception and should be taken into account when designing risk communication on EMF.

SE 02.2 Measurement Supported Information Series Concerning Potential Health Risks of Mobile Communication

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Immissions from German transmitter stations are far below legally imposed thresholds. This is ensured by the approval procedures of the Federal Network Agency. Yet people are afraid of health risks, associated with high-frequency electromagnetic fields of mobile communication. People wish to know the precise level of immissions in their neighbourhood. Therefor since 2003 the Information Centre for Mobile Communication (IZMF) commissions in cooperation with state authorities independent experts to perform EMF-measurements. Goal is, to facilitate a fact-based dialogue about potential health risks of EMF, and to improve the knowledge about its technological and physical background. The measurement part of the project aims to investigate typical exposure scenarios in the vicinity of base stations and allow estimations for comparable locations. To evaluate the measurement results the IZMF cooperates with independent specialists of metrology, medicine and risk communication. In order to inform the public the measurements are suplemented by a comprehensive information campaign composed of pressconferences, workshops public information days and specific brochures for every campaign. The measurement and information series proved to be an efficient instrument to enhance public knowledge concerning technical, physical and health facts on mobile communication. They demonstrate that the immissions are far below the national safety thresholds, even in close vicinity of antennas. The involvement of independent experts caused a high degree of objectivity and widespread media coverage. The cooperation between state authorities and municipalities guaranteed credibility and evoked great public interest. In all participating federal states, the cooperation partners confirmed a significant decrease of health concerns. Municipal and federal state authorities regularly use the project material for public information and for finding a consensus on specific local problems.

SE 02.3 Health complaints, attribution, and perceived health risks of electromagnetic fields among participants with and without self-reported electro hypersensitivity.

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Background: Around 50% of the European population is fairly to very concerned about possible health risks of exposure to electromagnetic fields (EMF). Some people attribute their physical complaints to EMF. The aim of this study is to asses how individuals with self-reported electro hypersensitivity (EHS) differ in physical complaints from the general population and how this difference relates to perceived risks of EMF and attribution to EMF. Method: A questionnaire was filled out by two groups: (1) People with self-reported EHS (n=116), recruited via a Dutch organisation monitoring environmental related health problems; and (2) a representative group of people from the Dutch population (n=1009), recruited through an online panel. We compared the groups on physical complaints, attribution of complaints to EMF and other causes, and perceived risks of EMF. We used mediation analysis to asses whether perceived risk mediates the effect of complaints on attribution to EMF. Results: As expected, the EHS group reported more complaints, more frequent complaints, and higher risk perception of EMF than the general public. The EHS group attributed complaints more to EMF and air pollution (environmental causes) than the general public, but did not differ in attribution to other causes, e.g. lifestyle. Mediation analysis showed that perceived risk of EMF partially mediated the effect of complaints on attribution to EMF. Conclusion: EHS individuals have a stronger attribution of their complaints to EMF. Our results suggests that this attribution is enlarged by their risk perception.

SE 03.1 Risk from product counterfeiting and the resilience of legitimate supply chains

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There is an increasingly important risk arising from the counterfeiting of safety critical products like pharmaceuticals (Yar, 2008), threatening not only the welfare of individual consumers but public health more widely. It is evolving towards more threatening forms, moving (for example) from the sale to credulous consumers of counterfeit lifestyle drugs to the infiltration of public health services with counterfeit life-saving drugs. It is a characteristic risk of later modernity: reflexive (Beck, 1992) and migrating (Alcock and Busby, 2008), arising from efforts to protect ourselves and our own choices about how to do so. The aim of this study is to develop a normative framework for analysing the resilience of legitimate supply chains to counterfeiting risk. It is based on two elements: 1) an analysis of the causes and consequences of counterfeiting, drawn from a literature survey, showing the causes that need to be mitigated and the consequences to which robustness needs to be developed; and 2) an analysis of the strategies adopted by counterfeiters, drawn from a secondary data set of publically reported cases, showing the specific threats to which resilience needs to be developed. The normative framework is intended to be reflexive in nature — stressing how the choices of actors in legitimate supply chains can facilitate and incentivise counterfeiting. We also propose further research on counterfeiting risk, particularly: 1) studies of the perception, social amplification and cultural selection of counterfeit risk - the latter especially relevant given the cultural differences concerning the legitimacy of counterfeiting; 2) studies of the social construction of counterfeiting risk — especially relevant given the rhetoric that surrounds the issue; 3) the study of risk management practices — especially interesting given the importance of reputational concerns when the institution threatened by counterfeiting, ie trademark, is itself a reputational device.

SE 03.2 Environmental Forensics: A New Field for an Expterise Driven in a Project Management Mood Frenche Perspective

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1 Judicial expertise in Environment In the field of environment, expertise applies mainly to risks, then damages. That expertise encompasses both the field of prevention or preparation of public authorities decisions and litigation. Then in environment related litigations, judicial expert in France remains still mainly an individual. His links with jurisdictions make him in fact a man of dispute and litigation. 2 Some specific aspects of environment related litigations and expertise Environment is at once a qualitative domain : nuisances are domains in which the appreciations truly change according to the person who undergoes them, and transverse because a particular litigation recall numerous disciplines: causes of pollution raise many of the chemistry skills, and its effects, various domains of the bio sciences. 3 Environmental Forensics: a new domain for expertise on litigation solving «Environmental Forensics», the legal expertise in environment is a field of investigation which develops solutions and methods related to specific disciplines: from dendro chronology to chemistry, olfactometry....That domain needs to be developed trough improved methodology which will be presented. 4 Managing a plurality of skills to answer a plurality of stakes The wide span of environmental stakes requires an extended field of knowledge and mobilized disciplines increasing the number of tasks to be carried out. So expertise presents several of the characteristics of a project: a plurality of tasks, plurality of skills, 5 Environmental forensics: expertise lead as a project Then, the expert has to be a project manager which means that he has to deal with: - a wide array of skills, - management of resources – technical, financial - in front of court and litigants requirement, In a process binded with a calendar and accuracy of answers, project management tools become there mandatory to answer those environmental forensics questions.

SE 03.3 Claims prevention within home insurance: Insights from insurance customers

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The recent economic crisis has speeded up the concentration process within the European insurance sector. However, nowadays customers are more price sensitive, which increases pressure for the whole industry and in consequence leads to further premium erosions. Thus, some insurers are seeking new ways to differentiate their portfolio by offering innovative insurance products combined with prevention activities to compete with a high value-added service strategy. The objective of this research is to gain knowledge about consumer habits related to prevention articles and the acceptance of prevention solutions to the issue of water claims prevention. We explored this through an online survey (N=197) and Telephone Assisted Web Interviews (N=122) using the same questionnaire to allow a mixed reporting of the data. The respondents are all Swiss individuals which are all responsible for the buying decisions of insurance products within their respective households. About one fifth of all respondents indicated to have at least one insurance relevant claim within the last five years. The main claims cause results in water related damages followed by fire. But in terms of claims prevention individuals are just almost exclusively aware of fire protection than on water claims protection. More than 40% of the Swiss households are featured with fire extinguishers and fire blankets, however less than three percent use water sensors to detect water leaks or related damages. The main reason is that fire protection helps to prevent injuries and may save lives while water claims prevention can be implemented (from an insurance point of view) to save high claims costs. Based on our surveys we are able deriving recommended actions for insurance companies in order to reduce claim costs by motivating claims prevention to their customers. Henceforth, this increases their own differentiation capabilities as well as customer loyalty in the above mentioned weak market environment.

SE 03.4 Biogas safety and regulation: the EU situation

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New energies are experiencing a great development in the world and particularly in Europe. As a result, solar panels, wind turbines and other ecological technologies are more and more installed in many European countries and are constantly evolving. The main purpose is to find an alternative energy replacing the fossil energy dependence which is more sustainable and reduce CO2 emissions. Biogas has a special major advantage: it reuses the waste as raw materials. The production of biogas is positioned as energy which can not only generate a source of energy known as ”green” but also which can recycle waste. In a context of sustainable development, the place of the biogas is therefore essential. However, the processes of anaerobic digestion or biogas are continually improving and new ideas for the uses of this gas continue to emerge. Thus, the risks corresponding to processes of biogas production from biomass are still too little known. Several questions appear about the optimization of the production, the safety, the harmonization of the regulations and the need to develop standards (at EU or International Level). To find answers to these questions, INERIS and EU-VRi took the initiative to organize a workshop on biogas safety and regulation on November 24, 2010 in Paris. The communication helps to share knowledge, to structure questions, and to propose answers on further actions aiming at improving safety of biogas production and supporting the quick and sustainable deployment of this energy. The key messages from the workshop can be summarized as follows. Regarding the safe production and uses of biogas, it is important to reach a harmonization at least at EU level. The workshop pointed out the need to create a ”safety network” and a platform to share safety information and best practices (database). The participants also agreed that an important issue for safety is the systematic performance of risk analysis for all stages of operation.

SE 04.1 Assessing the risk(s) of a resilient system operating in a complex and dynamic environment

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SINTEF Technology and Society, Norway

The specific field of interest is how to assess the overall risk of a system with resilient capabilities that operates in a complex environment in which performance variability and handling of surprise is the normal state of affairs. The main issues addressed are 1) complexity in the sense of a tendency to (re)produce unintended effects and emergent (novel) pattern as an inherent effect of normal operations, 2) organizational resilience in terms of the foundations for a concerted and coordinated attempt of systemic proaction across a diversity of organizational (decision) contexts, and 3) a perspective of risk that aims at comprehending the pathogenic as well as the salutogenic contributions to overall risk. The paper is theoretical comprising a sense of perspectivism, that is, employing both a systems perspective on complexity and resilience as a systemic property on one hand, and a community of practice perspective on the implementation of resilience on the other hand, as well as a (preliminary) attempt to integrate these into a risk perspective that traditionally embeds a more or less tacit presumption of benefits achieved from being as atheoretical as possible. The expected results will be directly relevant for projects conducted at SINTEF with national and international partners, addressing the new conditions for framing of risk itself as well as risk mitigation practices (e.g. resilience), following from the ongoing transition to «Integrated Operations» (IO) in the Norwegian offshore petroleum sector. The discussion and results are however expected to be highly relevant as input to translations to similar industrial (as well as service-providing) contexts, due to their theoretical level and orientation which emphasizes that scientific contributions should be neither purely descriptive nor prescriptive, but seek to be actionable in a dynamic, interactive collaboration between (risk) management and practitioners.

SE 04.2 Socio-economic factors affecting physical vulnerability

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In the literature, it has been widely investigated impacts of physical failures on socio-economic structure of affected areas. The scale of those impacts can be evaluated on infrastructural system and recovery period. Minor impacts tend to affect social and business environment in short terms with a certain limit whereas major ones would create associated stress and conflict in community and economic tension at regional or national scale. Once considering physical environment which is a product of socio-economic milieu, behind the scene, it is possible to find out some traces on this mutual relationship which either increase or decrease vulnerability. Our assumption is defined as while the vulnerability of infrastructural systems are related with socio-economic systems, consequently, socio-economic systems are affected by the miss-functioning of infrastructural systems, where this vicious circle may lead cumulative impacts on urban system. To reveal the impacts of socio-economic factors on physical vulnerability, our starting point will be the impacts of infrastructural damages on socio-economic asset of a given region and subsequently, the inherent vulnerability of socio-economic system which enhance infrastructural vulnerability. The findings of this study which have developed due to numerous case studies (e.i. Northridge and Kobe earthquakes, Hurricane Katrina) related to past experiences from major disasters, show that the vulnerability and the resilience depend on implementation of regulations, redundancy and engineering approaches to improve new technologies and uncertainties. On the other hand, community is essential to increase resilience and to decrease vulnerability of settlements. Awareness, risk perception and acceptable risk level of each community depend on how much information they can get. Therefore, dissemination activities on disaster mitigation are very important to decrease socio-economic vulnerability which has direct and/or indirect effects on other components of vulnerability.

SE 04.3 Developing health risk assessment training in Europe - the Risk ASSETs Project

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In recent years there has been a substantial increase in EU policy and legislation requiring health risk assessments to be undertaken. Alongside this, there is also a continuing public health need to conduct health risk assessments to protect public health and inform decision making. However, there remains a dearth of training opportunities across Europe to develop health risk assessment skills and these are often not focused on the requirements of EU policy and legislation. In 2008, the EU commisoned the Risk ASSETs (Risk Assessment and Management - European Training Programme) project, to develop a proposed Europe-wide training scheme for health risk assessment. This involved characterising health risk assessment training needs in Europe via an extensive literature review and survey of practicing health risk assessors. From this, competencies for health risk assessors were developed and refined during two international workshops and a Europe-wide consultation process. The finalised competencies were then used as a basis to develop health risk assessment training materials, with a view to providng a pathway to a Masters level qualification in health risk assessment. Alongside this, a proposed administrative framework for the health risk assessment training programme is being developed. The administrative framework will propose how such a training scheme should be coordinated and implemented and address issues such as recognition of qualifications and training undertaken outside the Risk ASSETs training programme. This paper will provides an overview of the Risk ASSETs project, and presents results to date on the development of the training programme. If implemented, a coordinated health risk assessment training scheme will not only help improve the quality of health risk assessments and ensure better public health protection, but also contribute to the career development of health risk assessors themseleves.

SE 04.4 Improvement of complex transportation systems against disasters

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When the effects of a natural hazard combine with complex city systems, it turns into a disaster which creates serious physical, economical and moral lost. In the literature, it is always mentioned that the complex physical and social network in a metropolis are the main factors which lead to damage after a disaster. It is true that without any changes on the ratio of hazard, risk could be increased due to the vulnerabilities of physical, social, economical and organizational systems that exist in the complex environment of a city. However, complex networks also contain the opportunities to decrease the risk and increase the resilience of systems and cities. Cities as complex systems are composed of diverse sub-systems. Transportation system is one of the sub-systems which is interdependent and vital to other sub-systems. Having some failures in one of these systems could lead to problems in another one as well. Transportation is the core of this paper because transportation infrastructure requires long repair times than other lifeline systems. Moreover, long term economic impacts because of long restoration times lead to loss of competitiveness, decreasing number of jobs and changes on the spatial pattern. Improvement in the transportation system of a city could serve to increase resilience of a city by decreasing pre-existing conditions of disaster vulnerability. The hypothesis of this paper is that with an understanding of the complexity of transportation systems, a strong and sustainable transportation system will contribute to resilience of a city. This paper aims to show that the main mistake done frequently is dealing with the complex problems as they are just complicated issues. The suggested methodology is to alter the way of asking questions by introducing a new perspective which considers connectivity, interdependency and feedback factors. Complicated questions lack these factors and conceive the problem separated from the whole system; where complex questions focus on providing solutions to the problems by considering them as a part of an entire system by having characteristics of connectivity, interdependency and feedback mechanism. Thus, asking complex questions those focus on the characteristics of being complex instead of complicated ones, would help better defining problems and providing necessary answers. To sum up, this paper sheds light on the notion of complexity, what makes a system complex and the complex nature of transportation systems. The aim is to reveal an alternative reflection of complexity of transportation systems with respect to natural disasters. With the help of a literature review on what questions asked by responsive bodies to tackle disaster problems with respect to transportation; it would be possible to see new constructive questions to be asked as for more affective risk assessment and mitigation processes.

SE 05.1 H1N1: perceived risks and decisions across healthcare occupations

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There were many firsts during the 2009 H1N1 pandemic: a new swine origin A/H1N1 influenza, the declaration of a pandemic, production of a new vaccine, plans for its distribution, development and dissemination of new educational messages and the implementation of a widespread immunization campaign. Accompanying these events were new risks and the need to make decisions given limited information. Healthcare workers are an important target group in pandemic planning — they face an increased risk of exposure to H1N1 given their role in patient care. To date, research has only examined the intent to get vaccinated for H1N1 among healthcare workers. The purpose of our study was to go beyond intentions and to examine: (1) risk perceptions of H1N1 and seasonal influenza across healthcare occupations, and (2) decisions around actual personal behaviors and choices related to H1N1 (including the level of absenteeism/presenteeism among healthcare workers given H1N1 symptoms, H1N1 vaccination and other protection measures). An online survey was developed and implemented in partnership with local agencies, associations and unions involved in occupational health and safety. The survey was administered in British Columbia, Canada (N=150), and was randomly stratified across three healthcare groups (lab technicians, nurses and physicians) to account for differences between occupations. This presentation will discuss the results of this study and their implications for improving current risk communication and educational programs available to healthcare workers during seasonal influenza outbreaks and pandemics.

SE 05.2 Communicating swine flu in the food safety context

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During the initial days of information on the epidemics of Influenza A, the term used to name this pathology was swine flue. In Spanish, the term used was gripe porcina, which could be translated as 'pork flu'. Because of the influence that such a term could have on public perception (and, consequently, on the consumption habits of the population) a case study was conducted in order to analyse how the issue was addressed both by the media and its sources.
Main results: In less than a week from the first news about the epidemics (04/25/2009), the main Catalan TV channels and newspapers changed the denomination of the disease from Gripe Porcina (Pork Flu) to Nueva Gripe or Gripe A (Novel flu or Influenza A). The analysis of the press releases elaborated by the main sources of information (European Commission, WHO and local governments) showed a clear strategy behind this change, drawing the attention away from the pigs, and thus avoiding important misunderstandings on the perception of risk related with pork consumption. This case could be considered as a good practice from the point of view of food safety communication. Nevertheless, the communication of Influenza A also showed how easily a state of alarm can be generated when certain news appear constantly, particularly if accompanied with threatening images.
The communication of swine flu has been analyzed in the context of the SAM report (Seguretat Alimentaria i Mitjans meaning Food Safety and Media) a project which aims to improve the information that society receives on food safety and food security issues.

SE 05.3 Trust in Canadian pandemic H1N1 risk messages: Manitoba Metis Perspectives

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The objective of this research is to determine if (and what aspects of) public health risk communication activities have had an impact on Metis people's trust in decision-makers on key issues related to pandemic H1N1. Between October and November in 2010, 17 mixed gender focus groups were conducted with the following age categories: 18-34; 35-54, and 55+. Overall, participants were skeptical of public health messaging around H1N1. While many were able to identify the common strategies about how to protect oneself from developing H1N1 (e.g. handwashing, staying home while sick, getting immunized, etc), few did not feel they had adequate information about H1N1 to protect themselves or their family. Moreover, many participants were confused about why Aboriginals had been prioritized to receive the vaccine, where several indicated that they thought the H1N1 vaccine was being tested out on Aboriginals for potential harmful effects before giving it to the general population. While trust in provincial (Manitoba) and federal (Health Canada/PHAC) agencies varied, only some of the measures of trust based on the construct of «cooperation» were taken up by Metis. Vaccine uptake among participants in this research was low. Study results, while focused on Metis, highlight how public health agencies need to pay more attention to the specific socio-economic and cultural contexts of First Nations, Inuit and Metis peoples when planning for, managing responses and communicating risks associated with pandemic outbreaks.

SE 05.4 Risk perception, trust and behaviours among the Swedish population during the 2009 outbreak of A(H1N1) influenza

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During the 2009 outbreak of A(H1N1) influenza the Swedish healthcare authorities invested considerable effort to inform the population about precautionary measures. Sweden was also one of few countries that offered the opportunity for all citizens to receive vaccination. Since about 60% of the population was vaccinated, these efforts do seem to have been quite effective. However, a considerable percentage refrained from vaccination and/or from taking particular precautionary measures. The purpose of the present study was to examine different perceptions among the Swedish population regarding the pandemic outbreak, the vaccination issue and the actions of key Swedish authorities during this period. Retrospective survey data were gathered (April-August, 2010) from a random national sample aged 18-79 years (n= 1,587, response rate = 53.2%). Preliminary findings indicate that perceived risk, concern, knowledge about the influenza and the vaccination process, as well as trust in authorities were all important mediators of taking vaccination and precautionary measures. Concern about spreading the infection to relatives was given as the main motive for getting influenza vaccination, while low personal risk and concern about vaccine side effects were the main reasons for refraining from vaccination. Analyses of demographic variables revealed that women, persons between the ages of 26-39, employed persons and parents with children between the ages of 0-6 months were overrepresented among those vaccinated and also showed a higher frequency of precautionary measures. A cluster analysis identified three distinct profiles of perceptions and attitudes. These profiles indicate at least two different rationales for taking vaccination: one based on personal perception of risk and vulnerability, and the other mainly based on trust in authorities and a sense of community responsibility. Implications of the results for risk communication in future pandemics are discussed.

SE 06.1 Stakeholders would Protect Aquatic Ecosystems from Risks of Pharmaceuticals: a Hospital Case Study

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Pharmaceuticals are only partially removed in wastewater treatment plants (WWTP); many end up in water. Negative effects on human health are not expected and predicting environmental consequences is difficult. X-ray contrast agents have a low ecotoxicological risk, but are persistent and emitted in highest amounts. Despite uncertainties, wastewater experts are discussing measures to remove pharmaceuticals, centrally at WWTP or at point sources (hospitals). As decision support, we combined a stakeholder analysis with multicriteria decision analysis in an interdisciplinary project. Aim was to assess stakeholder acceptance for different technologies and organizational measures to reduce pharmaceuticals in the wastewater of two typical Swiss hospitals. We analyzed 68 (general hospital) and 50 alternatives (psychiatry). We combined expert predictions (e.g. costs, ecotoxicological risk) with subjective preference-valuations, which we elicited in 26 interviews (authorities, hospital personnel, experts). We included uncertainties of predictions and tested robustness of results to different risk attitudes. The general hospital contributed 38% to the total load at the communal WWTP, the psychiatry 5%. For the general hospital, alternatives that remove all pharmaceuticals, performed systematically better than the status quo, despite higher costs. We included cheaper alternatives with urine separation, because 60—70% of the load is in urine. However, these performed poorly, apart from removing most X-ray contrast agents with roadbags. In the psychiatry, costs were more critical. Stakeholder feedback was very positive. They were pleased that the results were robust for various representatives from the wastewater and health sector. The study gives important insight: measures to reduce uncertain environmental risks from pharmaceuticals will likely meet acceptance, despite costs. Hospitals should be considered if the contribution to the total pharmaceutical load is fairly high.

SE 06.2 What does risk transparency mean for pharmaceutical regulators?

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Today there are unprecedented calls for greater transparency among pharmaceutical regulators, in both Europe and North America (EMA 2010; Garattini and Bertele 2010; Grassley 2007; Harris Interactive 2009; Lancet 2010). Many of these calls have led to concrete policy actions such as the posting of adverse events reports on the internet or individual requirements to disclose conflicts of interests. Transparency is certainly necessary to prevent «cover ups» and contributes to the positive view that organisations are open and honest (Breakwell 2007; Matsumoto et al. 2005; Schutz and Wiedemann 2000). As one may expect more information about risk is likely to have an impact. But are pharma regulators always clear about the impact that their transparency policies may have? For example people may gain more confidence in the data but they may also see how policy makers muddle and bicker throughout the decision making process (Lindbloom 1959; Stone 2001) and as an effect may become more critical (Strathern 2000). The question is therefore: what form of transparency do regulator promote? And what form is conducive to more effective risk decisions? Is it «fishbowl» transparency (Coglianese 2009), where the focus is on the release of raw data, or is it «organised» transparency where the focus is on supporting a meaningful exchange between stakeholders? These questions of paramount importance are addressed in this comparative review of European and US regulatory practices. Our research has concentrated on specific cases of drug and vaccine scares. It shows that putting out information without adequate explanations often leads to greater public confusion. There are strong indications that neither European nor American agencies have sufficiently tested the impact of transparency measures before their introduction. The conclusion is that the idea of a European white paper on Transparency may gain some momentum as the negative impact of ill-conceived policies becomes apparent.

SE 06.3 Training Courses for Medical Professionals on Potential Health Risks of Mobile Communication

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In the general public, new technologies are often associated with potential health hazards. A number of studies describe that people who are worried about EMF-health risks often ask physicians for advice. However a survey on general practitioners, which was part of the German Mobile Communication Research Program (DMF), showed that most of them are inadequately informed about EMF health research. Some of them even seem to stir up more fears instead of providing fact-based information. Physicians should have access to actual scientific knowledge about high frequency electromagnetic fields (RF-EMF) of mobile communication; in particular as concerns about new technologies affect considerably the perception of health risks. Therefore, since 2005 the Information Centre for Mobile Communication (IZFM) offers a series of training courses for medical professionals, focusing on mobile communication and health. They are performed by Kinderumwelt GmbH, a non-profit organization, and the Institute of Hygiene and Environmental Medicine at the Justus-Liebig-University in Gießen. Three lectures are presented by independent scientific experts, covering the topics: a) Spread and physical effects of RF-EMF b) Biological effects below the safety margins; c) Physician - patient communication. Since 2005 approximately 1400 participants have attended 37 trainings in cities all over Germany. The training series are approved by the German regional medical associations. They credit usually four CME points (Continuing Medical Education). The analysis of the evaluation questionnaires demonstrate, that the majority of the participants consider the acquired knowledge as useful. Especially, they feel better prepared to argue with patients who are worried about the immissions of mobile communication. The high acceptance of the described training courses gives evidence that the target groups — physicians and related professions — have been reached and instructed successfully.

SE 06.4 Multiple hazards and hierarchies of risk: the contribution of staff prioritisation of perceived risk to the aetiology of adverse events in hospitals

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Although there is ample evidence that people both perceive multiple hazards and respond to them in different ways, there has been less focus on how people simultaneously perceive and prioritise the multiple hazards they experience in their daily lives. Crucially, the circumstances under which one perceived hazard may take precedence over another, qualitatively different, threat when it is necessary to make choices is rarely addressed. Health professionals need to be continuously aware of multiple and qualitatively different threats to the well-being of vulnerable patients. They must also balance decisions about the relative importance of such threats and the urgency of the response required against their own personal needs and preoccupations and those of the organisation as a whole. However, despite awareness of the importance of patient safety, adverse events concerning patients run into hundreds of thousands each year and remain a major problem. Adverse events relating to failure of routine procedures account for around a third of the total and are particularly likely to be seen as evidence of negligence. The research reported here comes from an on-going qualitative study of adverse events in an acute hospital. It focuses on the contribution made by the multiple perceptions of risk of hospital staff to failures in carrying out routine procedures, putting patients at risk of harm. The data already collected from in-depth interviews with those involved show clearly that staff perceptions of the multiple hazards in their environment vary in their salience and hence in the extent to which they generate action at any particular time. There is evidence that staff are, to a greater or lesser extent, aware of this 'hierarchy of risk' and create algorithms for effective prioritisation. However, emerging data suggests that they may have difficulty in adhering to these, particularly under pressure of time, when unexpected events occur, or when fatigued.

SE 07.1 What should be a good crisis communication?

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Crisis communication is more and more becoming a management tool to back decision makers during crisis situations. This paper deals with the main determinants needed to help a crisis to be solved, by presenting in the present context the basic hypotheses, then by demonstrating, in a study-case, how to establish ideal conditions allowing those hypotheses to take place. Literature on crisis is quite important but no paper is able to deliver accurate solutions to those specific situations. When a crisis occurs, it's the whole firm which is completely disorganized. Most of the time there's an important media pressure and a total loss of management basic principles. If more and more firms ask to be trained by specialized consultants with made-up scenarios, it seems quite obvious to study the reasons why crisis communication is nowadays essential. Our case study is from the civil security field, involving loss of human lives. We have collected data using a participative observation method among twenty different categories of actors. We'll present a brief overview of the crisis literature, then explain why this case study is interesting and we'll highlight a bad interpretation of the events, four prejudicial factors, the adaptive skills and the capacity of response of the helpers. We'll show that it is necessary to create a room crisis with a skilled team, to have solidarity among the helpers, and to create dynamism in the firm to make everybody think that this firm is healthy. Crisis communication is only a management tool that should be offered to identify and select persons, who have to be trained by regular crisis exercises and who should possess an important relationship network.

SE 07.2 The Influence of Risk Perception on the Purchase of Compulsory Earthquake Insurance in Turkey

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Since the Turkish Catastrophe Insurance Pool (TCIP) could not offer compulsory earthquake insurance (CEI) for homeowners, homeowners purchase CEI contracts voluntarily. In this context, the penetration ratio of TCIP could not be increased above 20%. Thus, assessing the influence of risk perception on the decision process of homeowners in purchasing CEI contracts could be essential to develop suitable hazard insurance policies. According to numerous studies, risk perception can have significant influence on insurance purchase. The international disaster policy points out also the significance of increasing risk awareness to promote safety culture. Changing perceptions through suitable risk communication strategies can increase willingness to take risk reduction measures. In this study, the influence of perceived risk on CEI purchase decision of homeowners is evaluated through an empirical study in a high risk district of Istanbul, Zeytinburnu. The analyses assessed earthquake risk perceptions through several variables that vary from general to specific earthquake risk perceptions as well as to attributes of earthquakes. Based on findings, the level of perceived earthquake risk seems to not influence purchase of CEI contracts. Despite, perceiving earthquake risk as more controllable through scientific and technical measures is found as involved with the purchase of CEI contracts. In addition, perceiving CEI purchase as compulsory seems to lead perceiving more losses and earthquakes as more controllable and causes to purchase CEI contracts. Indeed, multivariate analysis revealed that perception of CEI purchase as compulsory has more influence than risk perception. Although implementing CEI as compulsory may increase the penetration ratio, increasing perceived controllability seems to necessitate participation of homeowners into community risk mitigation projects. Thus, this paper attempts to design suitable strategies for communicating and decreasing risks.

SE 07.3 Changing perception from disaster to pre-disaster The effects of the August 1999 Kocaeli Earthquake in the legal system of Turkey

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The events are the fault lines between past and future and when a natural disaster happened, it creates big chaos, because of the accumulation of mistakes done before the event. After occurrence of a disaster, these mistakes are clarified and argued by the awareness of public, media and governments. The 1999 Kocaeli earthquake, which affected the entire country very deeply, led to opening an opportunity window in Turkey. To understand the changing perspective of the government, there is a need to look at the legal system and the projects authorized by the government and the Istanbul Municipality before and after the event. The aim of this paper is to evaluate the Turkey's legal system and the projects conducted in Ystanbul related with disaster mitigation after the 1999 Kocaeli earthquake to reveal the changing perception of the country from post-disaster to pre-disaster. To clarify profoundly the legal system of Turkey related with natural disaster, there is a need to look at the 1982 constitution, the disaster law (Law no: 7269), the compulsory earthquake insurance and the 8th national development law. As for the projects, they are conducted by the government, municipalities, universities and research institutes and related with assessment, mitigation and management of earthquake risk and thirteen projects, which are conducted by aiming to assess, mitigate and manage risk, are going to be analyzed in this paper. As a result of this study, it can be said that all these laws and projects mentioned in the paper must be integrated with each other and new organizational schemas have to be formed to create permanent institutions to reduce risk. Although the point of view of the government has changed from post disaster to pre-disaster, the assessments of the legal system and laws are far from being related with complementary disaster management plans, however projects conducted by several institutions filled up this hole.

SE 07.4 Integrated research on disaster risk

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I describe the science plan for an international programme on Integrated Research on Disaster Risk (IRDR), available at: http://www.icsu.org/Gestion/img/ICSU_DOC_DOWNLOAD/2121_DD_FILE_Hazard_report.pdf. Of particular relevance is the emphasis on the need to combine insights from social and behavioural sciences with those from natural and physical sciences. This recognises the fact that the occurrence of a disaster following a hazard event typically depends, not only on the event itself, but also on decisions and actions taken (under uncertainty) by people at several levels, from individual citizens to national governments and international corporations and institutions. Hence, a fundamental question is how and why people's interpretations of the risks of various natural hazards relate to their actual choices and behaviour. Despite contributions from research within separate disciplines, gaps remain in terms of where research activity (and funding) is presently concentrated. These include: Challenges in generalizing from one type of hazard to another, or to combinations of hazards. Challenges in generalizing across cultures. A greater emphasis on risk forecasting than on communication. Incomplete understanding of why and when local citizens' evaluations of risks may diverge from scientific forecasts. Incomplete understanding of how people's decisions may diverge from their evaluations of such risks, an emphasis decisions from description rather than decisions from experience. Within traditional research on decision-making, an emphasis on choice between sets of prospects of known expected value, as distinct from contexts where information is acquired through experience. Within policy/planning, an emphasis on protection or restoration of existing infrastructure, rather than redesign for greater resilience.

SE 08.1 «How Is My Drive?» - Risk Mitigation Through Technology-enabled Behavioral Change in the Motor Insurance Industry

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Motor insurance markets in Europe are characterized by comparatively high combined ratios due to the commoditization of motor insurance products, for which differentiation from competitors through product attributes other than pricing is difficult. As a consequence, insurers have focused on strategic initiatives that promote operational efficiency, thus further increasing cost competition. In our research we analyze how insurers can leverage innovative technology in order to both increase customer loyalty and reduce claims expenses through risk mitigation. On-board devices connected to the standardized OBD-II data port, which is a mandatory equipment of vehicles manufactured after 1996, record, evaluate and transmit vehicle parameters that allow for the inference of driver behavior characteristics. Based on this information insurers can take measures to improve driving style of their customers, which can reach from basic driver information and education to individualized pricing schemes. As a consequence, accident risk is reduced and the trust of customers in their insurance brand is increased. We present a survey of state-of-the-art telematics solutions that provide above-mentioned functionalities and discuss the relevant parameters that suffice to evaluate driver behavior with respect to the resulting risk exposure. Furthermore, we propose a process-oriented framework for driver risk management through an insurer, which allows for a comprehensive description of involved actions separated into data acquisition (1), data analysis (2), interaction with driver (3), behavioral modification (4) and assessment of benefits (5). Based on this framework, insurers can classify and evaluate different options for technology solutions and the associated business models. Through our research, we aim at conveying a strategic option besides cost leadership for motor insurers which delivers benefits for both customers and the insurance business.

SE 08.2 Prevention as element of a differentiation strategy for cargo insurance companies: risk management vs. risk avoidance

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Since its deregulation in the early 1990's the insurance market today is characterized by fierce competition and price sensitive customers. These facts lead to strongly decreasing premiums particularly in the cargo insurance sector. Up to now, the main challenge for cargo insurances is a risk adequate pricing. This is exacerbated by the low transparency of the customers' shipping processes. Furthermore, claims amounts of cargo insurance companies increase significantly due to the rising risk of accumulation, moral hazard of insurance holders as well as theft and damage frequency. The research objectives are to structure prevention technologies and to analyze its impact ex-post on damage and loss reduction. This includes the identification of major problem areas associated with transportation damages and losses (e.g., by analyses of claims amounts, claims frequencies, causes of claims and affected goods) leading to an appropriate risk profiling/ mapping according to industry, transport mode and transport region. To study this issue, we analyzed claims data from one of the largest transportation insurance providers in Europe. The sample consisted of 18,146 claims made in the recent ten years as a result of incidents in transportation. In this sample, the insurance holder was either a LSP or a shipper. The average loss given incident was €19,265. The five largest incidents accounted for a loss of €4 to 11 million; all of these five incidents involved trucks and valuable pharmaceuticals. Henceforth, an analysis and categorization of prevention solutions will be presented to effectively minimize or prevent damages and losses in future. We develop a first approach for an insurance company's innovative business model to reduce claim costs by motivating loss prevention to its customers. Thus, the research aims at deriving recommended actions for insurance companies in order to increase their own differentiation capabilities as well as to increase customer loyalty.

SE 08.3 Consequence, Time and Interdependency-based Risk Assessment in the Field of Critical Infrastructure

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Critical infrastructure encompasses a broad spectrum of vital sociotechnical sectors, such as transport, energy, ICT, health services, water etc. Their partial or complete failure could threaten supported societies, national security and create various kinds of crises. Several risk assessment approaches for assessing and measuring critical infrastructure related risks have emerged in theory and practice. The problem with these approaches is their risky reliance on probability of rare extreme events, disregard of cross-sectoral interdependency and time effects. This paper aims to explore risk assessment possibilities by moving away from the the risky application of probability towards nonprobabilistic but quantitative approaches, as suggested by Bier, Haimes, Lambert, Matalas & Zimmerman (1999). Our Consequence, Time and Interdependency-based risk assessment approach (three dimensional CTI model) aims to diagnose what consequences can emerge in what time (how fast), and with what intersectoral effects. We argue that critical infrastructures that have capacity of causing the highest societal consequences and strongest intersectoral negative effects in shortest time period would represent the most risky infrastructures. Our direct risk calculation based on the CTI formula was further improved by the network-based risk calculation (multi-risk analysis) that takes into account the network transfer of risks among different directly of indirectly dependent critical infrastructures. We tested our model on seventeen subsectors of critical infrastructures in Slovenia. The questionaire on basic variables was consensually filled out at workshops by 113 relevant public and private managers. The results show highest direct riskiness of the subsectors electricity, road transport, medicaments and laboratories and water quantity. The network-based risk calculation/simulation, however, showed the increase of subsectoral risks by increasing the network effects or transfer levels.

SE 08.4 Water user conflicts and drought risk in the Province of Varese

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The management of drought risk is a critical component of economical development and quality of life. The management of water user conflicts is a key activity to manage the drought risk in the short term, such as an emergency phase, and in the long term through an integrated management of drought risk. Many studies carried out that the climate change is affecting and could affect the hydrological regime of rivers and streams and consequently the total amount of water available and is quality as well in the future. Analysing the future availability of water is still problematic due to the difficulties on downscaling the climate change models and on correlating the rise of temperature to changes in the rainfall regime. Therefore, the research is focused on analysing how to manage the water demand of different users in short and long term in drought conditions. Consequently, it analyses the factors of exposure, the elements of vulnerability related to different water usage and the criticality in the management of past crisis. The findings of this study show that an emergency plan should be both a tool shared between different actors and an institutional framework in which actors can reach a new agreement and renegotiate duties or the use of specific resources if necessary. On the other hand strategic spatial planning and land use management play a key role in the future availability of water. Therefore, it is essential that master plan's development previsions consider the availability of water to guarantee a sustainable growth.

SE 09.1 Opinions on potential nuclear waste repositories - There is more than the extremes

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All over the world projects for repositories for (high-level) nuclear waste, at least in the past, had been facing strong (local) resistance, for instance in the US, in Sweden, Germany, UK or Switzerland. Previous research has shown that the perception of risks and/or benefits is an important factor to explain acceptance of repositories for nuclear waste as well as of nuclear power. However, traditional risk perception research dominantly focuses on the extreme groups: Those who are strongly against a repository see more risks such as potential leakage of a repository, transportation accidents or health and environmental risks. Supporters, on the other hand, perceive relatively more potential benefits such as lower taxes, additional long-term jobs, or incentives for local businesses. Data from a series of studies (N = 2900) among the Swiss population show that a majority perceives both risks and benefits. They furthermore have moderate opinions with respect to repositories. These data are supported by a recent postal survey (N = 486) in which we found three clusters of respondents: opponents; proponents; ambivalent. Participants from the latter cluster perceive risks and benefits equally and show rather slightly negative opinions about accepting a repository for nuclear waste in their home region. The study provides data from both non affected and affected regions of Switzerland (that is, regions are currently under consideration for a repository of nuclear waste either low- and intermediate-level or high-level waste). Results show no significant differences in risk perception between non affected and affected communities. Complementary qualitative interviews (N = 40) provide in depth insights into the underlying patterns of arguments. We conclude that both research and the activities in the current repository site selection process in Switzerland might focus on this «intermediate» population group rather than on the extremes.

SE 09.2 Is knowledge important? Empirical research on risk communication regarding nuclear risks in two countries.

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Knowledge is recognized as one of the driving factors for attitude formation and therefore increasing knowledge is often an objective of risk communication. However, there is a lack of adequate empirical research supporting the importance of knowledge in diverse societal and cultural environments. Our research fills this gap by exploring the influence of specific knowledge on perception and acceptability of radiological/nuclear risks after intensive communication campaigns in two different countries. Extended empirical investigations are perfomed to test the hypothesis that low specific knowledge is related with high risk perception and low acceptability of the specific risks. The analysis includes and compares populations living in the vicinity of nuclear installations in Belgium and Slovenia. The Belgian population sample (N=207) is target population of a recurring campaign for distribution of stable iodine. The Slovenian population sample (N= 200) is target population of an ongoing, long-term radioactive waste disposal campaign. The aim of both communication campaigns was, among others, to increase specific knowledge. The results obtained for these two population samples were also compared to results obtained for the general population in Belgium (N=1035) and in Slovenia (N=1000). The results in both populations show that, although a common objective of risk communication is enhancing specific knowledge, effective risk communication has to focus on other, more heuristic predictors. Our research contributes to the theoretical knowledge on risk communication in general and has practical implications for communication about nuclear risks in particular.

SE 09.3 Nuclear power stations put in a new jacket? Examining an explanatory model of laypeople's acceptance of nuclear power

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The rebuild of nuclear power stations is currently a hot topic in several countries. The public›s opinion about nuclear power stations has an influential voice in the decision whether this type of energy production will be continued in the future. A comprehensive picture of the psychological determinants of the public›s acceptance of this technology is however still lacking. In a telephone survey among a representative sample of the Swiss population, we therefore investigated an extensive explanatory model of laypeople›s acceptance of nuclear power. The model comprised the factors risk perception, affect, and social trust. Additionally, we considered two types of benefit perception: for the climate and for a secure energy supply. Both types of benefits are used to put nuclear power in a new jacket, it has however been unclear to what extent these two influence the acceptance of nuclear power stations and what influences the perceptions of these benefits. Moreover, we investigated the relation between social trust, affect and risk perception, which has hardly been studied. We used structural equation modelling (SEM) to analyse the model. The model fitted very well to our data. Acceptance was primarily affected by perceived benefits for a secure energy supply and, although with less impact, by perceived benefits for the climate and by risk perception. Affective feelings about nuclear power appeared to have a central position in the model as it explained a large extent of people›s perceived benefits and perceived risk. Also, social trust influenced risk perception indirectly through affect, in addition to a direct connection. The general public thus seems to consider a secure energy supply as more important in its acceptance of nuclear power stations than zero CO2 emissions. We will discuss possible explanations for our findings, the implications for communication about nuclear power stations and for further research.

SE 09.4 The influence of cyclical and linear temporal representations on risk perception and discounting of negative consequences: The case of nuclear waste

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Time is an important aspect in the issue of nuclear waste, both from a technical and from a perceptional perspective. Previous studies investigated the relationship between time and risk perception applying the discounting paradigm and therefore limited time to a very narrow aspect, its duration. However, time is a multifaceted concept and does not only include a linear property. The aim of our study was to test the influence of a different aspect of time, namely temporal representations (linear or cyclical) on risk perception and on discounting of negative consequences. In an experimental study (N = 83) we demonstrate that both linear and cyclical representations have a reducing effect on risk perception compared to the control condition, where no specific time representation was activated. Examining group differences in risk perception, we also demonstrate that temporal representations have a differing influence depending on whether participants have a strong belief towards nuclear power and nuclear waste or whether they belong to a moderate group that does not have a strong belief yet. Temporal representations also seem to induce discounting of negative consequences: In contrast to the control group, we found less non-discounters in both experimental groups. We discuss some critical methodological issues about measuring discounting of negative consequences for the case of nuclear waste as well as our implications for risk communication in nuclear waste management.

SE 10.1 Explaining risk controversies: a social sciences review of wireless communication technology

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The last decade has seen a huge growth in the use of wireless communication technology (WCT) in Europe. Despite the high penetration rate, its ubiquitous nature and steady popularity, WCT has become a scholarly example of an uncertain risk that ignites public concern, especially at a local level where the technology is implemented. Even though the majority of scientific experts emphasize that to date no consistent evidence has demonstrated health risks from the radiofrequency electromagnetic fields (RF EMF) generated by this technology, citizens continue to protest against the siting of base stations in their neighbourhoods. This paper attempts to answer the question «Why/How WCT has become portrayed as a health risk in recent years?» by focusing on the role of scientific knowledge and uncertainties as key dynamics in local controversies. Methodologically, it relies on results from ongoing case study research on local mast siting controversies in municipalities in the Netherlands and Flanders (BE) (interviews and document analysis) and a review of different bodies of social sciences literature concerned with this controversy. I analyse how a variety of disciplinary and interdisciplinary research - drawing from sociological and psychological studies on risk, science and technology studies, and studies by policy scientists and legal scholars - conceptualise risk, uncertainty, the public and experts. I show a tension in the literature resulting from diverging underlying epistemological perspectives that could be coined as an objectivist/ realist and a constructivist approach to risk. This dualism becomes most apparent in the discussions about the role and status of scientific and nonexpert knowledge and expertise. I will discuss the implications of taking these different approaches in researching and dealing with situations which are characterised by a plurality of viewpoints, contested truth claims, conflicting values, and the problematisation of unquestioned expertis.

SE 10.2 Exploratory Risk Modeling

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The emergence of a new infectious disease is characterized by uncertain knowledge about the pathogen and sparse surveillance data. Infection spread is a stochastic process, in particular at the beginning of an outbreak, while the total number of cases is low. Pathogens can evolve over time, and they may develop resistance against pharmaceutical treatment. Therefore epidemiological models can in general not be used for predictions. But what is the use of modeling, if it can not be used for predictions? As a consequence of uncertain and partial knowledge we always have to deal with a large set of plausible models. Despite the fact that further validation of these models is not possible, exploratory risk analysis can reveal properties like the efficacy of alternative interventions, that are valid in all or most plausible models. This mode of operation is called exploratory modeling and is very different from predictive modeling. Predictive modeling is data driven, because data is necessary for parameter estimation and validation, resulting in a single optimal model. But confining modeling to problems where predictive modeling is possible is like searching for a lost key below a lantern because it is too dark to search elsewhere. Exploratory modeling, on the other hand, is driven by the policy questions under investigation. The iterative and adaptive model development process allows expressing uncertain and partial knowledge, resulting in a set of plausible models, possibly one set for each policy question to be addressed. The result is a chain of models and model revisions that help to build a chain of convincing arguments that can be used for policy making. In this contribution exploratory risk modeling is used to analyze the threat of a bioterrorist smallpox attack.

Example Figure: Exploratory risk analysis of 10000 smallpox outbreak simulations: The scatter-plot reveals a tri-modal distribution of total outbreak size vs available isolation capacity.

SE 10.3 Complex roles and mixed norms - a dilemma for safety inspections? A case study from the Norwegian offshore oil and gas industry

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A debate about the principles of risk-management in hazardous industries follows after major accidents as the Texas City and the Gulf of Mexico (Hopkins 2011). As a consequence, a revitalized discussion arise of prescriptive vs. performance based rules and regulations as well as the role of the regulator. The context of the paper is the Norwegian offshore oil and gas industry where the regime was developed in the 1980s after major accidents as the capsizing of the Alexander Kielland where 123 lives were lost. The paper raises the question of how inspectors within a regulatory system combine their complex roles as controller and educator with a diversified mixture of legal norms and industrial standards (Lindøe and Olsen 2009). Reason (1997) addresses «the regulator's unhappy lot» in examining the difficult and complex roles of regulators while Bruhn (2006) is pointing at the dilemma between control and educative methods in doing inspections. Within a framework of enforced self-regulation inspectors are facing a hierarchy of norms ranging from laws and regulation, including legal standards towards global accepted industrial standards, company specific requirements and guidelines as «best practice» (Braut and Lindøe 2010). As an empirical basis, three cases representing different elements of the complexity of roles and norms are chosen; Acknowledgment of Complience (AoC) of mobile facilities, controversies between regulator and the industry on extended working hours and night work with a possible long term effect on health by weakening alertness with possible fatal consequences and the introduction of a legal requirement of «HSE-culture» in the regulation. The cases may be useful to identify some generic features and the analytical framework thus follows three perspectives; (1) Controlling risk within enforced self-regulation (2) roles as «controller» and «educator» and (3) the concepts of norms and standards.

SE 10.4 Decision making for installations with risks: who wants to be involved?

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National and international legislation and guidelines increasingly call for stakeholder involvement in risk informed decision making. However, practical problems remain, such as representativity, motivation, communication and involvement of the general population. To bring a better insight in these issues, this paper investigated the willingness to get involved in decision making processes concerning installations that may pose risks to the population. We first identified specific groups in the general population, who wish to get informed about and/or participate in decision making processes on installations with risks. Next, we evaluated the amount of time people are willing to spend with this purpose. Based on this, we commented upon potential communication and stakeholder involvement tools for these groups of population. The research is based on empirical data from a large-scale public opinion survey carried out in Belgium in 2009. The sample was representative for the adult population with respect to province, region, habitat, gender, age and professionally active status. A comparison with data collected in 2002 helped in highlighting the evolution with time. Results show that the measured involvement attitudes are associated with socio-demographic characteristics (gender, education, region, social class, number of family members), but also with safety behaviour and perception of risks from accidents in chemical/nuclear installations. Overall, the willingness to invest time decreased since 2002 with regard to both effectively participating in decision making processes, and spending time on getting informed. One day per year comes out — most of the time — as the preferred option. These limitations have to be taken into account when addressing the general population in order to ensure democratisation of the decision making process, empowerment of the people to control/influence their environment and efficiency.

SE 11.1 Liability of firms that may cause environmental disasters

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We study the design of a suitable public policy for managing industrial/environmental disasters. More specifically, we compare the performances of various liability rules enforced against firms that harm third-parties. We take it for granted that many safety measures taken by firms are not directly observable by the authorities: we model care as a moral hazard variable. Externality and asymmetric information call for public intervention to provide incentives to reduce risk. Public policy takes the form of No Liability (NL), Strict Liability (SL) or a Negligence Rule (NR). It is accepted that the insolvency of potential injurers is a serious impediment to the effectiveness of any liability regime. It is thus essential that we should understand the behaviour of judgment-proof firms, those firms whose assets do not fully cover potential damage, when subject to these policies. We model the behaviour of a firm that can invest in unobservable safety measures in order to reduce the likelihood of accidents. If an accident does occur, the victims lose all their wealth. The injurer's assets cannot fully compensate them. We determine the amount invested in prevention under the three regimes and compare it with the First-Best level of care. An experiment allows us to test the main theoretical results. We show that SL and NR perform better than NL: SL changes the behaviour of agents, who increase their level of care, in accordance with the theory. There is no significant difference in the effectiveness of SL and NR, confirming another theoretical result. Lastly, agents invest more when losses to victims increase (for a given size of their own wealth), i.e. when the insolvency problem is more stringent. This unexpected behaviour arises under NL and NR regimes, but not under SL. This phenomenon remains to be investigated, and more experiments and tests are called for.

SE 11.2 Liabilities, GMOs and the Regulatory Settlement

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An enormously complex set of apparently ever-evolving regulations applies to GMOs in the EU. Much of our attention focuses on the highly contentious authorisation process. However, risk regulation properly stretches both forwards and backwards from authorisation, and the more general legal context in which GMOs exist are an important element of their regulation. This context includes the research and development environment, the protection of intellectual property, and co-existence rules. In this paper I want to concentrate on the liability regime that will apply to GMOs. Liability is often treated as if it were a technical question, for resolution by experts sheltered from the political debate. But who bears the risk of ill effect is a deeply political question, inextricably linked with the overall regulatory regime. In fact it is difficult to see how authorisation decisions can be made at all in the absence of discussion of a reasonably predictable post authorisation regime. This paper will explore two connected problems relating to liability and GMOs. One is the uncertainty of any liability regime. Where the costs will lie if things go wrong, and indeed an understanding of what counts as things going wrong, is uncertain along a number of dimensions. The associated lack of transparency makes discussion of liability beyond the experts very difficult. Which leads to the second difficulty, that is the problematic assumption that existing tort liability satisfactorily addresses what might go wrong in this field; that it is not a suitable object for political debate. We should be conscious of the lawyer's complicity in the marginalisation and control of broader social debate about GMOs. Who bears the risk of ill effect is a deeply political question, inextricably linked with the overall regulatory regime, and a question that should be addressed within that context.

SE 11.3 Can Science Tame Politics: A History of a Failure

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The proposed paper is part of my broader research on the potential of evidence and argumentation to overcome differences in the beliefs of the agents and to foster cooperation in the name of their common interest. I focus in particular on the role of objective and trusted expert advisors in reducing controversial political choices to objective scientific assessments. Such Cartesian claim may seem unsustainable in our post-modern age, but apparently this was the rationale for the adoption of the current regime of GMO authorisation in EU. The creation of European Food Safety Authority (EFSA) was supposed to bring to an end the heated controversy amongst the EU members on the issue in the late 90's and beginning of 2000s. In the proposed paper I make a case study of the authorisation of a GM potato (BASF's «Amflora»), which is the first and so far the only approval for cultivation of GM crop in Europe for more than decade. I analyse how EFSA, the member states and the Commission dealt with the scientific arguments on the safety of the potato, the various assessments that were made, the (in) consistency among them and their role for appeal against the authorisation which is now pending in the General Court. The conclusions from this analysis do not support the hypothesis that the reliance on one supposedly neutral and scientific advisor can solve the controversies. Nevertheless, it illustrates how scientific arguments can matter, and how science can structure the debate and push decision-making towards more deliberative mode. It also shows that the controversy on the outcome is maintained because of the different ways the risk is framed, rather than on its different assessments or differences in the available evidence. As a whole this single authorisation of the GM-potato for cultivation in Europe lead to collapse of the regulatory regime, which was made evident by the Commission's haste to propose regime change immediately after the authorisation was issued.

SE 12.1 Effective risk communication: The effect of risk level, format and numeracy on people's concerns

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Effective communication between physicians and patients is important in order to ensure informed decisions. Graphical displays are considered to be a helpful tool in communicating medical information, especially when probabilistic information needs to be conveyed. Most studies on graphical displays and risk perception focus on low levels of risk, however. The present research explores the concern evoked by a wide range of risk levels in the context of colon cancer. In addition, it was also examined whether numeracy has an important influence on the perceived concern evoked from different risk levels communicated by icon arrays (Study 1) and by percentages (Study 2). Results from the two experimental studies indicate that participants were constantly more concerned than probability levels would suggest. Especially low levels of probability lead to high concern. The findings also indicate that low numeracy individuals were generally more concerned than high numeracy individuals when risks were conveyed by icon arrays. However, no difference was found between low and high numeracy individuals when risks were communicated by percentages. In sum, our results suggest that people›s concerns about medical risks depend not only the risk level, but also on the risk format and the individual›s level of numeracy. Implications for medical risk communication will be derived.

SE 12.2 The Tick Talk: Design, Dissemination, and Evaluation of a Novel Risk Communication Product

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This presentation describes the development, dissemination, and evaluation of a novel risk communication product designed to raise awareness about the risks of an emerging environmental health threat in British Columbia, Canada. Tick-borne diseases such as Lyme disease can have debilitating consequences for both humans and livestock. The infection risk to tick-borne zoonoses is increasing due to climate change and increased encroachment into wilderness area. Current communication strategies are complicated by numerous misconceptions as well as controversy about ticks and tick-borne diseases. In order to develop an effective risk communication initiative, an interdisciplinary group of environmental scientists, public health officials, and risk communication specialists worked with media production experts to create a short video aimed at primary school-aged children (ages 6-10). The video employs animation and appealing characters to teach children about the simple protective practices associated with avoiding tick bites. Existing research shows that children can be effective channels for education, because when they learn and retain information they transfer this knowledge to their parents. The resulting video and accompanying educational materials were disseminated via numerous channels, including summer camps, community recreational centres, educational facilities in public parks, as well as through social media and public television. This presentation will describe the development and dissemination of the educational video product, and will present data on its effectiveness. The risk communication materials were evaluated by a combination of pre-post interviews and surveys, and the presentation will describe the impact of this intervention on the target population in terms of uptake of protective practices.

SE 12.3 Nanotechnology Labeling Influences Risk Perception

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Currently, there is no mandatory labeling for products containing synthetic nanoparticles. The public as well as other stakeholders have positive views toward mandatory labeling. Such labeling could have unintended side effects, however. The goal of the present study was to examine the effect of labeling on the perception of nanotechnology applications. We expected that participants interpret a label as an indication of possible risks associated with nanotechnology. As a result, products with a label may be perceived in a less positive way compared with products without a label. Participants received different types of information about a consumer product, and we examined the effect that this information had on risk and benefit perception. Sunscreen was used in the present study for several reasons: sunscreens containing synthetic nanoparticles are already on the market, sunscreen is a familiar product, and sunscreen with synthetic nanoparticles has been perceived as more risky than other nanotechnology applications. Data were collected in a survey experiment (N = 1382). Participants were randomly assigned to one of six conditions. The control group received a picture of a sunscreen container without a label. One experimental group received a picture of a sunscreen container with a label. The other groups received in addition to the sunscreen container with a label some risk or benefit information. Results suggest that labeling of products may reduce consumers' benefit perception and increase risk perception. Labeling consumer products may, therefore, change public perception of these products. This is an unintended side effect of labeling and must be taken into account when discussing the mandatory labeling of consumer products containing synthetic nanoparticles.

SE 13.1 Multi risks in a globalised world: Integrative risk management concept

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Today's globalised world faces many interdependent risks. Financial risks for instance amplify natural disasters which potentially threaten public health. Hence, risks should not be approached individually, but rather within an integrative approach. In order to be able to take effective and efficient decisions leading to transparent and comparable results between different risk situations, a consistent and systematic risk management process has to be followed (in this context called «integrative risk management»). The presented risk concept is a systematic framework for risk analysis and risk assessment procedures that leads towards an integrative way of planning measures. The presentation will discuss the systematic implementation of a conceptual approach to risk governance as a whole and to an integrative risk management of natural hazards in particular. The integrative risk management concept demonstrates how to implement a consistent risk concept which is a basic need for integrative risk management. As such it specifies the steps of risk identification, risk analysis and risk assessment, evaluates necessary risk reduction and mitigation measures, and identifies the resulting needs for an efficient risk dialogue among all different stakeholders.

SE 13.2 Risk Assessment within the European Union - The Role of Scientific Committees and Agencies

Barbara Kofler
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Risk regulation, as a means of preventing dangerous situations from collapsing and setting standards in political fields where coherence is necessary, is one of the main aims of European policy-making. In addition to the problem of how risks once recognized are efficiently communicated between European institutions and member states, the main question is: how does European legislation define and assess risks and who plays the leading part within this process? The Institute for European and Public International Law at the University of Innsbruck is currently analyzing the scientific question of how regulation of the Internal Market in the European Union is actually carried out. As regulation goes hand in hand with a risk analysis process, including risk assessment and risk management as well as risk communication in general, it is one of the project's aims to understand the role of regulatory agencies as well as the scientific background that serve as the basis for regulatory decisions. European committees fulfill a major function concerning European policy-making, however there is very little knowledge about the number of scientific committees that exist and how they work within the risk assessment process. Following a brief overview of the project content the speech outlines the role of the different scientific committees and agencies that endeavour to support the institutions of the European Union in their effort to decide whether products, actions or specific situations pose a threat to public health and/or environment and in that case to set the standards needed to avoid those negative effects.

SE 13.3 Scientific decision-making and stakeholder consultations: The case of scientific advisory body for nutrition (SACN)

Lada Timotijevic [1]; Monique Raats [2]; Julie Barnett [3]; Kerry Brown [1]; Richard Shepherd [1]
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Policy making has increasingly relied upon scientific advice to confer objectivity and rationality, whilst simultaneously, public participation (in its various forms) is called upon at least in part as a means of providing greater legitimacy and validity to the decisions. There has been limited empirical work exploring the workings of scientific advisory bodies (SAB). Empirical evidence in relation to SAB have mostly focused upon the science addressing controversial issues that are likely to attract considerable public response, and where the consequences of the decision making are potentially wide reaching and alarming. Less clarity exists about the way in which this balance of science and public engagement plays out in the context of a relatively uncontroversial science. The current paper aims to examine the consultation processes within the UK's Scientific Advisory Committee for Nutrition (SACN), with a special emphasis upon salt. Desk research of all publicly available documents related to the workings of the Salt Subgroup was carried out, which included the minutes of the working groups' meetings, the summaries of the consultees' responses and the Salt Subgroups' response to the consultation comments. Content and thematic analysis of the documents indicated that the key areas of contestation of the Subgroup's report were about: framing of the issues; nature of evidence; outcomes of the Subgroup's decision-making. The evidence suggests that even when the terms of reference for the expert committee are provided in no ambiguous terms, there is an area of ambiguity that will invite scrutiny and interest of stakeholders. Whilst political sensitivities and pragmatic decisions are mainly visible at the later, «risk management» stages of the decision making relevant to nutrition policy, the current analysis suggests that early stages of decision-making where the problem framing occurs is not devoid of judgments.

SE 13.4 Crystal balls or Christmas Baubles? Risk-Based Policymaking and the Institutional Modulation of Risk

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Risk has become a central organizing concept of governance in recent years, exceeding its long association with harms to the environment, health and safety. Proponents of risk-based policymaking argue it can improve the efficiency and effectiveness of policy interventions, but critics argue that its potential benefits are undermined by the challenges of putting it into practice. In this paper, we examine the factors shaping the adoption and implementation of risk-based policymaking by the UK Department for Environment, Food and Rural Affairs (Defra). Building on a wide range of studies of the factors shaping the way that organizations operationalise risk management, we consider whether risk -based approaches challenge policymaking, or simply reframe and reinforce current practices in ways that are «institutionally modulated» by preexisting values, beliefs and ways of working. We conclude that risk serves varying and sometimes conflicting objectives and that this has important implications for achieving desired policy outcomes.

SE 14.1 Effects of Uncertainties within the «Impact Pathway Approach» on Ranking of Technologies included in an Energy System

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Different options for electricity generation are available. All options have advantages and disadvantages. Hence, the policy and decision makers need defendable and scientifically provable information on the attributes. There are many attributes which may have to be taken into account, such as generation costs, employment effects, reliability, availability & import dependency, environmental impacts, acceptability, risks due to terror and proliferation, etc. etc. Within the well-known ExternE project series (www.ExternE.info) the impact pathway approach (IPA) has been developed in order to evaluate the major impacts due to air pollution and climate change and their effects on human health and the environment. Moreover, as far as possible, other issues, like accidents or waste disposal have been evaluated. The IPA consists of the following steps:
- Activity
- Life cycle emission
- Dispersion
- Impacts assessment
- Impacts weighting via monetary valuation.

This enables to conduct an aggregation and a corresponding ranking of alternative technologies or to perform a cost benefit analysis. Results are expressed as external costs per kWh of electricity for each technology.
These overall results are known for their large uncertainties ((Rabl et al. 2005), (Lenzen 2006), (Zwaan et al. 2007)). Indeed, several crucial points within the different composing steps have been first characterised, then their uncertainties have been assessed qualitatively (WHO, 2008), and their effect on recommendations and possible decisions are presented. These points are for example:
- Spatial allocation of activities
- Relation between emission and exposure
- Toxicity of classical air pollutants
- Risk aversion regarding the impacts of major accidents during operation and due to unintended release of harmful waste
- Valuation and discounting of impacts in the future (e.g. up to the year 2300) and in different regions of the world (especially, impacts due to climate change.

SE 14.2 Applying multicriteria decision aid methodology for the interpretation of qualitative uncertainty characterisation results

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The science of risk assessment of chemicals is increasingly complex. Recently, risk assessments are encouraged to characterise and communicate uncertainty in all steps of risk assessments. WHO published a guidance document on characterising and communicating uncertainty in exposure assessment. It is based on a «tiered» approach for selecting the level of detail to be used in the uncertainty characterisation. As expansion of the WHO IPCS 2008 focusing on exposure assessment and the COT 2007 focusing on hasard assessment, this presentation focuses on the qualitative approach to characterise uncertainties in risk and exposure assessments. In principal, the qualitative uncertainty characterisation is organised in three distinct consecutive steps: 1. Identification of all uncertainty sources; 2. Qualitative characterisation of uncertainty comprising three dimensions: 2.1. Evaluating the direction and the magnitude of the uncertainty, that is, qualitatively rating how the source of uncertainty, in the presence of alternative information, may affect the risk assessment results; 2.2. Scoring the uncertainty of the knowledge base; 2.3. Scoring the subjectivity of the choice; 3. Qualitative uncertainty reporting on all sources of uncertainty. For each identified source, five criteria compose the characterisation of the uncertainty of the knowledge base, and in addition, another five criteria compose the characterisation of the uncertainty related to the subjectivity of choices of each identified source. In total, each identified source is evaluated or scored qualitatively according to twelve criteria. The qualitative uncertainty reporting can thus lead to multiple interpretations and contribute to decision-making gridlock. Therefore, we propose a multicriteria decision aid methodology to harmonise the understanding of the qualitative uncertainty reporting aiming at consistent follow-up actions toward uncertainty reduction to the maximum extent possible.

SE 14.3 Expert elicitation on risk perceptions in integrated assessments: an MCA approach

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One of the challenges in an integrated environmental health assessment is to include risk perceptions in the assessment. When survey data are lacking it is often difficult to quantify the level of concern. This holds particularly for relatively new and unknown risks and for integrated assessment that (by definition) addresses alternative (future) scenarios for which no empirical information exists. As a consequence other means than surveys are needed to include the perception in the appraisal. Moreover, in the European context risk perception survey data might be available for some European countries, but not for others. One of the solutions for these problems is expert elicitation. This means that experts are asked to estimate the level of concern in the general public. In order to structure this task, we developed a multi criteria approach. In a first step experts asked to provide estimates for risk aspect scores that correlate significantly with concern of a relative new risk or to provide the missing scores for their country. In a second step it has to be decided how to cumulate the scores on the risk aspects to a level of concern about the risk. One way to do this is by giving all risk aspects an equal weight of (1 / number of risk aspects). Another approach is to use the regression coefficients of individual risk aspects against overall acceptability or concern of the risk problem known from previous studies. Moreover, there is a possibility of asking experts to estimate the weights by making pair wise comparisons between different risk aspects. After the scores have been obtained by means of expert elicitation and it has been decided in what way to accumulate the scores, in a third step the assisting software can be asked to calculate a weighted sum. This weighted sum expresses the level of concern in a single number and can be used in integrated assessments.

SE 14.4 On the value of expert information in a multi-criteria context

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Calculating the pre-posterior value of potential as well as perfect information in a cost-benefit analysis is a standard technique that enables a decision maker (DM) to make informed judgments on the uncertainty in the decision support. In problems involving sustainable development, such as the remediation of contaminated land, focus now is on multi-criteria decision analysis (MCDA). In an MCDA options, that is to say possible actions, are typically scored with respect to various criteria and the option with largest total score is suggested to the DM as being the best or optimal one among those that are feasible. The paper studies a basic probability model in which the scores are regard as utilities, and the option that maximizes the total expected utility is chosen as the optimal one. This is prior to collecting expert information on the performances of the options with respect to the criteria. The expert elicitation process is modelled by a likelihood conditional on the true score. Two insights from the modelling are (1) experts are not independent (in our model they are conditionally independent given the available information) and (2) experts are no magicians (that is, they cannot say more than the available information implies). By means of Bayes' Theorem a pre-posterior mean of the posterior score can be calculated for each option. This pre-posterior mean score is never smaller than the prior maximal expected score. The difference is the (pre-posterior) data value. The paper shows how to calculate the data value in the model presented. Some complementary results are also given.

SE 15.1 The Affect Heuristic, Mortality Salience, and Risk: Domain-Specific Effects of a Natural Disaster on Risk-Benefit Perception

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In the present study we assessed the perceived risk and benefits of various activities (social, recreational, financial, gambling, ethical etc) in a representative sample after a major natural disaster (the 2004 tsunami). Some of these domains may be more influenced by goals and motives triggered by a natural disaster. For example, terror management theory (TMT) suggests that individuals, when thinking about their own mortality, act in ways consistent with self-esteem maintenance goals. Three different effects were predicted and found 1) the «mere» affect account suggest that incidental affect elicited by a disaster should have a direct impact on risk perception and preference so that across decision domains it would amplify the perceived risk and attenuate the perceived benefits, 2) the affect heuristic predicts that risk-benefit correlations should become more polarized when the decision maker experiences affect, and 3) the motivated affect regulation account that suggest that thoughts and incidental feelings trigger different affect regulation motives for different decisions domains leading to an increased focus on certain type of behaviors. Consequently, the risk-benefit relationship may be different for different domains depending on the saliency of other concerns induced by the disaster. For instance, after exposure to a natural disaster it is likely that individuals, in addition to experiencing more negative feelings, have existential concerns and death-related thoughts (i.e. mortality salience) that may override other goals.

SE 15.2 Salient Values, Trust and Public Protest Potential in the Case of CCS

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Climate change is challenging electricity production in most societies. Carbon dioxide capture and sequestration (CCS) is an important technology for handling CO2 emissions from fossil fuel power plants. In various countries, public protests lately have shown to be an important hurdle for CCS›s implementation. We studied a comprehensive causal model using structural equation modeling to describe the public›s potential to protest CCS. The model incorporated salient value-similarity-based trust and perceived benefits and risks. Earlier studies demonstrated that salient values determine social trust, but it was not clear which values are important; so we examined particular values› role in salient value-similarity-based trust in electricity corporations implementing CCS. The data from a representative Swiss sample described our model well. Values about possible interference with natural structures in the deep subsurface and pertaining to decentralized small-scale energy production showed to be essential determinants of trust in electricity corporations implementing CCS. Procedural fairness affected trust only modestly, suggesting an upper limit on fair procedures› effectiveness for building trust. Trust affected protest potential via perceived benefits and risks. Perceived benefits› influence was higher than that of perceived risk, yet it did not dominate the influence of perceived risks to the extent previous research found for acceptance. We conclude that risk perception should not be taken too lightly when managing new technologies threatened by active public protests.

SE 15.3 The Importance of Multiple Performance Criteria for Understanding Trust in Risk Managers

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Effective risk management requires balancing several, sometimes competing, goals, such as protecting public health and ensuring cost control. Research examining public trust of risk managers has largely focused on trust that is unspecified or for a single goal. Yet it can be reasonable to have a high level of trust in one aspect of a target’s performance but not another. Two studies involving redevelopment of contaminated land (Study 1) and drinking water standards (Study 2) present preliminary evidence on the value of distinguishing between performance criteria for understanding of trust. Study 1 assessed perceptions of several trust targets (councillors, developers, scientists, residents) on their competence (capacity to achieve goals) and willingness to take action under uncertainty for four criteria. Study 2 assessed competence, willingness, and trust for five criteria regarding a single government agency. In both studies overall trust in each target was significantly better explained by considering perceptions of their performance on multiple criteria than on the single criterion of public health. In Study 1, the influence of criteria also varied plausibly across trust targets (e.g., willingness to act under uncertainty increased trust in developers on cost control and councillors on local economic improvement, but decreased it for both targets on environmental protection). Study 2 showed that explained variance in trust increased with both dimension- and trust-based measures of criteria. Further conceptual and methodological development of the notion of multiple trust criteria could benefit our understanding of stated trust judgments.

SE 16.1 Enhancing acceptance of social decisions by procedural fairness and trust, the moderating role of issue importance

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Objective: This study examined the effects of procedural fairness and trust on social acceptance when the issue is relevant (vs. irrelevant) to people. Social justice research argues that procedural fairness is an important factor in acquiring social acceptance. Risk research has argued that trust is an important factor of risk acceptance. The purpose of this study was to integrate these two perspectives by examining the factors affecting people's willingness to accept the decision. In addition, this study aimed to study the moderating effect of issue relevance, arguing that trust, as an assurance of positive outcomes, would be most important under high issue relevance. Thus, we hypothesized that procedural fairness would have effects on the acceptance both for relevant and irrelevant issues, while trust would have its strongest effect on acceptance for relevant issues. Design: Our study manipulated three factors in a scenario experiment. The first was reflection of delegates' voice known as an antecedent factor of procedural fairness. The second was similarity of opinion to the delegates known as a significant factor of trust. The third was self-relevance, whether the issue of the meeting was important (or unimportant) for participants. Results: Our main results demonstrated the effect of reflection of voice indicating that more decision acceptance occurred when delegates' voice was reflected compared to not reflected. The effect of similarity of opinion was not found, instead, the interaction effect between similarity and self-relevance was found. More participants accepted the decision when delegates had similar opinions rather than dissimilar opinions on the relevant issue. But, no such effect emerged when the issue was irrelevant to participant. Conclusion: Our findings suggest that procedural fairness influences social acceptance regardless of issue importance. Trust effects on social acceptance occur especially under conditions of high issue importance.

SE 16.2 Uncertainty, precaution and risk governance

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In the past years, on request of the Dutch government, several Dutch knowledge institutes have published studies about recent forms of dealing with risk in public policy-making. The Netherlands Environmental Assessment Agency (PBL), the Advisory Council on Spatial Planning and the Environment (RMNO), the Dutch Health Council, and the Scientific Council for Government Policy (WRR) tried to translate state-of-the-art thinking in risk research to recommendations for public policy. In view of this agreement, these knowledge institutions organized a conference focussing on the limits of current risk and safety policies and the challenges for future policy-making. The various contributions were developed into scientific papers for a special issue of the Journal of Risk Research with contributions of among others Ragnar Löfstedt, Ortwin Renn, Michael Rogers, Gerard de Vries, Harrie van Dijk and Jaap Spier. It provides an overview of the current state-of-the-art pertaining to the governance of risk, as well as indicating which future challenges have to be faced by the risk community. Around the time of the SRA-E conference, it will be published and I would therefore like to present the special issue as a way to (further) discuss challenging issues in the risk community. On the one hand, the special issue is an attempt at taking stock. What is the current state of the art with regard to uncertainty, precaution and risk governance? On the other hand, the critical reviews of the state of the art indicate a number of challenges the risk community is faced with. It should agree on at least some principles that should be consistently considered in the development of frameworks, tools, process designs, guidelines and institutional proposals. The special issue is a contribution to that process and warrants further reflection and discussion as well as critical thinking on the teething issues that are or might be faced in implementation.

SE 16.3 Chatting with the experts: Exploring the impact of new information on citizen acceptance of novel food technologies

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This research seeks to provide insights into Irish citizens' acceptance of novel food technologies (NFTs) and detail the determining factors framing their attitudes. Key issues investigated include citizens' awareness of and attitudes towards NFTs, the subjective values (including perceived risk-benefit trade-offs) that frame these attitudes and the influence of new information, obtained during an interaction with a food scientist, on attitudes and acceptance. An innovative methodology involving observations of a one-to-one deliberative discourse (dialogue) between food scientists and citizens about a specific NFT was applied. The aim of this research was to understand the evolving perspectives of the individual citizen as information was presented. The discourse involved the food scientist and citizen discussing one of eight NFTs. The scientist presented pre-defined hypothetical scenarios, illustrating benefits and risks of different applications of the NFT, in an effort to establish «tipping points» in citizen acceptance. In-depth pre and post discourse interviews were also completed with participants to determine the perceived influence of the discourse on citizens' acceptance and the factors contributing to any attitudinal change. Generally, new information positively impacted citizens' attitudes towards the NFT and increased their likelihood of purchasing foods produced using the technology. The scenarios revealed key «tipping points» for acceptance. Citizens were more accepting of the NFT if they perceived the associated personal and societal benefits to outweigh potential risks. However, citizens were not homogenous in their perceptions of the benefits and risks presented. Demographic factors and subjective values framed their overall attitudes towards the technology. These findings are considered within the context of past research on public understanding of science and risk communications. This research was funded by the FIRM initiative.

SE 16.4 Ambiguity, complexity and uncertainty in Hydrogen energy: citizen panels' deliberations about risk and safety

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In the context of «peak oil» and climate change, increased government and commercial attention is being given to the development of hydrogen energy as a partial replacement for fossil fuels. Hydrogen appears to be an efficient and non-polluting way of powering vehicles, heating systems and other devices. Ambitious claims have been made about a future hydrogen economy in which hydrogen is the primary energy carrier. However, there are important concerns about the safety hazards associated with hydrogen, and there are also wider concerns about its public acceptability. This paper reviews some of the scientific evidence about the hazards and «knowledge-gaps» of hydrogen, and then discusses findings from recent Citizens' Panels in two areas of the UK about public perceptions of hydrogen energy and hydrogen technologies. Qualitative evidence is used to illustrate different aspects of «critical trust» in independent experts and scientists. The findings are also analysed in relation to the International Risk Governance Council's (2005) framework for risk management, which highlighted emergent risks with high levels of uncertainty. Hydrogen energy is shown to have a close correspondence with the IRGC's categories of ambiguity, complexity and uncertainty, and this poses difficult questions for risk regulation and governance (Aven and Renn, 2010; Renn, 2008). The paper concludes by arguing for wider public debate and deliberation about the acceptability of the new infrastructure and socio-technical system required for hydrogen.

SE 17.1 Addressing climate change: Determinants of consumers' willingness to act and to support policy measures

Christina Tobler ; Vivianne Visschers ; Michael Siegrist
ETH Zuerich, Switzerland

Public acceptance is an important precondition to implement climate mitigation policy measures. Furthermore, consumers influence greenhouse gas emissions with their consumption patterns. Both climate-friendly actions and policy support comprise a broad range of options, which vary in manifold ways, for instance in terms of costs or perceived climate benefit. Accordingly, different options of addressing climate change might be influenced by different factors. To examine the determinants of consumers› willingness to behave climate-friendly and to support policy measures, we conducted a large-scale mail survey in which we presented a comprehensive list of possible actions and mitigation measures. A principal component analysis yielded three factors of voluntary actions: climate-friendly consumption behaviors (e.g., recycling), indirect behaviors (e.g., offsetting CO2 emissions), and mobility (e.g., reduction of car use). Mitigation measures could be divided into supportive measures (e.g., subsidies) and CO2 restrictions (e.g., taxes on heating oil). With the exception of mobility, perceived climate benefit had the strongest influence on people›s willingness to act or to support climate mitigation policy measures. For mobility, however, perceived costs turned out to be more influential factors. Our findings indicate that the characteristics of climate-friendly actions have to be considered. Implications for information campaigns are discussed.

SE 17.2 Public perception of geoengineering - knowledge, risk and acceptability

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Geoengineering is a prime example of an emerging or «upstream» technology, since many of its technical aspects, including questions around effectiveness, cost and risks, are highly uncertain. But the question of whether geoengineering will be acceptable to society is not so much a technical issue as a matter of perceptions, ethics and governance. This paper contributes to the emerging debate about the social acceptability of geoengineering by presenting current evidence on public responses to this suite of technologies. We draw upon qualitative data, including from the innovative UK Public Dialogue on Geoengineering «Experiment Earth», together with the results of a nationwide survey of opinion. Currently baseline knowledge of geoengineering amongst the British public is extremely low, but when given additional information people can engage effectively with the topic. The data indicate that, in general, Carbon Dioxide Removal approaches are preferred to Solar Radiation Management. This research also begins to map out some of the ethical considerations which people will bring to bear on their judgements of the acceptability of geoengineering, as well the constraints that people might wish to see placed upon geoengineering research and deployment. The paper concludes that, aside from technical considerations, public perceptions are likely to prove a key element influencing the debate over questions of both acceptability and governance.

SE 17.3 How do We Ensure Linkage between Climate Change Adaptation and Disaster Risk Reduction to Make Cities Resilient? Implications from Analysis on Perception Gap between the Experts and the General Public

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To prepare for emerging impacts of climate change, the central government, such as MOE (Ministry of Environment) and MLIT (Ministry of Land, Infrastructure, Transport and Tourism), and some pioneering local governments have begun to examine adaptation policies eventually in Japan. Local governments are expected to play a significant role especially in disaster risk reduction and climate change adaptation (DRR-CCA) to make cities resilient. Although climate data and models on impacts of climate change are required to be downscaled to develop local adaptation policy, the scientific results are unavoidable to contain uncertainty. But in fact, as DRR-CCA is one of the urgent issues, local governments will have to develop adaptation policy based on the uncertain risk information. It is therefore important to clarify potential perception gap among stakeholders on the uncertain risk information for DRR-CCA policymaking. To increase effectiveness of the policy by wide-ranging participation of actors, this study clarifies the perception gap including interpretations, attitudes and interests on DRR-CCA among stakeholders. Firstly, we conducted semi-structured interviews to 11 experts and elicited their interpretations on climate change impact on urban infrastructure, disaster risk, vulnerability and drivers and barriers of policy implementation. We will draw up an influence diagram with the results and additional literature survey to summarize the perspective of expert knowledge on the issues. Secondly, we conducted a nationwide questionnaire survey on the website to the general public. We focused on their risk perception on climate change, trust to the local governments, intention to take adaptive behavior and acceptance of adaptation policy. According to the above mentioned survey results, we will analysis the potential gap between the experts and the general public, and derive some implications for DRR-CCA policymaking for local governments.

SE 17.4 Global warming and American evangelicalism: exploring attitudes, beliefs, risk perceptions and policy preferences

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This presentation explores how American evangelicals engage with and understand global warming risk. From a nationally representative survey, 584 evangelical or "born again" Christians were asked questions assessing global warming risk perceptions and policy preferences. Although American evangelicals were less likely than non-evangelicals to believe global warming is happening, has an anthropogenic basis and is causing serious harm, majorities are concerned and do support a range of policies to mitigate damage. Multiple regression analyses were conducted to explore the basis of this understanding and found that environmental concern was a more significant predictor of global warming risk perceptions and policy support than affect, cultural worldviews and a range of sociodemographic variables. More specifically, a biospheric concern with non-human nature and an altruistic concern about humans are likely to be resonating with the moral and ethical dimensions central to the religion. Implications for the role religion might play in a European context for this, and other risk issues, are also discussed.

SE 18.1 Bridging between political communication and risk communication: An adaptation of the Receive-Accept-Sample model

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This paper explores the use of the most prominent opinion formation model in political communication — the Receive-Accept-Sample (RAS) model — in risk communication. The objective was to adapt and test empirically the RAS model for communication in the context of nuclear emergencies. Similarly to the RAS model, we made a distinction between two information processing steps: reception and acceptance of information. Adaptation of the RAS model to risk communication implied redefinition of concepts such as predispositions and awareness, which have been proven to be driving factors in information processing. The case study addressed in the empirical research is a radiological accident in Belgium (2008) which led to a release of radioactivity to the environment. The aim of risk communication by the authorities was two fold: i) to ensure compliance with measures taken to protect the population and ii) to stimulate acceptance of reassuring messages. In this study we first examined who is most likely to receive risk messages. We then determined who among those having received the messages is most likely to accept them. The empirical data originate from a large scale (N=1031) public opinion survey in Belgium. The sample was representative for the adult population. The data collection method employed was Computer Assisted Personal Interviewing. The results clearly demonstrated that systematic and heuristic predictors, respectively, come into play in different phases of the information processing. Specific knowledge dominates at the level of reception of risk messages, while heuristic predictors, such as psychometric risk characteristics, confidence in risk management and attitudes towards science and technology, are most influential at the level of acceptance of risk messages. The adaption of the RAS model to risk communication provided a better insight into the processing of risk information, by highlighting which predictors are related to the different stages of the proces.

SE 18.2 A literature review on the perception and communication of flood risks

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Flood hazards are the most common and destructive of all natural disasters. For decades now, experts have been examining how to mitigate the losses from floods. Within flood risk management, the study fields of risk perception and risk communication have grown rapidly. Because of the increased attention to these new domains, a state of the art review is felt necessary. Based on a set of empirically supported peer-reviewed studies on flood risk perception, a comprehensive literature review is given on various aspects of the research method. From this review, it follows that no methodological standardization is present in measuring and analyzing flood risk perception. This heterogeneity leads to difficulties in comparing results between studies. It is also shown that the communication of flood risk is scarcely out of the egg. Some studies go beyond conceptual communication models, but practical implementations remain problematic. The study ends with a set of recommendations to flood experts and an agenda for future research in the fields of risk perception and risk communication in flood risk management.

SE 18.3 More insights about the communicative turn in risk communication

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The interpretative turn is fully incorporated in a theory of communication as a constitutive framework. In our mediated times, risk communication communities are shaping and shaped as creative entities with the capacity to construct risk objects. In order to assume the centrality of communication, the transition from 'the risk management of everything' to 'the mediation of everything' may be conceptually seriously explored. In other words, the communication of risk management is strengthens the communicative constitution of risk objects at the same time that is transformed qualitatively by it. To think about some empirically steps on, the challenge is taking into account the characteristics of risk communication communities (Who and Whom) which are constituted through their mediations (How and What). These mediations could be primarily represented by the discursive balance of benefits or danger, the promotion of top-down and bottom-up institutional strategies, the prioritization of internal or external dynamics, the definition of public opinion towards which addressing, among others key debates. Taking as a case study the European Union, as a risk communication community, it appears clearly how risk categories are more depending on these processes of communication. In using this framework, it is possible to interrogate the whole policy-making process but also the communicative strategies used by the different polities according to the own risks characteristics, or not. Following this case, we are opening some unmasking questions related with hidden reasons (Why) affecting risk communication communities: why is prioritized the communication of a risk over others, how is the risk/beneficial balance modified through the circulation of their meanings, in what ways risks are related each other and their influence change depending on the benefits side. At the end, the deepness on the communicative turn in risk communication is searching for building a critical agenda.

SE 18.4 Dimensions of success in risk communication

Peter Modin
KTH (Royal Institute of Technology), Sweden

In discussing risk communication, it may be tempting to say that some instance of risk communication has been successful; however, one is often forced to rephrase such formulations, since success in risk communication is a complex, multi-dimensional concept. For example, the sentence «The food standards agency communicated successfully about the risk of contracting Salmonella» could mean several different things. Some possible interpretations are: (1) The agency transmitted the intended message, and the intended target group received it successfully (communicative success); (2) The agency attained the goal of the risk communication they had set beforehand, e.g. to raise the target group's awareness of Salmonella (goal-oriented success); (3) From the (actual or hypothetical) perspective of some of the stakeholders — e.g. the target group, the agency, other organizations etc. — the communication filled some meaningful purpose (perspective-oriented success); (4) The risk of contracting Salmonella decreased as a consequence of the risk communication (teleological success). In many cases, several of these types of success are achieved simultaneously, but this is not always the case. This paper elucidates the concept of success in risk communication by introducing several dimensions of success. These are then discussed in some detail; theoretical analysis and practical cases and examples are used to demonstrate relevant features and interrelations of the dimensions of success. It is finally argued that and suggested how risk communicators can derive practical benefit from using this taxonomy when attempting to communicate successfully.

SE 19.1 Risk communication during a pandemic: The benefit of disclosing uncertainty

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The influenza pandemic (H1N1) showed that many policy and decision makers do not trust citizens to effectively cope with uncertainty. Instead, public institutions such as the World Health Organization (WHO) communicated dramatic estimates of infection and death rates. Other institutions, for instance the Robert-Koch-Institute (RKI) in Germany, tried to convince the public that getting vaccinated against the H1N1 virus was necessary and safe. In retrospect, it has been argued that, instead of reassuring people and providing guidance for their actions, the failure to acknowledge the uncertainty of the evidence at the time may have reduced people's trust in public institutions. We conducted an experimental study to test whether the disclosure of uncertainty has positive effects on behavioral outcomes (e.g. willingness to get vaccinated or to take precautionary measure), trust in institutions and risk perception. Therefore, we presented participants a fictitious scenario and manipulated whether an estimate of infection and death rates was provided or not, whether an explicit recommendation to get vaccinated was given or not and whether the pandemic turned out to be mild or severe. Preliminary results suggest that participants who received either estimates of infection and death rates or vaccination recommendations rated the issuing institution as less responsible and were less able to understand and agree with the provided information than those who were informed about the uncertainty surrounding influenza and vaccination. If the pandemic was mild participants who were informed about situational uncertainty rated the issuing institution to have been more competent in fighting the pandemic and more likely acting according to sound scientific principles. If the pandemic turned out to be severe, participants who received information about situational uncertainty perceived that the issuing institution was more considerate of the public's attitudes and opinions.

SE 19.2 Microbiological risk assessment for listeriosis associated with smoked fish products: a Belgian scenario

Germán Andrés Vásquez [1]; Pieter Busschaert [1]; Frank Devlieghere [2]; Jan Van Impe [1]; Mieke Uyttendaele [2]; Annemie Geeraerd [1]
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Smoked fish products, stored at refrigerator temperatures, are to be considered as high risk food products for listeriosis, an important food borne disease with high fatality rate for immuno-compromised people caused by Listeria monocytogenes. This research aims to obtain the risk estimate associated with the consumption of smoked fish by a person at risk. Such microbiological risk assessment is performed through the dedicated use of models and databases. An extended database was constructed, partly specific to the Belgian situation. It contains prevalence (presence/absence tests in 25 g food samples) and concentration (counts/g) data of L. monocytogenes in smoked fish products (n=285, including smoked salmon and halibut), obtained from Belgian food companies in 2005-2009. Following variables were also recorded: shelf life, storage temperature, lactic acid bacteria (counts/g), pH, and packaging atmosphere. The database was further enriched by exploiting ComBase (www.combase.cc). Consumption data and consumer refrigeration temperatures of the Belgian Food Consumption Survey (Scientific Institute of Public Health) are used. Maximum Likelihood Estimation will be used to fit probability distributions to qualitative, quantitative and semi-quantitative prevalence data. Bootstrap methods will be used to estimate the parameter uncertainty of the variability distributions. A model describing growth of Listeria in smoked fish as a function of temperature, time, physico-chemical characteristics and lactic acid bacteria levels will be applied to simulate the evolution of number of cells in the smoked fish food chain. Two dimensional Monte Carlo simulations, separating as much as possible uncertainty and variability of relevant variables, will be used to assess the risk of infection. Finally, sensitivity analysis will be performed to point out the most important contributors (i) for the estimated final risk, and (ii) concerning data/model gaps causing uncertainty.

SE 19.3 The Megacity Project: risk of infectious diseases predicted by a spatially and age-structured model

Göran Bengtsson [1]; Markus Schwehm [2]
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The «swine flu» pandemic of 2009 has puzzled researchers and public health officials all over the world. Classical pandemic influenza models predicted large outbreaks reaching about 80% of the population. Despite initially fast outbreaks, the real pandemic reached only a final size of 20 to 40% of the population. It is not possible to model such a behavior with homogeneous mixing compartmental models. Instead, inhomogeneous mixing has to be assumed, as observed by social contact research like the POLYMOD study: Children and adolescents have much more and more intense contacts with their peers than adults and elderly. Under these conditions, the spatial distribution of children and adolescents within a population and their different mobility patterns compared to adults has a large influence on the dynamics of infection spread. This contribution presents a new modeling approach to pandemic influenza, combining an established influenza model (InfluSim) with a fine-grained demographic and spatial structure. In particular the model allows assigning the large concentration of people living on a relatively small parcel of land in Megacities to tightly connected patches of cities and suburban areas. The spatial distribution of the population and its movement pattern in a megacity tends to amplify the disease transmission. The resulting model can reproduce the fast pace but small final size of the 2009 pandemic. Because of the inhomogeneous distribution of children within a population, it also generates regionally different recommendations for interventions like school closing and vaccination. While this study was done to reproduce the influenza pandemic 2009, the results are also relevant for the assessment of other (emerging) directly transmitted diseases. However, the study reveals that successful modeling of the spread of infectious diseases requires a fine-grained surveillance of disease symptoms within a population.

SE 19.4 Establishing a Global Social Science Knowledge Source to Improve Understanding and Management of Risk - A Case Study on 'Swine Flu'

Jens Zinn
University of Melbourne, Australia

Ulrich Beck (2002, 2009) claims that ongoing globalisation processes would urge different nations to cooperate for mastering new risks such as climate change, international terrorism, and financial crisis. The proposed cosmopolitan worldview might not only refer to political cooperation but a need for cross-national capacity building such as new independent knowledge sources to learn and understand national and transnational responses to and regulation of risk. This presentation reports from the development of such a knowledge source at the University of Melbourne. The International Social Science Risk Database (ISSRD) will fill a major gap in the resources available to social scientists to support academic and practical research as no comparable database currently exists in this field. Its major aim is to fertilise cross-national comparisons of risk perception and regulation. By the example of the recent swine flu and a comparison of Australia and the US, the presentation will illustrate how the data base can be used for research. The ISSRD identifies central players in the swine flu debate such as the WHO, and how the debate was influenced by the production of knowledge and national and regional deficits in management and regulation. It shows the dynamics of risk communication and how it was linked and used past experiences for imagining possible futures. References Beck, U. 2009, World at Risk, Polity Press, Cambridge, UK; Malden, MA. Beck, U. 2002, 'The Cosmopolitan Society and its Enemies', Theory, Culture & Society, vol. 19, no. 1-2, pp. 17-44.

SE 20.1 Understanding barriers to consumer acceptance of new food technologies

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ICCR, Austria

Within the food sector, new food technologies have been continuously developed to meet the needs of more efficient production methods and better quality for consumers. However, concurrently new food technologies have met consistent resistance and scepticism on the part of consumers mainly due to social and ethical concerns. As consumers generally possess relatively little knowledge of new food technologies, research has shown that in a causal-chain relationship consumers' acceptance of new technologies is influenced by several factors ranging from risk-benefit perceptions, demographic and socio-economic characteristics, through to social trust in laws; in companies; in scientists; and in the information provided by institutions. In overcoming such barriers to consumer concern, it remains critical that effective risk communication strategies incorporate beyond the traditional food safety concerns also socio-economic risks and benefits as well as opportunities so as to provide a level playing field for consumers to make informed food choices. In developing recommendations for effective risk communication strategies, it is important to focus on the credibility of the information source as perceptions of scientific uncertainty and risk are factors that may influence the interpretation of communication and thereby acceptance, and that the communication of the benefits and risks of new food products and technologies incorporates the demographic and psychological indicators so as to target and tailor communication at specific target groups. Thus, understanding how consumers perceive the risks and benefits of the food they buy and thereby form their attitudes is a key factor in identifying and achieving a better understanding of consumer acceptance of new food technologies. This is the purpose of this paper.

SE 20.2 Risk Perception of Pesticide Residues in Food — Results from a Representative Survey in Germany

Astrid Epp ; Mark Lohmann ; Gaby-Fleur Boel ; Britta Michalski ; Ursula Banasiak
Federal Institute for Risk Assessment (BfR), Germany

Not least because of regularly media coverage pesticide residues in food are of high public interest. Two European surveys in 2006 and in 2010 have shown that pesticides in fruits and vegetables are regarded as the highest risk factor in the food area by German consumers. That makes a knowledge-based communication concerning actual food-borne risks very difficult. To gather the facts and get more detailed information about perception, coping and information behavior by the consumer with respect to pesticides, the German Federal Institute for Risk Assessment (BfR) started a representative survey in 2009. A CATI survey with a random sampling scale of n=1003 was conducted during the period from November to December 2009. The results show that German consumers generally expect complete pesticide free food. Furthermore, the majority of consumers think that pesticide residues in food are illegal. In case pesticide residues were found and the story was communicated by the media people got the impression that a giant lack of control and regulation enforcement exists. Although no health damage was ever observed, pesticide residues in food are still perceived as a high risk factor by the consumer in Germany.

SE 20.3 Changes of the public risk perception and opinion about science and technology in Japan

Motoko Kosugi
Central Research Institute of Electric Power Industry, Japan

The aim of this paper is to show differences of the public risk perceptions and values about S&T between 1999 and 2009. The first survey for the public was administered in December of 1999 to 1,000 residents in metropolitan area, who were 20-69 years old, randomly sampled from the resident resisters. There were 735 complete responses. The second survey was conducted in November 2009, and was asked 1,000 residents who were sampled as same procedure as previous one to respond. The number of respondents was 685.
The public perceived genetically modified foods (GMOs) and Nuclear power generation (NPG) as rather dangerous in 1999 survey (GMOs:3.49, NPG:3.83) by using 5-point scale (1=safe, 5=dangerous), however, the public in 2009 perceived these technologies as safer than before (GMOs:2.99, NPG:2.67). The public attitudes toward S&T also shifted more positive direction in 2009 survey compared to in 1999; the public thought that «the advancements in S&T make our lives more comfortable and convenient», «the progress of S&T have positive effect upon human health and abilities», and «the present unknowns ought to become along with development of S&T». And they strongly agreed with «human ought to accept some risks instead of enjoyment benefit of S&T» and «people ought to endure any disadvantage and burden for keeping natural environment». On the other hand, they felt «Information that imply risks of S&T was covered up from the public». It is probable that these changes are influenced by media coverage of global worming and a few experiences of serious accidents and disasters in last 10 years.

SE 20.4 The causes and limitations of Koreans' low level risk perception of nuclear power

Choong-hoon Park
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The purpose of this research is to study cause factors which influence Koreans' low level risk perception of nuclear power. Korea is the one of the top nuclear power generation country. Korea ranks fifth in terms of the number of nuclear reactors and ranks sixth in terms of nuclear power production output. It has 20 commercial reactors in four nuclear power plants and plans to build more units in the coming years to meet growing energy needs. Some traditional environmentalists may be surprised, but the nuclear power is the mainstay of «Green Growth» policy by Myeong-bak Lee Government. This aggressive attitude of nuclear power generation in Korea is the result of the low level risk perception of nuclear power. According to KNEF(Korea Nuclear Energy Foundation) survey, 88.4% of Koreans surveyed said that development of the nuclear industry is necessary and 53.6% of respondents said they believed radioactive materials were being safely stored. In fact, nuclear waste facility's decision on location in 2005 came after cutthroat competition among several local governments. For many Koreans, nuclear facilities are not serious disaster. This study is to examine these causes which affect Koreans' low level risk perception of nuclear power in 3 aspects: nationalism, economy and development of democracy. I also discuss the limitation and influence on nuclear power's risk management by low level risk perception.

SE 21.1 Risk Perception as a Process of Mitigation

Seda Kundak
Istanbul Technical University, Turkey

The importance of risk perception of community rises in the achievement of mitigation activities. Today, we know that risk mitigation is not only a technical process but mostly connected to the behavioral change of end users to sustain established structures. Within this perspective, this research focused to evaluate the earthquake risk perception of the community, the reactions/feed backs to related training activities and perception of the community after having been trained to reduce disaster risks. As a case study area, Istanbul has been chosen due to: (1) it is under the severe earthquake threat because of the North Anatolian Fault, (2) it is a big metropolis with a population more than 10 millions, (3) local and central governments spend great efforts on earthquake mitigation activities since the last big earthquake occurred in Kocaeli in 1999. The primary results show that the community has low internal locus of control that they are not able to change their destiny, therefore majority of them believe that this is the duty of the government to mitigate the risks. In the further steps of the research, the focused group was interviewed before and after the risk mitigation training programs to evaluate the changes on their perceptions. The results show that there is a dramatic change in perception according to gender after having been trained.

SE 21.2 That's Synergistic!: Measuring Perceptions of Synergistic Risks

Ian Dawson ; Johnnie Johnson ; Michelle Luke
University of Southampton, United Kingdom

Efforts to empirically assess individual's understanding of synergistic risks have been hindered by concerns that the psychometric measures employed in previous studies may not obtain data that accurately reflects the individual's understanding of the risk attributable to combined hazards. To address this issue, we developed a new approach for assessing subjective risk judgments for combined hazards. Unlike previous studies, which have obtained judgments in a 'decomposed' format (i.e., where a risk judgment for a combined hazard is made separately to the risk judgments for each constituent hazard), participants in our two studies made risk judgments in a 'composed' format (i.e., where a risk judgment for a combined hazard is explicitly made relative to the risk attributable to each constituent hazard). In the first study, non-experts made risk judgments for three combinations that present synergistic health risks: alcohol-driving, aspirin-clopidogrel and radon-tobacco. In the second study, a comparison was made between the judgments of domain-experts (i.e., independent drug prescribers) and non-experts for the aspirin-clopidogrel combination. Results from the studies demonstrated that the composed format documented different trends in risk judgments between (a) the different hazard combinations presented to non-experts, and (b) the non-experts and domain-experts for the same hazard combination. Importantly, these findings indicate the composed format may provide a valid metric for the assessment of subjective risk judgments for combined hazards. Furthermore, the results suggest that whether an individual understands that a combined hazard presents a synergistic risk may depend on several factors that include domain-specific knowledge and judgmental experience concerning the combination.

SE 21.3 An intersectional analysis of risk perception

Anna Olofsson
Risk and Crisis Research Center, Sweden

The aim of the paper is to introduce intersectional analysis to risk perception research and testing it empirically. One of the strengths of intersectional analysis is that it does not only include the intersection of class, gender, ethnicity etc in the analysis, but it also shows the variability of the effect of different socio-cultural factors in different context and at different kinds of events. The theory is applied on quantitative data composed of a Swedish national survey about risk perceptions. The expected results are that the developed theoretical concepts will increase the understanding and explanation of the known differences in risk perception between men and women as well as native people and people with foreign background.

SE 22.1 «Do pecautionary messages tend to heighten public concerns about health effects of mobile phones?»

Peter Wiedemann
FZ Juelich, Germany

This paper will summarise the results of a major recent international research study that investigated the effect of precautionary messages upon perceptions of potential health risks. Peter will consider criticisms of the underlying thesis and how research, policy and practice should respond.

SE 22.2 Mobile Phone Risk Assessment and Policy Response: Recent French Experience

Marc Poumadere
Institut Symlog de France, France

This presentation will relate recent experience of the multidisciplinary expert committee composed by AFSSET (the French agency for environmental and workplace risks) to examine the state of risk assessment in mobile phones and health risks. AFSSET published a highly precautionary communiqué whereas the committee, after one year of review, had concluded that research has failed to uncover physical risk.

SE 22.3 EMF-Risk Management by Means of a Voluntary 'Self-Commitment' Made to the German Federal Government

Karsten Dr. Menzel ; Dagmar Wiebusch
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Facing increased public concerns about possible health risks of mobile communication, the network operators in Germany committed themselves to reduce the conflicts related to the rollout. For this reason, a voluntary «Self-Commitment» was signed by the operators in December 2001. In addition to the legal framework, the operators confirmed to improve their environmental and health related activities to enhance the acceptance of the mobile communication infrastructure. The commitment contains enhancement of participation of municipal administrations and of communication with the broader public during the planning process for mobile base stations, enhancement of consumer protection and information regarding mobile communication technology and health plus financial support of EMF-research (German Mobile Communication Research Program), of a public domain EMF-Database and of automatic measurement systems. The voluntary «Self-Commitment» is monitored by regular independent audits. Since 2001, seven Annual Reports have been published. They all revealed that the network operators achieve theire aims to a great extent. The number of municipalities that complained about conflicts has been reduced to the half (from 21.7 % to 11.9%). In addition, the conflicts taken to court decreased, as well as protest actions of citizens. At the same time, the quality of consumer-friendly information, provided by the operators, improved continuously. The informational sources (brochures and websites) were judged as informative, objective and well-balanced. The results of the German EMF-Research Program, the data from the EMF-Database and the automatic measurement systems enabled the involved authorities to improve the communication with concerned citizens. Considering the track record of the voluntary «Self-Commitment», the Federal Government assessed it to be an effective tool for risk-management and -communication. Therefore in 2008 it has been elongated for an unlimited period.

SE 22.4 What happens if you inform about precautionary measures?

Peter Wiedemann [1]; Holger Schütz [2]; Franziska Börner [3]
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When risks are unclear or highly controversial, precautionary measures are called for to reduce the potential for risks and also oftentimes to primarily affect risk perceptions. Understanding how risk perceptions are influenced by precautionary measures is a critical component of the efforts to improve risk communication strategies and, indeed, risk management practices. In a multi-national (9 +3 nation) research project, survey experimental studies were performed to obtain crucial scientific data related to understanding trust, risk and benefit perception of mobile communication technology by the general public in regards to the issue of precautionary measures towards both mobile phones and base stations. Contrary to the prevailing assumption that implementation of precautionary measures, or more precisely communicating or informing about taking such precautionary measures, will increase trust, alleviate fears, and reduce risk perceptions in the general public, previous findings from Western & Middle European countries indicated that the opposite effect may be observed. Preliminary data analyses for the ISEP study in these countries support the previous observations. Various theoretical hypotheses may be posited to explain this countervailing effect. To verify whether this effect holds true across larger sample sizes and across different cultures and countries, an international comparative study was performed in nine countries using a standardized survey instrument that, however, was culturally adapted. Initial comparative analyses indicate that a countervailing effect may not be observed in all the ISEP partner nations. Survey variables included the information about the level of precautionary measure, the basic intention behind implementing it, and the order of addressing base stations and mobile phones. Respondents rated their perceived risks, organizational trust, and benefits, and in addition self-reporting their own mobile phone usage patterns.

SE 23.1 Governing and assessing sustainability within public organizations

Myriam Merad ; Frédéric Marcel
INERIS, France

INERIS is a member of the sustainable development Club of public institutions and firms which currently has over 60 members. These considerations led to the development of a best practices guide for SD following the recommendations of ISO 26000 on Societal Responsibilityof Organizations. On April 15, 2010, member institutions of the Club have confirmed the needs of a common reflection on the SD governance. INERIS was mandated by the General Commissioner for Sustainable Development for working on governance modes. In daily practice, all public organizations are facing the complexity of managing balance between social, environmental and economic dimensions. This paper will therefore, identify the challenges of managing these balances. This will need to work on how to improve performances which are based on both policy makers at the highest level of organizations as well as operational decisions regarding sustainable development. It is in this context that we address the issue of dashboards and indicators. These are used in many areas to make a synthetic knowledge and appropriate for a decision, the question of the adequacy of such tools in the context of sustainable development is raised here. The goal of this paper is to answer the following questions: - To what extent sustainable development indicators' can improve decision making processes and therefore the sustainability of public organizations? - In what contexts is it appropriate to use the indicators and in what other contexts it would be, however, inappropriate to use because of possible simplifications they generate? - For contexts deemed irrelevant to the use of indicators, what other approaches, technical or organizational, would be relevant to improve the representations are the makers of the sustainable development level of a public organization.

SE 23.2 Managing vulnerability: the implementation of risk reduction measures

Jeroen Neuvel ; Wilbert Rodenhuis
Saxion, Netherlands

In risk management literature and practices, the reduction of vulnerability is regarded as a central element of risk management, in addition to the reduction of hazards and exposure. In previous studies, the Netherlands approach towards the reduction of technological en natural risks were presented, in which special attention is paid to the reduction of vulnerability. In this paper, it is explored which issues are faced with respect to the implementation of vulnerability reduction measures. Special attention is paid to measures to increase the capacity to resist, adapt to, cope with and recover from natural and technological risks. The findings are based on empirical research. One study focuses on the implementation of measures to mitigate societal risks, related to activities with dangerous substances, through spatial planning. The second study focuses on the implementation of flood mitigation measures. Both studies consist of numerous case studies in the Netherlands in the period 2010-2011, in which spatial development projects were studied through relevant policy documents and interviews with the main actors involved. The studies demonstrate that prescribed measures for the reduction of vulnerability are hardly implemented. The Dutch land use planning and environmental management system cannot yet facilitate the implementation of desired measures. First of all, measures for vulnerability reduction are often not compellable to both public and private actors. Second, costs of safety measures can often not be transferred to property owners or developers. Third, tasks and responsibilities with respect to the implementation and enforcement of measures are unclear. Moreover, local authorities are not fully aware of the available instruments for the implementation of measures, such as private agreements or contracts.

SE 23.3 Perceptions of environmental health risks: citizens' and policy makers'

Ric van Poll [1]; Christian Bröer [2]; Gerben Moerman [2]; Pita Spruijt [1]
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The way citizens perceive health hazards is influenced significantly by the way these hazards are dealt with by national health risk policies. We expect that peoples' risk perception differs between countries, in case risk policies differ between those countries. Within each country, we expect to find congruence between peoples' perception and national risk policy. We used a mixed methods approach: quantitative survey data about risk perception and qualitative data on policy. As part of «INTARESE», a European 6th Framework Program Integrated Project we were able to conduct research in six European countries: Finland, the Netherlands, Slovakia, Spain, United Kingdom and Belgium (Flanders). In a survey, we asked people to rank 9 different risks (air pollution, sea level rise, corrosive cleaning agents, tanning, dampness, polluted tap water, nuclear waste, alcohol consumption, and pesticides in food) according to their own priorities. In qualitative expert interviews, we assessed the policy priorities concerning the same risk. Together with established governmental policy, we include recent policy measures and policy debates in our analysis. We are aware that policy is not the only force shaping risk perception. Citizen's trust towards health risk authorities is part of the analysis too. In addition, recent «incidents», for example at a nuclear power plant, might influence citizens' policy priorities. The same holds for media attention for specific health risk. Both, publicized incidents and media attention in general, are therefore included in the analysis as mediating between policy and people's perception. Preliminary results show that, contrary to our hypothesis, there seems to be a general agreement among citizens of the six countries when it comes to the most urgent health risk (out of nine), while policies in their home countries differ. We will elaborate on the distinction between citizens and policy makers and the influence of trust and media.

SE 23.4 Managed-retreat as form of adaptation to climate change. How a «new issue» encounters local practices of land use.

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Though climate change appears rather a new public issue, it does not happen on a tabula rasa; it affects «traditional» policy sectors. If it is so, the question is how this «new issue» interacts and takes shape in already established organizational processes? How climate change is «operationalised» in local practices? In the face of major events linked — to a certain extent — to climate change such as desertification, climatic migrations, inundations, landslides, one can make the assumption that one of the main implications of climate change is a major change in land use or at least a transformation in land organization and management. The study explores the process of implementation of a «flood controlled area» as adaptation practice to climate change. What kind of theoretical and empirical tools the analysis should adopt to give account of the multiple actors, types of knowledge, artefacts, socio-technical systems and governance configurations and sectors engaged in the definition of such practices? By adopting a theoretical approach inspired by Actor-Network Theory (Latour, 2006), the suggestion in this paper is to consider the adaptation practice not as standardized top-down solution but rather as the result of specific connections among different actors, materials, discourses beyond the boundaries of formal organizations. The analysis proposes to take into account local narratives in the definition of adaptation policies and to consider implementation practices as distributed knowledge.

PS 01.1 Socio-cultural analysis of vulnerability production and community responses to flash flooding: a Mexican case study

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This research aims to understand the production of vulnerability and differential local responses to flash flooding, taking as its case study a small town in central Mexico. It adopts an approach based on situational analysis (Clarke 2005) and employs qualitative research methods, including observation, interviews with local actors and documentary materials. Analysis of the social worlds that structured the local flood disaster arena revealed two distinct communities within the affected population; an established, traditional community and an emergent community, inhabiting a new neighbourhood, made up of incomers to the town. The research found significant differences in community responses that could be traced to contrasting social identities, beliefs, knowledges and practices. These differences played an important role in shaping community understandings of and coping strategies for dealing with the flood hazard. Furthermore the research found that the different strategies adopted both by the communities and also by local governmental institutions were as much about protecting themselves against improvised or non-situated policy making as they were about disaster risk reduction. The research findings highlight the consequences of intra-community socio-cultural differences, as well as of a number of contextual factors, which pose a challenge to efforts at disaster risk reduction based on community engagement and participation.

PS 01.2 Psychological Research on Consumers' Financial Risk Perception and its Dimensionality

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Meiji University, Japan

This article provides a psychological perspective towards financial risk through examining consumers' risk perceptions and its dimensionality. Financial risks have been studied mainly through the calculated variance of financial value. However, some studies have pointed out that such understanding of financial risks among experts differs from that of general consumers. Unlike financial experts, general consumers tend to make investment decisions based on the risks that they perceive, and not necessarily on a calculated financial risk. Thus, a consumer's risk perception is one of the key factors in their investment behavior. This study aims to clarify such consumers' financial risk perception and to illuminate the processes of making an investment decision. We conducted the research by interviewing university students in a finance class about financial products and the associated risks. A trained interviewer asked the participants to discuss in a group various financial products, the risk perception associated with each of these products, investment cost, and the anticipated benefit from the investment. Content analysis of the interview demonstrated that they made investment decisions based on six factors. We then categorized these factors into two dimensions: a socio-financial dimension and a financial risk perception dimension. Neither of these two dimensions contained a calculated variance of financial risks that experts use as indicators when they decide to invest. This revealed that consumers, unlike financial experts, judge financial risks based on their perception, rather than on calculated risk. We concluded that general consumers do not make investment decisions based on the calculated financial risks but rather on their mental models that consist of social and risk perception dimensions.

PS 01.3 Integration of risk and benefit assessment models, risk-benefit assessments and validation within the PlantLIBRA project

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Use of plant food supplements (PFS) is widespread among European consumers that consider these products as a helpful tool for deriving health benefits. Plant extracts used in food supplements, due to their concentrated form, may rise safety concerns at doses which are close or lower than the effective dose. Development of methodologies for safety and benefit assessment has only recently begun. In 2008 the European Commission challenged the scientific community to develop a methodology for integrated risk-benefit assessment of PFS. In response to this call, the PlantLIBRA consortium has developed a project aimed to support the safe use of PFS by increasing science-based decision-making by regulators and food chain operators, including an appropriate methodology for risk and benefit assessment. The conceptual framework for the development of such methodology has been designed as a modular structure and it is composed of several interconnected research steps. The study design includes a systematic literature review of the existing methods in food and food supplement sector and of the concept of assessment validation. The outcome will be used to evaluate quantitatively the performance of the identified approaches for risk-benefit assessment of PFS and to develop a tiered methodology for risk-benefit assessment of PFS. Characteristics of the methodology, which will encompass the principle of a novel method, called the open assessment, will be defined through expert elicitation including national regulators. A common currency which provides a commensurable measure for evaluating health risks and benefits, including well-being related ones, specific of PFS will be part of the framework. The results will include total «burden of disease/well being» estimates. Finally, an Internet-based interface will be developed to perform risk-benefit assessments by interested parties. The research is funded by EC-FP7 (grant agreement 245199) and carried out within PlantLIBRA project.

PS 01.4 What Makes Risk Politics: Political Base in Risk Perception about Mad-Cow Disease

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At 2008 in Korea, different attitudes toward importing beef from USA brought out social conflicts among people. Anti-group argued that there was higher risk of MCD (Mad Cow Disease, i.e., BSE: Bovine Spongiform Encephalopathy) whereas proponents officials in Korean government believed that the imported beef with non-MCD would be good because a lot of people will be get more consumer utility and economic benefit at «the cheaper beef price». Korea government faces the resistances from a lot of citizens. The protest movement brings out the legitimacy crisis to government. Where do such social conflicts around MCD come from? It is «politics of risk». To answer the question, we need more comprehensive research model to include not only perceptive or cognitive variables which dominant psychometric paradigm in risk studies have always stressed on, but also «political factors» which they have been disregarded in psychometric paradigm for long times. Our study will empirically test the power of political factors, not just only psychometric perception factors, to explain the risk perception toward MCD. We will analyze the survey data which were collected by Social Development Institute at Seoul National University (n=1002) in 2008. To explain the risk perception toward MCD, we construct the model, consisting of not only perceptional determinants such as perceived benefit/risk, trust and emotion, but also political determinants such as ideology (left-light or conservatism-progressivism), political partisanships, democratic orientation, social class and religion orientation. By comparing the psychometric perception factors with political ones, we will check the theoretical possibility of political factors in explaining the risk under highly politicalized risk event. It will contribute to rebuild the frame of risk studies based on traditional psychometric paradigm.

PS 01.5 Again Nuclear Energy But!: The Level and Determinant about Acceptance of Nuclear Energy in the Age of Energy Crisis and the Green

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Facing serious energy crisis and environmental problems, every country has begun to regard the nuclear energy as a solution for those problems in the future. Hence, a lot of countries already considered more construction and sanction about nuclear power station. However, it is wondering «how many people accept the nuclear energy as alternative for energy future and what's factor to influence the acceptance of nuclear energy». There are few studies about structure of acceptance about nuclear energy as new alternative for future energy. Our study will empirically explore first, the level and determinants about acceptance of nuclear energy, and then compare those levels of acceptance and determinants of nuclear energy with other renewable energies. We will use the survey data which are collected in 2008 with samples of 1500. In analysis, first, after describing the basic level of acceptance of nuclear energy among people, we will divide the respondents, according to degree of supporting the nuclear-power, into pro-nuclear group and anti-nuclear group. The demographic information about two groups will show the cleavage in support structure about nuclear energy. Second, we analyze the determinants of support for nuclear energy, in which the risk/benefit, trust, knowledge, stigma should be set as independent variables, all of which usually regards as main determinants for the degree of acceptance. Third, we will compare the support structure of nuclear energy with that of other energies (water power, fossil power, renewable energy, etc.). This analysis will reveal the relative position of nuclear energy among competing alternatives for next future energy. In short, our researches may empirically well show the structure of acceptance and its determinants for nuclear energy as one of alternatives for energy crisis. The analysis could be contribute to not only theoretical building but also practical energy policy making, related with energy choice for the future.

PS 01.6 Is It Connected?: Exploring the Linkage between Societal Risk and Technological Risk

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Research Question: There are great divides between technological risk studies and societal risk studies. The former is a traditional psychometric paradigm in risk studies which heavily focus on technological and natural hazard and, as determinants for risk perception, usually stresses cognitive and emotional factors, i.e., perceived benefit/risk, trust and stigma. The latter is mainly concerned with social welfare studies, which have interested in societal risks such as health, economic status/employment and environment/safety, tried to confirm the socioeconomic structural factors to determine those societal risk. Our basic research question is i°Areni¯t two paradigm really separated?i± We believe that there are possible connections between societal risk and technological risk. Research Design: To explore the connection between two risk paradigms, we set the research framework as shown in below . By analyzing the survey data, we want to confirm this model by verifying two hypotheses: First, there are closely connections, i.e., interactive or causal relationships, between perceived technological risk and perceived societal risk. Second, causal factors, not included their own paradigm, would be influence the counterpart risk perception. For example, perceived risk/benefit, trust and stigma may influence perceived societal risk whereas health, economy/employment, environment/safety may have impact on perceived technological risk. Research Output: If that hypothesis would be confirmed, it could provide more comprehensive and balanced approaches to risk study by covering both psychometric paradigm and social welfare paradigm.

PS 01.7 Accept or Not!: Exploring the Effect of Government's Persuasion Strategies in Risk Conflict Issues

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In risk communication studies, government is generally one of key actors to persuade the public. In the persuasion process, it mobilizes the diverse persuasive strategies such as highlighting the higher benefit/low cost, trust worship and positive image about risk objects. However, there are few studies the effects of government's persuasion strategies. Such fewer studies come from lack of appropriate theory and method about government's persuasion strategies under risk communication literature. Our studies will explore what kinds of and how much persuasion strategies take effects on changing the public by using survey experiment method. Survey experiments construct natural situation by using survey questionnaire in which respondents' original attitude toward specific topics is checked and then rechecked the attitude change after giving intended stimuli to respondent. Even if survey experiment can't control all of exogenous factors, it has take advantage of well explaining the realistic situations with strong validity. We will apply the survey experiment to the case of Mad Cow Disease which made serious social conflicts in Korea, 2008. In this case, although government tries to persuade the public that there are no risks related with Mad Cow, it faces the strong resistance from the public. In the survey experiment, we will first check, in survey questionnaire, the respondents' original position toward Mad Cow and then recheck their attitude change after giving them stimuli, all of which the government used as persuasion strategies. Those persuasive stimuli include mitigating the perceived risk, increasing the benefit, building up the trust, providing the knowledge and attenuating the negative stigma, all of which are related with MCD. By comparing the original attitudes with those which are measured after giving those stimuli, we will know the degree of the effectiveness which each persuasion strategy has.

PS 01.8 Who Are the Vulnerable?: The Test of Vulnerability Hypothesis in Risk Perception Studies

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Our study aims to empirically test the «Vulnerability Hypothesis». Vulnerability is usually defined as a degree of hazard from biophysical risks as well as social risk. Vulnerability may be an internal risk factors of the subject or system that is exposed to a hazard and corresponds to its intrinsic predisposition to the affected or t be susceptible to damage (Cardona, 2003). Vulnerability hypothesis argued that vulnerable position in given society make people being risk-sensitive. The less resources which need for sake of their own security do people have, the more risky the vulnerable group feel, compared with those have sufficient resource against risk. Those vulnerable may usually include women, the older and the poor, those who are the minority in society. Even if the vulnerability is the key concept in risk studies, there are few studies (Bang, 2008; Benford et al., 1993). We elaborate this hypothesis both by building the more comprehensive theoretical model and by testing it through empirical analyze of the survey data. In data analysis, we will do, first, systemically analyze the hypothesis whether the traditional vulnerable groups (women, the older and the poor) really have the higher risk perception than other competent groups do. Since existing studies have heavily focused on socioeconomic factors such as gender, age and wealth, they have disregarded the new variables such as social network, knowledge and ecological-geological site. We will analyze how those who have weak social network, less knowledge and living in risky site have degree of risk perception, differing from which competent actors have. Second, we will analyze whether or not those vulnerable groups really face risky experience more than the strong groups do. Our study will use the survey data and compare the degree of vulnerability between diverse social groups. We believed that our research will give more clear specification about structure of vulnerability in given society.

PS 01.9 The Comparative Study of Structure of Science-Technology Acceptance across 34 Countries

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Our study will empirically analyze the dividend of variations between micro and macro levels of social acceptance of science-technology. We argue that the social acceptance of science-technology should be predicted by not only individual psychometric factors but also emergent ones embedded into social context. Based on data covering 31,390 respondents in 34 countries, we apply the multilevel modeling to confirm both individual and context effects on acceptance of science and technology. Before constructing the multilevel modeling, we review the key theoretical concepts not only at the individual level, such as perceived risk/benefit, knowledge and affective image, but also at the national level, such as economic state (GDP per capita), religiosity, and materialism/ post-materialism. In the data analysis, first, within each country, we uncovered the difference in individualsi¯ attitudes toward and determinants of science-technology acceptance at the micro level. Second, by analyzing the aggregated data across countries, we uncovered the significant contextual role of macro-level variables. Finally, by adopting multilevel modeling, we compare explanatory power between predictors at the individual level and those at the aggregate level.

PS 01.10 The Comparative Studies of Determinants of Risk Judgment about Five Diseases

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Our study will comparatively analyze the determinants of risk judgment which will be supposed to be varied according to types of disease. There are a lot of studies about diseases. Wallis & Nerlich(2005) and Washer(2006) argue that the disease was influenced by not only social-structural variables also psychometric variables especially media. Smith (2006), Miller(1999) also argued that people are perceived differently about disease risk depending on the role of mass media. However, most previous researches tend to have focused on the single disease subject, so they have been overlooked the attributes which lot of disease have. Moreover, they did not include all of significant determents to influence the risk judgment in disease. In our study, we will analyze five types of diseases (Tuberculosis, mad-cow disease, Aids, Bird-flu, Leprosy disease). Those risks from five diseases will be measured in terms of «possibilities of risk» and «degree of risk exposure». Then we explore how not only social structural variables such as income, education and gender, but also psychometric variables such as social trust, emotion, controllability and perceived benefit/risk influence the judging five disease. In short, we may well show the distinctive determinants changed according to kinds of diseases. All of research framework will appear in below figure.

PS 01.11 Four Competing Paradigms: Exploring the Catalytic Determinants for Energy Conservation Behavior

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The shortage in natural resource & energy is one of immediate threats & risks to human. Energy conservation behavior at the individual level is one of necessary solutions of resource shortage problem. Existing studies have confirmed the role of causal determinants such as level of education(Held, 1983; Olsen, 1983), income(Cunningham & Joseph, 1978), age(Reizentein & Barnaby, 1976), gender(Zuiches, 1975), perceived benefit (Fischhoff et al, 1978: Desvousges et al., 1993: Alhahkami & Slovic, 1994: Williams et al., 1999), perceived risk (Brandon & Lewis, 1999; Poortinga et al, 2003) in energy conservation behavior. However, those studies did not get the theoretical parsimony because there are lots of independent variables to explain the conservation action. Hence there are no theoretical frameworks to classify or explain the different variables under simple structure. Hence, we present the four paradigmatic research models to explain energy conservation behavior. Four paradigms are related with Ideology & Value, Resource Availability & Capability, Experience (Poverty experience in the older & affluence experience in the younger), and Perceived Benefit & Perceived Risk. Each variable among four paradigms has been fragmentally analyzed in previous studies. We will empirically analyze how this parsimonious model explains the energy conservation behavior (three behavior in house and four actions related with private cars. The research framework is shown in below . In short, our study will show the usefulness and power of theoretical model for explaining the conservation behaviors. We will use the data (n=1,002) from «Korea social science data archive (Kossda)».

PS 01.12 Who's and What's Emotional?: The Specification of Varieties of Emotion and Its Determinants in Judging the Nuclear Power

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In our study, we analyze the structure and determinants of emotional judgment about nuclear power. A lot of previous studies have found that emotion is one of important factors in judging the nuclear power acceptance. There are great divides between rational thinking and irrational thinking in judging risk objects; the former stresses perceived benefit/costs role in judgment and the latter focuses on the feeling and stigma reflecting image of risk. We will specify the emotional thinking in case of judging the nuclear power. At first, to test the causal factor to bring out emotional thinking, we will analyze how the emotional judgment occurs according to demographic variables. We prove the previous study's main results that the younger, more educated, being female rather think emotionally than the older, more educated and being male do. Additionally we explore the relations between dependent emotion and independent social-constructed variables such as trust, benefit/risk and knowledge. Second, we will analyze how the different kinds of emotion, for examples gloomy/good, weak/strong, dirty/clear, retrogressive/progressive, are determined by different causal factors. In short, we expected that this study would contribute to elaborating the structure and content of emotion in judging the nuclear power.

PS 01.13 The Specification of Social Trust in Judging Food-Related Risk

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Our study will specify the social trust as a determinant of risk acceptance related to six food risks which include mad-cow disease, GMO, antibiotic & hormone, new virus, insanitation, pesticide.). Social trusts take a important role in judging the food-related risk. Dora(2006) and Cho(2009) argued that people tend to feel the food-related risks as magnitude of images that depend on social trust rather than objective probability of risk. Moreover, Joffe and Haarhoff(2002) show that, in food-related risks, the trust toward government, newspaper, broadcasting, religion, and expert is very important role. However, previous studies did not show how different trustworship objects bring out varied degree of trust. Since there are lot of objects — i.e., government, newspaper, broadcasting, religion, and expert — which are trusted, those different trusted objects bring out different effects on decreasing the risk perception. Moreover, the impact of trust on risk judgement could be changed according to risk objects Our study will empirically show that, first, how do the different trusts bring out variations of risk judgment, second, such trust is also varied according the kinds of risk objects, in our study, four food-related risks (GMO, New Virus, Mad Cow, Insanitation). Our research model appears in belo.

PS 01.14 From Nuclear Weapons to Nuclear Terrorism: Qualitative Analysis about Changing History of Concept of Nuclear Risk

Jaesung Kim
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Nuclear Terrorism sometime in the most apocalyptic events occurs to prevent the inevitable happens, but to do not know how.i± Warren Buffett has expresses about the danger of nuclear terrorism. Traditionally, the biggest risk to security on the nuclear that Cole War after nuclear weapons as a national security was a critical variable. After the collapse of the Cole War the U.S and Soviet bilateral nuclear disarmament treatise between the countries by reducing the risk of nuclear war, but nuclear attack. In other words, nuclear terrorism threats increase. At nuclear Security Summit held in April 2010, Obama said on including the nuclear disarmament, nonproliferation, the prevention agenda of nuclear terrorism. Nuclear disarmament has been reduced by the number of nuclear weapons. But the risk of nuclear terrorism has increased. In fact according to the IAEA from 1993 to 2007 years, all nuclear and radiological trafficking suggests 1340 or unintentional violations of nuclear security. This is a shortcut to nuclear proliferation and nuclear terrorism is that it can be. And neighboring Afghanistan, about Parkistan's nuclear facilities, anxiety and correct management weaknesses have largely been questioned. 2010 Nuclear Review(NPR) report on nuclear policy such as the top priority of preventing an increase in nuclear power and constraining other terrorist groups obtaining nuclear weapons to prevent nuclear terrorism. First, the risk of Nuclear Terrorism - All groups are planning terrors can be used as a means of points. Second, why is this important to the risk of Nuclear Terrorism? - Nuclear terrorism could take the nucleus of the existing property. In other words, the balance of deterrence and the fear does not work. Third, 9.11 after come beginning nuclear terrorism. In short, we will qualitatively analyze the change of concept of nuclear from nuclear weapons to nuclear terrorism. All of risk research framework will be shown in below Figure.

PS 01.15 Risk assessment in global raw material procurement

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Due to the specialization in processed products and the lack of own resources, the German Industry is highly dependent on imports of raw materials. Especially in terms of metals (rare earths), energy and agricultural products the dependency is existence-threatening for some companies. These challenges are permanently increasing because scarce resource deposits are concentrated in just a few countries while the global demand is heavily increasing. Besides that, more and more investors speculate in raw materials which often leads to a temporary artificial shortage.
In addition to raw material scarcity German companies as part of a world leading industry are increasingly committed to Sustainable Development. Customers, authorities and companies' moral standards force them to aim for a balance between environmental, social and economical goals. Due to this movement, German companies gained a lot of knowledge in Sustainable Development over the past 15 years and, therefore, a competitive advantage worldwide.
In order to balance the challenge of raw material shortage on the one hand and the competitive advantage of sustainability know-how on the other hand we developed a new approach for the risk management of raw material procurement. The aim of this approach is to establish strategic partnerships between raw material buyers and suppliers by achieving win-win situations. While the supplier benefits from consulting and engineering support in sustainability, the buyer gaines guaranteed access to raw materials. As raw materials are globally spread and consulting requirements are individual this approach has to take into account cultural differences. We developed a global multi-risk process which in a first step helps to identify critical suppliers and in a second step supports raw material procurement by reducing risks with customized sustainability consulting. This approach, however, needs also to be analyzed regarding the generation of unexpected new risks.

PS 01.16 Expert mental model on comprehensive climate change risks and adaptation in agriculture and food production in Japan

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The impacts of climate change have become obvious in Japan broadly these days, and agriculture and food production is one of the key fields recognized as a national issue with risks to be dealt with. Japanese agriculture has faced challenges such as increasingly aging as long-term matters through recent globalization and Japanese social modernization, and today it is facing climate change impacts in addition. Scientific findings on climate change impacts have been numerously provided so far, however, the prospective risks and risk management in a broader context of current Japanese society and Japanese agriculture have not been investigated in detail. The objective of this study was to create the expert mental models with regard to the comprehensive climate change risks and its management in Japanese agricultural system, covering scientific knowledge, and social, cultural and political dimensions. We have conducted the individual interviews to 10 multidisciplinary experts engaging in climate change impacts research in agricultural production, economics, engineering, policy, and so on. Based on the results, and the latest scientific literature available for risk assessment as well, we will design a wide-ranging expert mental model. In the climate change adaptation, building the risk communication and cooperation among concerned diversified stakeholders is significant to encourage social or individual decision-making and policymaking. In this study, the structure of stakeholders will be analyzed based on expert perspectives. The considerable factors, which obstruct or facilitate the risk management, will be also identified, such as the uncertainty included in currently available scientific knowledge. The comprehensive expert knowledge-based model including clarified relevant stakeholders and factors will be shown, and possible strategies and issues in the adaptation to climate change risks in Japanese agricultural system will be discussed.

PS 01.17 Risk and memory: Recognition and forgetting

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Finnish Environment Institute, Finland

Views differ about what kinds of issues should be included in risk analysis, communication and management. The constitutive processes in this inclusion and exclusion are of key importance. While the emergence of new risks or risk perceptions has been much studied, much less attention has been paid to memory and long-term recognition and, conversely, non-recognition and forgetting of risks. Memory of risks both in scientific and archival as well as socio-psychological terms is essential for dealing with risks, but so is forgetting of some (aspects of) risks; memories thus have multi-faceted roles in shaping responses to risks. Scientific and experiential, collective and individual, and conscious and unconscious risk memories are discerned. They all involve, although differently, selection and bias: potentially relevant information of risks is downplayed or omitted and less relevant overemphasized. Multiple, cumulative (also in time) and lagged environmental and health risks caused by chemicals and other stressors pose particular challenges for recognition, some of which are however generic. We identify and discuss different forms of unrecognized, hidden and forgotten risk information, and test conceptual models of processes in recognition and forgetting by using chemical risks as a case. A typology of absent risk information is outlined, and its methodological and practical implications are discussed.

PS 01.18 Risk Attitude and Willingness-to-Pay for Uncertain Events: Impacts of Climate Change on Wastewater Infrastructures

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Although climate change is nowadays undisputed, its magnitude and consequences contain large uncertainties. In Switzerland, the scenarios for climate change forecast an increase in heavy rainfalls. This will affect sewer systems where the rainwater is collected together with the household wastewater. Such combined sewer systems are expected to overflow in surface water and streets more often in the future, leading to an increased risk for human health and for the environment because of the pathogens and pollutants contained in wastewater. To keep the same standard of service as today, the sewer system should be adapted. This induces substantial investments that have to be paid by the population. The population must then decide, based on uncertain scenarios, whether it accepts an increase of the risk associated with overloading of the sewer system or if it agrees to raise its wastewater fees. In this work, we tested how the uncertainty in the climate change forecasts influences the population's willingness to pay (WTP) to adapt the sewer system. We carried out a representative population survey for 1000 inhabitants in the Italian, French, and German part of Switzerland. The WTP of the respondents was assessed using a conjoint analysis, including different scenarios, and their probability of occurrence. Additionally, the risk attitude of the respondents was tested with 3−5 questions where they had to choose between a certain scenario and a probabilistic scenario with different levels of attributes that were associated with different risks. We will present these new results concerning the correlation between the WTP for different probabilities of a scenario and the risk attitude of a respondent.

PS 01.19 Which Information is the truth: Trust and cultural theory in risk communication?

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Nowadays, people have been exposed to information. Anyone can send, receive and deliver the information. If someone wants to search an issue, they can find out a lot of information through Google, blog and webcast provided by any individuals. In such situation, the most problem which is especially related risk is which information is the truth. In other word, it is a matter that people think the most reliable information provided by whom. In this article, we assume that individuals vary to trust information source depending on cultural bias. To examine this research question, we conduct a survey of undergraduate and graduate students. And than we try to analyze the relations between individuals' cultural bias and the reliable information source. There are theories that predict and explain what kinds of people will perceive which potential risk to be how dangerous. For example, there are knowledge theory, personality theory, economic theory and political theory. In this paper I will use cultural theory as a framework which to understand which information people trust (Wildavsky, 1990: 166-168). Cultural theory has proposed that individuals choose what to fear in order to support their way of life. Individuals defend different patterns of social relations. Social relations are categorized hierarchy, egalitarianism, individualism, and fatalism (Wildavsky, 1990; Douglas, 1982; Thompson et al; 1990). Information source classify according to providers. Information source suggest randomly individual, professional individual, research group, Media (TV and internet), interest group, and government. Furthermore we try to examine the level of involvement related the dangerous situation. The level of involvement is higher people react more sensitive. We shall develop such a view base on relation individuals' cultural bias, the level of involvement and the reliable information source.

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