

## **Summary Report on RIA Symposium at the Society for Risk Analysis – Europe (SRA-E) Conference (17-19 June 2013, Trondheim, Norway)**

At the annual meeting of the *Society for Risk Analysis – Europe* held in Trondheim, Norway, in June 2013 we presented a symposium entitled: **‘Natural’ hazards: Risk interpretation and action.**

The topics of the conference covered a range of issues including risk perception, management and prevention in the context of a variety of environmental, health, industrial and security risks. Delegates from a variety of academic backgrounds and communities of practice attended. Our symposium provided an opportunity to publicize the themes of the RIA working groups and to illustrate their relevance to issues of disaster risk reduction.

The risk of disaster associated with so-called ‘natural’ hazards typically depends not simply on the hazard event itself, but on the actions and decisions of individuals and groups at many levels from ordinary citizens to scientific experts and government officials, as well as on how scientific evidence is (co-)produced and communicated by more and less trusted sources. The symposium introduced aspects of the RIA approach in the contexts of empirical and conceptual papers with particular reference to volcanic, seismic and flooding risk. Among the main issues addressed were how citizens’ personal experience of hazard events shapes their interpretation of risk and how effective and trusted communication can mitigate disaster risk.

The symposium included five papers (see links to powerpoint presentations):

**Trust, precaution and interpreting volcanic risk.** *J. Richard Eiser (Univ. of Sheffield, UK), Amy Donovan (Univ. of Cambridge, UK), Stephen Sparks (Univ. of Bristol, UK)*

Interpreting uncertain risks and providing appropriate advice to the public is a challenge to scientists and risk managers. Based on typically uncertain forecasts, a balance has to be struck between an overly cautious approach, which may result in ‘false alarms’ with associated costs and inconvenience, and an overly risky approach, which may result in a hazard turning into a disaster, with associated fatalities and/or damage. Key questions are how advice is interpreted by the public as a function of their own experience and interests, and the relationship between such interpretation and their trust in different communicators. We report the findings of two parallel surveys in Iceland and the UK in which participants described their reactions to the Icelandic volcanic ash- cloud events of 2010 and 2011. For the Icelanders, these events appeared to fit into a more familiar history of experience with volcanic activity, including direct risk to persons, property and livelihood. Endorsement of a more precautionary approach to risk management was associated with higher trust in scientists and the Icelandic Civil Protection. Friends and family were also highly trusted. For the British, the 2010 eruption at Eyjafjalljokull and its impact on air travel around N. Europe was a new experience. Those who were more accepting of a precautionary approach to risk management were less likely to say that “nothing bad would have happened” if air traffic restrictions had not been imposed and tended to trust scientists and government sources more,

whereas those who flew more often tended to show higher trust in the airline companies and questioned the necessity of the length of the restrictions in 2010 and 2011. These findings illustrate some of the interrelationships between trust, risk interpretation and estimation of personal cost and benefits.

**Seismic Risk Mitigation in Port Systems.** *Ann Bostrom (University of Washington), Tim Scharks, Lori Reimann-Garretson, Glenn Rix (Georgia Institute of Technology).*

Earthquakes pose a significant threat to many seaports. The global rise of shipping and evolution of public-private partnerships in seaports pose potential challenges for seismic risk management. To examine stakeholders' risk interpretation and decision making in port systems, we conducted qualitative mental models interviews (N=42) in two ports at high seismic risk. The interviews demonstrate that engineers and other decision makers in port systems are well aware of the vulnerability of port infrastructure, cranes, and operations to earthquake damage; they also volunteer information about past and predicted earthquake magnitudes as well as wider economic impacts of seismic events at ports. Nevertheless, the findings paint a picture of increasingly complex risk governance, divergent ideas about how to measure risk performance, and lack of attention to seismic risk management.

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**Social role and causal structure as determinants of environmental risk perception and behavior.** *Gisela Böhm (University of Bergen, Norway)*

A dual-process model of risk perception is presented that complements cognitive and consequentialist evaluations with deontological and emotional ones by distinguishing two modes of evaluative processing: (a) a consequentialist evaluation that focuses on potential consequences, and (b) a deontological evaluation that focuses on moral values. Each of these two modes is assumed to trigger specific cognitive evaluations, specific emotions, and specific behavioral impulses. An experiment is presented that tested whether the relative dominance of the two evaluative modes depends on the causal structure of the environmental risk that is evaluated and upon the social role of the evaluator. Three types of causal structure were varied by providing scenario information: (a) anthropogenic risks that endanger only nature, (b) naturally caused risks with potential harmful consequences for humans, and (c) anthropogenic risks that may harm humans. Participants evaluated each scenario from the perspective of one of three social roles: environmental activist, expecting parent, mayor. For each scenario, subjects evaluated the event's morality, perceived risk, the intensity of specific emotions, and their preference for prospective actions. Results show that deontological evaluation is stronger for anthropogenic than for natural causation and stronger for environmental activists than for the other roles. The implications for environmental decision making are discussed.

**Personal experience of flooding heightens climate change risk perception and mitigation intentions** *Stuart Capstick, presented by Nick Pidgeon (Cardiff University)*

Climate change has long been considered a ‘hidden hazard’, due to its tendency to be seen as a temporally and spatially remote risk, and because of the difficulty of attributing discrete occurrences to climate change. Nevertheless, a number of recent studies have examined whether direct experience of extreme weather events may stimulate public recognition of and response to climate change. This work is particularly pertinent in light of phenomena which have lately been experienced around the world such as hurricane Sandy in the USA, bushfires in Australia, and widespread flooding in Europe. Results from studies examining the links between personal experience and perceptions in the context of climate change have tended to be equivocal, although recent analysis by Spence et al. (2011) has suggested this may be because experience effects are complex and indirect, mediated by a series of psychological processes.

We present new analysis based on survey findings obtained during a period of nationwide flooding in Wales in late 2012. This is designed to replicate and extend previous research through enhancement of the way in which flooding ‘experience’ is gauged – including through oversampling in a region which had been acutely affected, and through measures which distinguish between different types of impacts encountered by respondents (e.g. property damage, travel disruption). In addition, we address a shortcoming of previous work through appraising the extent to which climate change is spontaneously associated with flooding, and whether this varies according to flooding experience. Finally, we examine in greater detail the mechanisms connecting flooding experience with climate change risk perception and behavioural response.

Our analysis indicates that flooding experience affects behavioural intentions indirectly through its influence upon climate change concern, attitudinal strength, perceived vulnerability, and efficacy beliefs. We also find for the first time that spontaneous association between flooding and climate change varies in line with extent of flooding experience. This finding suggests that particularly for many people affected by flooding, climate change constitutes a risk which is now manifesting in everyday life. We discuss how the links between personal experience and perceptions may best be conceptualised in the context of climate change, as well as implications for communication.

**Communication and action based on risk interpretation.**

*Britt-Marie Drottz-Sjöberg (University of Trondheim, Norway).*

Communication is the means to establish and sustain all kinds of social organization and collaboration. Communication is essential in efficient everyday decision-making and risk prevention work and it is crucial in reducing detrimental effects in disasters. This paper highlights communication aspects especially related to environmental or physical hazards based on the RIA workgroup’s suggestions of developing a conceptual framework to guide future research in the area. This involves the themes of risk interpretation, decision making under uncertainty and subsequent action and learning. The framework underlines the need to better understand how decision-making under uncertainty is influenced by people’s

interpretations of risk which in turn are based on own experience, beliefs, values and feelings as well as cultural and social dynamics. The role of trust in others is highlighted from the individual as well as the collective perspectives. The discussion addresses the impact of social context and underlying societal values on disaster outcome.