Risk Interpretation and Action (RIA)

J. Richard Eiser, University of Sheffield, UK.
David Johnston, Massey University, Wellington, NZ.

Background

The IRDR Science Plan points out that, despite advances in the quantity and quality of scientific data about natural hazards, worldwide human and economic losses from disasters continue to increase. Hence, to quote from Section 4.1 of the Plan:

> "*In order to reduce risk, there needs to be integrated risk analysis, including consideration of relevant human behaviour, its motivations, constraints and consequences, and decision-making processes in face of risks…The risk associated with environmental hazards depends not only on physical conditions and events but also on human actions, conditions (vulnerability factors, etc.), decisions and culture…The seriousness of the consequences of any disaster will depend also on how many people choose, or feel they have no choice but, to live and work in areas at higher risk…"*

The focus of our working group is therefore on the question of how people – both decision-makers and ordinary citizens – make decisions, individually and collectively, in the face of risk. There are several broad fields of work that are relevant here, but our impression is that many of these have progressed somewhat independently of each other, typically within the framework of single academic disciplines. This leads to a number of discontinuities in how the issue of risk reduction is conceptualized, as well as gaps in the areas where research activity (and funding) is presently concentrated. Among these gaps might be:

- 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 appear to diverge from scientific forecasts (perhaps because they attach importance to different sets of outcomes, and/or rely on different sources of information).
- Incomplete understanding of how people's decisions may appear to diverge from their evaluations of such risks (perhaps because of social norms and/or perceived or actual constraints on their freedom of choice).
- 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 or prevention.

In short, our fundamental question is how and why people's interpretations of the risks of various natural hazards relate to their actual choices and behaviour.

Activities during 2011.

Our first aim during this last year has been to assemble a small number of experts from different disciplines in order to produce together a concise and authoritative position paper that specifies more precisely the kind of research that needs to be conducted (and funded) within the broad context of how risk is interpreted and how this influences decision-making and action. To this end, we held two working group meetings with separate but overlapping membership, the first in Wellington, New Zealand in March, and the second in Paris in April. Following discussions at these meetings and much email contact thereafter, we produced a draft report *Risk Interpretation and Action: A Conceptual Framework for Research in the Context of Natural Hazards.* This was completed in time for distribution and presentation at the Beijing conference, and was well received.

The next phase.

Our next aim is to try and facilitate the use of our framework as a guide for research in this are that can be both well-grounded theoretically and of practical relevance. While our report can be accessed through the IRDR website, wider and more varied dissemination is a priority. During the first few months of 2012, therefore, we shall explore possibilities of publishing a revised version of our report, in whole or in part(s), in an international peer-reviewed journal or journals. We would hope to have positive news to report by the time of the May meeting of the Science Committee.

In addition, we need to widen the 'family' of RIA researchers beyond those who participated in the working group. To this end we shall seek to explore a wider range of contacts among researchers already engaged in relevant research, or those who could be steered in our direction. We plan that at least some members of our group will attend most major international conferences where there will be opportunities to disseminate the ideas contained in our paper and encourage more colleagues to become involved in collaboration. Among the relevant conferences will be: Society for Risk Analaysis – Europe (Zurich, June 2012); World Risk Congress (Sydney, July 2012); Global Risk Forum (Davos, August 2012). There may also be a need to make a few visits to major research centres, where relevant projects are planned or under way. Additionally, we wish to establish stronger links with IRDR National Committees, with a view to ensuring that the RIA theme is part of their respective agendas. (NB. These activities will require resources in order to support the travel costs of working group co-Chairs and/or other members).

A further major plan for the year, though not yet finally settled, is to run a workshop, primarily for young researchers in Taipei. It is envisaged that this will last for 1-2 weeks, probably in October 2012, close to the dates of the meeting of the Science Committee.

The dissemination of such a paper will be an important matter to discuss, but one part of this is fixed. There will be an international conference to launch the IRDR programme in Beijing at the end of October 2011, and we are committed to a presentation of the work we have been doing. Clearly, we need to have a draft of our position paper to distribute in good time for this meeting.

Timeline

Task 1   Wellington workshop

Develop a draft framework for the Beijing Conference "RIA Discussion Paper"

Task 2   Paris meeting preparation

Please put together about 2-3 pages giving your own reflections on the aims of the working group as described above (particularly the bullet points characterizing research gaps) from the perspective of your own experience and discipline. What do you see to be the main lessons to be drawn from previous research and what methods and conceptual approaches do you regard as most likely to prove useful? Please email to Dick (J.R.Eiser@sheffield.ac.uk) by **31 March 2011**

Task 3   Paris workshop – 29-20 April 2011
Building on framework developed in Task 1 and contributions from task 2, identify report structure, content themes and authors (lead and other contributors).

Task 4   Writing "RIA Discussion Paper"

May-June 2011

Task 5   Final editing and review of contributions

July-August 2011

Task 6

After presentation in Beijing submit revised paper for publication (e.g. to Natural Hazards and Earth System Sciences, http://www.natural-hazards-and-earth-system-sciences.net/home.html)

PART II.
Brief summary of Wellington workshop, 7th March, 2011.

Present:
- Bruce Glavovic
- Emma Hudson-Doyle
- Douglas Paton
- Julia Becker
- Dick Eiser
- Nuray Karanci
- John McClure
- David Johnston
- Ljubica Mamula-Seadon

This meeting brought together scientists and decision-makers from NZ as well as academic visitors from Australia (Paton), Turkey (Karanci) and UK (Eiser). The meeting took place just under 2 weeks after the Christchurch earthquake, which gave our discussion an added

poignancy. Following a general introduction to IRDR and RIA, individuals gave brief summaries of their personal interests and background, before turning to a discussion of the circulated document in Part I. While the framework was broadly endorsed, several comments emphasised the theme that, for research in this area to be "integrated", it must be *interdisciplinary*. Whereas government departments and, increasingly funding agencies, are keen that research should be interdisciplinary (and, where possible, include ranges of stakeholders as partners), participants remarked on a reluctance within many traditional academic departments and institutions to venture outside single-disciplinary "silos". These impressions seem to be so widespread that there may be an important role for ICSU here in fostering a cultural change so that interdisciplinarity is more highly valued.

Another theme that ran through our discussion was the need to move away from a narrow conception of knowledge being "produced" by scientists and then communicated *to* (rather than *with*) different communities (either citizens or government). We were warned against the notion of "end-users" of such knowledge.

PART III
Written notes, research summaries and comments so far received:
(Bostrom, McClure, Paton, White)

III.1   Ann Bostrom (University of Washington, USA).

The points the group has made regarding research needed on how people make decisions, individually and collectively, in the face of risk seem right on target:
A few thoughts on main lessons to be drawn from previous research:
Risk perception and decision making from experience differs from that based on statistics or other information. People attend to multiple characteristics of risks, including not only the severity of the threat or magnitude of potential consequences, but also their ability to do something about the risk, uncertainties and ambiguities about the risk, and what they know about the hazardous processes creating the risk in question. In all of this, experts differ from non-experts, and experts in one area are likely to differ from those with other expertise. In emergencies, people attend to information about what to do (they need concrete information about what to do) and try to evaluate it collectively (social milling), often before acting. Practicing response behaviors helps. Abstract or complex information about risks can be difficult for people to evaluate or interpret based on their own mental models, and so may not be very useful for them. Stress of various kinds can increase reliance on affective responses to information (rather than cognitive analysis).

Financial, social and political investments in resilience and preparation for disasters are more likely following big disasters. Integrated risk assessments are rare. Even national and international level investments in resilience may be guided by scenario analyses rather than probabilistic risk analysis.

Methods and conceptual approaches to learning how and why people's interpretations of the risks of various natural hazards relate to their actual choices and behaviors:

Integrated behavioral and social and institutional research on disaster related decisions that involves both behavioral decision researchers and researchers with substantive expertise in the hazards could be much better developed. Also potentially promising is the possibility of neuroscientific research in conjunction with in depth research on mental models, perceptions and decisions, including decision making in context. As noted below, new approaches to harvesting data on individual and collective behaviors and actions also appear promising (e.g., using GPS data from handheld devices, internet data streams, data from onboard computers in vehicles). Data mining of administrative databases could also potentially reveal more about institutional decision making.

Additional reflections on research needs:
Many natural hazard researchers appear to specialize in specific hazards, to some extent, for example earthquakes, or floods, leading to a lack of cross-fertilization in some areas of research. This could be empirically documented; there is some research that assesses collaboration in earthquake and other research centers (Melkers and colleagues), but more research on social and research networks would be useful to evaluate this.   The lack of cross-fertilization leads to discontinuities in how risk decisions and related factors are conceptualized. For example, vulnerability is interpreted somewhat differently by geographers and risk analysts, so that they may talk past one another in discussions of how to improve data and models.

Integrated risk assessments are lacking, and where they do exist integration with the social and behavioral sciences is weak. Could use better integration across the different types of decisions people make about hazards and disasters, from avoidance through mitigation and

adaptation – that is, from individual, institutional and political decisions about prevention and investments in resilience, through immediate responses and decisions in events, to post-event decisions.   Better understanding of the characteristics of and constraints imposed by different decision contexts would be useful.

Integrating disaster research across the full spectrum (across temporal, spatial and social scales) of decision research could better inform risk and disaster decision making, from neuroscience and behavioral decision research on risk perception, response and decision making, to organizational and institutional decision research on global political decisions, for example regarding management of global information systems, data sharing and data sharing protocols.   Data quality issues can stem from lack of monitoring technologies, insufficient funding, or suppression of data or delay (e.g., of disease outbreak information by governments).   Tsunami warning systems and global seismic monitoring illustrate major recent advances, but also gaps and challenges.   Tsunami warnings until recently have not incorporated what is known about what makes warnings effective, and tsunami warning systems do not effectively incorporate or address the social milling that happens in disasters.

Research activity and funding, and proposals for research on disasters and risk decisions are exemplified by the recently released NRC report on U.S. national earthquake resilience.   The report outlines 18 areas of funding.   In only one of these areas are social sciences named explicitly at the top level, and behavioral sciences seem virtually absent from the top-level discussion.   In contrast, physics is named specifically in one of the lines proposed for significant funding, as is performance-based engineering.   Nevertheless, the research agenda is proposed as an integrated, interdisciplinary research agenda.

Disaster-related research on the behavioral and social aspects of new technologies and data has been initiated but is sparse.   Data streams from internet activity and cellphone activity or from on-board computers in cars, for example, could be used to both detect and support individual and collective disaster-related activities and decisions   We probably need more research on social and economic vulnerabilities created by reliance on emerging globally sourced information and communication technologies.   To what extent are technologies dependent on components or raw materials from a small number of sources or a geographically confined area that might be disaster-prone?

As populations grow, urbanize, age and manifest new migration patterns, the potential consequences of disasters change in character, as do the risk and disaster decisions that people face.   How well is research on long-term demographic and cultural trends integrated with event-related decision research?   These areas of research could likely better inform one another.

III.2 **John McClure (Victoria University, Wellington, NZ).**

Research Overview:
Risk perception and preparedness with earthquakes and other hazards

1. Completed projects
My research examines factors that affect preparation for hazards, especially earthquakes. It clarifies factors that affect perceptions of risk and reduce fatalism about preparing for earthquakes i.e., the belief that preparation is not worth doing or makes no difference.

Project 1: Clarified which communications that lead people to attribute outcomes in earthquakes to preparedness rather than solely earthquake magnitude. [McClure et al., BASP 2001]. It also showed how different news media messages lead people to attribute outcomes in earthquakes to either preparedness or earthquake magnitude. [Cowan et al., AJSP 2002].

Project 2: This project examined the effects of messages reporting that buildings that collapsed had poorer designs than buildings that were resilient [McClure et al., AJSP 2007]. It also showed how messages reporting different rates of damage to well-designed and poorly-designed buildings affect attributions for the damage. [McClure et al., JASP 2007]

Project 3: Funded by an EQC [Earthquake Commission] grant, examined whether giving businesses hazard information with an action plan led to higher uptake of two earthquake preparedness actions [one a survival action and one a damage mitigating action] than hazard information with no action plan. [McClure, Fischer et al., 2007]

Project 4 showed that there are different components to preparedness, such as survival actions like getting an emergency kit, and actions that mitigate damage (these also enhance survival after an earthquake). [McClure et al., 1999; Spittal, Walkey, McClure et al., 2006]. It also showed that people tend to take many more survival actions than damage mitigation actions and that these different types of actions have different psychological predictors [Spittal, McClure et al., 2008].

2. Current projects
Project 5. Is the preference for survival actions over damage mitigation actions due to the lower perceived costs of the former or the judgment that life and injury losses are more important than e.g., business or housing losses? We received an EQC grant to carry out this research. [Manuscript in preparation]

Project 6 (funded by a GNS-Science subcontract) is examining whether people show a bias towards discounting the importance of low frequency hazards, even when costs for these events are equal those for high frequency events. This research compares judgments of the importance of taking out insurance for high and low frequency events. [Manuscript in preparation]

Project 7. (funded by a GNS-Science subcontract) Risk perception and preparation in New Zealand and Canterbury citizens before and after the 2010 Canterbury earthquake. [Manuscript in preparation]

Lessons from past research and priorities for future research
The key lessons from past research - ours and others - are that:
1. People often misjudge the risk from natural hazards in their own city, and place more weight on other hazards and risks. These biases in risk judgment reflect several factors including a tendency to discount low frequency hazards and take more account of hazards that are more frequent, available, uncontrollable, etc.

2. People are fatalistic about many natural hazards, and think there is nothing that people can do to prevent of reduce harm from them. These fatalistic views involve specific patterns of attribution when people attribute outcomes solely to uncontrollable causes such as the hazard itself; these views are accentuated by news media messages, and can be changed by more accurate patterns of information about causes of damage in natural disasters.

Useful future directions could include:
1. Clarifying the most effective risk communication development strategies leading people to prioritize low frequency high impact hazards. In addition, to clarify ways to enhance legislation and design of infrastructure that is hazard-resilient.

2. Clarifying strategies that lead people to take preparedness actions that will reduce and mitigate damage and harm, rather then solely focus on preparations such as emergency kits that are only useful for survivors who are not seriously harmed. A related issue is clarifying ways of redressing and circumventing corruption that undermines the quality of preparedness, such as using appropriate building standards, etc.

3. Clarifying strategies that lead people to recognise that preparedness does reduce harm in natural hazards (i.e. circumventing fatalism), and which type of legislation can assist this.

Key publications
Articles
McClure, J., & Sibley, C. G. (In press). Framing effects on disaster preparation: Is negative framing more effective? *Australasian Journal of Disaster and Trauma Studies.*

McClure, J., White, J., & Sibley, C. G. (2009). Framing effects on preparation intentions: Distinguishing actions and outcomes. *Disaster Prevention and Management, 18,* 187-199.

Spittal, M., McClure, J., Walkey, F., & Siegert, R. (2008). Psychological predictors of earthquake preparation. *Environment and Behavior, 40,* 798-817.

McClure, J., Sutton, R. M., & Wilson, M. (2007). How information about building design influences causal attributions for earthquake damage. *Asian Journal of Social Psychology, 10,* 233-242.

McClure, J., Sutton, R M., & Sibley, C. G. (2007). Listening to reporters or engineers: How different messages about building design affect earthquake fatalism. *Journal of Applied Social Psychology, 37,* 1956-1973.

Spittal, M. J., Walkey, F. H., McClure, J., Siegert, R. J., & Ballantyne, K. E. (2006). The Earthquake Readiness Scale: The development of a valid and reliable unifactorial measure. *Natural Hazards, 39,* 15-29.

Crozier, M., McClure, J., Vercoe, J., & Wilson, M. (2006). The effects of land zoning information on judgments about earthquake damage. *Area*, *38.2*, 143-152.

Spittal, M. J., McClure, J., Siegert, R. J., & Walkey F. H. (2005). Optimistic bias in relation to preparedness for earthquakes. *Australasian Journal of Disaster and Trauma Studies, 2005-1*, 1-10.

Cowan, J., McClure J., & Wilson, M. (2002). What a difference a year makes: how immediate and anniversary media reports influence judgments about earthquakes. *Asian Journal of Social Psychology, 5*, 169-185.

McClure, J., Allen, M. W. & Walkey, F. H. (2001). Countering fatalism: Causal information in news reports affects judgements about earthquake damage. *Basic and Applied Social Psychology, 23*, 109-121.

McClure, J., Walkey, F., & Allen, M. (1999). When earthquake damage is seen as preventable: Attributions, locus of control and attitudes to risk. *Applied Psychology: An International Review, 48*, 239-256.

Hurnen, F. & McClure, J. (1997). The effect of increased earthquake knowledge on perceived preventability of earthquake damage. *Australasian Journal of Disaster and Trauma Studies, 3*. [1-10]

Book chapters

Paton, D., McClure, J., & Burgelt, P. Y. (2006). Natural Hazard resilience; Modelling preparedness. In D. Paton & D. Johnston (Eds.) *Natural Hazard resilience: The role of individual and household preparedness.* Springfield, Ill: Thomas. (pp. 105-127).

McClure, J. L. & Williams, S. (1996). Community preparedness: Countering helplessness and optimism. In D. Paton & N. Long (Eds.) *Psychological aspects of disaster: Impact, coping, and prevention*. (pp. 237-254). Palmerston North: Dunmore Press.

Reports

Wright, K., Becker, J., Doody, B. J., & McClure, J. (2010). *Pedestrian and motorist flood safety study: A review of behaviours in and around floodwater and strategies to enhance appropriate behavior.* GNS Science Report 2010/51.

McClure, J., Fischer, R., Charleson, A., & Spittal, M. (2009). *Clarifying why people take fewer mitigation actions than survival actions: how important is cost?* EQC (Earthquake Commission).

McClure, J., Fischer, R., Hunt, M., & Charleson, A. (2007). *Using action plans to increase voluntary actions that reduce earthquake damage.* EQC (Earthquake Commission).

McClure, J. (2006). *Guidelines for Encouraging Householders' Preparation for Earthquakes in New Zealand.* Building Research (for BRANZ).

III.3   Douglas Paton (University of Tasmania, Australia).

1. **Challenges in generalizing from one type of hazard to another, or to combinations of hazards.**
   o Generalising across hazards is important. With regard to hazard preparedness, to achieve this is it important to distinguish between process and content. Content issues arise from a focus on the hazard (e.g., earthquake) and its unique preparedness requirements. A focus on content makes developing an all-hazards approach difficult. It is necessary to complement this with attention to the processes that describe how people evaluate their hazard environment and make choices about responding in conditions of uncertainty. Since uncertainty is common to all hazards people are being asked to respond, uncertainty can act as a common denominator for research into processes/predictors people use to make decisions. It is also possible to circumvent content issues by using intentions as a dependent variable. The task then is to develop a generic intentions measure.

2. **Challenges in generalizing across cultures.**
   o Cross cultural psychology distinguishes between universal and culture specific factors. From this it becomes possible to develop and test cross cultural equivalence in adaptive processes (as above). That is, cross cultural comparison should be based on comparing across cultural dimensions rather than countries. Work on cross cultural equivalence should be complemented with research into culture specific mechanisms such as Jishubo in Japan and the Hakka Spirit in Taiwan. The latter work can also deconstruct these constructs to explore similarities and differences in deep structure processes and examine the cultural underpinnings of their development and action to identify the degree to which such mechanisms could be transferred to other cultures.

3. **A greater emphasis on risk forecasting than on communication**
   o Forecasting often focuses on the physical elements of risk (e.g., frequency, return periods, magnitude, intensity etc of physical processes) rather than people's role in risk estimates (e.g., mitigation actions implemented or not implemented.
   o In an era focusing on risk management and resilience and vulnerability, it may be prudent to reflect on Dakes (1992) call to return to the original definition of risk that entails "accounting for the gains and losses in situations of chance." (my recollection – need to check but this captures the essence).
   o Risk communication should shift from top-down dissemination of physical information about natural processes/hazards to a bottom up engagement/ empowerment focus in which people discuss and debate their risk etc.
   o Need to recognise that at any one time people are at different stages of readiness to prepare/respond to hazard events - some have done nothing others are well prepared. Risk management strategies need to be tailored to people at different stages rather than assuming a one-size-fits-all approach.
   o Need to distinguish between information and people's abilities to interpret and use information under conditions of uncertainty. Risk professionals are trained to provide them with the knowledge and analytical skills to derive estimates of risk and how to mitigate that risk. Ordinary citizens do not receive such training. Consequently, the interpretive and decision competencies they bring to bear on their risk management choices are those that develop from their experiences of dealing with challenges in everyday life. In addition to providing high quality information, risk strategies may need to help people apply, for example, their problem solving

competencies to atypical hazard decision making or develop these skills to ensure people can use information in the manner intended.

4. **Incomplete understanding of why and when local citizens' evaluations of risks may appear to diverge from scientific forecasts (perhaps because they attach importance to different sets of outcomes, and/or rely on different sources of information).**
    o More research into the social construction of risk and how people's social settings inform their understanding of risk and what can be done to manage their risk.

5. **Incomplete understanding of how people's decisions may appear to diverge from their evaluations of such risks (perhaps because of social norms and/or perceived or actual constraints on their freedom of choice).**
    o Researching the social construction of risk and consequent normative influence on risk beliefs and mitigation choices with a focus on how social (and societal sources such as the media) can amplify and attenuate risk beliefs and whether or not people decide to act to mitigate their risk.
    o Further work on practical constraints and whether constraints prevent people thinking about acting or whether it prevents their converting intentions into actions.
    o Investigate how beliefs regarding when the next hazard event affects risk beliefs/mitigation. For example, research how the progressively abstract nature of future-oriented events reduces the anxiety required to motivate protective action.

6. **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.**
    o Research role of fatalism and outcome expectancy in these processes

7. **Within policy/planning, an emphasis on protection or restoration of existing infrastructure, rather than redesign for greater resilience or prevention.**
    o Develop better linkages between policy/planning and research. Changing mindset regarding the role of recovery. For example, if mother-nature does the demolition work in a disaster, society can make choices about how to re-build itself. This should extend beyond physical rebuilding – which should be developed using a bottom-up approach to development. Opportunities for development also extend to the social context. For example, disasters can generate a stronger sense of community amongst those affected than had prevailed prior to the disaster. Decisions can be made to reorganize social and institutional relationships in ways that sustain this new quality of life and so contribute to the social capital of the affected area in ways that will endure long after the disaster has passed into history.

8. Risk management strategies should be re-framed to include preventing loss and developing capacity. Emphasis on developing a capacity to co-exist with potentially hazard environment to promote sustainable communities.

9. Change how preparedness is conceptualised. Move from treating all items in preparedness scales as homogenous. Systematic research into whether preparedness can be categorised according to, for example, mitigation, protective and survival components. Distinguishing between individual-level adjustments and those requiring collective activity. Research to identify the predictors of each of these classes of adjustment.

10. Developing and testing composite, integrated models.

III.4   **Mathew White (University of Plymouth, UK).**

The Role of Trust in Disaster Risk

"Japan govt losing public trust as nuclear crisis worsens" (Linda Sieg, Reuters, March 16, 2011)

Overview

Since the damage to the Fukushima nuclear power plant caused by the recent earthquake and tsunami in Japan headlines like the one above have been widespread. Media reports suggest that this undermining of trust in the government is largely due to a lack of initial transparency about what was happening. It remains unclear whether this was due to a) a lack of knowledge by government officials themselves, b) a reluctance to be alarmist given ongoing uncertainty or c) a willingness to keep the true nature of the problems from the public in order to avoid panic. Importantly, all three of these reasons are known to undermine public trust in risk managers (White & Eiser, 2007; White & Johnson, 2010), including reactions to nuclear incidents (Eiser, Van der Pligt & Spears,1995; Slovic, 1996; Slovic, Flynn & Layman, 1991; White & Eiser, 2006).

Although we are beginning to understand the antecedents of public trust in specific actors involved in risk management, a number of key questions remain in relation to disaster risk. These include: 1) Which actors does the public consider important in disaster risk management and to what extent do they trust the entire hazard management system as opposed to specific actors within it?; 2) In an age where social media are being increasingly used to transmit disaster information, how should risk managers utilise the opportunities this presents while at the same time manage inaccuracies and misunderstandings spread by independent observers?; and 3) Ultimately how important is trust in the hazard management system and communications via social media for public behaviours such as evacuation? Each of these issues is considered below.

Trust in the Risk Management System

Johnson (1999) has argued that much of the previous research on public trust in risk/disaster managers has focused on perceptions of the different stakeholders separately and attempts to compare to see who is more or less trusted. However in reality, he argues, individuals have to place their trust in whole systems of risk/disaster management which will depend on the interplay of these different agents. So, for example, to what extent can we believe messages from official regulators that come to us through the media given: a) the pressure on them from industry, b) reporting biases of the media, c) competing scientific opinions and so on. A conceptualisation of this process, based on Heider's (1948) Balance Theory, is shown in Figure 1. Moreover, the public may trust the various actors in some respects but not others, e.g. scientists to accurately assess the risks but not necessarily to be most concerned about the economic impacts (Johnson & White, 2010). This model is still in its infancy and further research is needed linking to a mental models approach (Morgan, Fischhoff, Bostrom & Atman, 2002) to improve our understand of how the public conceptualises not just the hazard but the hazard management system and how trust can emerge from these perceptions of competing interests and perspectives.

Figure 1: *A schematic representation of the hazard management system for disaster risk from the perspective of the public (adapted from White, 2004).*
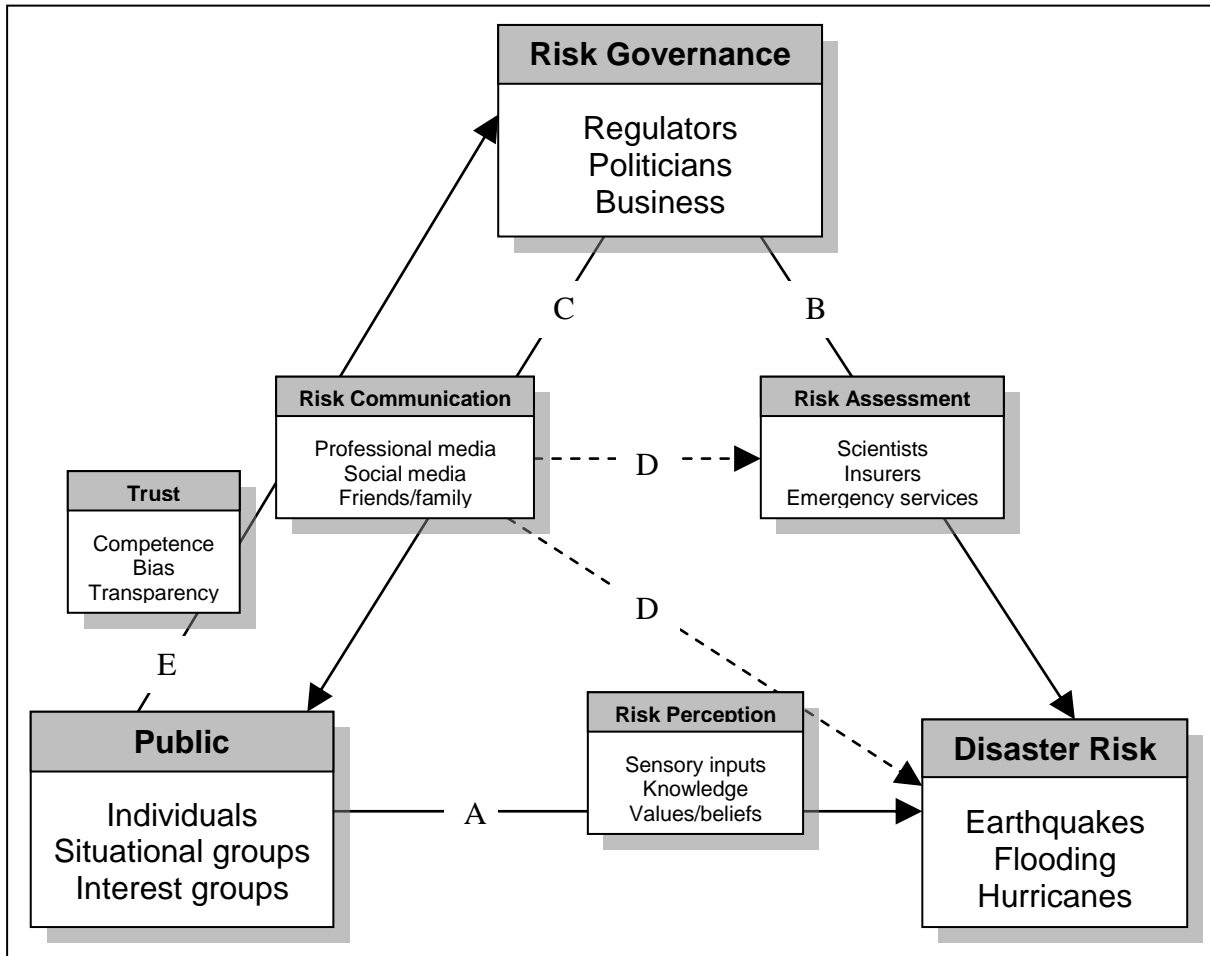
A) Public ---> Disaster Risk

Members of the public, either as individuals or groups try to make their own appraisal of the risks. This is usually referred to as *Risk Perception*. It is based on sensory inputs, which is why radiation is so feared, knowledge, beliefs and values. If the public has high levels of confidence in their own perceptions they will act accordingly without too much recourse to consideration of other sources of information (e.g, press, official statements etc).

B) Risk Governance ---> Disaster Risk

Those responsible or liable for managing risk (e.g. government, regulators, business etc) will be trying to base their response to more technical assessments that are conducted through more formal *Risk Assessment*. This will be carried out by a range of organisations including scientists, insurers and emergency services.[1]

C) Risk Governance --->Risk Communicators---> Public

Risk managers will attempt to communicate their assessment of the risk to the public, generally through traditional media channels, i.e. *Risk Communication*. The messages may or may not be all that the risk managers believe to be true.

D) Risk Communicators ---> Disaster Risk/Risk Assessment

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[1] Although we might hope "experts" are more skilled in understanding the hazards than the lay public the distinction between "risk perceptions" and "risk assessments" does not imply the latter are necessarily better (for further discussion see e.g. Fischhoff, 1995; Functovitz & Ravetz, 1992; Kraus, Malmfors & Slovic, 1992; Wright, Bolger & Rowe, 2002; Wynne, 1980).

The professional media, in many countries at least, rarely takes the risk managers messages at face value and often seeks to make its' own appraisals of the disaster (D', *Risk Perceptions*) and those assessing it (D"). Moreover, modern technology also allows other members of the public to record and communicate their own assessments of the risk via use of video and social media and the internet (D'). This provides a potentially useful but problematic way of communicating disaster risk.

E) Public ---> Risk Communicators---> Risk Governance
If the pubic feels unable to assess the risks itself it then has decide what to believe in terms of the communication it is receiving from risk managers, filtered through the professional media, and directly from professional and social media. The degree to which the public thinks these sources are competent, has their interests at heart and is being open and transparent will determine how much *Trust* the public has in them.

Trust in Social Media
Many researchers are starting to investigate the impact of new media in disaster risk and trust process. Hellier and colleagues, for instance, have been working closely with the UK Home Office to understand how best to communicate disaster risk (Hellier et al., 2008a, 2008b, 2009). One of their main conclusions is that the most effective means of communicating emergency messages quickly, at least to the working population, is to use emerging media technologies such as mobile phone text messaging and social media such as facebook and twitter. Yuichi Iwai, a 39-year old IT engineer, in Japan is quoted in Sieg's article above as saying, for instance, "*All I can say is that the government and TEPCO (Tokyo Electric) are totally behind the curve. The confusion is made worse by the sensational media coverage. Under such conditions I tend to get better information through Twitter.*"

However, one of the other features of Hellier and colleague's work is that most people still have far less trust in these modes of communication than more traditional sources such as television news. Further research is therefore needed to understand where and when disaster risk messages via social media are most trusted and effective. For disasters where visual images are key, e.g. earthquakes, volanic eruptions or tsunamis modern video technology allows images to be broadcast rapidly and the public can, in a sense, make their own appraisals of the risks using these transmitted images. For other hazards such as radiological incidents social media are potentially less powerful because of the lack of visual cues. Moreover, greater understanding is needed regarding how different demographics react to these information sources and how best to provide access to people in some of the more vulnerable locations who are often also among the poorest in those communities.

Trust and Behaviour
Abandoning one's home following a warning of an impending disaster also entails risks such as looting and other economic costs. Accordingly, people are sensitive to "False Alarms" which expose people to risks other than from the natural hazard itself (e.g. Dow & Cutter, 1998; Golden & Adams, 2000). Simmons and Sutter (2009), for instance, show that the number of casualties from tornados is linked to the number of false alarms made in specific areas since the more false alarms the less likely people are to heed further warnings and evacuate when the risk forecast is accurate. Further research is needed to understand the relationships between the accuracy of disaster predictions and people's trust in these communications at both the psychological and behavioural level. This could be linked to the Dual Mode Model of trust which puts behavioural "cooperation" as the end point in a trust relationship (Siegrist, Earle & Gutscher, 2003; Siegrist, Gutscher & Keller, 2007) and the Intuitive Detection Model of trust that views people's trust in risk managers as a function of their past performance history (White & Eiser, 2006; 2007).

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