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Risk Management or Uncertainty Governance?: The  
Challenge of an Interdisciplinary Approach

Anna Garcia Hom, Rachel Palmén, Ramon J. Moles Plaza  
and Sergi Fábregues Feijoó

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# Risk Management or Uncertainty Governance?: The Challenge of an Interdisciplinary Approach

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*Abstract: The governance of risk has become an increasingly 'hot subject' as recent technological controversies have ignited significant levels of public alarm in a wide range of diverse arenas in distinct geographical locations. Recent controversies have led to the very questioning of more traditional forms of risk management as technical and scientific expertise is increasingly questioned by the public as regards its ability to manage contemporary risks adequately. Despite the existence of a wide range of literature discussing various elements of risk management the assumptions embedded within this literature are that risks can essentially be prevented, controlled and managed with the accumulation of scientific knowledge. Contemporary risks however can be characterized by the lack of scientific knowledge regarding a) the elements that constitute these risks and b) their very existence. The relationship between science and society, experts and laypeople, technocrats and citizens needs to be redefined to reflect this new reality of 'uncertainty'.*

Keywords: Risk: Dynamic Phenomenon, Socio-Technical Complexity, Uncertainty Governance, Participation

**T**HE GOVERNANCE OF risk has become an increasingly 'hot subject' as recent technological controversies have ignited significant levels of public alarm in wide range of diverse arenas in distinct geographical locations. Recent controversies, have led to the very questioning of more traditional modes of risk management as technical and scientific expertise is increasingly questioned by the 'public' (or in fact various 'publics') as regards its ability to manage contemporary 'risks' adequately. Examples of these recent controversies include genetically modified crops in the U.K, electromagnetic waves from mobile telephone base stations in Spain, the U.K. and Italy, and a host of other 'risky' issues. Despite the existence of a wide range of literature discussing various elements of risk management, the assumptions embedded within this literature are that risks can essentially be prevented, controlled and managed with the accumulation of a certain type of knowledge. This assumption however must be seen as problematic as regards contemporary 'risks' which are becoming increasingly defined by the very lack of scientific knowledge concerning: a) the elements that constitute these 'risks' (in terms of magnitude and probability) but perhaps more fundamentally as regards, b) their

very existence. In today's dynamic and 'risky' society therefore, the sphere of risk management, where risks are rationally calculated and controlled by scientists and technocrats increasingly seems archaic as scientists are unable to produce the 'certainties' demanded by the public. The relationship between science and society, experts and laypeople, technocrats and citizens essentially needs to be redefined to reflect this new reality of 'uncertainty'. Increased participation and public engagement of different stakeholders and their subsequent types of knowledge need to be incorporated in the taking of decisions as regards defining future technological and scientific developments.

## Risk as a Dynamic Phenomenon in a Socio-Technical Complexity Context

Rapid social changes in the latter half of the twentieth century have meant that contemporary society is characterised by a current state of flux as more traditional solid social structures have become increasingly eroded in our 'runaway world' (Giddens, 1999). Dynamic global changes linked to developments in science and technology, and intimately bound to global information exchanges are having far reaching



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unintended consequences. Intimately linked and forming part of the new wave of 'risks' are those related in some way or another to developments in the sphere of Information and Communication Technologies (ICT). 'Risk' has been dubbed the defining feature of twentieth century industrial society by an increasing body of work in the social sciences. The 'Risk Society' as coined by Beck (1992) is defined by the socially produced technological *risks* or indeed the negative by-products created as part of the process of scientific and technological development. As Stirling (1999:4) explains, "the abstract concept of risk has become a dominant ordering principle, helping to structure and condition social and institutional relations and to some extent, replacing monetary wealth and cultural privilege as the focus of distributional tendencies and political conflict". The prominent nature of contemporary risk issues, which can be defined as 'complex, dynamic phenomena, characterised by uncertainty and conflict' are exerting pressure on existing strategies of risk regulation and management (Macgill and Siu 2005:1105). As Macgill and Siu (2005:1110) state, "to consider risk anything other than a dynamic phenomenon, it is necessary to deny the changing complexion of the risk agenda within society in general and scientific communities in particular".

Dynamic risks resulting from technological developments not only affect the social sphere in a variety of different ways but are fundamentally comprised of the non-linear complex interactions between the social and technical spheres. The complexity context in which the risks associated with technologies are embedded is not only of a technical nature but crucially depends on social processes of definition within and between distinct social groupings (Garcia, 2005:105). In the case of 'risk', knowledge can be seen to be constructed in both the 'physical world' and the 'social world' (Macgill and Siu, 2005:1110). The former reflects those disciplines which have traditionally monopolised the sphere of 'risk' and which encompass the scientific, technical and economic spheres, whilst the latter refers to the various actors and stakeholders involved and encompasses the social practices in relation to the specific risk issue. A 'weak social constructionist' approach can be seen to enable the incorporation of different knowledges with distinct epistemological bases into the risk assessment and management processes in an attempt to represent this state of complexity. In line with this approach Lupton, (1999:35) defines risk in the following terms, "risk can constitute a damage or an objective danger but at the same time, it is inevitably defined through social and cultural processes of which it cannot be independent". In the literature looking at risk management processes a distinction is often made between 'science' and 'values' the

former often associated with a more 'objective' epistemology implicated in the natural sciences, economic and technical arenas and the latter is usually associated with a constructivist epistemology and a cultural approach to 'risk' within which the 'social' is often boxed (see Gregory et al 2006). This recognition of these two fundamental elements to some extent can be seen to enable the integration of *science* and *values* in the decision-making arena. Recent changes throughout the world concerning a wide range of 'risks', including technological developments need an approach that is capable of recognising dynamism, the specificities of the 'risk' in question, and also the 'realities' of the local context in which it is operating (Burgess, 2006:338). A holistic perspective that approaches dynamic systems, characterised by uncertainty and complexity must begin to recognise that these very characteristics have indeed become the *norm*, and no longer represent the *exception*.

### **Risk Assessment: Uncertainty and Ignorance**

Dynamic contemporary society and its intricate relationship to risk is fundamentally characterised by a state of incertitude in terms of the inability of traditional forms of knowledge to determine the nature and very existence of future risks. The contemporary context is characterised by a certain dynamism whereby the majority of 'risks' indeed fall to the end of the knowledge spectrum marked by 'ignorance' and 'uncertainty' as opposed to the possibility of predicting, estimating and quantifying future effects. Leach et al (2007:3) detail how complex dynamic systems can incorporate various states of knowledge, from solid knowledge where a calculable risk can be estimated, through to incomplete knowledge, uncertainty and ignorance. 'Risk' implies a solid relationship to knowledge, as knowledge can be utilised to estimate the magnitude, possible outcomes and probabilities of 'risk'. Uncertainty is characterised by an identification of possible outcomes but probability can not be estimated, judgement therefore explicitly enters the equation. Ambiguity can also characterise the state of knowledge as regards complex dynamic systems, whereby different stakeholders disagree as regards the character of desired outcomes. Some socio-technical complex systems however demonstrate a relationship to knowledge which can be characterised by 'ignorance' whereby what is unknown cannot be specified. These four classifications of states of incertitude need to be managed in different ways. Whilst expert/ technical knowledge can be seen as essential in managing 'risks' where knowledge of possible outcomes and probabilities can be estimated, the inadequacy of this approach is

extremely apparent as regards the other states of incertitude. It is certain however, that contemporary 'risks' that accompany the rapid changes in technological developments and globalisation processes occurring in our post-modern 'liquid' world tend to fall to the ignorance and uncertainty side of the scale.

As Bauman, (2007:99) highlights, "what makes our world vulnerable are principally the dangers of non-calculable probability, a thoroughly different phenomenon from that to which the concept of 'risk' commonly refers. *Dangers that are non-calculable in principle, arise in a setting that is irregular in principle*". From this perspective, the future is defined as uncertain, risk becomes merely one strategy of instrumental rationality amongst others to "transform uncertainty regarding future expectations to a (rational) manageable entity" (Zinn, 2004:4). A shift from the concept of 'risk' to 'uncertainty' is advocated by Bonß (1995) who maintains that a societal approach to risk, must start from the concept of uncertainty rather than risk (Zinn 2004:4). This has the subsequent effect of contextualising the idea of 'risk' as one economic/rational/ probabilistic strategy of managing an uncertain future. Marjolein et al (2006:332) point out how the concepts are inherently linked, "uncertainty refers to the impossibility of exact predictions" whilst "risk refers to the possible negative consequences of uncertainty". The implications of the shift from a conceptualisation of 'risk' to one of 'uncertainty' are immense in terms of thinking about how "uncertainty erodes the traditional positivist model of knowledge in which science speaks truth to power" (ibid). This perspective opens up the possibility of challenging a linear idea of 'progress' and is more readily able to incorporate a multiplicity of goals and objectives with a variety of processes to achieve these. As Leach et al (2007:4) state, "systems and their goals and properties, are open to multiple framings, where framing refers to the particular contextual assumptions, methods, forms of interpretations and values that different groups might bring to a problem, shaping how it is bounded and understood".

### **Risk Management: Precautionary Principle and the Lack of Scientific Evidence**

The precautionary principle has been employed as a regulatory strategy in managing a whole range of 'uncertain risks' at different governance levels. It pertains to those risks that are not calculable and controllable due to the fact probability of damage/harm cannot be estimated, however a suspicion of danger exists. It emerged as a decision rule for regulating environmentally hazardous activities in the Swedish Environmental Protection Act of 1969 and

has been applied widely within the European Union. It is commonly accepted that 'uncertainty' is the essence of the precautionary principle (Marjolein et al, 2006:313). Mayer and Stirling (2002:60) explain the precautionary principle in terms of the central ideas that "prevention is better than cure" whilst they go on to explain the primary benefits in the following terms, "it implies the recognition of the vulnerability of the natural environment and prioritizes the rights of those who stand to be affected by an activity, rather than those who stand to benefit from it". Implementation of the precautionary principle can vary dramatically and the choice of possible actions span from "doing nothing to banning a potentially harmful substance or activity" (Kheifets et al 2000:113). The precautionary principle has been cited specifically in relation to electro-magnetic fields, as serving a double function, a) helping to create a sensation of protection of the public and b) helping to restore trust in public institutions (Burgess, 2004).

The precautionary principle has however come under fire from various different camps as regards its application to a variety of different risk fields. The validity and utility of the principle as a tool for policy-making has been questioned and the polarity of opinions as regards the principle can be seen to reflect socio-political interests and perspectives. Stirling (1999:6) highlights how criticisms of the precautionary principle often stem from the distinction made between 'precaution' on the one hand and 'science-based regulation' on the other. This, distinction implies that a 'precautionary approach' to policy becomes more a political consideration than the application of a 'scientific' approach to risk assessment and management. He criticizes this distinction as proving a false dichotomy due to the fact that 'science' and 'precaution' are not inherently conflicting. Other criticisms however, attack the very logic of the precautionary principle itself (see Peterson, 2006). As Marjolein et al (2006: 335) explain, an acknowledgement of the limits of science in its ability to provide conclusive evidence has led to the development of the precautionary principle. However the legal elements and formulations of the precautionary principle include a 'knowledge condition', which is necessary in order to make an application. Marjolein et al (2006:335) highlight the paradoxes involved in this requirement in terms of how policy-makers and lawyers therefore need to appeal to various experts and scientists in order to 'prove' uncertainty. This leads to a situation whereby, "on the one hand it is increasingly recognised that science cannot provide decisive evidence on uncertain risks, while on the other hand policy makers and authorities increasingly report to science for more certainty and conclusive evidence". Criticisms have also been forthcoming that link the notions of prevention and

precaution to ideas of paternalism, thus rendering notions of either active citizens or institutions obsolete (Perri 6, 2000). If uncertainty is recognised as the fundamental component of the ‘risk society’ perhaps, in accordance with Marjolein et al (2006:331) we need to develop a scenario i.e. policy strategies and legal principles that allow social actors to fundamentally *act* under uncertainty.

### **New Forms of Assessment: Interdisciplinary Practice**

The necessity of adopting an interdisciplinary approach to researching issues associated with risk is becoming more and more evident. As Leach et al (2005a: 4) state in relation to how processes associated with globalisation have enabled distinct disciplinary traditions to “mutually enrich, build on and critique each other”. Interdisciplinary and cross-disciplinary work has a long tradition in terms of applied research and Horlick-Jones and Sime (2004) draws our attention to the recent growth in academic interest in cross-disciplinary work. To explain these developments he draws our attention to Gibbons et al (1994) who state to have identified a “fundamental shift in the global nature of intellectual production” (ibid). The academy has been facing greater pressure to produce knowledge that is ‘useful’ to addressing social ‘problems’ whilst at the same time being able to contribute to economic competitiveness. This necessity to apply research to the ‘practical world’ has meant that, the complex nature of social ‘problems’ demands an integrated interdisciplinary approach to research and analysis. An interdisciplinary approach is certainly necessary for the study of risk, as conceptualised as a multidimensional concept. As Macgill and Siu (2005:1106/7) state in regards to risk research, “(it) cannot be drawn from single disciplinary perspectives because, although such perspectives are crucial for in-depth insight on specific dimensions, they are inevitably out-scoped by the multidimensional nature of risk issues”. They go on to state that a transcendence of disciplines is needed and that this meta-perspective must embody the following qualities:

- *Engagement*: The knowledge of everyone who is impacted must be taken into consideration because knowledge moulds the way in which risks are defined, perceived and assessed, (refers to both qualified experts and lay publics).
- *Holistic*: The approach should be holistic in terms of the ability to integrate the various dimensions of ‘risk’ and their subsequent disciplinary approaches (sociological, health, environmental, legal, economic e.t.c)

- *Uncertainty and Trust*: To recognise that uncertainty and trust permeate issues associated with risk.
- *Dynamic*: It must recognise the very dynamic nature of risk issues.
- *Risk Management*: It should be able to contribute to a more effective risk management. (ibid).

The above ideas are often invoked as a justification for an interdisciplinary approach to risk assessment and management for various different theoretical and practical reasons. A holistic approach is stressed in the ‘risk assessment’ phase as different disciplines should be integrated in an attempt to reflect the multi-dimensional and dynamic character of risk. A pluralist approach recognises the benefits of integrating the different knowledges of the stakeholders implicated in the controversy in the management of risk. The majority of the literature stressing the necessity of interdisciplinary research however does not actually state *how* the integration of disciplinary knowledge is possible nor detail the process. Horlick-Jones and Sime (2004:445) differentiate between *multidisciplinary* and *transdisciplinary* research, the former is characterised by an approach which respects the “division of labour in which different disciplinary frames survey separate aspects of the same whole”. Despite there being an increased interaction between the disciplines, the methodology of each discipline remains distinct. Transdisciplinarity, however is where elements from distinct methodologies can be “exchanged across disciplinary boundaries in an evolved methodology which transcends ‘pure’ disciplines”. They are explicit in their attempt to integrate knowledge from the natural sciences with an approach emanating from the ‘social sciences’. They term them the ‘hard’ knowledges, (quantitative and objective) and ‘soft’ knowledges (qualitative and judgemental), whilst recognising that this distinction is problematic. Klink and Renn (2001:161) take a similar approach which is an attempt to “integrate the natural and technical sciences as well as the social sciences”. They stress how the “social scientific perspective offers the framework under which contributions from all relevant disciplines can be embedded” in order to undertake interdisciplinary risk research and risk management strategies.

### **New Forms of Management: Social Participation in the Governance of Uncertainty**

The pluralistic approach, or more specifically an interdisciplinary approach to research and risk assessment can essentially be complimented at the management phase by the involvement of different stakehold-

ers in the decision-making process. Existing risk management procedures and forms of regulation are recognised as highly technocratic arenas in need of increased input by both citizens and the wide range of stakeholders implicated in the management of the specific 'risk'. These recommendations often include the call for 'increased public involvement' in 'risk', on various different levels, from the 'practical' risk management decision-making arena, to the more abstract ideas of the very framing of risk. It is the contention of this paper that increased public participation not only forms part of a paradigm shift from 'risk management' to 'uncertainty governance' however this approach can be seen to challenge embedded assumptions fundamental to the positivist project. The former (risk management) forms part of a context in which the future is projected as essentially 'controllable' by technocrats and scientists and their relationship to the public is defined by faith and confidence. In the latter however, uncertainty governance can be characterised by a context in which traditional faith in science has been eroded and active participation of the population is required to negotiate developments in science and technology. There are two main bodies of literature that consider the democratisation of risk management arenas, those that focus specifically on the idea of 'risk' and those more broadly within the sphere of science and technology.

The former group of studies often emanate from a complex-systems perspective (Renn, 2004; Macgill and Siu 2005) and see participatory processes as the best way to manage the inherent uncertainty of risk, by incorporating a plurality of inputs into the decision-making arena. Scientific evidence (as propounded by scientists and a range of experts) is seen as in need of being injected with increased public input. From this perspective two levels of stakeholders can be detected, a) primary stakeholders i.e. those involved in the management of the risk, and b) secondary stakeholders those affected by decision-making in general 'the public'. Increased community involvement and public participation from this perspective is closely linked to instrumental notions of trust and acceptability. Increased participation in the decision-making arena is seen to a) increase the trust the public have in various institutions' capacity to manage risk effectively, and b) the public is seen to be more likely to accept decisions in which they have been involved. As Elliot, (2001:266) states, "the Top-Down paradigm is no longer efficient and effective in contexts where public confidence has been seriously eroded, contributing to social distrust. New patterns of risk governance are needed to provide legitimacy and promote trust or to restore public confidence and social trust where these have been lost". This literature can be seen as predominantly

procedural and institutional, in terms of attempting to delineate and specify the best participatory procedures to integrate scientific knowledge with public input in risk management arenas. It therefore emanates from a more 'applied' perspective in terms of its practical implications as regards managing risk. The literature in this camp, emanating from within a 'risk' framework is complimented by those studies emanating from a 'democratic' perspective which see 'risk' or 'environmental management' as another arena in need of democratization (see for example, Webler and Tuler 2000; McDaniels et al, 1999; Weale, 2001; Laird, 1993). These studies utilise elements of democratic theory to look at concrete participatory processes. These two camps are also linked by their emphasis on institutional mechanisms. Despite the fact that the majority of literature emanating from this perspective addresses local processes of participation in terms of very concrete issues, it more often than not adopts a 'societal' perspective stemming from a complex systems approach (see for example, Klinke and Renn, 2001).

This kind of 'third way' approach has proliferated in various decision-making arenas in the new 'governance' context, where partnerships of public authorities, civil society and representatives of the corporate world act in concert in search for some kind of consensus. They have however, received lots of criticisms, including accusations of perpetuating 'tyranny' (Wynne, 2005; Cooke and Kothari, 2001) as participatory processes are portrayed as a 'technique of governance'. Criticisms also highlight how micro-politics of power relations within these participatory spaces can easily be overlooked. Perri 6 (2000) is extremely critical of the recent shift in risk management to 'proceduralism' which he terms "the search for procedures by which parties can be brought together, in the hope of bypassing substantive moral and political disagreements". Wynne (2005:68) explains how participatory processes developed within the above framework have so far not challenged the dominant risk discourse,

"This rigid failure of institutional-cultural imagination has not hitherto been challenged by the processes of participation and dialogue that have been developed. I thus argue consistent with the critical appraisal of the fashionable development discourse of participation – 'the new tyranny' as Cooke and Kothari (2001) have stated- that virtually all of the mushrooming commitment to public citizen engagement in 'science policy' or 'scientific-technological' issues or to 'democratizing science' is something of a mirage."

Critiques emanating from a more radical constructivist approach to risk can be seen as predominantly

linked to the discipline of science and technology studies. Science and technology studies have since the 1970s investigated the issues of technological practice and culture. Hybrids of nature/culture cannot be split into separate realms (social and technical) but constitute one another (Latour, 1993). This perspective can be seen to incorporate those more recent studies from a 'public understanding of science' approach (see Wynne, 2005, Dietrich and Schibeci 2003). As Zinn (2004:5) states, from a social constructivist perspective social interpretation crucially *defines* risk. The implications of this approach in terms of risk policy and management therefore run far deeper than incorporating members of the public into participatory processes. Deep structural changes are seen to be needed, for example as Dietrich and Schibeci (2003) state, "only policy processes that recognise the particular, local, and contextual knowledges of "the public", which co-construct innovation, can achieve deep, social structural consideration of gene technology". 'Risk' from this perspective is questioned in terms of the discourse culture surrounding the term, and there is no epistemological hierarchy of different (i.e. expert and lay) knowledge systems (Zinn, 2004:5). As Wynne, (2005:68) explicitly states, the discourse of risk "imposes severe and unspoken framing limits around these processes, such that the continuing failure to democratically sensitise science, and its persistent non-accountability to publics even in the new (if still limited) 'participatory' ethos is omitted from critical attention". The essentially distinct ontologies of scientists and the public become performative and therefore demand that various publics become involved in the very *framing* of science and the initial stages of technological developments (i.e. the research and development stage) (Wynne, 2005).

## Conclusion

The shift from 'risk management' to 'uncertainty governance' in fact questions the linear idea of progress whereby scientists and technocrats are in effect

our guardian angels able to deliver us to some predictable future. The notion of uncertainty governance however captures the idea that a variety of aims, objectives and paths are in fact open to negotiation. Science, as with any form of knowledge is constructed and therefore the opening of this initial research and development decision-making space to distinct publics reflects the active construction of this process. The more radical constructionist perspective is useful as it allows one to consider the deeply embedded cultural influences that affect these spaces. This perspective is less concerned with the institutional mechanisms than the cultural framings and social relations that occupy these participatory spaces. The fields and disciplines of science and technology studies, public understanding of science and the sociology of scientific knowledge are however, explicit that they "are in the business of analysis not prescription" (Martin and Richards, 1995:522/3). As Bijker (1995:256) is keen to point out "technology and society are entangled in much too complex an ensemble to hope for context-independent instruments and recipes". The logical conclusions for policy processes, participatory spaces and risk management arenas emanating from this line of thought are however potent. For example one of the policy implications of this approach is, "to encourage policy actors to recognise, the cultural dimensions of the interactions of 'lay' public knowledge with scientific knowledge over risk and environmental issues and the like" (Leach et al 2005a:4). Different publics therefore need to be engaged fundamentally at the initial research and development stages of science and technology to enable participants to crucially *frame* these developments. This pluralistic input into the future governance of uncertainty may be a way of creating greater confidence and trust in public institutions however, more fundamentally would allow citizens to crucially *shape* the kind of society that they form part of. It might even enable a change in climate from one of fear and distrust of public institutions and science and technological developments to one of hope where active citizens have a stake in society.

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