

CONCLUSIONS

CURRENT PRACTICES AND FUTURE CHALLENGES OF RISK ANALYSIS AND MANAGEMENT

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The articles presented in this volume provided insights into a variety of professional practices related to risk analysis and management. They explored a broad diversity of topical issues and conceptual approaches, and convincingly demonstrated that the increasing complexity and rapid change in the world have brought the notion of risk to the center of many debates in public policy and the corporate world. Some of the discussed problems or challenges are particular to a specific institutional context. Others, however, cut across conventional sectoral or functional boundaries and provide evidence that risk is a conceptual tool that powerfully connects issues and institutions hitherto perceived as being quite distant from one another. The early identification, adequate assessment, and appropriate mitigation of risks have apparently become decisive requirements for effective and successful policymaking in public and private governance.

This concluding chapter begins by highlighting some key aspects that are mentioned in most articles and are therefore of special relevance when assessing current practices of risk analysis and management. The first section refers to the changed international environment that forces institutions and analysts to adapt adequately to altered circumstances when thinking

about, planning for, and coping with emerging risks and threats. The second section restates the central premise of risk management and outlines selected issues drawn from the contributions in this volume with regard to risk identification, assessment, and mitigation. The text then adopts a more future-oriented perspective by showing in the third section what strategies different actors in politics and business have developed for addressing emerging risks. The fourth and final section focuses on the individual analyst by emphasizing six central tasks that may lead to better tailored and more effective strategic responses to risk governance challenges. It concludes with a short summary.

1 A changing international environment

A common strand in all articles is the diagnosis that the international environment is changing. The increasing use of the risk concept in the domain of security policy, for instance, is due to the altered security situation after the end of the Cold War when it became increasingly difficult to identify hostile actors, their intentions, and the damage they can potentially inflict upon others. Because the threats are diffuse and the shape and evolution of security challenges are near-unpredictable, the concept of risk is well-suited as a tool for explaining the state and dynamic of a radically transformed security landscape.¹ This insight apparently necessitated new approaches to public policy management. It is thus not surprising that the civil defense organizations of Germany, Sweden, and Switzerland have all profoundly changed over the last decade by shifting their focus in terms of which risks are important and imminent and by adapting their doctrine, concept, and organization.

This adjustment process and the related debate about emerging political risks and public policy issues took place simultaneously in such diverse

1 For an overview, see Bailes, Alyson J.K., 'Introduction: A World of Risk', in Stockholm International Peace Research Institute, *SIPRI Yearbook 2007: Armaments, Disarmament and International Security* (Stockholm: SIPRI, 2007), pp. 1–20; Coker, Christopher, *Globalisation and Insecurity in the Twenty-first Century: NATO and the Management of Risk, Adelphi Paper 345* (Oxford: Oxford University Press, 2002).

areas as financial businesses or the armed forces. An important aspect in this regard is the increasing internationalization of policy-making that forced all actors to abandon an exclusively national perspective and to consider their strengths, weaknesses, opportunities, and threats in view of international trends and developments. It is evident that the emergence of systemic risks, which are often global in origin and have an impact that transcends national borders, demand more international cooperation and better coordination among all actors involved, within and across territorial boundaries, in order to effectively counter arising threats.

2 Key issues in risk analysis and management

The central premise of risk management remains the same throughout all articles: the need for early detection and adequate assessment of upcoming issues in order to ensure that decision-makers can act upon them in a timely and appropriate manner. Accordingly, risk management always embodies two basic rationales: in a more reactive sense, it intends to prevent surprises that may negatively affect envisaged (institutional) objectives; in a rather proactive sense, it aims to preserve and enhance the margin for strategic maneuvers in order to better realize envisaged objectives. Beyond the affirmation of this overall objective of risk analysis and management as outlined in the introduction, the different chapters point to a number of aspects that are specific to the three key phases of an ideal risk management process.

In terms of *risk identification*, institutions perceive risks differently, not necessarily because they face different risks, but due to their varying vulnerability assessments. While it is evident that institutions and actors are confronted with the same basic risk landscape, not all risks are relevant to all institutions or to the same degree. Whether and to what extent a particular risk is actually relevant depends on how an institution perceives itself as being affected by it. This vulnerability assessment, in turn, depends on the institution's objectives: civil defense organizations strive to protect the population from incidents that negatively influence safety or welfare,

intelligence agencies aim to protect states and societies from aggression by criminal networks, and companies serve their shareholders by protecting the firm's integrity and economic strength. They all frame their protection goals differently and recognize other risks as being relevant, although they are faced with the same overall risk spectrum. As a result, it is obvious that the vulnerability assessments and thus the risk management perspective of public policy institutions differ from those of private companies.

In the context of *risk assessment*, the focus is on risk prioritization in particular. Insurance companies specifically target unpredictable, ruinous cumulative claims and therefore focus on risks with a high cumulation potential that may lead to ruinous damages. Such a clear setting of priorities might be easier to implement for private companies than for public actors, because their institutional objectives are more narrowly framed, stakeholders' expectations more specific, and those who profit from risk mitigation are those who have to pay for it. In public policy, conversely, more stakeholders are usually involved, all of whom have specific expectations and insist on covering "their" risks: citizens request mitigation measures for the risks by which they feel threatened, bureaucrats emphasize the significance of the risks they personally deal with, and both justify their claims by referring to an often vaguely defined public duty, even if the costs for mitigation vastly exceed the potential benefits.

With regard to *risk mitigation*, an intriguing result is that public policy institutions often resort to issuing new laws or regulations when they design preventative or precautionary measures, while private actors, which obviously do not have the respective capacities, are affected by such governmental interventions. One of the key rationales of corporate risk management is to monitor government-induced regulatory changes in order to counter potential negative effects and to create a regulatory framework that is conducive to business success. The somewhat paradoxical result is eventually that public risk mitigation may lead to risks against which private institutions shield with their own risk management. Such outcomes, apart from once again illustrating the importance of adequately assessing who is affected by what risks to what extent, also underline that risk mitigation measures may not have the intended effect or they may even unfold

unexpected consequences – including the opposite of those desired – in areas or sectors that were not targeted by the measures.

3 Strategic responses in business and politics

The increased attention to risk management and the development of long-term, forward-thinking strategies underline the efforts of many actors in politics and business to adapt to a changing risk landscape over the last decade. In business, the scope of actively managed risks has been broadened significantly from a quite narrow view of operational, financial, or credit risks to a large spectrum of risks – including social, political, or environmental risks – that may all have an impact on business activities. In 1993, for instance, GE Capital, a global financial services firm, was the first to create the position of a “Chief Risk Officer” (CRO) in order to analyze and manage the risks the company faces in a more comprehensive way. Today, the position of CRO is an institutionalized position in many companies across a large variety of business sectors.

At the governmental level, three reports serve to illustrate the trend towards more emphasis on foresight and risk management: the US National Intelligence Council in 2004 published a report entitled “Mapping the Global Future” that takes a long-term view of how global trends might develop and influence the world by the year 2020.² The Development, Concepts and Doctrine Centre within the British Ministry of Defence published a (regularly updated) similar study in 2006 in the form of an independent assessment of the strategic context until 2036.³ Similarly, the Finnish Ministry of Defence in 2006 issued an assessment of the long-term

2 US National Intelligence Council, *Mapping the Global Future: Report of the National Intelligence Council's 2020 Project* (Pittsburgh: Government Printing Office, 2004) <http://www.dni.gov/nic/NIC_2020_project.html>, accessed 15 November 2007.

3 UK Development, Concept and Doctrine Centre, *The DCDC Global Strategic Trends Programme 2007–2036* (Swindon: DCDC, 2006) <<http://www.dcdc-strategic Trends.org.uk/view-doc.aspx?doc=1>>, accessed 15 November 2007.

developments future strategic challenges in Finland's security environment up to the year 2025.⁴

At the global level, government agencies and non-governmental organizations alike have also contributed to this growing trend: the Organisation for Economic Co-Operation and Development (OECD) released a study on "Emerging Risks in the 21st Century" in 2003,⁵ which identified the most pressing challenges in public risk management and was followed by an OECD Futures Project on Risk Management Policies.⁶ The World Economic Forum (WEF) in 2004 founded a "Global Risk Network" in response to the concerns of the global (business) community about difficulties in responding adequately to a changing risk situation.⁷ In 2003, finally, the International Risk Governance Council (IRGC) was established as an independent organization of risk experts from government, industry, and academia with the aim of improving the anticipation and governance of global systemic risks that affect human health and safety, the environment, the economy, and society at large.⁸

4 The way forward: six central tasks for risk analysts

The changing state of risk apparently evokes the need for a more future-oriented, strategic approach in public and private governance, and the chapters collected in this volume strongly underline this argument. However, the question remains what needs to be done in the future in order to make better use of the full potential of knowledge and expertise of risk analysts – of

4 Finnish Ministry of Defence, *Securely into the Future: Ministry of Defence Strategy 2025* (Helsinki: Ministry of Defence, 2006) <<http://defmin.fi/index.php?l=en&s=318>>, accessed 15 November 2007.

5 OECD, *Emerging Systemic Risks in the 21st Century: An Agenda for Action* (Paris: OECD, 2003).

6 For more information, see the website of the OECD Futures Project on Risk Management Policies <http://www.oecd.org/department/0,3355,en_2649_35014780_1_1_1_1,00.html>, accessed 15 November 2007.

7 For more information, see the website of the World Economic Forum's Global Risk Network <<http://www.weforum.org/en/initiatives/globalrisk/index.htm>>, accessed 15 November 2007.

8 For more information, see the website of the International Risk Governance Council <<http://www.irgc.org>>, accessed 15 November 2007.

which this book provides strong evidence – and to support decision-makers even more effectively in adequately coping with emerging risks. In the following, six central tasks of risk analysts are identified as propositions for the possible future shape of risk analysis and management.

The *first task* of risk analysts is to develop a nuanced understanding of risks, of the risk landscape, and of the risk management process as such. To begin with, they should understand the essential elements of the risk concept as well as the various concrete risks that are relevant to a particular institution. Furthermore, they should be aware of the complexity and accelerated dynamic of an often volatile, fluctuating, and diffuse risk landscape. Finally, they should recognize that risk analysis and management involves a long-term commitment and requires a clear definition of values and objectives, a meaningful evaluation and prioritization of identified risks, and a lucid appreciation of the resources needed for mitigating them.

The *second task* of risk analysts is to recognize that dealing with risks means dealing with the future and to acknowledge that there is always a variety of possible futures. This insight implies that analysts and decision-makers alike must learn to think in terms of alternatives, or more precisely, in terms of alternative futures. Risk experts are not assigned to predict the future, because no one can know it, and it is misleading to pretend to. The job of risk experts is rather to imagine a multiplicity of futures in order to “help policy-makers think about the future” and to “deal with heightened uncertainty by presenting alternative scenarios”.⁹ They must confront decision-makers with the reality of complexity and uncertainty, while aiming at reducing both to a degree that allows the formulation of meaningful policy recommendations.

The *third task* consequently is to discern uncertainty as a matter of degree. Unfortunately, uncertainty is often perceived in a binary way: the world is either assumed to be certain and its future course open to precise prediction, or it is seen as uncertain and therefore completely unpredictable. Both views are wrong and fatal for risk management: underestimat-

9 Nye, Jr., Joseph S., ‘Peering into the Future’, *Foreign Affairs*, 73/4 (1994), pp. 82–93, at pp. 88 and 93. Cf. also Minx, Eckard and Ewald Böhlke, ‘Denken in alternativen Zukünften’, *Internationale Politik* (December 2006), pp. 14–22.

ing uncertainty leads to strategies that do not defend against probable threats, while assuming unpredictability leads decision-makers to abandon analytical rigor, to rely on their “gut instinct”, and to forego effective risk management.¹⁰ Risk analysts should aim at overcoming the binary view of “certain” versus “uncertain”. A complete lack of knowledge is a rare state. Even in the most uncertain environments, is it possible to detect some information, and usually, it is possible to identify a host of hitherto unknown factors if the right analyses are performed.¹¹ A certain amount of “residual uncertainty”, which corresponds to the “residual risk” as described in the introductory chapter on risk mitigation, may remain, though, even if the best analysis is done.

The *fourth task* of risk analysts, then, is to use a sophisticated understanding of different levels of uncertainty in order to propose appropriate strategic responses and to tailor the methodological tools adequately. We can distinguish at least four levels of uncertainty, for which different strategic and methodological choices can be derived (see Figure 1 on p. 211):¹²

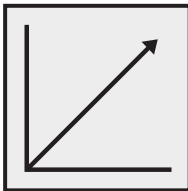
- *A clear-enough future*: the future can be predicted to a degree that is sufficiently clear to allow straightforward strategic answers. A prominent example would be the forecast of demographic trends. Traditional tools like trend analyses, which forecast future outcomes based on historical results, may lead to reliable results.
- *Alternate futures*: a few clearly distinguishable alternate outcomes or discrete scenarios can be observed. We know that one of these will occur, but we do not know which one. Often it is possible to assign probabilities to the different possible outcomes. A classic example is a presidential election: we know that one candidate will win, but it is uncertain which one. In this case, tools for decision analysis (for example, in the form of decision trees) or the development of scenarios for different outcomes may be helpful.

10 Courtney, Hugh, Jane Kirkland, and Patrick Viguerie, ‘Strategy under Uncertainty’, *Harvard Business Review* (November–December 1997), pp. 67–97, at pp. 68f.

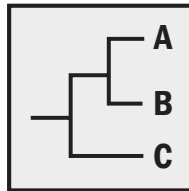
11 Courtney, Kirkland, and Viguerie, ‘Strategy under Uncertainty’, pp. 68f.

12 For the following, cf. *ibid.*, pp. 69–73.

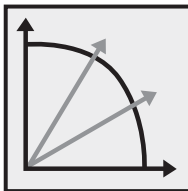
- *A range of futures*: a multiplicity of potential futures exists, but no concrete final outcomes can be depicted. The range is defined by a few variables, but the actual outcome may lie anywhere along a continuum bounded by that range. An example is the design of future laws and regulations. In terms of methods, analysts need to develop a number of scenarios, focusing on trigger events and offering a broad and distinct risk picture. The set of scenarios should account for the probable, not the entire possible range of outcomes.
- *True ambiguity*: uncertainty in all dimensions creates an environment that is virtually impossible to predict. Neither definite final outcomes nor even ranges of possible outcomes can be identified. So much uncertainty is rare, and experience shows that it tends to drift to another level over time. True ambiguity can be typical for major historical turning points such as the end of the Cold War. The best that analysts can do is to look very hard for variables that may give hints as to future developments.



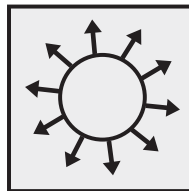
A clear-enough future



Alternate futures



A range of futures



True ambiguity

Figure 1: Levels of uncertainty¹³

13 Cf. Courtney, Kirkland, and Viguerie, 'Strategy under Uncertainty', pp. 70f.

The *fifth task* of risk analysts is to facilitate the sharing of knowledge across territorial and sectoral borders. When future challenges become global and their impact transcends boundaries, there is a growing need for risk analysts to engage with one another across countries and to connect public administrations, international institutions, private companies, universities and think tanks, civil society organizations, and the broader public. Insurance companies, for instance, resort heavily to external experts or consultants in order to purchase specialized knowledge – a trend that will certainly spill over to the public sector and create more demand for access to risk expertise outside government. In order to facilitate such a knowledge-sharing process, risk analysts should, firstly, engage in the establishment of various forms of platforms for the exchange of ideas and best practices in risk management, and, secondly, they should tailor their specialized advice to the respective institutional needs.¹⁴

The *sixth task* of risk analysts is to recognize that although risk perception largely depends on individually held values, worldviews, goals, and interests, risk identification and assessment requires some form of collective judgment to initiate risk mitigation. In a public policy context, this task cannot be left to the elites in the inner circles of government if public trust in political leadership and democratic institutions is not to be undermined. It is thus vital to engage all involved stakeholders, to establish the appropriate communication channels, and to inform the broader public in a timely and regular manner about risk assessments and planned mitigation measures. A systematic and patient risk dialog that generates public awareness and understanding of the complexity of the risk landscape is a crucial requirement for cultivating open, enlightened, and future-oriented communication about risks and threats.

14 The Crisis and Risk Network (CRN) at the Center for Security Studies, ETH Zurich, is an example of such a platform for sharing experiences among risk experts: <<http://www.crn.ethz.ch>>, accessed 15 November 2007.

5 Conclusion

Analysts and decision-makers in public administrations, armed forces, international organizations, or business corporations have discovered risk as a preferred tool for analyzing and managing trends and developments in an interconnected, complex, and uncertain environment. The notion of risk reveals some of the basic characteristics of the contemporary world by constantly reminding decision-makers of the difficult task of striking a sensible balance between opportunities and threats in dealing with uncertain future events. It has been the aim of this “International Handbook on Risk Analysis and Management” to provide insights into the current practices and future challenges of risk analysis and management from practitioners in a broad range of professional contexts. Indeed, the collected contributions bear witness to a great deal of experience and profound knowledge within and across professional communities. We hope that this volume offers a starting point for even more in-depth research, stimulating reflections, lively debates, and profound discussions about risks and threats today and tomorrow.

Modern risk management refers to the ability to price risks and to provide adequate compensation for the risk taken in business activities. Evaluate and apply tools and procedures used to measure and manage risk, including quantitative measures, qualitative assessment, and enterprise risk management. Distinguish between expected loss and unexpected loss and provide examples of each. Interpret the relationship between risk and reward and explain how conflicts of interest can impact risk management.

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Only about one-third of CROs and a quarter of risk managers and C-suite risk nonowners view their risk management programs as highly integrated. Meanwhile, although less than 10 percent of non-CROs see their programs as separated and isolated, a surprising 18 percent of CROs view their programs as such (figure 5). I see a future with an ERM operations center, real-time monitoring, predictive analytics, and an app and a dashboard. tools for risk analysis: Current and future. challenges. Cite as: AIP Conference Proceedings 1642, 310 (2015); <https://doi.org/10.1063/1.4906680>.

operational food management systems, such as Hazard Analysis Critical Control Points, public health and governmental. decisions. To do that, a series of new Risk Metrics has been established as follows: i) the Appropriate Level of Protection. Current and future challenges. A major challenge in QMRA is to address the variability in microbial responses of different pathogenic strains. [18]. Such variability increases as the conditions became harsher (close to the growth boundaries) and/or at low. population levels ([19]; even more at the individual cell level). The analyses include identification of hazards and threats, cause analyses, consequence analyses and risk description. The results of the analyses are then evaluated. The totality of the analyses and the evaluations are referred to as risk assessment.

Consider the risk, seen through the eyes of a risk analyst in the 1970s, related to future health problems for divers working on offshore petroleum projects. An assignment is to be made for the probability that a diver would experience health problems (properly defined) during the coming 30 years due to the diving activities.