Concept Note

Public Sector Governance of Emerging Risks

How can central governments improve their anticipation of and early response to emerging risks?

A concept note to accompany IRGC's workshop report on hallmarks and drivers of public sector governance of emerging risks

Contents

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Introduction

In September 2012, IRGC organised a workshop with experts and government representatives to discuss how to improve the public sector governance of emerging risks. The aim of the workshop was to identify, characterise and analyse key issues that governments face in their responsibility to effectively address emerging threats and uncertainties. Risk management is a normal task of all governments, but communicating about emerging risks and new threats is a challenge, as is establishing processes for government agencies to deal with uncertainty and emerging risks in a proactive manner.

For those governments that have established risk management policy norms, procedures, guidelines and practices, the challenge lies beyond these norms and procedures. It is about setting the right conditions that allow for the "right thinking" in an institution, in such a way that emerging risk management is not a separate issue, but is intrinsically connected with decision-making across agencies,

Management of emerging risks must be a joint, collaborative, effort between technical experts and policymakers. The former may have some knowledge about emerging issues of concern and thus they can provide recommendations to be addressed by the latter. Policymakers have immediate short-term preoccupations and are seeking advice about how to deal with longer term issues.

Regarding risk management, some of the questions that technical experts face in their task of preparing policymakers to deal with risks which are emerging, ignored or neglected are:

- How to communicate complexity, uncertainty and ambiguity in such a way that policymakers will be able to act on the information provided?
- How to engage at the policy level on emerging threats that, in their view, require more attention?
- How to overcome budget constraints?
- How to motivate investments in prevention and proactive risk management?

For policymakers, questions of immediate concern include:

- How to know which advice should be followed?
- How to deal with issues that may only materialise in the long term?
- How to allocate scarce resources?
- How to satisfy various, possibly conflicting, interests?

In order to improve its understanding of how to better deal with emerging risks, IRGC has analysed:

- Examples of governments managing risks that affect the prosperity and well-being of populations and environments;
- The additional challenges that emerging risks pose to these kinds of approaches;
- Practical approaches that are available to policymakers to minimise unwanted shocks from and resilience to emerging risks.

The aim of this paper is to provide some answers to these questions.

Definition:
IRGC defines an emerging risk as a risk that is new or arising in new or changing context conditions.

Enhancing the effectiveness of public sector governance of emerging risks

What are the possible drivers (or hallmarks in the case of success) of good or bad practices in emerging risk governance by the public sector? In particular, what are the main indicators of successful handling of the following aspects:

- "Translation" of evidence-based information into recommendations and into policy decisions and actions?
- Political priorities and the need to address short-term issues?
- Budget constraints, allocation of scarce resources and risk prioritisation?
- Trade-offs between inclusive democracy and the need for leadership?

Based on an analysis of six case studies about how certain emerging issues have been or are handled by public sector institutions, IRGC has proposed **nine points to be considered for effective public sector governance of emerging risks** These points are referred to as "hallmarks and drivers of governance practices". They can be regarded as conditions for success that those responsible in ministerial departments are advised to consider in order to address the objectives and challenges they face (see appendix) and identify what might be "missing" in the work done by teams of technical experts, whose function is to analyse and make recommendations about possible uncertainties or new threats that may affect societies and governments.

The nine drivers of effective public sector governance of emerging risks

(1) The development of transparency in government objectives and means to deal with uncertainty and emerging issues
(2) The need to ascertain accountability
(3) An effective inclusion of stakeholders in the assessment and decision-making process
(4) Integration of the various risks as well as the elements that compose the risks
(5) The provision of convincing methods and procedures for evaluating threats and designing options to deal with the threats
(6) The need to prioritise issues among the many uncertainties, potential opportunities and threats
(7) Determining when it is time to act
(8) Agility, innovation and creativity to ensure flexibility and adaptability
(9) Communication to build a constructive discussion about risks

The numbers in brackets next to each point refer to numbering used in the workshop report published separately. For a more detailed analysis of these drivers of effective emerging risk management in the public sector, we recommend reading the workshop report and the case studies it is based on. Those studies provide illustrations of how to achieve the effective implementation of these nine points.[1]

1. Fostering inter-disciplinarity and multi-sectorial risk management

Identification and early proactive management of emerging risks is best achieved when there is:

- **An effective inclusion of stakeholders in the assessment and decision-making process (3)**

It has often been observed that bringing together all actors who have a stake in a risk issue, or an interest in its management, supports the development of decisions which are more robust in the long term. When emerging threats are new or not well known and it is necessary to make decisions in the absence of sufficient knowledge, it is useful to engage collectively in their analysis, evaluation and management. Inclusive and multi-stakeholder governance is a factor of effective emerging risk governance.

Example: *the Government of Denmark was exemplary in how it successfully organised a multi-stakeholder approach and engagement to ban the use of antibiotics as growth promoters in animal feeding, as soon as scientific evidence had led to the conclusion that this practice was largely the cause of antibiotic resistance in human health. Farmers, veterinarians and pharmaceutical companies agreed to the ban, despite the uncertainties about animal health and economic impacts.* [2]
Key to success: *using evidence-based information, being transparent and communicating about risk and uncertainty; and seeking solutions with other stakeholders.*

- **Integration of the various risks as well as the elements that compose the risks (4)**

With regard to emerging hazards and risks, with various origins and causes, it is often difficult to identify which impacts they will have across a variety of fields and how they may affect various actors. Additionally, the actions of various stakeholders may interact. There is often complexity and uncertainty and it is useful to frame the issue under consideration and set the boundaries of the analysis in such a way that it will be possible to identify and understand the various interactions. An integrative approach is useful.

With regard to an inter-agency approach to integrated risk management, so called “cross-cutting” or systemic risks in particular require specific attention and the integration of various governmental agencies to develop effective management options and implement decisions. It is important to learn how to integrate the actions of different government sectors in the assessment, communication and management of risks that affect them all.

Example: *some governments have established structures and processes for “all-hazards” national risk assessments (that provide the evidence base for integrated assessment of risks and their impacts); “whole-of-government” approaches to integrated risk management (that involve all government agencies in the management of a risk that does or may affect them;) and “all-community” risk management (whose purpose is to involve communities and the public in the management of uncertain, complex issues that require wide-ranging multi-stakeholder and collective action). These structures and processes are efficient places to discuss with all involved partners the identification of new threats, issues or interactions between risks. Information on these approaches can be found on various public websites.* [3]
Key to success: *establishing agreement on methods used and focusing on impact and vulnerability in order to target resource allocation.*

2. Establishing an appropriate risk culture

Components of an appropriate risk culture that enables the negotiation and setting of an appropriate level of risk taking (risk appetite) include:

- **The development of transparency in government objectives and means to deal with uncertainty and emerging issues (1)**

This implies, for example, sharing assessment and management efforts with stakeholders and the public as much as possible. Being open and transparent can help create a climate of trust which is necessary for dealing with the inevitable trade-offs that need to be made. Equally, it is recognised that a lack of transparency is a contributing factor to risk emergence. Creating transparency is closely associated with creating accountability, which it helps to foster.

Example: *in 2012, the Government of Singapore started a "national conversation" to discuss with the population about the country they would like to live in in the future, and the objectives and priorities for the country, the government and the people. This process allows society to come together to discuss different perspectives and weigh trade-offs in deciding the direction and choices that Singapore will take, and addressing current and future challenges and risks.* [4]
Key to success: *two-way communication.*

- **The provision of convincing methods and procedures for evaluating threats and designing options to deal with the threats (5)**

Transparency and "rationality" matter as they can provide the base for decision-making with respect to how risks are compared, ranked and prioritised, and how trade-offs are made. Emerging risk managers are expected to make the "business case" that it is worth spending resources to reduce threats before they materialise. Policymakers need to be provided with support and evidence in such a way that they are confident about the methods and procedures used by emerging risk managers. They want to be comfortable with the decisions that technical experts propose, in terms of risk prioritisation, resource allocation, capability building and planning. The provision of convincing methods and procedures facilitates the processing of information for the decision-making, thus improving how decisions are made.

Example: *the development of biotechnology applications, such as those deriving from synthetic biology, is pursued for the benefit of improving human health or dealing with environmental challenges. However, for a new research and deployment to be authorised and successfully applied, confidence must be provided that related risks will be avoided or mitigated. Scientists are thus on the front line to provide assurance that they use effective methods to prevent, for example, the release and dissemination of dangerous pathogens into the environment. The burden of proof is somehow moved "upstream", with the research teams, which have developed collaborative and open processes to demonstrate that they apply effective methods for avoiding new or emerging risks to materialise.* [5]
Key to success: *creating a collaborative environment for communicating about research, application and deployment.*

- **Agility, innovation and creativity to ensure flexibility and adaptability (8)**

In the face of uncertainties, it is useful to avoid irreversibility. Institutional mechanisms that allow for adaptation of regulation or policies as new knowledge about a potential threat is gathered have the immense value of avoiding lock-ins. For example, they set goals (e.g. greenhouse gas reduction) instead of imposing a technology or a type of product (e.g. electric cars). They encourage innovation as one risk management option. They allow trials and errors and look forward, instead of imposing strict regulations which may create perverse incentives.

Example: *some governments (such as Canada, the USA the Republic of Korea and Singapore) explore how to develop adaptive regulation for new pharmaceuticals, which enables a fast-track approval for market introduction, but includes long-term monitoring of impacts. This is regarded as a flexible and adaptive way to regulate in the absence of full scientific knowledge. In order to achieve this, creativity in re-thinking regulation is critical.* [6]
Key to success: *providing incentives for institutional change.*

- **Communication to build a constructive discussion about risks (9)**

Effective communication helps share information and foster dialogue but is also recognised for its capacity to change institutional and individual behaviours. Communication is a normal business for any government, but communication of risk is a "risky business" for governments as various actors with differing expectations and interpretations often complicate the dialogue.

Communicating that it is important to deal with emerging threats before it is too late or too costly, is one important component of every successful emerging risk management strategy. This implies, initially, recognition by governing bodies of a problem of national significance that needs to be addressed. Whether a government is dealing with an existential matter such as an increased risk of flooding in the Netherlands or a concern about how to provide sufficient care for elderly people in an ageing country, such recognition is crucial to moving forward.

Example: *in the case of the fight against antimicrobial resistance from animal growth promoters, the Danish Government invested many resources in communicating about the emerging threat.* [7] *This involved:*

- *Communicating about uncertainty to enable full engagement with the stakeholders who participated in the dialogue. This also required managing the related risk that some stakeholders may try to impose their preferences above those of others.*
- *Communicating about trade-offs to enable full and open discussion of these trade-offs. This also forced the actors to pay attention to the secondary consequences including that some stakeholders may be disadvantaged.*
- *Communicating about risk taking and sharing. This made stakeholders understand that governments cannot always be the ultimate risk bearer.*
- *Communicating about strategy to make it possible for the risk management of antimicrobial resistance to be "brought up" to the policy level, which is the level that technical risk managers need to reach. This enabled effective decisions to be made with regard to prioritisation, resource allocation and overall government and policy support for decisions. This highlighted that risk management is often a political matter and that some decisions may be taken on the basis of political priorities rather than technical considerations.*

Key to success: *planning, preparing and testing in advance.*

3. Assigning risk ownership ("home") for emerging issues

Because it is difficult to establish who is accountable for a problem or a risk which has not yet materialised, it may be relevant to establish a place (an institution, a committee or a process) whose role is to scan for potential emerging issues and conduct early assessment as soon as an issue is identified. When the issue is sufficiently assessed, and prioritised (versus other issues) it is transferred to another existing institution with established processes for dealing with it proactively.

There are various institutional ways of assigning risk ownership for emerging threats. In some countries, there is the general belief that governmental agencies are well equipped to manage new risks that affect the public or large parts of the population. For example, we assume that this explains in part how the Government of Denmark was able to impose a ban on the use of antibiotics as growth promoters in animal feeding, despite obvious initial opposition from farmers, veterinarians and other interested parties (see endnote 2). In some countries, however, people have learned to accept a higher level of personal risk and address it individually or on a shared basis with their neighbours.

- **The need to ascertain accountability (2)**

It is only when institutions and individuals are made accountable that risks can eventually be managed, especially when the risk is not sufficiently familiar or developed. Ascertaining accountability can lead to the establishment of risk ownership, and risk managers can be rewarded for their effective actions.

Example: *because of economic constraints, much public infrastructure is ageing and risk of failure is increasing. In complex and interconnected systems the risk of cascading failures represents an emerging risk to actors who may be far away from the source of the risk. It is often difficult to identify the exact causes of failures and therefore to assign accountability. Providing incentives and rewards is a good practice and driver for success. It can be surprising to see that, in such cases, issues which otherwise would require heavy investment or maintenance costs, may be addressed by improving the human factor, i.e. individuals being rewarded to pay more attention to effective risk prevention and infrastructure maintenance.* [8]
Key to success: *separating accountability and liability, providing incentives.*

- **The need to prioritise issues among the many uncertainties, potential opportunities and threats (6)**

Governments cannot address all potential threats. They routinely select those threats whose impact may affect them or their citizens most negatively. They have to develop criteria and indicators (that may indicate important thresholds) and other tools and processes for determining when a potential threat becomes serious enough to become the focus of attention and require risk avoidance or reduction measures.

Example: *international food supply chains are subject to many possible disruptions to either food safety (quality issues) or food supply (availability and affordability issues). Individual consumers, private actors (e.g. food processors and distributors) and public sector institutions (governments which design food security and safety policies and controlling agencies) routinely make trade-offs between the many benefits and risks. Risks are prioritised according to specific interests, which are context dependent. Analysis of the case of food supply chains provides an interesting example of how governments prioritise benefits and risks according to objectives.* [9]
Key to success: *focus on impact and vulnerability.*

4. Determining appropriate timing

Finally, time is a critical issue for proactive risk management. Intervention too early may not be appropriate or possible, but too late may no longer be effective.

- **Determining when it is time to act (7)**

Doing things at the right time often determines whether an action will be effective, cost efficient or not. Today it is commonly recognised that the design and implementation of early warning systems, the monitoring of early warning signals and the use of relevant criteria for evaluating the meaning of the signals provided are very useful tools to guide risk managers about when it is time to act. Such systems can provide valuable data and information about how an emerging or potential threat develops, the context in which it evolves, the presence of negative feedback effects which would tend to attenuate the threat, or of positive feedback effects which would exacerbate the threat.

Examples: *several of the above mentioned cases illustrate that, in the absence of sufficient knowledge, timing is crucial for determining risk management options at various stages of the development of the risk. Often, it is the occurrence of a specific event, such as a crisis, that triggers the possibility of action. For example, "mad cow" disease eventually led to the creation of the European Food Safety Authority to deal with the changing nature of food safety issues. In the case of fighting antimicrobial resistance in Denmark it was the publication of scientific knowledge that triggered the initiative from the government.*
Key to success: *prepare in advance agreed intervention points as the emerging risk develops.*

Appendix: The challenge of emerging risk management in the public sector

1. Can conventional risk management approaches be used to manage emerging risks?

In theory, governments that have adopted systematic risk management approaches (to risks of any kind) have done so to enable their stakeholders to exploit the opportunities, and minimise the risks, presented by changing context conditions. In practice, governmental risk management has focused on the downside risks, and on the need to devote resources in the near to medium term to mitigate risks and their impacts in a proportionate way.

Reasons for this "precautionary" approach to risk management have included:

- Failure to anticipate or predict new risks and disasters, and a resultant loss of faith in predictions and threat assessments;
- Even where risks and crises have been predicted, failure to anticipate their full outcome in terms of impact on society and the economy, and a need to understand the possible impacts of future events;
- Concern that the accelerating pace of change in science and technology, and the greater connectedness of the world (its economy, communications and infrastructure), will make further failures more likely and their consequences more serious;
- Concern also that a political climate increasingly marked by intolerance of failure to foresee crises, and declining trust in all institutions, especially government, will amplify any failures by government to manage the emerging risks; and
- A need – particularly acute since the financial crisis of 2008 – to use risk management for its traditional purpose: to optimally allocate scarce resources.

Key characteristics of these new risk governance systems are greater openness, attention to evidence, and greater rigour in devising policy approaches to the treatment of risk. So, for example, the United Kingdom's approach over the past decade[10], of increasingly using risk assessment to drive policy planning for national resilience planning, and more recently to inform the national security strategy and the national climate change adaptation plan, encompasses:

- Attempts to allocate and clarify responsibility for owning and managing elements of risk, catalogued systematically and open to public view[11];
- A systematic process of learning from policy failures arising from a failure to identify or correctly assess risks; embedding consideration of risk in core decision-making processes; an enhanced capacity to identify and handle strategic risks, with improved horizon scanning, resilience building, contingency planning and crisis management; and
- Improved risk communication, political and senior official/professional leadership and clear objectives to enable confident decision-making on risk and innovation.

2. What additional challenges do emerging risks pose to these kinds of approaches?

Many emerging risks, because of the uncertainty of the science about them, their complexity and their interconnection with other risks and systems, and of the many conflicts of interest about them, could pose a serious threat to our societies and our world, as illustrated by the following, non-comprehensive, list of examples from widely different sectors of society and nature:

- Evolution of antibiotic-resistant strains of bacteria and multi-drug resistant "superbugs";
- Cascading risks due to failures of ageing infrastructure;
- Risks of food insecurity due to disruptions in food supply chains;
- Risks of intentional or unintentional release of dangerous pathogens from new developments in synthetic biology;
- Increasing income disparities at national and global levels and consequences on societal stability;
- Demographic imbalances;
- Unsustainable national debts;
- Fragmentation of habitats leading to loss of biodiversity and focus on monoculture agriculture with the potential for large crop losses through disease; and
- Over-extraction of deep aquifers leading to loss of water resource and salination of land.

Some of these risks are, in principle, covered by the national risk assessments developed by certain governments (e.g. the Netherlands, Norway, UK, USA) to prioritise planning for the crises that may result. But the risk assessment models used by these governments have tended to focus on nearer term risks and, in particular, on the more politically "neutral" external threats to national security interests. So, although they provide an essential basis for effective risk governance of emerging risks, they have still some way to go before they are up to the task of identifying and weighing longer term, emerging risks. Scientific understanding of such risks can inform policy, but cannot be used alone to manage emerging risks.

The problems that societies and governments face in establishing and implementing general principles by which risks can realistically be handled are of four types: identification and assessment of the risk; information overload; long-term governance and management of the processes; and risk communication. The nine points proposed in this note can trigger the development of solutions to help deal with these problems.

Problems in identification and assessment of emerging risks

- Many risks have multiple causes. It is not always easy, or even possible, to identify and prioritise these, especially since they often interact with and affect each other in complex ways that involve multiple feedback loops. For example, the effect of an ageing population on public debt (pensions, health costs, etc.) may seem to be predictable, but both pensions and health expenditure can affect fiscal and social decisions in other areas.
- Complex risks may have complex consequences, which need to be understood to build resilience. Analysing the possible consequences of emerging risks often means understanding the evolution of the relevant complex adaptive networks – a science that is developing rapidly, although much progress remains to be made.
- The uncertainty attaching to changes taking place over decades needs to be characterised in ways that can aid policymaking. Policymakers value the use of scenarios to illustrate possible outcomes (best, worst and most likely) of a risk materialising, and advice on what signs to

look out for that will provide strategic warning of change, more than spurious accuracy or embellishment of the possibilities.

Problem of information overload

- Digital connections have made everything seem "knowable" and "manageable" because it is routed through smart networks. But public decision-making has not really changed; with the result that bottlenecks in the political decision-making process may cause frustration. The problem now facing policymakers is new – how to make sense of so much information, much of which is in the public domain. The pressures to act are not only driven by rational scientific analysis, but to a large extent by multiple interest groups who have vested interests in no action or little action being taken by government.

Problems in governance and management of emerging risks

- People are more familiar with linear thinking (a change in A causes a proportional change in B) than with non-linear thinking (many effects are both disproportionate and non-additive) and also systemic thinking (A, B, C, D and E interact with each other in a complex, non-linear way, so policies are needed that address changes and disproportionate effects in the system as a whole, rather than adopting a piecemeal approach).
- The tendency to discount costs ("richer societies of the future will pay to deal with the problem") may trigger the emergence of risks from developments that confer short-term benefits on stakeholders who therefore have a vested interest in maintenance of the status quo.
- Many people extend the (discredited) principle of the "balance of nature" – that systems which are disturbed will tend to return to their initial state by "natural" processes if they are just left to themselves – to encompass the assumption that man-made disturbances are likely to be resolved by new scientific discoveries or unexpected creative solutions. This belief is reinforced by the fact that many societies and natural systems can be surprisingly resilient. History has often shown, though, that such resilience is not to be relied upon, and that the "safety margins" we rely upon may be illusory. To give one example, the effect of industrially produced carbon dioxide on global temperatures was predicted by the Swedish chemist Svante Arrhenius in 1896, but his predictions were neglected for a century because of the underlying belief that new scientific discoveries were bound to solve the problem.
- The "cause(s)" of new risks, and their consequences, may not be universally perceived as negative (industrialisation and its many benefits provide a classic example). Change may produce benefits for some, but difficulties for others. When some segments of society are unpopular or marginalised the problem for socially responsible policymakers is particularly serious.
- Even where the long-term negative consequences are recognised, policy objectives may differ between key actors; this is a particular problem for global risks where actions to cope with emerging risks may conflict with established political and/or economic interests.
- Identifying owners and stakeholders. Particularly for those risks with an international dimension, a key ingredient for risk management – that someone can be found with responsibility for managing the risk – may be absent.
- Multiple ownership. Addressing the "cause" of an emerging risk may be seen as being only partly within, or completely outside, the legitimate mandate of government, and may require the reform of political/administrative structures, especially at the international level.

- Effort may be needed over an excessively long period of time, with action to resolve immediate/familiar problems being seen as more important. The political incentive /recognition/reward for averting what may be seen as a hypothetical catastrophe is low, and shifting policy interests may inhibit consistent long-term treatment of risk.

Problems in risk communication

- Getting society in general, and policymakers in particular, to understand that the potential for emerging risks is an intrinsic feature of all evolving economies and societies, and not usually a consequence of some external force that can conveniently be blamed for their occurrence.
- Getting a public exposed to too many predictions of catastrophe in different arenas may lead to “risk fatigue”.
- Some scientists involved with risk prediction are all too easily susceptible to hubris, and to focusing on extreme possibilities in an effort to get their message across. As a consequence, scientists are often seen by politicians as just another pressure group, and their messages may be discounted on this basis.
- Following on the above, a major problem is that of getting policymakers, media and scientists to discuss in objective and suitably qualified terms long-term emerging risks. The media, in particular, have a vital role to play in transmitting accurate information and influencing opinions and behaviours.

3. Objectives for emerging risks governance

With these challenges, what are governments and societies going to want out of the risk governance process? Given the uncertainty, and that it increases markedly into the future, policymakers want something that will enable them to:

1. **Estimate where and how to hedge against the long-term risks**. This means identifying the top strategic risks in terms of plausible (even if remote or extreme) outcomes affecting key stakeholder groups (populations, businesses) or the environment. Over time, it means having a greater understanding and quantification of the kinds of impact that may be felt if the risk materialises. These are necessary to inform planning for risk treatment, including risk mitigation and resilience strategies.

2. **Avoid significant adverse surprises**. This means having warning and indicators that the conditions may be present for critical transitions in time for anticipatory action to be taken. Given the uncertainties over the longer term, assessment of emerging risks, and the range of possible outcomes, policymakers need to understand how to recognise the symptoms that should provide a trigger for strategic contingency planning. They also need to create conditions for flexibility and adaptability.

3. Have a coherent basis for **information sharing and risk communication**, providing an essential basis for persuading people, if necessary, to forego short-term gains for longer term benefits which may in some cases accrue to successive generations and not to themselves.

4. **Trigger behavioural change** (institutional and individual)
   Behavioural change, involving changes in attitudes as well as actions, is probably necessary for dealing with many serious emerging risks. Exhortations, whether from scientists or policymakers, are not enough. What is needed is:
   - A clear agreement between scientists, policymakers and other interested parties about the risks and attitudinal changes that are needed; and
   - Clear policies (in the form of concrete actions, laws, incentives, subsidies and penalties) to make the changes possible. These policies need to be developed and introduced with openness and transparency from the start, and in conjunction with communication and education.

5. **Incentivise and reward accountability and leadership**
   Most emerging risks can only be addressed effectively if a substantial proportion of the community understands their importance and is prepared to take individual action towards a common cause. Such actions can be stimulated (especially in the early stages) by appropriate rewards and incentives, with appropriate encouragement and support for individuals to take leadership roles.

About this concept note

This concept note draws on several IRGC reports and workshops. It continues IRGC's work on risk emergence, and in particular, the following publications:

- *Risk Governance Deficits*
  http://irgc.org/wp-content/uploads/2012/04/IRGC_RiskGovernanceDeficits_PolicyBrief20101.pdf
- *The Emergence of Risks: Contributing Factors*
  http://irgc.org/wp-content/uploads/2012/04/irgc_ER_final_07jan_web.pdf
- *Improving the Management of Emerging Risks*
  http://irgc.org/wp-content/uploads/2012/04/irgc_er2conceptnote_2011.pdf
- *Public Sector Governance of Emerging Risks – a workshop report on hallmarks and drivers* (For a detailed analysis of the drivers of effective emerging risk management in the public sector, we recommend reading the full workshop report and the case studies it is based upon).
  http://www.irgc.org/risk-governance/improving-anticipation-of-and-early-response-to-emerging-risks/
- *Preparing for Future Catastrophes: government principles for slow-developing catastrophic risks that can have potentially catastrophic consequences*
  http://www.irgc.org/wp-content/uploads/2013/03/CN_Prep.-for-Future-Catastrophes_final_11March13.pdf

It builds on discussions at three workshops:

- In August 2011 on "slow-developing catastrophic risks", with scientists and policymakers who discussed the challenges of risks that evolve slowly but have the potential to cause a collapse of the systems they are part of. The management of this type of risks share certain similarities with emerging risks (http://www.irgc.org/event/irgc-workshop-on-slow-developing-catastrophic-risks-sdcr/).
- In March 2012 on what could help governments to better deal with emerging risks, with representatives of various governments (Canada, the Netherlands, Singapore, Switzerland and the UK)
- In September 2012 on hallmarks and drivers of emerging risk governance, with the same representatives of governments, plus the authors of six case studies cited throughout this note (http://www.irgc.org/event/public-sector-governance-of-emerging-risks/).

This workshop was led and facilitated by Prof. Ortwin Renn, member of the IRGC Scientific and Technical Council, Professor and Chair of Environmental Sociology and Technology Assessment, and Director of the Center for Interdisciplinary Risk and Innovation Studies (ZIRIUS) at the University of Stuttgart, Germany, and by Dr Michel Maila, member of the IRGC Advisory Board and President and CEO, the Global Risk Institute, Toronto.
IRGC is grateful to them for their contributions at the workshop.

Notes

1. See Public Sector Governance of Emerging Risk (http://www.irgc.org/risk-governance/improving-anticipation-of-and-early-response-to-emerging-risks/).

2. See *Combating the risk of antimicrobial resistance in animals for the benefit of human health in Denmark* (Peter R. Wielinga and Jørgen Schlundt, National Food Institute, Danish Technical University, 2012, available at: http://www.irgc.org/wp-content/uploads/2012/04/P.WielingaJ.Schlundt_AMR-Denmark-27Aug2012.pdf).

3. See for example:

- In the UK (Cabinet Office): *Risk: Improving government's capability to handle risk and uncertainty,* 2002 (http://webarchive.nationalarchives.gov.uk/+/http://www.cabinetoffice.gov.uk/media/cabinetoffice/strategy/assets/su%20risk%20summary.pdf).
- In the Netherlands: The Netherlands National Security Programme (2008): *National Risk Assessment Method Guide 2008* (http://link.springer.com/chapter/10.1007%2F978-3-642-04045-0_11#).
- In the US: US Department of Homeland Security, *The Strategic National Risk Assessment* (http://www.dhs.gov/strategic-national-risk-assessment-snra) and US Federal Emergency Planning Agency, *A Whole Community Approach to Emergency Management,* 2011, (http://www.fema.gov/whole-community).
- In Singapore: the Public Service Division of the Prime Minister's Office has developed a "whole-of-government" approach to risk management, with a particular emphasis on creating a "networked government" to develop collaborative risk management process to manage complexity and disruptive change (www.csf.sg).
  The Risk Assessment and Horizon Scanning (RAHS) programme was launched in 2004, as part of the National Security Coordination Secretariat (NSCS). The RAHS programme explores methods and tools that complement scenario planning in anticipating strategic issues with significant possible impact on Singapore (www.rahs.org.sg).
- *Disaster Risk Assessment and Risk Financing: A G20/OECD Methodological Framework* (http://www.oecd.org/gov/riskmanagement/G20disasterriskmanagement.pdf).

4. See https://www.oursgconversation.sg/ and *Risk Management in the Public Sector: The Interaction of Social and Economic Risk*, Darryl Jarvis, Johannes Loh, Tim Hilger, Lee Kuan Yew School of Public Policy, National University of Singapore, 2012, http://www.irgc.org/wp-content/uploads/2012/04/D.-Jarvis-J.-LohT.Hilger_economic-social-interaction_28Aug2012.pdf).

5. See "Proactive and adaptive governance of emerging risks, the case of DNA synthesis and synthetic biology", Kenneth A. Oye, Political Science and Engineering Systems Division, Massachusetts Institute of Technology (http://www.irgc.org/risk-governance/improving-anticipation-of-and-early-response-to-emerging-risks/case-studies/).

6. See "Proactive and adaptive governance of emerging risks, the case of DNA synthesis and synthetic biology", Kenneth A. Oye, Political Science and Engineering Systems Division, Massachusetts Institute of Technology (http://www.irgc.org/risk-governance/improving-anticipation-of-and-early-response-to-emerging-risks/case-studies/).

7. See "Combating the risk of antimicrobial resistance in animals for the benefit of human health in Denmark", Peter R. Wielinga and Jørgen Schlundt, National Food Institute, Danish Technical University (http://www.irgc.org/risk-governance/improving-anticipation-of-and-early-response-to-emerging-risks/case-studies/).

8. See "Managing the risk of aging infrastructure", Richard G. Little, The Price School of Public Policy, University of South California (http://www.irgc.org/risk-governance/improving-anticipation-of-and-early-response-to-emerging-risks/case-studies/).

9. See "Risk governance of food supply chains", Kees Burger and Jeroen Warner, Social Sciences Group, Wageningen University (http://www.irgc.org/risk-governance/improving-anticipation-of-and-early-response-to-emerging-risks/case-studies/).

10. See UK (Cabinet Office Strategy Unit): *Risk: Improving government's capability to handle risk and uncertainty,* 2002 (http://webarchive.nationalarchives.gov.uk/+/http://www.cabinetoffice.gov.uk/media/cabinetoffice/strategy/assets/su%20risk%20summary.pdf).

11. See UK (Cabinet Office): central government's guidance on the UK's arrangements for responding to and recovering from emergencies (https://www.gov.uk/government/publications/emergency-response-and-recovery).

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The International Risk Governance Council (IRGC) is a non-profit and independent foundation whose purpose is to help improve the understanding and governance of systemic risks that have impacts on human health and safety, on the environment, on the economy and on society at large. IRGC's mission includes developing concepts of risk governance, anticipating major risk issues, and providing risk governance policy advice for key decision-makers. To ensure the objectivity of its governance recommendations, IRGC draws upon international scientific knowledge and expertise from both the public and private sectors in order to develop fact-based risk governance recommendations for policymakers. IRGC operates as an independent think-tank with multidisciplinary expertise and can help bridge the gaps between science, technological development, policymakers and the public. IRGC acts as a catalyst for improvements in the design and implementation of risk governance strategies that can be effective in today's challenging governance environment.

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