



Report

# The Emergence of Risks: Contributing Factors

Executive Summary

The full report is available at  
[www.irgc.org/risk-governance/irgc-concept-of-contributing-factors-to-risk-emergence/](http://www.irgc.org/risk-governance/irgc-concept-of-contributing-factors-to-risk-emergence/)

# Preface

The International Risk Governance Council (IRGC) aims to support governments, business and other organisations and to foster public confidence in risk governance and in related decision-making by:

- reflecting different views and practices and providing independent, authoritative information;
- improving the understanding and assessment of important risk issues and any ambiguities involved;
- designing innovative, efficient and balanced governance strategies.

IRGC's mission includes developing concepts of risk governance, anticipating major risk issues, and providing risk governance recommendations for decision-makers who deal with policies and strategies involving risk issues.

At the core of IRGC's work is the concept and practice of **risk governance**, defined as the identification, assessment, management and communication of risks in a broad context. It includes the totality of actors, rules, conventions, processes and mechanisms concerned with how relevant risk information is collected, analysed and communicated, and how and by whom management decisions are taken and implemented.

Central to IRGC's approach to risk governance is its Risk Governance Framework, intended to help policymakers, regulators and risk managers in industry and elsewhere both understand the concept of risk governance and apply it to their handling of risks. A detailed description of IRGC's Risk Governance Framework was published in IRGC's White Paper "Risk Governance – Towards an Integrative Approach" in 2005 [IRGC, 2005].

More recently, IRGC has endeavoured to identify commonly recurring "deficits" in risk governance. IRGC's report on Risk Governance Deficits [2009] is designed to foster better understanding of their causes and how they can be prevented or mitigated through improved assessment and management. The IRGC project on risk governance deficits was the entry point to this current IRGC project on emerging risks, of which the objective is not to develop a list of emerging risks, but, instead, to focus on their origins.

IRGC is concerned that important opportunities for social and economic development may be foregone through inadequate risk governance of emerging risks, which are often seen as peripheral, disturbing factors rather than issues that should be at the centre of attention. One valid reason for this is that decision-makers often find it very difficult to justify the allocation of scarce resources to an emerging risk when there are other, known risks that require better management – this is especially true when there are uncertainties surrounding the likelihood and consequences of an emerging risk. With this report, IRGC hopes to make this task easier by raising awareness about and improving the understanding of emerging, global risks and the sort of impacts that they can have on human health and safety, the environment, the economy and society at large. The perspective presented in this report builds on an earlier concept note<sup>1</sup> and will form the basis for IRGC's development of guidance for practitioners in business and the public sector, to help them overcome obstacles and improve their own capabilities for understanding, anticipating, and responding to emerging risks.

More information on IRGC's emerging risks project can be obtained by emailing [governance@irgc.org](mailto:governance@irgc.org)

(1) The IRGC concept note on emerging risks describes sources and drivers of risks, and the governance issues arising from how organisations and people deal with them [IRGC, 2010a].

# Executive summary

IRGC defines as “emerging” a risk that is new, or a familiar risk that becomes apparent in new or unfamiliar conditions. Of particular interest to IRGC are emerging risks of a systemic nature, which typically span more than one country, more than one economic sector, and may have effects across natural, technological and social systems. These risks may be relatively low in frequency, but they have broad ramifications for human health, safety and security, the environment, economic well-being and the fabric of societies.

With this report, IRGC aims to raise awareness among professionals about the fact that risks emerge from a common “fertile ground” that is cultivated by twelve generic “contributing factors”. IRGC defines and illustrates these factors in this report. The illustrations, which are drawn from real-world experience, trace how the contributing factors led new risks to emerge or be amplified at their early stages. For example, rising rates of obesity are offered as an illustration of an emerging risk that results from changing social dynamics and economic forces.

The twelve generic factors are not exclusively relevant to the systemic, emerging risks that are the focus of this report. On the contrary, some of them are relevant for all risks. However, IRGC has identified these factors as especially pertinent to emerging risks and assumes that an understanding of these factors will provide practitioners with insights to help anticipate these risks and better manage them at the early phase of their development.

This report is thus not concerned with identifying or predicting any specific emerging risks, but rather the focus is on the general origins of emerging risks. While IRGC believes it is crucial for practitioners to gather in-depth subject knowledge of each emerging risk they are faced with, there are nevertheless some useful, general lessons about the causes and control of emerging risks that can be drawn from historical experience.

IRGC treats the emergence of risks as a negative phenomenon, but we do not intend to deprecate the

importance of benefits, or the necessity of risk taking in society. Indeed, one of the central challenges in responding to emerging risks is how to achieve a wise balance between the opportunity for benefit and the downside possibilities.

The twelve factors presented in this report reflect the collective judgement of a wide range of international experts in risk analysis and management. These experts have drawn upon both the peer-reviewed scientific literature and their extensive professional experience in the field. The generic factors may be seen as contributing to the creation of fertile ground from which new risks can emerge (or be amplified), much in the same way as factors such as nutrients and minerals contribute to creating fertile ground for the germination of a seed (or, vice-versa, factors can attenuate the emergence of risks, just as a lack of nutrients can create unfertile ground). There may (or may not) be a single dominant seed that gives rise to the risk but there are often multiple contributing factors in the growth process.

IRGC’s twelve factors are all generic, in the sense that they are applicable across multiple domains, but, importantly for practitioners, under certain circumstances, some of them may be more controllable than others and are therefore ripe targets for risk management measures. While the origins of emerging risks often require a basic understanding of the physical and life sciences, several of the factors identified in this report have a psychological, social or economic dimension. In some cases the social science aspects, instead of affecting the likelihood or severity of an emerging risk, can help explain the neglect of a risk’s emergence by seemingly competent managers of organisations.

Before outlining the factors, it is useful to first situate them within the context of systems. In particular, we are interested in complex systems, which often give rise to the emergence of systemic risks. Complex systems may be defined, scientifically, as systems “composed of many parts that interact with and adapt to each other” [OECD, 2009a]; their often surprising

behaviour needs to be understood as a whole. IRGC has found that a systems perspective, which examines how a system's components relate to each other as well as to the larger system, sheds light on emerging risks. Multiple interacting system components are commonly involved in risk emergence and even multiple systems can be implicated (changes in one system can have ramifications for another system).

Complexity can encompass, or at least strongly influence, many of the twelve factors presented in this report. The behaviour of complex systems involves chance variation and is therefore often unpredictable and hard to control. Some traits common to complex systems, such as non-linearity or threshold behaviour, have the effect of increasing the unpredictability of the system's future behaviour and, as a result, make risk anticipation difficult. On the other hand, some traits such as adaptability and self-organisation may act to make risk emergence less likely, as they can confer on the system a coping capacity, allowing it to withstand some potentially destabilising perturbations.

The twelve factors described below should be considered with the above context in mind. These factors are not presented in any order of importance or impact (indeed, such an assessment could only be usefully made with a specific situation in mind).

### **Factor # 1: Scientific unknowns**

Dealing with emerging risks inevitably requires dealing with scientific unknowns. These unknowns, whether tractable or intractable, contribute to risks being unanticipated, unnoticed, and over- or underestimated.

### **Factor # 2: Loss of safety margins**

The level of connectivity in many of today's social and technical systems is greater than in the past and the interconnections are increasing. The pace at which these systems operate is becoming faster and many are operating under higher levels of stress. This can lead to tight-coupling of components within systems and to loss of safety margins – a loss of slack or buffering capacity that leaves systems more vulnerable to disruption and thus increases the likelihood that new risks will emerge

### **Factor # 3: Positive feedback**

Systems exhibiting positive feedback react by amplifying a change or perturbation that affects them. Positive feedback tends to be destabilising and can thus amplify the likelihood or consequences of an emerging risk.

### **Factor # 4: Varying susceptibilities to risk**

The consequences of an emerging risk may be different from one population to another. Geography, genetics, experience and wealth are just some of the possible contextual differences that create varying susceptibilities to risk.

### **Factor # 5: Conflicts about interests, values and science**

Public debates about emerging risks seldom witness a clear separation between science, values, and interests. The conflicts that result have the potential to contribute to fertile ground for risk emergence or amplification. For example, emerging risks may be amplified when efforts to assess them and take early management measures encounter opposition on the grounds of contested science or incompatible values.

### **Factor # 6: Social dynamics**

Social change can lead to potential harm. In other circumstances, it can attenuate potential harm. It is therefore important for risk managers to identify, analyse and understand changing social dynamics.

### **Factor # 7: Technological advances**

Risk may emerge when technological change is not accompanied by appropriate prior scientific investigations or post-release surveillance of the resulting public health, economic, ecological and societal impacts. Risks are further exacerbated when economic, policy or regulatory frameworks (institutions, structures and processes) are insufficient, yet technological innovation may be unduly retarded if such frameworks are overly stringent.

### **Factor # 8: Temporal complications**

A risk may emerge or be amplified if its time course makes detection difficult (e.g., the adverse effects

of the risk only become evident after a long period of time) or if the time course does not align with the time horizons of concern to analysts, managers and policymakers.

### Factor # 9: Communication

Risks may be complicated or amplified by untimely, incomplete, misleading or absent communication. Effective communication that is open and frank can help to build trust. In many cases, such communication can attenuate, or lead to better anticipation and management of, emerging risks.

### Factor # 10: Information asymmetries

Information asymmetries occur when some stakeholders hold key information about a risk that is not available to others. These asymmetries may be created intentionally or accidentally. In some cases, the maintenance of asymmetries can reduce risk, but in others, it can be the source of risk or the amplification of risk by creating mistrust and fostering non-cooperative behaviours.

### Factor # 11: Perverse incentives

Perverse incentives are those that induce counterproductive or undesirable behaviours, which lead to negative, unintended consequences. Such incentives may lead to the emergence of risks, either by fostering overly risk-prone behaviours or by discouraging risk prevention efforts.

### Factor # 12: Malicious motives and acts

Malicious motives give rise to emerging risks and therefore practitioners need to consider intentional as well as unintentional causes of risk. Malicious motives and acts are not new, but in a globalised world with highly interconnected infrastructures (e.g., trade agreements and information and communication systems) they can have much broader-reaching effects than in the past.

Responding to the challenge of emerging risks is not

easy. Heuristics and cognitive biases can affect how some of the contributing factors outlined in this report are perceived or dealt with by decision-makers.

Given the many different kinds of emerging risks and the wide range of potential responses by managers, it is not feasible to identify a creative management strategy that will be optimal – or even satisfactory – in all situations. But for emerging risks that arise from the behaviour of complex systems, there are certain elements of organisational capability that may prove to be particularly effective. Those elements include:

- Enhancing the capabilities for surveillance, data collection, knowledge development, scenario planning and formal uncertainty analysis;
- Developing an understanding of human behaviour and acknowledging that logic and traditional rationality are not the sole basis for human decision-making;
- Regularly and systematically reviewing decision-making and communication processes;
- Allowing for enough organisational flexibility and decentralisation to accommodate adaptation and innovation in response to changing situations and new indications of emerging risk;
- Building robustness, redundancies and, mainly, resilience as a strategy to combat uncertainties.

Establishing the capabilities described above at public and private organisations will not be easy. A strong case will need to be made for the necessary resources, and the strong case will require managers and leaders to acknowledge (often publicly) that their organisations are not prepared for emerging risks. Nor will a one-time change in capabilities create a sustainable solution. A new “risk culture” at organisations is necessary to optimally utilise the new capabilities. In the next phase of IRGC’s emerging risks project, which is following completion of this report, IRGC plans to supply guidance as to how private and public organisations can develop a professional risk culture. The ultimate goal is continuous improvement in how organisations anticipate and respond to emerging risks.



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