

# IRGC

International  
Risk and  
Governance  
Council

Proposal

January 2002

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# Executive Summary

This paper proposes the establishment of an International Risk and Governance Council (IRGC), a dynamic international not-for-profit organization that will serve the international community by improving access to scientific knowledge, elaborating guidelines to be agreed upon, providing a safe haven for multi-sectoral discussion and debate, and offering a unique platform for multi-disciplinary work on issues of risk governance and related decision-making.

Startling changes, as yet neither known nor predicted, will encompass the world in the twenty-first century. To a large extent they will be driven by extraordinary advances in basic sciences and applied technology, that risk management will find very hard to keep pace with. Policy decisions will be complex, major scientific uncertainties unavoidable and competition for finite resources inevitable. The range of options and difficulty of making satisfactory and acceptable trade-offs will be considerable. The current situation is anything but satisfactory. Today's decision-making is mainly based on short-term views and is not sufficiently oriented towards scientific facts but driven by emotional perceptions. Moreover, in many cases, decision makers use scientific facts as a "smokescreen". Disputes revolving around different assessments of risks, benefits and safety further exacerbate tensions between countries throughout the world. Experts, on the other hand, often act in a way that leads to loss of public confidence and social distrust; public authorities, which set regulatory frameworks in a centralised, top-down way, cause a similar effect. All in all, risk governance is in the most cases based on sectoral and disciplinary approaches and on classical local decision-making structures.

The IRGC's mission is to become a leading institution for compilation of knowledge and provi-

sion of tools in risk governance and to assist the public sector to improve the substantive as well as procedural quality of risk evaluation and risk management. The IRGC will be a source of independent, unified, authoritative and timely information on issues of risk governance. To that end, the IRGC will pursue activities in the three broad categories:

- *Category 1:* Collection and dissemination of analytical methods as well as best practices and lessons learned in risk evaluation and management techniques ("Best Practice Centre")
- *Category 2:* Provision of a platform for a multi-sectoral and multi-disciplinary dialogue on risk governance issues ("Forum Centre")
- *Category 3:* Forward-looking research studies on newly emerging risks and their implications, including scenario-planning ("Future Risk Centre")

The IRGC's work will promote an effective, efficient, and equitable allocation of resources for risk governance, will cover both man-made and natural risks and will benefit to both developed and developing countries. Taking advantage from its multi-sectoral and multi-disciplinary nature, IRGC's work will offer new perspectives on ways to balance the risks and benefits of alternative technologies and policies, especially where science is uncertain and value trade-offs are unavoidable. Methods of comparative risk analysis and risk-informed processes show promise but require valid scientific information, an appreciation of uncertainties, and explicit recognition of the roles for public values and ethical judgements.

The IRGC will not duplicate the work of existing organizations. Working with a small management office, the IRGC seeks to create an international network of risk governance institutions.

# Introduction

During its 1999 convention, the FORUM ENGELBERG, an annual international forum dedicated to the facilitation of a multi-disciplinary and multi-sectoral discussion, called for the establishment of a permanent international body to develop and advocate new approaches in international risk governance (see Appendix A). As governments and international organizations are increasingly challenged to respond to a constantly rising and oftentimes more complex and interlinked set of risk issues, such an international body could play an important role in bridging the gap between science, politics and society, as well as providing a forum for continuous discussion and work overcoming traditional borders.

To further develop this idea, a small high-level working group (HLWG) from various sectors, disciplines and countries was formed (see Appendix B), chaired by Professor Wolfgang Kröger of the Swiss Federal Institute of Technology Zurich. In four consecutive working group meetings, the present proposal for the “International Risk and Governance Council” (IRGC) has been developed. Its draft version had been circulated informally for peer comment and subjected –among others – to a broad discussion at a July 2000 international meeting in Washington, DC sponsored by the Society for Risk Analysis.

The end result of this two-year process is a bold initiative – to create the IRGC, a dynamic international not-for-profit organization that will serve the international community by improving access to scientific knowledge, elaborating tools and guidelines to be agreed upon, providing a safe haven for multi-sectoral discussion and debate, and offering a unique

platform for multi-disciplinary work on issues of risk governance. The IRGC will not duplicate already ongoing efforts – rather, it will adopt a network structure with a multitude of nodes and connections across all sectors, disciplines and continents and a comparatively small operating structure. It will offer a unique place to bring together scientists, politicians, business people and civil activists in a comprehensive approach to risk governance.

This prospectus is structured as follows. First, it briefly sketches the overall background against which the idea for the IRGC has developed, illuminating the very foundation and basis for the vision and mission of the IRGC. Second, the prospectus describes the mission and vision of the IRGC, clearly demonstrating the uniqueness of the Council as well as its strategic direction. The next chapter introduces some potential product and service lines the IRGC could offer in the future. While the eventual inventory of product and service lines will depend on the results of a pilot phase (to be implemented over the course of the next two to three years), this part develops some first ideas. The final chapter depicts one scenario for the future organizational structure of the IRGC.

This prospectus is work in progress. The HLWG is proud of the progress it has made over the last two eventful years, but it also recognizes that further work is necessary to turn this ambitious idea and bold proposal into reality. As current world events clearly demonstrate, the governance of risk, in whatever form and shape, needs urgent attention and, most of all, timely action.

# Problem Statement

Rapid advances in science and technology and increasing globalisation continue to fundamentally transform our environment. Policymakers around the world find themselves increasingly challenged to respond adequately to the (positive and negative) repercussions of scientific and technological revolutions. Scientific progress and technological innovation clearly are the engines of human advancement – but they also frequently generate new risks and challenges that increase the vulnerability of vital social, political, economic and cultural systems.

The Internet, for example, has become one of the driving forces behind the emergence of a global civil society, helping to advance cross-cultural understanding and giving those people a voice who have not been heard before. The Internet has also facilitated the growth of a new global electronic marketplace, increasing the efficiency of business-to-business transactions and providing consumers with access to a whole range of new products at (oftentimes) lower prices. At the same time, however, the Internet has opened a “Pandora’s Box” of new risks: The global processing of data has pushed concerns over data privacy protection on top of the agenda of European and U.S. policymakers. Identity-theft through the Internet, for example, is among the fastest-growing crimes. The Internet has also developed into a play-ground for money launderers using electronic payment systems to advance their illegal cause. Transnational criminal networks, including terrorist groups and organized crime, have discovered the Internet to be a congenial tool to improve their global business practice.

Or take the example of biotechnology. While our ability to genetically enhance food products

may well provide humanity with the long sought key to effectively fight hunger and starvation in the developing world, the associated risks of biotechnology may potentially undermine the very balance of our natural environment. A full assessment of the risks of genetically modifying food products is currently out of the range of our scientific capabilities. And yet, decisions need to be taken now whether or not to proceed with such new technologies.

The Internet and biotechnology are only two (though relatively new and prominent) issues on a continuously expanding agenda that policymakers find themselves confronted with. Further examples could be attacks against vital systems and risks arising from idleness and “laissez faire”. While certainly diverse in nature and different in magnitude, many of these risk issues are comparable to the extent that they generate geographically dispersed cross-national effects; that they are driven by high-speed technological innovation that continuously transforms the issue domain at hand; that they are addressed differently in different countries; and that issue domains are also linked through complex channels and feed-back effects, making it increasingly difficult to isolate and single out specific problems.

Along with “old” and “well-known” risks with, nevertheless, still unresolved problems and open issues, these new risks have created a new, rather complex environment, to which policymakers have difficulty in adapting. The geographic reach and accelerated pace of economic and social activity and the growing recognition of the daunting complexity of many risk issues have demonstrated the fact that policymakers and public institutions often simply lack the

information, knowledge, and tools to respond to such new challenges in a world characterized by globalisation.

Even at the most basic, technical level – the quantification of risk based on use of probabilistic and/or statistical methods – there are unexplained differences in technical practice at different organisations that require clarification and, where possible, harmonization by consensus building efforts. There is currently no organisation providing recommendations that promote an effective, economically efficient, and equitable allocation of resources for the management of risk. Nor do existing organisations act as a forward-looking body that anticipates the emergence of new risks and advocates appropriate research and preventive strategies. As a result, traditional approaches toward public risk assessment and management, sector and discipline oriented, deeply embedded in national and international public policymaking processes and combined with a lack of knowledge or with uncertainties in risk management, have highlighted a range of critical dilemmas:

**INEFFICIENCY** in risk management has turned into a serious predicament, as costly public policies, designed to alleviate alleged hazards, are frequently driven by emotional concerns, unsupported by readily available and proven scientific knowledge. Also, quite often disputes are based on conflicting assessments of risks, benefits and safety. Furthermore, preoccupation with a minor risk frequently distracts policy makers and the public from addressing far more important risk domains. Resources are also squandered disputing or analysing the existence of probable risks rather than preventing or reducing them.

**INCONSISTENCY** in risk management has become a crucial concern, as different technologies, generating equivalent levels of risk, are not being treated in a similar fashion by different national risk-management authorities. There is a need to foster consistency in how risks are analysed and resources are allocated for risk management, on a cross-national and cross-sectoral scale.

**UNFAIRNESS** in risk management has always been a serious and controversial issue, usually reflecting political-economic trade-offs and following electoral cycles. However, as many risks are now cross-national in nature, the distribution of risks and benefits has taken on a different quality. Unfairness in international risk management, an unequal distribution of risks and benefits, is a major source for international conflict and therefore requires adequate attention.

The **LACK OF TRANSPARENCY** in risk management has bred mistrust between policymakers and the broader public. Quite frequently, policy makers have used “scientific facts” as a smoke-screen for decisions that were in fact based on non-scientific considerations. At the same time, ambiguity and vagueness in risk management has also been a source for international disputes between states. There is an urgent need to make public decision-making processes more transparent, provide access for those stakeholder groups immediately affected by the issue at hand; and to find internationally acceptable norms and procedures for risk governance.

Inefficiency, inconsistency, unfairness, and lack of transparency undermine trust. Trust in experts, risk managers and the risk management process is difficult to establish, easy to lose in the face of criticism, and extremely

difficult to rebuild once lost. Unless risks are assessed and managed wisely, public trust in science and technology, as well as government and industry, will erode. Thus, to assure that an adequate level of knowledge is available and that an adequate safety philosophy is followed, there is a need for experimentation with new approaches to risk management that could successfully combine scientific expertise with careful consideration of public participation, transparency, and the role of values.

Such new approaches have to include the following features:

- Provision of a level of protection against risk that is widely recognized as acceptable, including assurance that no particular groups of people or natural resources are unduly exposed to risk;
- power to label, restrict or prohibit products or activities whose ratio of risks to benefits is undesirable, thereby fostering activities that contribute to sustainable development;
- opportunities for adequate participation by stakeholders who are affected by risk domains, overcoming old boundaries in responsibilities and decision-making (e.g. between governmental regulators and private industry);
- respect for the roles of both economic efficiency and fairness in the allocation of protection resources;
- a process of collective decision-making that promotes accountability and autonomy among individuals and organizations involved in risk-taking and risk-mitigation activities, and that avoids unnecessary delays and costs associated with policy indecision;
- competence to prevent public panic in the case of emergencies coupled with ability to facilitate rehabilitation after crises occur; and
- modes of decision-making that breed social trust based on public confidence that policy making reflects shared values such as respect for the natural environment and the value of technological innovation.

Clearly, these features go well beyond our traditional understandings of risk assessment and management. They give way to a new conception of risk governance as a comprehensive approach towards the assessment and management of risks in the era of globalisation. Governance refers here to the manifold ways and processes in which public and private actors coordinate their co-existence and interaction. As the Commission on Global Governance (1995: 5) has put it, "It is a continuing process through which conflict or diverse interests may be accommodated and co-operative action may be taken. It includes formal institutions and regimes empowered to enforce compliance, as well as informal arrangements that people and institutions either have agreed to or perceive to be in their interests". As such, the concept "risk governance" highlights the fact that a modern approach towards the effective assessment and management of risk (in addition to building bridges between science and politics) has to provide for effective and legitimate interest mediation across sectoral as well as national boundaries.

As yet there is no international body with the mission and capability to provide generic recommendations and guidelines and to share information on best practices in the assessment, management, and communication of risk. Policy makers throughout the world have implemented advances in risk analysis sporadically as well as inconsistently.

# Vision and Goals

Many critical decisions in the future will (have to) be increasingly science based. The development and application of methodologies for dealing with risks – although still too slow as compared to the advancement of technologies – is advancing with great speed and the time is ripe to use this source for a more effective integration of science in policy decisions. And while this is an exciting prospect for the future, it should also be clear that sciences can never provide answers free of uncertainties and subjective judgement. As a result, a more effective integration of science in public policymaking on risk (while certainly one of the key challenges) is not sufficient to effectively address the challenges of our age. The role of science is limited in principle and must be supplemented by e.g. social factors (“values”).

The notion of “risk governance”, as outlined in the previous section, is broader in nature. It encompasses the consideration of economics, alternatives, uncertainties, social concepts, culture and ethics in the assessment and management of risk domains. It is necessary not only to build a bridge between science and policy that permits the intelligent and early use of science within a framework of responsible public policy conclusions, but it is at the same time critical to establish a new pattern of risk governance that ensures broad multi-sectoral participation and multi-disciplinary dialogue. Furthermore, processes of science-based decision-making have to be sufficiently transparent to the public in order to garner credibility and trust. Presently, there is no institution that promotes such a comprehensive approach towards risk governance, fusing cutting edge capabilities in risk assessment and management with a strong multidisciplinary orientation and a multi-sectoral operating approach (see Appendix C).

The proposed IRGC is intended to fill this gap. The IRGC’s mission is to build a bridge between different technologies, to become a leading source for knowledge and tools in risk governance and to assist the public sector to improve the substantive as well as procedural quality of risk evaluation and risk management. The IRGC will be a source of independent, authoritative information on issues of risk governance. To that end, the IRGC will unfold activities in the three broad categories:

- *Category 1:* Collection and dissemination of analytical methods as well as best practices and lessons learned in risk evaluation and management techniques (“Best Practice Centre”)
- *Category 2:* Provision of a platform for a multi-sectoral and multi-disciplinary dialogue on risk governance issues (“Forum Centre”)
- *Category 3:* Forward-looking research studies on newly emerging risks and their implications, including scenario-planning (“Future Risk Centre”)

Within the framework of these three categories, more concrete product and service lines will be developed (see the following section of this prospectus).

In the technical arena (Category 1), the Council will compile, promote and disseminate appropriate risk-analytic methods, tools, data systems and develop generic guidelines, without, however, entering in the assessment of risks of individual technologies or activities. These contributions will be science-based, applicable to different risk sources, transparent with regard to scientific uncertainties, and clear about future research needs. With expertise from multiple sectors and disciplines, the Council will offer insight about how technical procedures

in one sector or discipline might be fruitfully adapted to another sector or discipline. Should lack of knowledge or data be identified, the IRGC will trigger related research activities to be carried out by specialised institutions.

In the governance arena (Category 2), the IRGC will promote a collaborative, problem-solving spirit among scientists, stakeholders and government officials through workshops and conferences on important risk governance issues. It will provide a “safe haven” and platform for open dialogue between the public, private, and civil society sectors. In addition, the IRGC itself will develop experience and evaluate practices for effective risk communication in different cultures and geographical regions. The IRGC will take care to avoid being a simple “debate club” or, at the other extreme, to make decisions about “risk creators”, but will rather elaborate recommendations and generic guidelines.

In addition to a focus on existing risks, the IRGC will act as a forward-looking body that anticipates the emergence of new risks and advocates appropriate research and preventive strategies (Category 3). In that capacity, the IRGC will serve as a monitor of underlying trends and developments, highlighting issues that require attention and assisting decision-makers in prioritising their agendas.

Overall, the IRGC’s work will promote an effective, efficient, and equitable allocation of resources for risk governance. Benefiting from its multisectoral and multi-disciplinary nature, the IRGC’s work will offer perspectives on ways to balance the risks and benefits of alternative technologies and policies, especially where science is uncertain and value tradeoffs are una-

voidable. Methods of comparative risk analysis and risk-informed processes show promise but require valid scientific information, an appreciation of uncertainties, and explicit recognition of the roles for public values and ethical judgments.

The Council’s role in the scientific and policy processes will be advisory. It is expected that the influence and credibility of the IRGC’s products and services will arise from the stature of the Council’s members, the quality of the Council’s staff, and the Council’s practice of reaching out to scientists, policymakers and stakeholders throughout the world.

The IRGC will be part of the international network of science, technology and public policy including governments, the private sector and NGOs and covering both developed and developing countries. Its work will be connected to the activities and use the products and standards of other international institutions through association by Commission members, exchange of information, co-operative projects, and institutional collaboration.



# Potential Products and Services

As outlined in the previous section, the IRGC's work will be structured within three broad categories that together manifest the Council's unique orientation and innovative approach. Over the course of the next two to three years, a set of pilot projects will be completed that will clarify a concrete set of potential product and service lines. During that pilot project period, the IRGC will also further scan its environment, identify potential partners, revise its operating structure and develop a sustainable funding strategy. Overall, as emphasized above, the IRGC strives not to duplicate existing efforts.

The IRGC is expected to deliver and promote 'action-oriented' knowledge packages on public risks and their appropriate risk governance policies. The following products and services will most likely form the core of the IRGC's activities:

- *Formulation of internationally accepted methods in risk governance:* Verification of scientifically sound methods, tools and basic data used in analysing, preventing and mitigating as well as safely managing public risks, which threaten the safety of the general public. This work will be performed in an intra- and cross-sectoral mode. It will be most useful for countries with limited resources and experience in dealing with public risks, such as many developing countries. The IRGC will prepare well-examined 'guidance' on "how-to-do" and "what-to-avoid", including crisis management techniques. The IRGC may also endorse certain "best practices" in order to provide guidance to decision makers (Category 1).
- *Improvement of economics of risk management:* Evaluation of the costs and benefits of investing or not investing in preventive measures related to public risks. The IRGC may suggest economically sound safety margins with respect to known and perceived public risks so that decision makers may take their stand with calculated and educated evaluation of options (Category 1).
- *Comparative assessment of risks using scientifically accepted methodologies:* Probabilistic risk and safety assessment methodologies are well established in professional practice. However, public understanding of those methodologies is less than satisfactory. The IRGC will foster a rigorous application of probabilistic risk assessment methodologies in evaluating risk factors and promote public comprehension of those methodologies. Further, the IRGC will foster the development and implementation of currently missing methodologies for characterisation of the problems and comparative risk assessment, including alternative decision frameworks. The IRGC will present the results of risk (safety) assessments to the public in understandable terms so that they can be reflected into the decision-making process of risk management (Category 1).

- *Systematic presentation of verified risk information:* Various researchers and professional organisations are collecting data and information on risks, respectively, and publish them for public information. The IRGC may scrutinise the scientific validity of such information and verify professionally accepted procedures in compiling the published data. If the data are considered important for reference, the IRGC may organise them into a proper and standardised format for subsequent use (Category 1).
- *Professional description of suggested public risks:* Over the past years, a constantly increasing number of natural as well as man-made risks have been addressed and emphasized by scientific communities, the private sector, the media or civil society organizations. Some of these risks are real and publicly accepted, whereas others still require scientific verification and adequate public recognition. The IRGC, in collaboration with representatives from relevant sectors, will review and ascertain the substance of those risks, which merit systematic response by the industrial, national and international bodies (Category 2).
- *Multisectoral international risk governance forums.* The IRGC, in collaboration with other relevant players, will organize discussion forums on selected number of risk issues to bring together all relevant stakeholders in a certain risk domain to foster constructive public debate and to build bridges for concrete action (Category 2).
- *Inventory of public risks and potential risk issues:* The IRGC may create an inventory of man-made risks and natural hazards. The inventory will include known comparative assessments of risks as well as their management techniques (Category 1) and will address risks that have not been subject to public concern so far but would be of increasing importance in the coming years (Category 3). Alternative decision frameworks (e.g., precautionary versus market-based) shall be described for the benefit of policy makers, with the objective of enhancing the considerations of effectiveness, economic efficiency, and equity in policy making.
- *Monitoring and forward looking activities:* There are national and international monitoring systems, which are put into practice. Such systems will increase and strengthen in the coming years. The IRGC may participate in such activities and render professional assistance to networks. If necessary, it may issue advanced notices so that the national and international communities can take immediate action (Category 3).

Some of the tools the IRGC may use to generate these product and service lines and to adequately communicate them to beneficiaries as well as the broader public may include:

- Cross-national comparative studies on best practice in risk assessment and management in a select number of issue areas; case study reports on specific issue areas (perhaps also cross-national comparisons)
- Online databases on risk assessment and management techniques
- Organization of multi-sectoral “Issue Round Tables” and multi-disciplinary workshops; reports on results from round table discussion process (independent guidelines, codes of conduct, etc.)
- Creation and support for Centres of Excellence (Comprehensive Risk Governance as overall framework, modelled on Santa Fe Institute for the Study of Complex Systems)
- Maintenance of network of organizations (public, private, not-for-profit) that are players in the field
- Maintenance of web sites monitoring emerging risks.

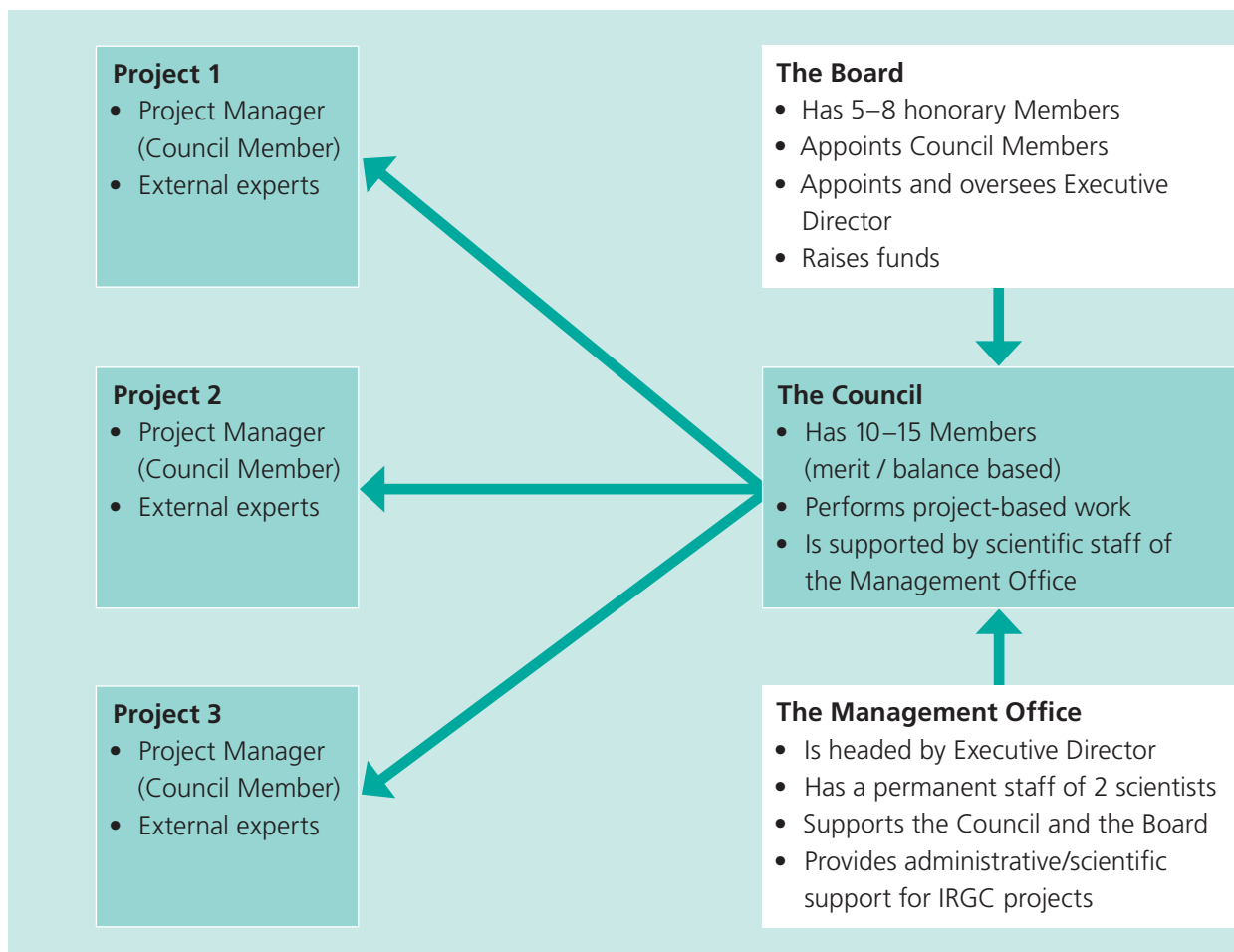
At this point, no definite decisions have been taken with regard to immediate focus areas or concrete outputs. However, first tasks that can be tackled during the pilot phase have been identified and briefly described (see Appendix D). The results of the pilot phase, as well as input from stakeholders and potential clients, will be instrumental to further refine these proposals and to develop a unique set of product and service lines for the IRGC that are best suited to effectuate the organization’s mission.

# Procedures and Organisational Strategy

The IRGC will work on a consensual basis. Draft product(s), developed by IRGC working groups or individual consultants acting on behalf of the IRGC, will be reviewed by the Council for final approval. The IRGC will issue the final product to the public or the beneficiaries only if the entire Council endorses it. If the IRGC cannot reach a consensus, the majority and minority views will be presented in the final documentation.

To prepare the initial drafts and continued maintenance of any documentation, the IRGC will maintain a small scientific secretariat. For all other projects, the IRGC will work with carefully selected consultants as well as partner organizations

The IRGC shall consist of a Board, the official Council members, as well as a small management office headed by an Executive Director (see Figure).



## The Council

Fundamental criteria for Council membership will be the stature/quality of the individual, balance, and ability to offer independent judgment. The Council will consist of 10–15 outstanding individuals and will be composed so as to ensure a range of different backgrounds and experience amongst the members. Typically the members will be drawn from scientific/technical communities, stakeholders (including business and not-profit organizations) and from individuals with high-level experience in government or international organizations. Since the reputation of the Council will be dependent on the competence and integrity of its members, they should be of the highest calibre. During the two-year pilot phase, a transparent and practical selection procedure will be developed in order to guarantee balanced membership.

The independence of the Council is integral to its effectiveness and credibility. New members are expected to disclose possible conflicts of interest. It is expected that members will be appointed for 3-year terms with one opportunity for re-appointment. The Council members elect their Chairman.

Council members, who will reside in different regions of the globe, will meet in person periodically (at least twice a year) but much of the work will need to be conducted electronically and with tele-video-conferencing. In-person meetings will be devoted to priority-setting and management issues. When a specific project is judged appropriate for the Council, the Chair of the Council will convene an appropriate subgroup of Council members to form a project team.

Financial support for the Council should be neutral in the sense that professional judgments of Council members are not influenced by funding entities. A diversity of multiple funding sources further enhances its independence, and thus the Council will obtain financial support from foundations, national and international governmental organizations, and private industry. Financial support will be provided either in unrestricted form, to support the Council's core activities, or in restricted form, to support specific projects.

### **The Board**

The Board, consisting of 5–8 outstanding public figures in honorary capacity, defines the profile of Council members, seeks proposals for nominees from scientific and professional societies, national and international agencies, stakeholder groups and the public, collects them and, finally, appoints the Council members. The Board also appoints the Executive Director and oversees his/her activities.

The Board is further responsible for fund raising. However, the power to set substantive project priorities and make scientific and policy judgments rests with the Council members.

### **Pilot phase**

Following the official implementation of the Council a pilot phase (2–3 years) will serve to receive feedback on some first tasks that will be tackled and, correspondingly, to more concretely define and optimise its operation mode. For this phase concrete milestones will be proposed, that will enable a continuous review of the Council's operation, quality and impact. At the end of the pilot phase, the scope, organisation and even the necessity of the existence of the council will have to be discussed.

For this pilot phase, an assured budget of about 6 million US\$ over three years is estimated to be necessary.

# Appendix

## Appendix A:

### Resolution from the 1999 Forum Engelberg

FORUM ENGELBERG was founded in 1989 as a non-profit autonomous organisation under Art. 60 of the Swiss Civil Code. The aim was to create an international platform for debate amongst illustrious specialists working in such diverse fields as science, technology, economics, philosophy, politics and culture, providing opportunities for them to exchange views and discuss key-issues affecting research and modern science which are of interest to the whole human race. The FORUM has international status and its aims are non-political, non-denominational and open to all cultures of the world.

The FORUM ENGELBERG '99 on "Risks and Safety of Technical Systems – In View of Pro-found Changes" was chaired by J.I. Vargas, former Minister of Science and Technology, Brazil, and presided by W. Kröger as expert of the scientific committee. In its course and through the rich information exchange between scientists and political leaders from different countries and fields, many new insights on a multitude of issues were gained. Among these it was recognized that technological developments are emerging at an even faster rate, are getting more complex and often imply global consequences. Subsequently, the gap between science and technology development on the one hand and "factual" risks and their perception by the public on the other hand is continuously widening. At the same time, the conference has shown sufficiently developed

interdisciplinary capacities (e.g., in the field of risk assessment) that international collaboration could help bridge these gaps.

It was, thus, concluded that there is an urgent need for an international body that would:

- review and further develop knowledge, skills and procedures dealing with risks and safety and trigger international projects;
- provide recommendations and guidance for decision makers;
- develop a concept for a global platform where science, technology, risk concepts and public policy can interact, and
- assume a role as mediator.

These insights were formalised in the following: *Resolution of the 10<sup>th</sup> FORUM ENGELBERG 1999*

Having taken into account that

- the limits of science are open and temporarily set by current knowledge only
- technological developments are emerging at an ever faster rate, are getting more complex, and will have impacts extending from local events to global consequences,

the 10<sup>th</sup> FORUM ENGELBERG also recognised that

- the gap between science, technological development, and the public is widening
- the interdisciplinary field of “risk and safety” has developed capacities that could help to bridge the aforementioned gaps.

It, therefore, has been recommended to and agreed upon by the participants of the 10<sup>th</sup> FORUM ENGELBERG to

- further develop knowledge and skills dealing with risk and safety
- develop a concept for a global platform where science, technology, risk concepts, and public policy can interact
- submit an action plan addressing these issues to the most appropriate international organization
- assume their role as mediators between science, technology, risk concepts, and the public.

## Appendix B:

### Members of the HLWG<sup>1</sup>

**Jenny Bacon**, Director General, Health and Safety Executive (HSE), UK,  
followed by

**Peter Graham**, Director, Strategy and Analytical Support Directorate, HSE, UK

**Adolf Birkhofer**, Professor TU München and Managing Director GRS mbH, Germany

**Simon Carroll**, GreenPeace International, The Netherlands

**KunMo Chung**, Professor, President of Hoseo University, South Korea

**Jacques Desarnauts**, Director, Product HSE Affairs, ATOFINA, France

**John D. Graham**, Director and Professor, Harvard Center for Risk Analysis, USA  
followed by

**Granger M. Morgan**, Professor, Carnegie Mellon University, USA

**Wolfgang Kröger**, Professor ETH Zürich and Member of the Directorate Paul Scherrer Institut, Switzerland

**Lewis Manning Muntzing**, International Nuclear Law Association, USA

**Junko Nakanishi**, Professor, Yokohama University, Japan  
followed by

**Saburo Ikeda**, Professor, University of Tsukuba, Japan

**Gail de Planque**, President, Strategy Matters Inc., USA

**Konstantin Foskolos**, Paul Scherrer Institut, Switzerland (Scientific Secretary)

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<sup>1</sup>Positions as of the time of appointment of the HLWG members

## Appendix C:

### Survey of Existing Risk-Related Organisations

Given the fragmentary approaches to risk analysis, management and governance throughout the world, the HLWG saw significant promise in a new international effort. The HLWG was therefore compelled to determine whether any existing organization is equipped to address the issues discussed under "Problem Statement". In light of those problems, it was concluded that any such organization would need to satisfy the following criteria:

- 1) International focus,
- 2) access to outstanding scientific and analytical capabilities,
- 3) appreciation for the roles of ethics and public sentiments in policy making,
- 4) participation by specialists from developing as well as developed countries,
- 5) independence from control by governmental authorities or particular stakeholders,
- 6) coverage of diverse risks in different sectors of the economy, and
- 7) the institutional stability/permanence to facilitate learning from different risk issues over time.

The HLWG asked two independent consultants to perform a survey of existing organizations: Synthesis Partners LLC in the USA and the Academy for Technology Assessment in Baden-Württemberg, Germany. The latter produced the following executive summary taking also the results of the former into account:

#### Executive Summary

For this research, information from following sources was collected:

- Internet pages from organisations, which are involved directly or indirectly in the field of risk analysis;
- Online-Journals dealing with aspects of risk analysis;
- Electronic Databases;
- Synthesis Partners LLC: A Review of Risk Analysis Organisations. Reston 2001.

Altogether scarcely 250 organisations in the USA, in Canada, in Europe (Germany, France, Great-Britain, other European Union countries) and in the major countries of East Asia (Japan, China, Thailand, Korea) were examined on the basis of their data accessible on the Internet. Information, which is not accessible in English, French or German, has not been considered. The analysed organisations work with risk analysis in very different application areas (e. g. finance, chemical industry, energy, environmental issues, health and medical services, nuclear industry) and technical disciplines (methodology and applications, organisation, software, risk management, etc.).

## Results

With regard to the requested criteria, the following statements can be made:

- **Coverage:** Only very few organisations cover a broad spectrum of spheres and sectors in the field of risk analysis. Usually, they focus on certain risks (such as pollution, atomic waste, etc.) or specific research areas (e. g. finance, chemical industry, environment, health, etc.).
- **Ethics:** The appreciation of ethics and public feelings during the risk analysis is reflected in the alternatively social or scientific character of each organisation. In fact these points play a rather minor role.
- **International Focus:** Most of the organisations analyse risks predominantly on the national sector. The integration of the international horizon depends on their clients, their superordinate institutions and the range of the analysed risks. Although the international perspective is implemented to different extents, the need to focus on an international approach is frequently stated. During the last years the number of international congresses on risk analysis has increased and there are also more efforts to improve worldwide networking among the organisations, for example by establishing international bodies (e.g. the "Global Association of Risk Professionals" or the World Commission on Dams).
- **Independence:** For the vast majority of the organisations an at least partial independence is to be granted, in particular university institutes as well as non-governmental organi-

sations and professional associations. However, no organisation corresponds to this criterion to full extent.

- **Institutional Stability:** Most of the evaluated organisations have an established status and are integrated in or affiliated to bigger research institutions, associations or the government. In addition, risk analysis as a scientific research method has been increasingly established on a political, social and economic level. Due to this, institutional stability of almost all organisations is rated "medium" or "strong".

The most significant deficits of the evaluated organisations could be identified in "Coverage", "International Focus" and "Global Participation".

### Further Results

- Nearly all organisations implementing programs in fields like natural hazards, health, security, finance, etc. also directly or indirectly deal with the analysis of risks. However, the participation in risk analysis is usually limited to the specific field of work or research and doesn't imply an interdisciplinary or cross-sector process.
- For most of the analysed organisations the development and advancement of methods, techniques and standards are one of their research related areas. However, these activities usually are limited to specific risks and specific sectors. More global and cross-sectoral research processes in the field of standards development for the discipline of risk

analysis are pursued only by a few organisations (e. g., “Standards Australia”, ILSI Risk Science Institute).

- In relation to other methods (e.g. cost-benefit analyses or traditional qualitative analyses) risk analysis gained significance in science and politics.
- At present, risk analysis plays a more important role in North America and Central Europe than in the states of East Asia. But in the last few years, the status of risk analysis in some countries of East Asia has improved considerably.

## Conclusions

- At present there is no organisation, which corresponds sufficiently to the claims pointed out of the IRGC.
- Both risk analysis and its subordinated disciplines are lacking consistent, standardised methods, guidelines and process cycles. Also the terminology of risk analysis is not uniform.
- Some of the organisations are working on the development of standards and harmonisation of methods and processes of risk analysis. However, there exists no council or institute, which coordinates these efforts and the harmonisation of different standards in a cross-disciplinary way.
- A global and interdisciplinary networking is desired by many organisations. A suitable platform for this does not exist so far.

## Appendix D:

### IRGC Preliminary Project Ideas

In preparing this prospectus, the working group elicited a variety of ideas for initial projects that the Council might undertake. The following short project descriptions provide illustrations of projects that have been suggested for the Council to undertake during its first years of operation.

Task 1:  
Strategies for  
Achieving Efficient  
Risk Informed  
Processes for  
Decision-Making

## 1. Risk Concern

Risks are today of major public concern. Important risk issues and public debates have emerged and proven significant during the last decades. Health consequences (e. g. from BSE and all kinds of radiation), the link between climatic impacts and global warming, the vulnerability of vital infrastructures and information systems by external attacks, the security of genetically modified food, the impact by substances released from large installations under accident conditions are only a few examples. Decisions making processes suffered from a loss of credibility and trust, and are often driven by crisis and public opinion.

Given these broad areas of risk concerns, the IRGC will focus in this potential work package on the technological risk cluster and aim at developing

### **Strategies for achieving efficient risk informed processes for decision-making.**

By concentrating on the human activities of designing and operating technical systems e. g. transport systems and fixed hazardous installations, a key segment of man -made technical risks will be covered. This is extremely important because accidental impacts in this sector are global, complex, may be irreversible over long periods of time, and evolve dynamically in public awareness and perception.

Technological disasters such as transportation accidents, fires and explosions have evolved rapidly in both scale and type since the early 1970s. Over the last decade have averaged 8.000 fatalities per year, and financial costs of about 70 billion US dollars per year [OECD].

## 2. Problem Statement

Aside from well-performed risk governance of specific issues in certain countries, the safety princi-

ples and the related decision-making process to design and to operate today's large-scale transport systems and fixed installations are often far from a global optimised process. Such a process would incorporate the "proper" level of risk in a framework that integrates the factors of benefits and consequences, thereby including costs, ethics, cultures and other factors.

In particular some of the risk management processes in the real world are

- inefficient, judged on the resources wasted during the decision-making process and often driven by public perception and risk aversion;
- unbalanced, judged on the relative weight of resources invested for risk precautions and mitigation;
- random, rather than based on a stringent and logically well structured decision-making process;
- unfair, based on the distribution of investment, risk and benefit;
- opaque, based on to the involvement of leading stakeholders and the lack of openness to the public concerned;
- reactive, rather than proactive based on the optimal time scale for successful actions;
- old fashioned, based on the current state of knowledge and best practices in both the analytical, scientific and the social approach.

Therefore, we advocate improvements toward a modern decision-making process, which incorporates the advantages of both the analytical, scientific and the social approaches, based on risk information.

Today's state of knowledge, techniques and tools allow us to extend the experiences and evidence of the past to a soundly based prognosis of the future system behaviour. Both, the consequences

and the related frequencies of undesired events can be estimated and presented as risk measures to all the involved stakeholders. Patterns of public risk perception and acceptance are sufficiently known and can be taken into account. Thus, by using risk information in a broader sense, modern decision-making can be turned from a reactive to a proactive approach.

Risk issues always deal with incomplete knowledge and uncertainties. In this task the transport systems and fixed hazardous installations, which are primarily considered possess a given degree of deterministic and statistical evidence and, therefore, the development of a new scheme for risk informed decision-making processes promises beneficial results.

One may observe large differences in the practice and status of the risk informed decision-making process in different countries. These differences show the need to improve the process by making it significantly more efficient and successful. This type of process is more or less legalised in some countries for specific technologies (e.g. for “Seveso” plants, and offshore plants) while in other countries the process is more or less ignored.

From this observation one can draw a simplified conclusion: the more “completely” the entire process is treated and executed in practice, the more efficiently and successfully decisions can be made. In this context completely means to follow all the important elements in decision-making in a comprehensive and logical way from risk policy making over assessment to control and risk management.

### 3. Vision for Improvements

Established decision-making processes in the hands of traditionally involved stakeholders are characterised by significant inertia and a strict ori-

entation on specific technologies. Therefore the required improvements proposed in this task need in general:

- **the long term and concerted activity of a powerful task force;**
- **the system under consideration, and**
- **consideration of the dynamic system behaviour in the global environment.**

The development of new approaches to risk related decision-making, which combine numerical and scientific insights and knowledge with careful consideration of public awareness, perceptions and values will turn the current situation toward “risk governance” in a proactive sense.

Experimentation with this new development must be performed in a manner that transcends national, sectoral and technical borders in this era of increasing globalisation. There is no longer a place for the so-called risk debate endlessly discussing whether the scientific or the social approach is more appropriate for decision-making; the key lies in the synthesis and synergy of both.

This task will focus on the establishment of general recommendations and specific guidelines for achieving improved processes for risk informed decision-making, based on a well-tailored framework adequate to the needs in the different technological areas.

The condensed and simplified principle of such an iterative risk informed decision-making process is shown in the following Figure:



Such a generic process is highly iterative, based on “learning by doing” and only powerful, if the entire framework process is understood as a “living” one, which dynamically follows the life cycle of the system or plant under consideration.

Obviously, in given decision-making cases for a specific technology the various elements in the framework process would have their own specific weight and constraints and, therefore, improvements on existing processes must always be well tailored and problem-oriented to this technology.

Finally, all the elements in this process have a system-specific and a procedural component. The development of guidelines in this task will be focused clearly on the latter.

#### 4. Transforming into Practice

The IRGC is aware that a fully generic framework process can only be a vision. The constraints and specific needs of various technologies require adequate tailoring. A tailoring matrix should first be developed to assess the severity of the problem and to screen out practical processes without compromising the global goal of IRGC to produce well balanced recommendations and guidelines for improvement of existing decision-making processes. Over doing – or under doing – could impact industry, economy and the society in an unjustified manner.

Finally, the tailoring process helps to identify promising strategies and to optimise the decision-making process with respect to the relative importance of the technical / scientific versus the social issues in a given case of interest.

#### 5. Conclusion

Considering today’s decision-making processes in the large technical risk cluster of man-made haz-

ardous systems like transport systems and fixed installations, the IRGC will concentrate their advisory and consulting activities in a first work package on the following issues, each in the sector considered:

- **Review and identification of given deficiencies** in decision-making processes observed;
- **Development of a tailoring matrix** for characterising the severity of the problem and screening out the most appropriate decision-making process;
- **Development of the structure and anatomy of generic risk informed decision-making processes** at approximately three different levels of scope and detail appropriate for a variety of decisions required for man-made risk concerns;
- **Application of a selected tailored approach** to the considered issues and visualisation of the deficiencies of the current process against a tailored and improved process;
- **Establishment of a communication concept** to clearly explain the potential improvements.

**Work products** of the generic advisory and consulting activities, including lessons learned in the course of this first work package, will be documented in “White Books” for public and dissemination to all stakeholders interested in achieving efficient risk informed processes for decision-making.

In conclusion it should be recalled that all the activities outlined above are driven by the vision of IRGC to bring synergistically together the analytical, scientific and the social approaches for an improved decision-making process for the existing and the emerging risks to human kind and the environment.

# Task 2: Learning from the Past to Better Manage Emerging Risks

## 1. Introduction

An early task envisaged for the International Risk and Governance Council is to review experience of new and emerging risks from around the world so as to provide advice and guidance to Governments, business and others on the practicalities of handling such risks.

Emerging risks pose particular challenges for Governments and business. The use of new technologies and scientific discoveries, changing practices in agriculture, medicine etc, global travel, the electronic global village all bring enormous benefits - but from time to time they produce new and unexpected risks. And at times these risks can challenge the prosperity or health of whole sections of the population; they can significantly effect the economic health of businesses or governments; and in some cases perceived failures in the handling of such risks can threaten government or business stability.

The early work that we envisage for the IRGC will not concentrate on identifying emerging risks as such. There is growing effort at government, business and international level being put into foresight work or horizon scanning which may or may not be successful in giving early warning of such risks. We suggest the IRGC should concentrate instead on what we can learn from the past about the practicalities of handling such risks when they emerge - as they undoubtedly will - and how governments, businesses and others involved in the management of such risks can use that experience to manage the risks and to maintain the trust of those who look to them for a lead in these matters.

## 2. Trust

For all responsible for managing risks - whether Governments, Regulators, Industry or whoever - trust is a key element. It has to be earned and maintained; and we can see from recent experience that once lost it takes time and effort to restore. Trust in the advice (and performance) of the regulator is essential if those at risk (and those managing risk) are to respond effectively to control regimes - and if they are to put risks in context. Trust in the duty holder - the business or whoever in charge of the risk - is also essential for those in the vicinity of industrial plant, for customers who use products etc, and indeed for the longer term health of the business.

A loss of trust affects not just government's or the regulator's ability to control effectively emerging risk; it can easily impact on confidence more generally - for example, in society's ability to develop, use and benefit from science and new technologies. Loss of trust for business can affect investment decisions, competitiveness etc. Trust and sound risk regulation are therefore important to protecting people, are important to maintaining modern society and are essential if there is to be future investment and the wealth and prosperity that new technological developments should bring to all.

### 3. Learning from Experience

History - even recent history - shows that we do not always manage new and emerging risks well. We need to learn from that experience - and there is sufficient experience to provide a wealth of learning. In recent years BSE, genetically modified foods, antibiotic resistance, decommissioning offshore installations and many more issues have illustrated how governments and businesses have had difficulty in managing risks of various orders.

The difficulties arise not only from failures to assess the risks properly but also failures in communication, in understanding societal concerns, in handling uncertainty and in dealing with a number of other factors. Frequently the „problem“ is more than just the physical manifestation of the risk; it can also involve for example understanding public perceptions and gaining the confidence of the public and other stakeholders. Indeed it is recognised now by many working in this area that an approach which solely involves analysing physical risks and deciding on measures is wholly inadequate where the risk issues include ethical or social aspects; any decision has to involve and take account of the perceptions of those who will be - or believe they will be - affected by the decision (or by any consequent activity stemming from that decision).

But to learn from experience, we still have to analyse and understand what has happened and why. Some recent risk incidents have been analysed at length - the BSE crisis in the UK for instance, or the differences in views on the safety of genetically modified food between Europe and the US. But where such issues are examined, that work tends to be either at the

national (or perhaps business) level or focussed on the particular area of concern; broader learning and application of the findings does not necessarily follow

### 4. Governance

What is clearly important is that any analysis has to look beyond the immediate risk. Because we are in an inter-dependent world where decisions in one country or sector can rapidly have implications elsewhere, the analysis needs to look especially at factors relevant to good governance at all levels nationally, regionally and globally; and governance involves seeking to understand and accommodate diverse views. A characteristic of much risk management is that those who create the risk are not necessarily those who bear the costs if the risk is realised and there is damage or harm. For example, major chemical plants create benefits for the population at large with the products they produce as well as profit for the business concerned and its shareholders; if control measures fail those who bear the immediate cost are those who live within the shadow of the plant. Such situations are regulated and the regulations should reflect principles of governance - but whether effective or not may well not be clear if and until the principles need to be applied in practice. And our impression is that such principles of governance are evolving and may well be expressed differently in different parts of the world and indeed even in the same parts of the world differently in different situations.

## 5. Factors for Consideration

Initial work by the Group preparing the proposal for the IRGC suggests there are a series of considerations that underpin the handling of these events and merit examination:

### (a) Science and Uncertainty

Although most people think science deals in certainties - the particles making up an atom, the orbits of the planets - the reality is that much science is uncertain. Some is uncertain because it is probabilistic – predicting the weather is a good case in point; but other is uncertain because scientists do not understand new phenomena or do not sufficiently understand the implications of new technologies or even the consequences of developing practices in areas that impact on significant numbers of people (for example, giving ruminant feed to cattle). But policy makers - be they in government or industry - cannot always wait for certainty. We need to be clear and transparent in dealing with scientific uncertainty and decision-making. So:

- how do we build in recognition of uncertainty into the commissioning and use of scientific advice.
- Given there is uncertainty and that science works by postulating and testing hypotheses, we need to avoid the risk of looking only for consensus. So how should divergent scientific views be handled?
- Politicians and businessmen prefer certainty, how should science and uncertainty be handled in the political or business process. [Too often recently, politicians have said I'll do what the scientists tell me - but in such deci-

sions, science is only part of the equation and dealing with uncertainty alongside social and moral concerns in a political decision].

- How should uncertainty be communicated to the public? [A lesson of the UK BSE crisis is that uncertainties must be communicated and that if necessary the public must have the information to make their own decisions].

In all this the IRGC can build on work already underway in various parts of the world. In the UK, for example, two Parliamentary Select Committees have addressed these questions.

### (b) Risk Concepts

The Precautionary Principle clearly links to uncertainty, for example when we do not know definitely whether X will result in harm but there are good grounds for suspicion; the Precautionary Principle in theory helps in deciding when to take precautionary action. The Precautionary Principle is not new. The Principle in one sense originated in Germany in the 1930s - the Vorsorgeprinzip - although it has recently been reformulated in the context of the Rio Earth Summit and in EU texts. In practice it goes back even earlier - the action which identified the sources of cholera in London in the mid 19th Century – mapping disease, noting it centred on a particular water pump, removing the handle of the pump while not understanding how the pump caused cholera - is an eminent example of action before there was scientific certainty.

But life is more complicated now. There need to be understandings on how the Precautionary Principle is used - in part to ensure an equity of approach and not to waste opportunities by

too rigid an application of the Precautionary Principle and not least because decisions involving use of the Precautionary Principle can be open to legal challenge at both the national and international level for example in the World Trade court.

The current reality is that there is a range of positions adopted by Governments. There are some situations where Governments acting as regulators, reflect the view and values of society and adopt a strong precautionary stance. But there are many situations where the prevailing societal view is near the „weak end“ of the precaution spectrum i.e. general presumptions are that:

- society wishes to secure the benefits of unfettered market led development and technological innovation,
- the state should interfere only to the minimum extent possible and on the basis of risk,
- intervention should be based on risk management.

So there is a need for more clarity on the different forms of the Precautionary Principle in use at present and the criteria being applied for their use. What can be learnt from that use? Can study improve understanding of how and when the Precautionary Principle should be used?

**Risk Transfer and Risk Trade-offs** All human activity involves risk. But those who create the risk (and benefit from the risk being taken) are not necessarily those who suffer if the risk is realised. And in some cases there have to

be trade-offs between different risks; for example between protecting the environment and protecting workers (part of the debate on the management of radioactive waste); or between different modes of transport (higher costs of rail safety affecting prices and causing increases in riskier road traffic).

Often the trade-offs or transfers are only recognised after the event; for example, the controls introduced in the UK to counter foot and mouth disease in cattle severely restricted access to the countryside with serious consequences for the leisure and tourism industries.

The IRGC can examine the frameworks used at present to control risk transfer and risk trade-offs - especially for new risks where there are uncertainties? And in particular it can look at the emerging lessons or thinking on risk transfer across boundaries; investment decisions made in one country can affect people in other countries.

This work could also look at approaches to compensation; how do those work across international boundaries. Bhopal is a case in point where the compensation for individuals affected by an appalling accident in a developing country bear no comparison with the compensation that would be available to those affected by an event of similar magnitude in the developed world.

### **(c) Stakeholders\the Public**

**Stakeholders Involvement** The public increasingly expect to be involved and consulted about decisions, which affect them. And where risk management is concerned there is growing acceptance that this helps promote trust in risk

decision-making. Process becomes transparent and there is sharing of knowledge and understanding. That may not always lead to agreement on the detail but acceptance that the process itself is basically honest can go a long way to getting acceptance of difficult decisions.

But how is this to be done in practice? How to identify the relevant stakeholders? - it is easy to miss the less vocal. How to engage them? Some will be more articulate or more able to cope with sophisticated approaches. What models are there across the world? And what does experience to date show.

And how to do this across international boundaries - increasingly the issue as projects themselves become more and more international as do their consequences.

**Public Concern** The public is not always rational about risk. They worry about relatively remote risks e.g. from civil nuclear power or remote diseases but ignore more immediate risks e.g. from smoking or driving without seat belts. Public reaction after an event such as a major accident can be such as to distort political and investment decisions – e.g. pressing to remove minimal risks which can then deny other investment addressing more significant risks.

Recent risk incidents (e.g. Brent Spar or Monsanto and genetically modified food) show how public concerns have been misjudged and with serious consequences. This illustrates the need to understand such social amplification of risk and its impact on decision-making. How far can such concerns be confronted and what is the right response in a democracy to unreasonable public demands for unnecessary risk control.

There is a wealth of scientific work and literature in this area – but practical distillation of the experience of governments and others to date is needed.

## 6. Conclusion

Risks are becoming increasingly international and so is the public reaction to risk. Risks can cross frontiers; reactions in one country quickly become internationalised. Less and less can businesses and governments handle risk analysis or risk control in isolation. And in any case trust which is essential for long term confidence in the use of new technologies in our society has to be earned on an international not a national basis.

An early task for the International Risk and Governance Council should be to review experience around the world in the handling of new and emerging risks with a view to developing a synthesis of such experience and possible guidance or advice on the handling of future events.

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