introduction

Science policy for risk governance

Rather than regarding risk governance as a burden, science should embrace it as an opportunity to build public trust

José Mariano Gago

Risk governance is a major challenge in the twenty-first century. Governments and regulatory authorities are required to deliver the best possible risk governance to society. However, in a globalized world, their performance is increasingly assessed at the international level by using the best scientific knowledge available. Companies face a renewed demand for social and public responsibility and must respond to stronger and more knowledgeable regulatory authorities and to demanding risk communication processes. Their risk governance also faces a problem of trust: society tends to trust science, but does not always trust companies or politicians.

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Society itself has to reassess how to share risks among its various stakeholders in view of the new dimension and nature of emerging risks. The future of the insurance industry in its current form will probably require that some new, large and mostly unpredictable risks are shared across society. To this end, risk sharing between government, companies and individuals is constantly being reassessed. Non-governmental bodies are also called on to have a greater role, given that their influence on the public perception of risks and risk governance is clearly increasing.

Science finds itself caught between its engagement in risk governance on the one

hand, and its role in the public perception of risk on the other hand. Its expertise and its capacity to share conclusions and doubts with society, honestly and without bias, are absolutely essential in building trust in risk governance. The professional integrity of researchers and the independence of academic institutions will therefore be an increasingly precious asset in democratic societies. We can even predict that the contribution of science to risk governance will become a new and important factor in shaping modern science and technology policies.

To understand this development and the challenges for science, we must take into account the fact that science is no longer in a 'steady state' or a widely accepted 'public good'. At least two factors contribute to this situation. First, the problem of increasing public deficits and the pressure for tax reductions in many countries have triggered a reassessment of the functions of the State and its relative expenditures for public services. The idea that public investment in science must increase is not at all obvious in many countries, particularly in view of budget constraints and increasing pressure from other sectors, such as security or health care. Second, the choice to study science and to embark on a scientific or technological career depends on, among other factors, the image of science in society and the importance that society attaches to scientific values and development. In many rich societies, these values are increasingly questioned and fewer students choose to study in scientific or technological fields. The growing problem of increasing human resources for science and technology is seen as a bottleneck for scientific development, particularly in Europe. It

requires a strengthening of the social constituency for science to address this issue effectively, as the choices by students and their families, as well as trends in science education, are deeply rooted in the social image of the role of science.

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However, the accepted social justifications for science are not only diverse but also controversial: utilitarian versus cultural, private versus public, basic versus applied research. Preliminary evidence from studies on youth motivation and attitude to science suggests that, to be supported by a larger constituency, science must be developed and perceived as an activity for the common good, as a provider of knowledge that needs to be shared by society at large. It also requires, of course, that the economic and political priorities for scientific development are clearly spelled out, that employment in the public and private sectors of science and technology (S&T) expands and that career prospects for S&T professions are improved. But these priorities cannot possibly emerge spontaneously from political or market objectives alone: they are defined and shaped by the deeper social factors that affect the public perception of science, the attractiveness of research careers, the role of science education and social trust in science. The idea that scientific development

provides not only new products and jobs, but also 'the truth' and a firm independent ground for societal regulation of private and potentially damaging interests is therefore important in creating a larger constituency for science and, consequently, to scientific development itself.

To convince a larger constituency of its need for development, science has to shape the very notion of time and progress. This requires more involvement of the scientific 'actors'—individuals as well as institutions—in societal debate. The networking of scientists and the general public will probably become one crucial component in performing and organizing science in the years to come and should therefore be addressed as an explicit science policy objective. Risk assessment and risk governance issues provide important opportunities in this respect and respond to a perceived societal need. To ignore these opportunities or to avoid addressing the need for independent knowledge and scientific advice on public controversies and democratic decision-making processes would mean suicide for science in modern societies.

We can expect that, even in countries that have benefited from rapid scientific development and have achieved large business investments in research and development, the attractiveness of science and technology will diminish if science policy does not urgently provide a stronger priority in basic science and in new employment opportunities. In these rich and successful S&T societies, reinforcing the credibility of independent regulatory bodies becomes essential. However, this cannot be achieved unless regulatory action is based on a strong network of independent research organizations that are perceived as credible and unbiased sources of competence. Science policy must therefore reinforce the independence and identity of scientific institutions, particularly in domains related to risk governance issues.

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Risk governance is both an opportunity and a challenge for science. On the one hand, the main challenge is to counter the allegation that it is itself a source of risks. On the other hand, the main opportunity for science is precisely that it can provide most of

the tools and the data needed for risk analysis and can therefore contribute effectively to the establishment of the platforms needed for decision-making in risk governance.

To address the accusation that it is a source of new risks, science must fight back. It has to reaffirm its role as a producer of knowledge. It must fight for its independence and, together with society, against the misuse of scientific knowledge. This requires a new involvement of the scientific players: the scientific institutions and the scientists themselves. Academic freedom, the organization of the scientific community as a partner for science policy-making, the interaction of scientists with the general public for the promotion of a scientific culture—namely in schools and science centres—should be improved. Institutional procedures aimed at strengthening their authoritative and independent expertise in areas related to public risks must be developed.

Independent international evaluation and cross-evaluation procedures are the key to the success of this strategy. Modern science is based on a culture of evaluation through international peer review, combined with various forms of sharing results and criticism. This institutional expertise of academic science is a major opportunity for society in the reform of the institutional framework for risk governance. An example can be found in the increasingly common practice of institutional evaluation of research organizations. We should recall that, with the exception of nuclear energy—which is overseen by the International Atomic Energy Agency—and to some extent civil aviation, none of the national bodies that are responsible for supervising the security of large infrastructures are subject to regular evaluation by independent foreign or international organizations. These evaluations should focus not only on procedures, but also on the actions that are performed. Evaluation reports should be public and should be published together with the response from the organization being evaluated. Only in exceptional circumstances should they be disclosed solely to governments or parliamentary commissions. International collaboration in evaluating the main risk-managing institutions should lead to the development of commonly accepted 'good practice' mechanisms and would certainly help to improve national organizations and foster greater trust. Collaboration in cross-evaluation could be extended to national regulatory bodies and to private

companies and should lead, ultimately, to better risk governance. I think that importing the culture of international institutional evaluation by peers from science policy into risk governance is a necessity and an opportunity that must be urgently grasped.

Science must address risk governance issues as new opportunities. It can provide the platform on which the private and the public sectors, companies, governments and individuals discuss how to share risks. In addressing major public risk issues, science can reaffirm its role as a trusted partner of society and thus enlarge its constituency. Risk issues are often very complex concepts that require scientific expertise in various fields and that force science to explore new problems. Multidisciplinary is imperative; the social sciences and humanities as well as informal sources of knowledge have to be combined with engineering and the natural sciences to develop useful decision-making tools. These are important contributions to the renewal of the research agendas in many areas and for scientific development itself; they are also a driving force behind the restructuring of scientific institutions and the establishment of multi-institutional research networks.

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Although the role of the scientist as an individual is crucial in building a shared platform of trust with society, economic, political and media competition can result in both real and fake experts being presented to the public as equal players. The media and politicians can also manipulate scientific controversy and the ego of many scientists to downgrade the unique value of science to society. It is therefore essential to strengthen the credibility of scientific institutions. This will require, in most cases, a reorganization of institutions to combine, in more appropriate ways, individual freedom and institutional responsibility. Competition among scientific institutions—namely, universities and research laboratories—to be recognized as trusted sources of independent expertise and as courageous players in the public arena in major risk issues is expected. Respected, independent organizations that help society

to assess the quality of expert knowledge and combine knowledge and practical decision-making experience into useful conclusions and advice will also be increasingly demanded. Trust will be assessed mainly at the global level. Globalization thus requires that the best expertise and the best possible norms at the global level are adopted at the local level and for each specific case. In this respect, the universality of science is an asset.

Our recent experience in launching a new international organization devoted to risk governance could be used as an example of how to achieve these goals. The International Risk Governance Council (IRGC; www.irgc.org) was legally established in Geneva, on the initiative of the Swiss government, after several years of preparatory work. Its board includes representatives from government, public research, private companies and international organizations from various parts of the world and different professional backgrounds. Switzerland, the USA, China, Swiss Re (a Zurich-based company devoted to risk management), Electricité de France, as well as the Organisation for Economic Co-operation and Development (OECD) and the European Commission are among the main stakeholders of the IRGC. The fundamental role of science has been incorporated in this new venture from the start: its worldwide scientific and technical council is at the heart of the organization, and its first projects rely heavily on sharing the best available scientific and technical expertise and knowledge about risk governance itself. Better risk governance requires this type of international platform, and we expect the IRGC to contribute to their emergence and to provide, at the global level, the tools and the recognition needed for the networking of science and decision-makers, and to contribute to a productive dialogue among public and private partners on risk sharing. Specific projects include: work on risk governance issues in the area of critical infrastructure networks—namely, the electricity grid—nanotechnology; and international comparative studies of risk governance strategies and policies. We hope to widen the scope of the IRGC's work in the near future, particularly in the area of biological research. We look forward to a close dialogue with major players in this field, particularly scientists.

Another area of focus could be the so-called 'precautionary principle' or 'precautionary strategy' and the emotions it triggers.

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Is it possible to add to the discussion a broader science-based analysis of the role and modalities of this principle in Europe and the USA, bearing in mind their distinct regulatory and legal frameworks and the specific function of litigation in the USA? We hope that such an informed dialogue may take place, as a common understanding of the purpose and means of precautionary strategies at the global level are crucial to the success of better risk governance policies.

For science to find its place in the new area of risk governance, it needs courage and vision. Short-term considerations by academic and research management on the 'risk' of irritating private donors or governmental bodies have to be put aside whenever breakthroughs in risk-related areas are possible through independent research. But the risk of premature overexposure to the media has to be contained as well. In many areas, results will be slow. But knowing that credible institutions have decided to shift some of their research agendas to address major public risk issues is in itself great news.

Science does not and cannot provide all the answers to risk governance problems. But it can raise questions that need to be addressed for understanding the constraints and consequences of choices. It can even provide some of the answers to these questions. And it may offer invaluable criticism of current strategies that are based on flawed evidence or imperfect or biased knowledge. Risk governance strategies are immersed in a network of conflicting and vested interests. Science can be used to protect private interests to the detriment of other, equally important, ones. This is certainly unavoidable but must be contained. Moreover, for the sake of the social credibility of science itself, science policy must guarantee that science is pursued in the interest of the general public and has the right conditions to operate. Regulatory systems have to rely on independent expertise and on the best scientific knowledge available. For this reason, regulatory bodies should become new players in the definition of science agendas and should engage in the debates on science policy.

Along with research organizations, governments, parliaments and companies have traditionally been involved in formulating science policy. At the national level, scientists, universities, professional bodies and non-governmental institutions are also part of the dense social fabric on which science policy is developed. This is not yet the case at the European level. Nevertheless, European scientists in societies, universities and research organizations have started to organize themselves. This emerging trend is probably the best news for science policy-making in Europe. The Initiative for Science in Europe (ISE; www.initiative-science-europe.org) was first developed as an instrument to provide the momentum to create the European Research Council and to reinforce the status and funding of basic science at the European Union level. We hope that it will develop into a new player in European science policy. This will of course require that the scientific community itself changes its traditionally reluctant attitude in respect to science policy and accepts a larger political role, one that society now requires from its scientists.

I would like to thank *EMBO reports* for this timely issue on risk. This collection of articles is an important contribution to the risk governance agenda and an inspiration for future work. Science in general and particularly the biological sciences have a major role in improving risk governance. At the same time, the public recognition and understanding of the role of science in risk governance contributes to the strengthening of the scientific culture in society and to a wider perception of the role and meaning of science itself.

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