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Report

Science advice: international co-operation of data and information during trans-national crises

Wednesday 6 – Friday 8 September 2017 | WP1564

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Wilton Park

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Background

The effective management of crises very often requires access to specialist scientific and technical advice. Recent crises such as the 2010 Icelandic Eyjafjallajökull volcano eruption, the 2011 Great East Japan earthquake, floods in central Europe in 2013, the West Africa Ebola outbreak and the Zika and microcephaly public health emergency have highlighted the special challenges associated with responding to events that have transnational impacts: the need to understand the scientific basis of decisions made by different countries and the need to improve the sharing of data and information.

The workshop was developed as part of an OECD project which is focused on the exchange of data and information and coordination of advice between national advisory systems and processes in major acute crisis situations.

Fifty participants from 20 countries and institutions, whose expertise included infectious diseases and environmental crises, explored a series of case studies of major international crises. These were discussed and analysed in relation to the following questions:

- What are the major challenges for sharing information internationally when responding to transnational crises? How to address these challenges?
- What mechanisms are appropriate for ensuring provision of scientific and technical advice to governments during transnational crises?
- How to ensure that science advice is based on good quality, up-to-date information?

The main focus of discussion was on the 'sense making' or situational analysis phase immediately before and after a crisis occurs when decisions have to be made rapidly in a complex and changing environment.

Key points

- The global risk landscape is evolving, and the effective management of crises often requires access to specialist scientific and technical advice. This needs to be based on a broad range of disciplines and consider other forms of relevant expertise.

"Scientists involved in providing advice to policy-makers require a broad skillset that goes beyond their specialised scientific knowledge"

- Scientists involved in providing advice to policy-makers require a broad skillset that goes beyond their specialised scientific knowledge. These additional skills need to be developed and recognised professionally.
- A broad range of stakeholders, including the private sector and civil society, need access to scientific advice in crises and can in turn provide valuable insight.
- International frameworks for collection and sharing of data and information provide the necessary institutional basis for transnational cooperation on scientific advice in crises. Alongside these, formal and informal networks are important to introduce flexibility and resilience.

"cooperation requires trust and understanding of different political, cultural and ethical perspectives"

- Such cooperation requires trust and understanding of different political, cultural and ethical perspectives. This can be fostered through joint exercises and by creating the right institutional environment.
- Effective crisis management and use of scientific advice requires extensive practice and exercises involving all relevant actors to ensure preparedness.
- Scientists can play multiple roles in the preparation and response to crises, including horizon scanning and modelling of risks and response strategies, real-time collection and interpretation of data, and the systematisation of relevant knowledge.
- Scientific insight is also important to evaluate crisis management and to ensure cross-sectoral learning of what has worked in different contexts.

Scientific advice in crises: rationale and challenges

1. The global risk landscape is evolving, and the effective management of crises often requires access to specialist scientific and technical advice. Globalisation, scientific and technological development, environmental, demographic and social changes all contribute to an increasingly complex landscape.

"Contemporary advanced economies rely on a complex and interconnected network of institutions and technological systems, such as communication and transport infrastructures, healthcare systems, global supply chains, and energy generation"

2. Contemporary advanced economies rely on a complex and interconnected network of institutions and technological systems, such as communication and transport infrastructures, healthcare systems, global supply chains, and energy generation. Such systems are vulnerable to disruptions caused by natural and man-made disasters, and their inherent complexity introduces further sources of risk in the form of catastrophic failure, that can lead, for example, to nuclear accidents. Increased interdependencies, both internally and externally, make contemporary societies particularly exposed to cascading risks, where the effects of a local crisis propagate and amplify transcending economic sectors and national boundaries. Natural disasters affecting production in one region, for example, can cause trade disruptions leading to food shortages and unrest elsewhere in the world.
3. Given the complex and interconnected nature of such systems, rigorous scientific and technical advice is essential to prepare for, respond to, and recover from crises. The interdependencies between the human, social, and technological components make the contribution of a broad range of disciplines necessary to fully address them. Advice in such situations will need to include not only perspectives from the natural and engineering sciences, but also from social, human, and behavioural sciences, as well as other forms of expertise such as management, process, and local expertise.

4. Recent crises such as the 2010 Icelandic Eyjafjallajökull volcano eruption, the 2011 Great East Japan earthquake, floods in central Europe in 2013, the West Africa Ebola outbreak and the Zika and microcephaly public health emergency have highlighted the special challenges associated with responding to events that have transnational impacts: the need to understand the scientific basis of decisions made by different countries and the need to improve the sharing of data and information.

5. During a crisis, decisions should be made balancing scientific information and evidence with political, economic and logistical considerations. On occasions, this can result in different decisions being made in different constituencies. For example, different national decisions on whether to evacuate citizens or cancel direct flights between two countries. Understanding the scientific advice that has fed into the decisions of countries can reveal key differences in what information and data has been considered and how, providing reassurance that decisions, albeit different, are being made based on adequate scientific analysis.

Scientists, experts and advisors

"Countries rely on different structures to ensure the provision of scientific expertise and advice to policymaking and crisis management"

6. Countries rely on different structures to ensure the provision of scientific expertise and advice to policymaking and crisis management. These include individual advisors, expert committees, specialised agencies, scientific academies, and others. The preferred mechanism will also vary between sectors. Researchers, scientists and technical experts working in academic, government, and private organisations can all provide valuable advice based on their knowledge and expertise.

"Political and diplomatic skills are also key requirements for experts advising in the context of transnational crises"

7. Given the broad range of advisory mechanisms, it is important to consider the differences between academic, private sector and policy cultures, their organisation, and their incentives and rewards structures. The characteristics of a good research scientist for example are not necessarily the same of an expert performing an advisory role, as the provision of effective advice requires not only a deep knowledge of the relevant issues but also a range of other skills. These include experience in dealing with the policy world, and an understanding of the reality of high-stakes decision making under pressure. Political and diplomatic skills are also key requirements for experts advising in the context of transnational crises, in order to understand and deal with the political and cultural realities of the countries involved.

8. Although such skills are not normally gained during traditional scientific training, they can be developed through specific training and exercises, and by fostering relationships between scientists, policymakers, and crisis managers in times of peace. Identifying and cultivating scientists who are interested in working at the science-policy interface can improve the human capital needed to prepare and respond to crises. Moreover, if leading researchers with cutting-edge scientific knowledge and skills are to be encouraged to engage with advisory roles, it is necessary to ensure that their contribution to policy is adequately recognised in academic settings.

"effective crisis management requires decisions-makers to have access to timely and reliable information, relevant technical expertise, and authoritative scientific advice"

9. Depending on the situation, effective crisis management requires decisions-makers to have access to timely and reliable information, relevant technical expertise, and authoritative scientific advice. These decision-makers include not only politicians, governmental bodies, and international organisations, but also private and third sector organisations, such as utility and transport companies, disaster relief charities, and the media. Moreover, these stakeholders can also be a source of valuable data, information, and knowledge, which needs to be combined with scientific expertise to ensure a complete picture. Discussion of the sharing of data, information, and scientific advice during transnational crises needs to consider the whole ecosystem of stakeholders involved.

"Social media allows rapid reach to a wide audience, including those that might otherwise be excluded from institutional communication channels"

10. Social media were identified as playing an important role in the context of scientific advice in crises, both as a communication channel and as a source of potentially valuable information. Social media allows rapid reach to a wide audience, including those that might otherwise be excluded from institutional communication channels, with

warnings and updates. As a source of information, these media can potentially offer a real-time monitoring channel, once appropriate analytical techniques have been developed.

"False or contradictory information can spread fast, generating confusion"

11. Yet, those same features that make social media a potentially powerful tool also introduce a novel range of problems. False or contradictory information can spread fast, generating confusion. As a source of information, social media require extra care and validation. The ambiguity intrinsic to the information derived from social media can be mitigated through triangulation with other sources, and can be itself a useful source of intelligence about the perception of a certain issue.

Capacity

"Cooperation is only as strong as the weakest link in the chain"

12. When the variety, scale and intensity of crises that can occur is considered, it is important to recognise that the scientific capacity of all countries is ultimately limited. The exchange of scientific information and advice internationally not only provides essential substantive material for better urgent decision making, but also powerfully extends finite resources by maximising shared capabilities. Cooperation is only as strong as the weakest link in the chain, and asymmetry of capacity weakens the whole process unless it is actively compensated for.

13. Scientific advice and information sharing during transnational crises requires an understanding of the capabilities of all those involved. This includes recognition of different countries' capacities to absorb and make effective use of scientific data and information. The internal political and governance structure of a country also needs to be considered. In societies with diffuse power structures for example, this might imply a need to operate outside formal government structures, for example, to involve local and/or religious leaders. The specific circumstances of crisis situations, in which decision-makers are likely to face intense pressure for their time and attention, should also be taken into account. Social and behavioural research can contribute to a better understanding of how scientific knowledge is received and acted upon by policymakers and other stakeholders in a given situation, which could in turn help to deliver more effective advice in crises. Coordination is important to ensure that recipients are not submerged with conflicting information, and that the advice reflects the actual requirements of the recipient country.

14. A country's capacity to make effective use of scientific advice can be developed by fostering its human capital and the technological and institutional infrastructure underpinning the translation of evidence into policy. Development of human capital can be achieved both through direct training, and through placement and secondment schemes with relevant bodies in more advanced countries and in international organisations. However, this needs to be done in a balanced way to avoid all of the country's most qualified human resources being posted abroad.

"diplomatic and scientific considerations need to go hand in hand to prevent antagonistic relationships"

15. The incentives and disincentives for all stakeholders involved in transnational cooperation and information exchange should also be considered. At the level of governments for example, authorities might be reluctant to acknowledge the existence or extent of a crisis in their own country,or to provide full access to relevant information, for fear of the economic and image consequences that the country might suffer. On the other hand, advice and support from more advanced countries needs to consider the best interest of the recipient countries, to prevent being perceived as self-serving. In such situations, diplomatic and scientific considerations need to go hand in hand to prevent antagonistic relationships.

"Crises that have transnational impacts increase the likelihood that multiple sources of conflicting scientific information will be delivered both to decision makers and the wider public."

"The effectiveness of scientific advice derives from its quality, authority and legitimacy."

"overly-standardising procedures risks undermining the local legitimacy of the advice or information provided"

"Trusted relationships are a key enabler for such co-operation, alongside formal frameworks and protocols"

"Trust cannot be mandated or stipulated"

"large scale real-time data collection and analysis can contribute to making sense of rapidly changing landscape"

Trust

16. Crises that have transnational impacts increase the likelihood that multiple sources of conflicting scientific information will be delivered both to decision makers and the wider public. This risks obscuring effective decision making and undermining public trust in advice issued from government and key institutions. The community of institutions that provide science advice must work to minimise this risk, and ensure that the necessary scientific debate can take place, while remaining consistent, authoritative and clear in their advice to decision makers.

17. The effectiveness of scientific advice derives from its quality, authority and legitimacy. Different countries have their own procedures to ensure these, which can be based for example on formal protocols, some form of peer review, the professional standing of the advisor(s), or a combination. These differences reflect and are deeply embedded in a country's political culture, and can at times lead to diverging assessments and misunderstandings that hinder transnational cooperation. However, overly-standardising procedures risks undermining the local legitimacy of the advice or information provided. Rather than forcing harmonisation, it is important to ensure compatibility by fostering mutual understanding of such differences and trust in the respective outcomes.

18. Effective co-operation in scientific advice and exchange of data and information during crises requires recognition of the need to understand and overcome the cultural differences between the stakeholders involved. Such differences exist not only between countries, but also between sectors, industries, disciplines, and even branches of the same organisation. This does not mean that practices should be homogeneous, but rather that differences should be acknowledged and ways found to work with them.

19. Trusted relationships are a key enabler for such co-operation, alongside formal frameworks and protocols. While formal instruments are fundamental to lay the institutional infrastructure for effective cooperation, these are not sufficient on their own, and might not be flexible enough to cope with unexpected situations. In the context of scientific advice, trust can take many forms, for example, trust between organisations, between advisors and decision makers, by the population in governments and experts, by researchers in data sharing protocols, trust in the data, and trust in media and social media.

20. Trust cannot be mandated or stipulated. Instead, trusted relationships can be fostered by creating an environment of confidence that promotes values such as transparency and cooperation, and by providing opportunities for stakeholders to work together, both at the individual and organisational level. Prolonged and iterative interaction, for example through joint exercises and training in times of peace, fosters familiarity and mutual understanding that can help overcome differences and build trusted relationship. These can also provide a mechanism to rebuild trust when it is weakened.

The multiple roles of science in crisis management

21. Scientific knowledge and advice can play several important roles in preparing and responding to crises, as well as in learning from them. During a crisis, reliable data is important both to immediately inform scientific assessment, and to support further modelling and research. Given the ever-evolving and non-linear nature of major crises, large scale real-time data collection and analysis can contribute to making sense of rapidly changing landscape. Real-time collection, analysis and interpretation of data during a crisis is an important task for scientists to perform, using their expertise and knowledge to distinguish between 'signal' and 'noise'.

22. Relevant data can be collected not only by researchers themselves through traditional channels, but also by citizens, media companies, and other private stakeholders. Industry stakeholders for example have access to a wealth of data about the systems they produce and run, as well as the expertise to understand them. Tapping into such

resources could be invaluable in assessing and responding to crises. Information sharing between public and private stakeholders, and between scientific experts and crisis managers can be encouraged by fostering the technological and institutional infrastructure to allow the collection, sharing, and use of such data. This implies the development for example, of adequate communication channels and trusted open data protocols. In order to encourage researchers to share their data, it is important also that the right incentives and safeguards are in place.

23. Scientists can also play an important role in foresighting and modelling cascading risks and their likely impacts, as well as the impact of potential responses. A separation of roles between those involved in the immediate response to a crisis, and those tasked with forecasting its consequences and evolution could help to ensure that these important functions are not sacrificed to the urgency of events.

"Effective crisis response requires extensive preparation"

24. Effective crisis response requires extensive preparation, and scientific advice can play an important role in ensuring that crisis management mechanisms are ready when needed. Scientific knowledge and research expertise is needed to perform horizon-scanning activities such as the identification and quantification of potential risks, the foresighting of potential impacts and their cascading effects, and the identification of prevention, mitigation, and response strategies.

25. Moreover, a previously accumulated and systematised knowledge base can prove invaluable in times of crisis. For example, existing modelling of the potential impact of a range of disasters and their implications can help prioritise response when they strike. It is therefore important for researchers, scientific advisors, and crisis managers to work closely together in quiet times to identify gaps in the existing knowledge and develop research strategies to address such gaps, as well as strategies to mobilise and share knowledge in times of need.

26. Crisis situations can also provide the setting for valuable research that would be impossible under normal circumstances, for example field trials that can only be carried out during an actual disease outbreak. This can provide useful knowledge to both deal with the immediate situation and prepare for future crises. In order to carry out such rapid response research, appropriate arrangements need to be developed in advance. For example the development of regional networks of analysis laboratories and the strengthening of field research capacity can improve preparedness to carry out both monitoring and research in crisis situations. Improved communication infrastructures are also important to allow such responsive research to take place. Rapid response funding mechanisms are necessary to finance necessary research at short notice.

27. Learning from past crises is key to improved responses, and scientific insight is important to systematically evaluate both crisis management in general, and the specific provision of scientific advice itself. Disciplines such as organisational psychology and behavioural sciences can provide important reflexive insights into how crises are managed and how scientific knowledge is mobilised in the process. For example, research into what made a certain crisis unexpected can help improve preparedness to future events.

"organisational psychology and behavioural sciences can provide important reflexive insights into how crises are managed"

28. Rigorous knowledge of what has worked in a specific context can provide useful lessons for both those involved and others, and facilitate learning across different sectors. Knowledge accumulated during a crisis and the lessons learned from it need to be systematised, preserved, and disseminated to allow mutual learning and improvements. This could be achieved by developing international knowledge networks and frameworks around these issues. Mutual learning can also be facilitated by sharing crisis management strategies and recovery plans among interdependent countries or those facing similar challenges.

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