1. Improving the use of science advice in international crises: Conclusions and recommendations

There are five key areas where policy action is necessary to improve the provision and use of science advice in international crises. Firstly, the appropriate structures and mechanisms to link scientific advisory mechanisms and crisis management need to be in place at the national level. Secondly, there is a need for clear communication and exchange across national boundaries and effective frameworks to facilitate this. Thirdly, there is a need to build trust between providers and users of scientific advice across national borders. Fourth, being prepared is crucial to crisis management and cross-sectoral and cross border cooperation is required to ensure this. Finally, communication with the public should, as far as possible be coordinated across countries.

1.1. Fostering domestic capacity for scientific advice in crises

Most OECD countries have scalable processes for crisis management and for the provision of scientific advice but this is not the case in all countries. Practical and operational procedures are important in order to integrate science advice into crisis management and there are opportunities for mutual learning between countries in this regard.

1.1.1. Recommendations

1. **Where not already present, national mechanisms for the provision of scientific advice in crises should be established, in particular for sense-making in complex and novel crises**. These should be designed to meet the needs of crisis managers and policy-makers during crises and build on existing institutional structures, providing ready access to a number of disciplinary perspectives. Processes for quality assurance and communication of scientific advice need to be integrated into these advisory mechanisms. Such mechanisms need to be maintained and tested during times of calm, which requires incentives, including dedicated funding, for participating scientists and responsible institution(s).
2. **Knowledge generated and lessons learned regarding scientific advice, during crises, including novel and complex events, need to be structured, recorded, systemised, preserved and disseminated** to allow mutual learning and improved use of scientific advice in crisis management. This is a shared responsibility for both the providers and users of such advice. *Ex post* evaluations of how particular crises were managed should include a specific focus on scientific advice.
3. **The international community should assist interested countries in developing their domestic systems for providing and utilising scientific advice in crises**. Such assistance can be built into existing international relations and mechanisms for international engagement, which can be adapted accordingly.

1.2. Enabling transnational scientific cooperation in crises: structures and frameworks

National crisis management structures collaborate to exchange information and coordinate responses during trans-national crises. In many cases this is facilitated by international organisations, such as the WHO, WMO or the EC, although the timing and extent of their involvement is very much context dependent. For scientific advice in trans-national crises most OECD countries depend primarily on their own domestic advisory mechanisms with the expectation that these will integrate the necessary international expertise and perspectives. In novel and/or complex crises the onus on including international expertise is increased and for many developing countries it is a necessity. Thus an understanding of how different national scientific advisory process work in crises, and identification of national contact points who can broker the exchange of scientific advice between countries, are essential for the effective generation of coherent scientific advice to meet domestic requirements in different countries during trans-national crises.

International frameworks for the exchange of scientific data and information are a critical aspect of crisis management and are routinely used in many domains, from hydrology to public health. The process of developing a framework, which normally involves

negotiation between different actors from different countries, can in itself be a mechanism for mutual learning and building common understanding. In the best examples, this can go as far as defining shared data standards and formats, which are critical for exchange of data and integration of information across different scientific domains. In novel, complex, large scale, crises existing frameworks may not be entirely sufficient but they can nevertheless provide a starting basis for international exchange.

1.2.1. Recommendations

4. **Countries should identify, and share details of, domestic and international contact points - institutions and/or individuals - with responsibility for coordinating scientific advice during trans-national cr**ises. These contacts will necessarily reflect different national scientific advisory mechanisms and there may be multiple contacts in individual countries, although the number should ideally be kept to a minimum to ensure effective communication between countries in crisis situations. There is potentially a role for relevant regional and global bodies in maintaining and sharing lists of such contacts.
5. **Existing frameworks for the exchange of data and information during crises should be strengthened and new frameworks developed as necessary, with a particular focus on novel, complex, trans-national crises**. These frameworks can play an important role in developing common standards and protocols for data exchange and access. Their development and adoption is a shared responsibility both of governments and the scientific community. In this context it is noted that academic norms and practices have not always encouraged the timely exchange of data and information during crises and moves towards open science and recent agreements between funders and publishers on sharing public health data should be supported in this regard.

1.3. Promoting mutual understanding and trust: people and networks

Whilst frameworks are an important enabler for the exchange of scientific data and information, they are only as useful as the mechanisms that are in place to ensure that they are implemented. Although the technical and legal challenges of effectively sharing scientific data and information in crises can, with some concerted effort, be defined and dealt with or minimised, building the necessary national and trans-national social networks can be more challenging. Promoting trust between the different providers and users of scientific data, information and advice is a long-term challenge. It requires appropriate support, mandates and incentives at the national level and mechanisms for building mutual understanding at the international level.

Formal international networks of relevant actors are often established to complement international frameworks and may be coordinated by international bodies, such as WMO or WHO. These play an important role when such frameworks are formally activated. However, informal networks (often involving some the same actors as in the formal structures) can play a critically important role in the early stages of a crisis or when formal structures are inadequate to deal with the nature and complexity of a crisis. Thus, for example, clinical research networks often play a critical role in sense making during public health crises. Building trusted international scientific networks of scientific institutions and individuals and recognising these as a valuable part of the infrastructure for crisis management is a shared responsibility for all countries.

1.3.1. Recommendations

6. **Regular interactions and building of mutual understanding** between providers of scientific advice (government scientists, academics, scientific advisors) and crisis managers should be encouraged at the national level. The different communities need to work together to identify knowledge gaps and how they can be filled.
7. **International science networks, operating in areas of relevance to actual or potential, trans-national crises should be considered as potentially part of the infrastructure for crisis response**, in which case the appropriate links need to be nurtured with crisis management practitioners. Contingency funding that can be rapidly accessed by these networks in times of crisis would improve their ability to engage effectively.
8. **Mechanisms to enable the exchange and mobility of interested individuals from different institutional settings and countries should be used to promote mutual understanding and trust**. Opportunities for academic researchers to work for crisis management structures or for those with domestic responsibility for scientific advice to work with international organisations can be particularly valuable

1.4. Being prepared

Improving disaster response preparedness was the central recurrent theme throughout this project and was also highlighted in previous OECD work on risk management (Baubion, 2013) and scientific advice (OECD, 2015). Preparedness needs to be established in times of calm, not in the moment of crisis and for this to happen it needs to be prioritised and resourced, by all relevant stakeholders including those involved in the provision of scientific advice. Preparedness includes having the necessary accumulated knowledge, capacity, frameworks and trusted international networks in place and it can be promoted by engaging all these constituent parts in well-designed training exercises. Crisis managers and policy makers in many OECD countries are familiar with crisis scenario role-playing exercises and may have been involved in those organised by the OECD network of strategic crisis managers. However, for many of those involved in providing scientific advice, such mutual-learning (or stress-testing) exercises are less familiar. Similarly, for novel or complex crises, where crisis response structures may be less clearly defined and/or for crises of a trans-national nature scenario, exercises are less well developed.

1.4.1. Recommendations

9. **Regular drills and exercises that bring together both crisis managers and those involved in providing scientific advice, should be encouraged** and supported both domestically and transnationally. Scientific experts should be supported and incentivised to participate in such joint exercises.
10. **Mutual-learning and training scenarios, for novel, complex trans-national crises should be developed** and tested with input from the scientific community and crisis managers. These need to take into account the communication channels for multiple stakeholders, including policy-makers, relevant industry actors and the public.

1.5. Communicating with the public

No matter how good the scientific advice is and how well it is integrated into crisis management and decision-making processes, the way that it is communicated to the public can have a major impact on its effectiveness. While openness and transparency is fundamental in scientific advisory processes, crisis situations can put special demands on public communication. The primary requirement is for rigorous and clear scientific advice to inform quick and effective decision-making by responsible authorities (OECD, 2015b). There is potential for confusion and loss of trust in these authorities, and in the science, if communication is not carefully managed and coordinated across countries.

New information and communication technologies and social media tools are providing exciting opportunities for both gathering input to sense-making during crises and for public communication of scientific information. Using social media tools for data and information collection raises specific issues about bias and quality control but a number of countries are experimenting with these tools and there are opportunities for mutual learning. For public communication, it is important that the brevity and ease of mass communication do not distract from the quality and rigour of what is communicated. It should be recognised that inaccurate or contradictory information can spread rapidly through social media, which can easily generate confusion and undermine public trust. Again, many countries are experimenting with making scientific information available in almost real time using on-line tools and there are opportunities for learning across fields and countries and between scientists and crisis managers.

1.5.1. Recommendations

11. **The public communication of scientific advice during crises should normally be embedded in a broader crisis communication strategy** -involving crisis managers and decision makers - and an international coordination strategy (OECD, 2015b).
12. **Responsibility for public communication of scientific advice in crisis response situations needs to be clearly defined** and, for transnational crises, those responsible for communication in one country should ideally be in close liaison with their relevant counterparts in other countries.
13. **Further experimentation with the use of social media and on-line tools for gathering and communicating information from, and to, the public during crises is required**. There are opportunities for scientists and crisis managers to work together in this regard.

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