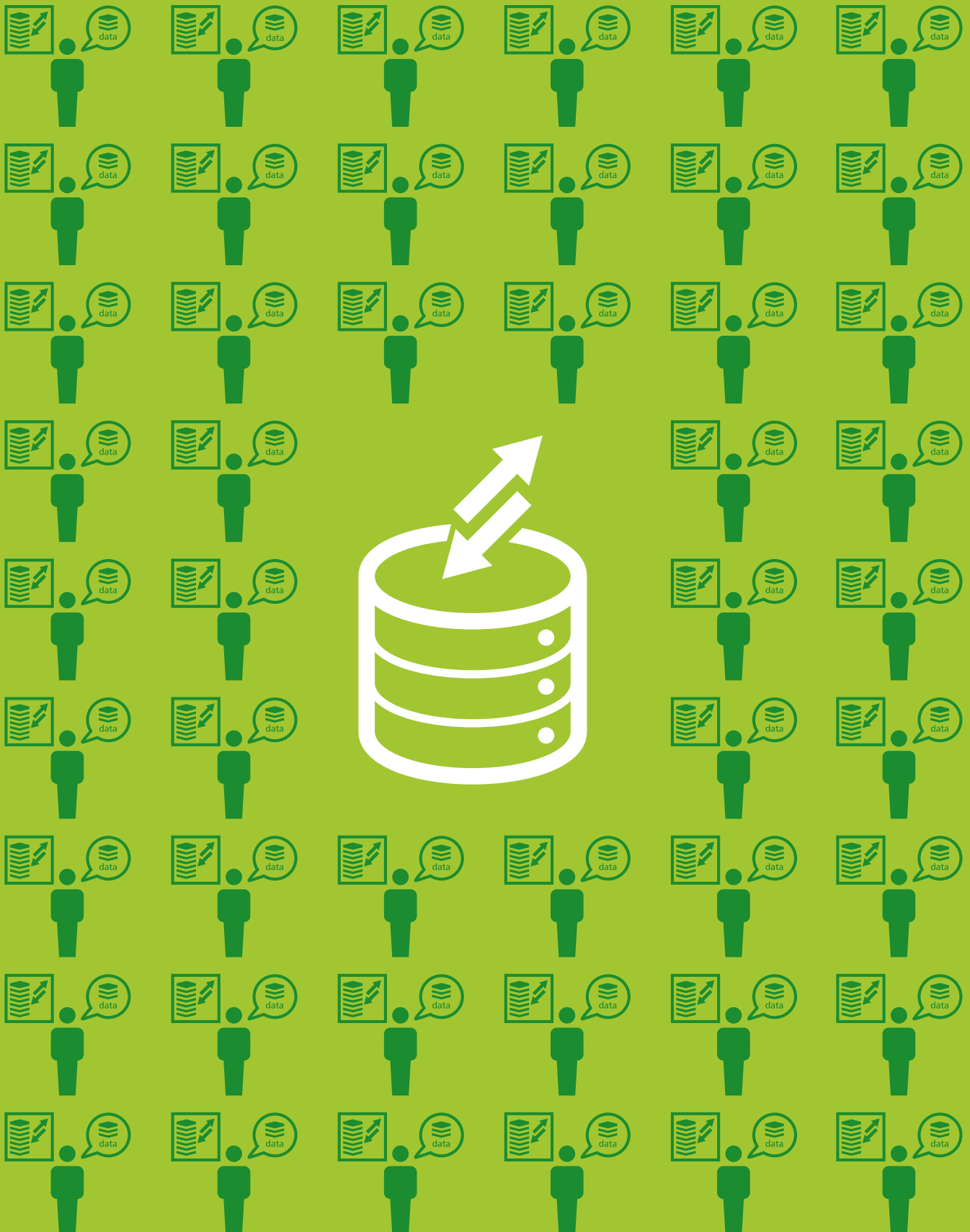# Gaining momentum: open data

5. Lessons from international jurisdictions and other sectors

Key points

Evidence from international jurisdictions and other sectors in Australia highlights three key principles for better organisation of data and research:

- **Access to information** through data sharing platforms
- **Facilitating collaboration to** leverage diversity of skills and experience across multiple disciplines
- **Prioritising investments** to meet the practical needs of end users.

There is significant scope to embed these principles in Australian data and research, through a greater focus on the needs of end users in response to the decision-making challenge.

Dealing with the risk of natural disasters is a global challenge. In 2013, a total of 890 loss events occurred throughout the world, causing 20,500 fatalities, insured losses of $US35 billion and overall losses of $US135 billion (Munich Re, 2014).

At the 2005 World Conference on Disaster Reduction, 168 countries adopted the Hyogo Framework for Action, a 10-year plan focused on strengthening the resilience of communities to natural disasters. Two of the five priority actions set out in the framework highlight the importance of collecting and utilising data and research on disaster risk exposure and mitigation. Meanwhile, data and research is also critical for driving improvements in other sectors, such as health and finance.

Accordingly, the organisation of data and research in Australia should be informed by evidence from international jurisdictions and these other sectors. This chapter outlines the importance of:

- Access to information
- Facilitating collaboration
- Prioritising investments.

These principles have been identified based on a review of the activities of the United Nations, World Bank and Organisation for Economic Co-operation and Development (OECD), national co-ordination of natural disaster information within New Zealand and the United States and approaches to building and sharing information in the finance and medical sectors in Australia.

Christchurch, New Zealand: Following three major earthquakes since September 2010, geotechnical experts divided Christchurch into four zones – red, orange, green and white. Residents in the worst-affected red zone received a formal offer from Government to buy their homes.
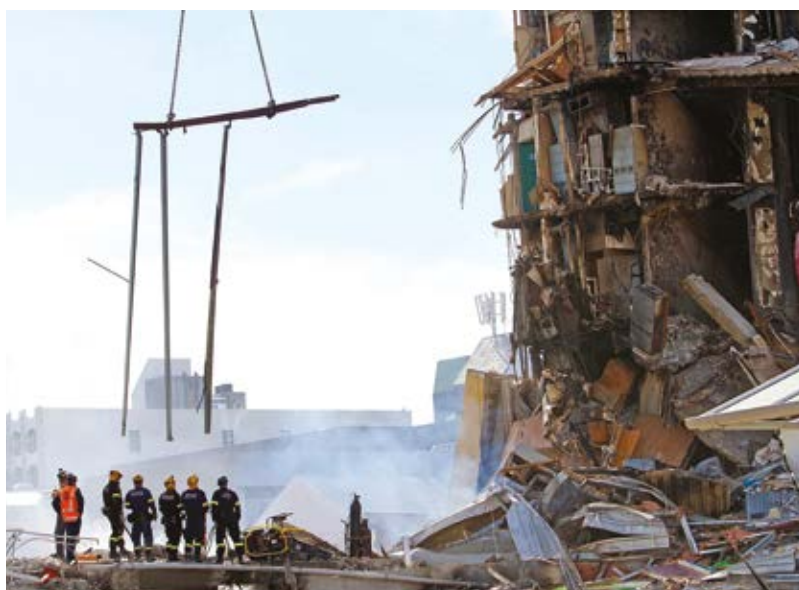
Christchurch, New Zealand February 2011: the collapsed CTV building where 110 people died. Much of the downtown area was destroyed and remained sealed off one year later following the 6.3 quake which killed 185 people as it flattened office blocks, buckled roads and brought historic buildings crashing down.

5.1 Access to information

Access to information is critical for practical application of data and research by end users. In addition, the accessibility of information helps to avoid duplication of effort and facilitates learning from the experiences of others. Both internationally and in Australia, there are numerous initiatives which support access to information for these purposes.

At the international level, an online platform administered by the United Nations Office for Disaster Risk Reduction (UNISDR), PreventionWeb, has established itself as the 'go to' information repository for disaster risk reduction (Gregorowski et al 2012). Designed as a participatory platform, PreventionWeb allows users to search for information and upload content according to country or region, theme or issue, and hazard type. The types of information on the platform include academic and training programs, educational materials, links to specialist networks and organisations, documents and publications, policies, maps and statistics. The target audience of PreventionWeb includes national and local governments, NGOs, community-based organisations and risk reduction experts and practitioners (Gregorowski et al 2012:25).

Access to information on natural disasters across multiple countries is also facilitated through a number of international risk and loss databases. These have been developed by a mix of stakeholders, including international organisations, research institutions, government agencies and the private sector. Some examples are presented in Table 5.1.

Global reinsurers, Munich Re and Swiss Re also maintain databases, NatCatSERVICE and Sigma respectively, on the losses associated with natural disasters across the world, in terms of lives lost, insured losses and total losses. NatCatSERVICE provides free access to basic data and mapping online, as well as free access to raw data for non-commercial purposes.

Links to these databases, and others, are provided on the United Nations Development Programme's (UNDP) Global Risk Information Platform (GRIP). This sits alongside a 'Methodologies Platform' which provides documents on concepts, standards, frameworks and techniques for disaster risk assessments (GRIP, 2014).

The World Bank's Global Facility for Disaster Risk Reduction (GFDRR) also supports access to disaster risk information in 25 developing countries through its Open Data for Resilience Initiative (OpenDRI) (GFDRR, 2014e).

Table 5.1: Selected natural disaster risk and loss databases

Database	Developer	Content	Extent of access
DesInventar	LA RED (the Network of Social Studies on Disaster Prevention in Latin America). UNISDR is the host and main sponsor. Also involves UN, NGOs, Government agencies, universities and private sector.	• Disaster events, causes, human impacts and economic losses • 29 countries across North, Central and South America, the Caribbean, Asia and the South Pacific.	Free, open source access to tables, graphics and thematic maps.
EM-DAT: The International Disaster Database	Centre for Research on the Epidemiology of Disasters – University of Louvain, Belgium. Partnerships with the International Federation of Red Cross and Red Crescent Societies, UNISDR and US Agency for International Development, among others.	• Human impacts, economic damage, international aid contributions • Data compiled from various sources.	Free, open source access to data.
PREVIEW Global Risk Data Platform	Created and hosted by UNEP/GRID-Geneva. Supported by UNISDR.	• Spatial data on global risk from natural hazards.	Free for non-commercial purposes.

Source: Centre for Research on the Epidemiology of Disasters (CRED) 2014; Corporación OSSO 2013; United Nations Environment Programme (UNEP) 2013; UNISDR (n.d.)

The purpose of this project is to make the information necessary to inform resilience investments available to decision-makers. It has led to the development of open source software and data platforms, such as haitidata.org, and the Indonesian Scenario Assessment for Emergencies (InaSAFE).

Individual countries are also increasingly recognising the importance of providing citizens with access to information on natural disasters. For example, a recent OECD report into disaster risk financing in Asia-Pacific Economic Co-operation (APEC) economies found that one of the top priorities for strengthening financial resilience in the region is the 'improvement of the availability and quality of data on hazards, exposures, vulnerabilities and losses' (OECD, 2013).

Government responsibilities in this area are consistent with the principles of the broader 'open government' movement. The United States has been at the forefront of such policy development, with President Barack Obama releasing a Memorandum on Transparency and Open Government on his first day in office in 2009. This highlighted the importance of transparency, participation and collaboration between government and citizens. This was followed by an Open Government Directive, which set actions and deadlines for government departments and agencies in relation to publishing information online, improving the quality of information and establishing an open government culture and policy framework (US Government, 2009a). In May 2013, the US Government released a new open data policy and executive order, focused on the accessibility and usefulness of information. Through this process, the US Government seeks to provide open data that is public, accessible, described, reusable, complete, timely and managed post-release (Project Open Data, n.d.).

In 2011, an Open Government Partnership was established in recognition of these principles (Open Government Partnership, 2014). There are currently 64 countries commited to developing and implementing an action plan, undertaking annual self-assessments, participating in an independent reporting mechanism process and contributing to peer learning. Australia is set to join the partnership in May 2015.

Similar ideals have been highlighted in the context of natural disasters more specifically. For example, The Rockefeller Foundation, in conjunction with PopTech, developed a set of principles for big data and resilience projects at a workshop in 2013. The principles call for:

- Open source tools for data analytics and manipulation
- Transparent data infrastructure
- Developing and maintaining local skills in using data
- Local data ownership
- Ethical data sharing
- The right not to be sensed
- Learning from mistakes (PopTech & The Rockefeller Foundation Bellagio Fellows, 2013).

While policies are recognising open access to information as an essential first step, implementing these principles is challenging. The Open Knowledge Foundation's Open Data Index measures the openness of 10 key national data sets in terms of whether the data exists, is in digital form, is publically available free of charge, is online, is machine readable, is available in bulk, openly licensed and up to date (Open Knowledge Foundation, n.d.). Australia is currently ranked 9th out of the 70 countries listed, although there remains opportunities for improvement in the openness of seven of the 10 Australian data sets considered. This is in addition to the multiple barriers to open natural disaster data in Australia, demonstrated in Chapter 3.

In an interview with McKinsey & Company, former chief analytics officer for New York City, Mike Flowers, noted that open data involves breaking down technological, cultural, legal and political barriers (McKinsey & Company, 2014). Furthermore, it is critical to address these challenges from an end user perspective:

"I think we need to do a much better job of helping people understand that data, which means being much more transparent from a process-and-people standpoint and not just a data standpoint. Open data is a start. It's not the end. (Mike Flowers, in McKinsey & Company, 2014)

Nevertheless, there are numerous examples of successful national open data initiatives. For instance, in 2008 the United States National Science Foundation initiated the DataNet program to establish a set of best practice data research infrastructure organisations. The program's first round of funding helped to establish the following two key initiatives:

- **DataONE** – a central platform of earth observational data, provided through an open network of member nodes and co-ordinating nodes (DataONE, 2014)
- **Data Conservancy** – a community of university libraries, data centres, research labs and information science research and education programs, involved in the development of data repositories, such as the National Snow and Ice Data Center, and research on best practice data frameworks (Data Conservancy, n.d.).

Another highly regarded international initiative for data sharing and access is the National Observatory for Natural Hazards (ONRN) in France.

The ONRN was established in 2012 as a partnership between the Ministry of Sustainable Development, the Central Reinsurance Company (CCR) and the Association of French Insurance Undertakings for Natural Risk Knowledge and Reduction (OECD, 2013). The purpose of the ONRN, a not-for-profit company, is to facilitate the sharing of data from different stakeholders, at both central and local levels, in a reliable, updated and consistent manner. Insurers provide detailed frequency and cost-of-claim information and the public sector provides hazard information. While the achievement of reliable and updated data sharing is a work in progress, the ONRN's governance arrangements provide for input from both data producers and data users, as illustrated in Figure 5.1.

A recent report into Disaster Risk Financing in APEC Economies published by the OECD describes ONRN as a noteworthy collaborative effort "focusing on the improvement of consistency and interoperability of data on natural hazards for a full range of different applications, including risk assessment, risk mitigation, emergency preparedness and financial planning" (2013:43). There may be scope to use this as a model for greater access to natural disaster data in Australia.

Figure 5.1: National Observatory for Natural Hazards governance structure
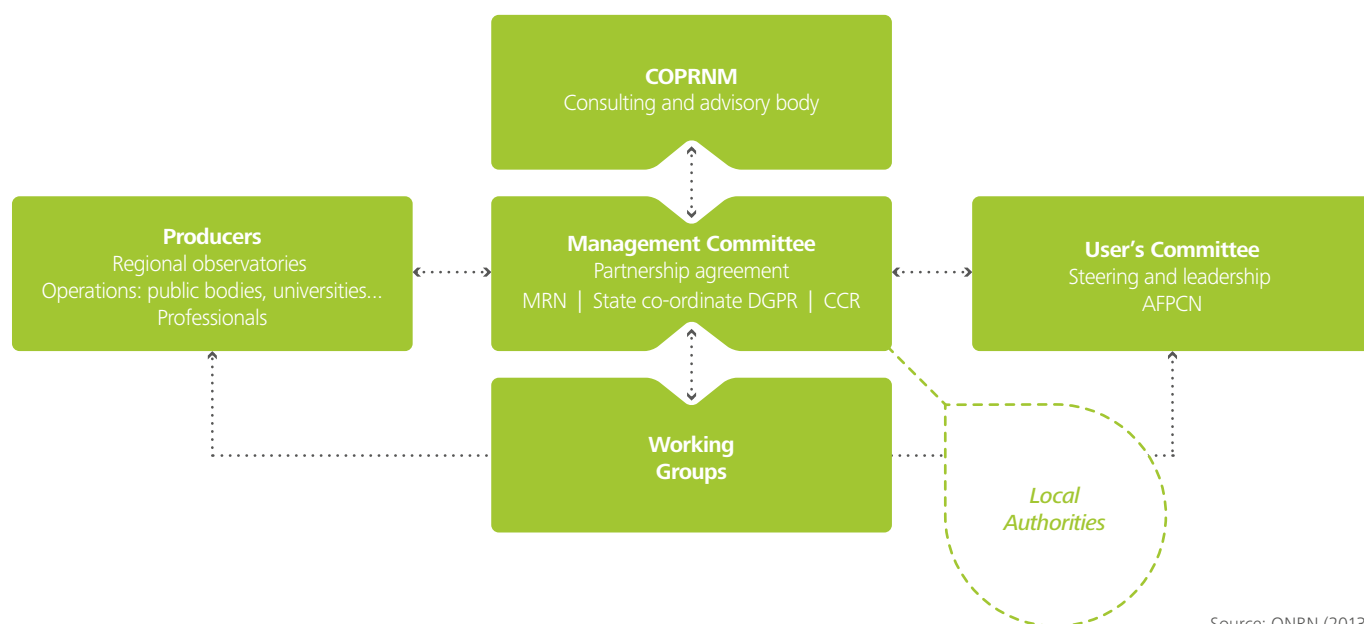
Source: ONRN (2013)

There are also successful Australian initiatives that support access to information in other sectors. For example, Sirca is a leader in the collection, storage and provision of financial data to enable research. A brief description of Sirca's activities is provided in Box 10. This example demonstrates a potential mechanism for centralised collection and provision of data between end users that seek the same data for different purposes. Just as the approach to financial data management is being applied to the Sense-T project, Sirca's experience can also provide insights for better access to natural disaster data in Australia.

Another relevant example of data sharing is the Critical Infrastructure Program for Modelling and Analysis (CIPMA).

The CIPMA was established in 2007 by the Attorney General's Department to facilitate modelling and simulations of the behaviour and dependency of relationships between critical Australian infrastructure, encompassing banking and finance, communications, energy, water services and transport (TISN, n.d.).

The program involves the provision of underlying data by the owners and operators of critical infrastructure, including private sector stakeholders, state and territory governments, and Australian Government agencies. As a technical partner, Geoscience Australia is responsible for developing the computer capabilities to analyse the data, combining infrastructure sector simulation models, databases, geospatial information systems and economic models. This enables businesses and governments to identify, under different scenarios, how a disruption to a critical infrastructure service will flow-on through, within and across sectors (Scott, 2007; TISN, n.d.).

Box 10: Sirca

Sirca was established in 1997 by a group of academics in Australia and New Zealand, who were seeking to reduce the time spent by PhD students collecting and preparing financial data for their studies. Sirca currently operates as a not-for-profit company, limited by guarantee, directly accountable to its membership of 39 universities across Australia and New Zealand.

Sirca's philosophy is to enable financial research by providing access to data from a wide range of sources. Financial trade and news data is stored in raw format in Sirca's data centres, through partnerships with Thomson Reuters and the Australian Securities Exchange. This data can be accessed by users through online, self-service interfaces, including an Application Programming Interface which is compatible with external software tools and a variety of programming languages.

Data use licences are provided to members and commercial customers on an enterprise wide basis. Users are then able to submit one-off or scheduled data requests through the online interface, or make a request via code through programs such as Matlab, SAS and R, among others. Overall, Sirca's database is around 2PB in size, growing by 35TB per month. In turn, Sirca provides around 100TB of data to consumers each month, in response to around two million data requests.

Sirca has played a key role in establishing a number of financial research initiatives, including the Capital Markets Cooperative Research Centre and Centre for International Finance and Regulation. Its flexible approach to data curation seeks to ensure that the potential of data for research is maximised.

Leveraging this approach, Sirca's involvement in data storage and provision has extended beyond the finance sector. In December 2013, Sirca announced a partnership with the University of Tasmania to establish a big data platform in Hobart for the Sense-T initiative. The Sense-T projects use sensor and communication technologies to collect real-time data for agriculture, aquaculture, viticulture and water management, with the objective of creating the world's first economy-wide intelligent sensor network.

Ultimately, this aids operational and strategic decision-making around resilience measures, for all hazards, including but not limited to natural disasters. To ensure the security of the program's sensitive information, data confidentiality arrangements are in place, consistent with the Australian Government's Protective Security Manual (TISN, n.d.). As part of these arrangements, there is a 'tasking' process through which stakeholders nominate research questions for analysis. Based on the strategic priorities, finalised each year by the CIPMA Executive Committee, analysis may be funded through the program's budget, or be undertaken on a cost-recovery basis (Attorney General's Department, n.d.).

Importantly, the program supports the broader Trusted Information Sharing Network (TISN), the mechanism that facilitates collaboration between government and the private sector to ensure the resilience of Australia's critical infrastructure, consistent with the national Critical Infrastructure Resilience Strategy[5].

Given the strong links between the critical infrastructure resilience agenda and the notion of building resilience against natural disasters, an evaluation of this program should provide useful guidance for structuring broader sources of natural disaster information.

5.2 Facilitating collaboration

Given that the challenge of responding to natural disaster risks encompasses multiple disciplines, international evidence suggests that the development and analysis of information inputs is best shared between stakeholders. This allows for specialisation and responsiveness to local issues, which would be difficult to achieve if responsibilities were consolidated within a single institution. At the same time, it is important for collaborative partnerships between governments, industries and communities to leverage academic expertise to tackle pressing societal issues.

At the international level, organisations such as the United Nations, The World Bank and the OECD naturally focus on co-ordination and facilitating collaboration and information between stakeholders from different countries and disciplines. A summary of collaborative initiatives is provided in Box 11.

Box 11: International collaborations on natural disaster data and research

A small sample of international projects relating to natural disaster data and research:

- **UNEP FI Principles for Sustainable Insurance (PSI) Initiative Global Resilience Project** – The PSI Initiative is a global sustainability framework and initiative of the United Nations Environment Programme Finance Initiative. The PSI Initiative is undertaking the Global Resilience Project to deepen understanding of disaster risk reduction globally, identify the social and economic cost of disasters and use this information to help governments and communities mitigate their risk.

- **Future Earth** – a collaborative research platform on global sustainability, launched in 2012, by the Science and Technology Alliance for Global Sustainability. Members of the alliance include the UN Educational, Scientific and Cultural Organisation (UNESCO), UN University (UNU) and the UNEP. Through the platform, research projects are undertaken in relation to sustainability issues, including natural disasters (Future Earth, n.d.).

- **OECD International Network on the Financial Management of Large-scale Catastrophes** – was established to lead a proactive, co-ordinated approach to natural disasters, involving both the public and private sector (OECD, 2014b). The network is guided by a High Level Advisory Board, consisting of 18 representatives from governments, academia and the private sector. The role of the Board is to provide intellectual leadership through advice on the content of the network and priorities for research, analysis and public initiatives.

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5   Further details on the Critical Infrastructure Resilience Strategy are provided in Appendix A.

While these initiatives demonstrate some of the ways in which collaboration on data and research is facilitated internationally, in this report it is more useful to examine how collaboration is achieved within countries, while balancing the need for specialisation. In New Zealand and the United States, there are many stakeholders involved in the development and analysis of natural disaster data and research.

For example, in New Zealand there is a range of government departments and agencies working with research institutions and the private sector in the context of natural disaster data and research. This includes GNS Science, the National Institute of Water and Atmospheric Research and a number of universities and other private sector initiatives, such as Opus Research.

The distribution of activities in the United States is also quite broad, with participation of at least seven government bodies, both within departments and as independent agencies. This is also evident from the organisation of data and research activities around finance and medicine in Australia, which involves a mix of government, research and industry participants.

Yet, at the same time, it is important that there are mechanisms to facilitate collaboration between these stakeholders. Some key examples of collaborative partnerships for natural disaster data and research in these countries are described in Box 12.

Box 12: National collaborations on natural disaster data and research

This review has uncovered many examples of collaborative partnerships for natural disaster data and research. A small sample of these initiatives from New Zealand and the United States include:

- **Joint Centre for Disaster Research, NZ** – is a partnership between Massey University and GNS Science. The Centre, hosted by the University's School of Psychology, undertakes applied teaching and research aimed at improving community resilience, emergency management planning, hazard education strategies and public responses to warning systems (Massey University, 2014b).

- **Resilient Organisations, NZ** – is a partnership of over 20 researchers from a number of New Zealand universities, including the University of Canterbury and the University of Auckland, with backgrounds across a range of disciplines. The partnership undertakes research projects within five streams, and has provided input into practical applications, such as the Construction Sector Workforce Plan for Greater Christchurch (Resilient Organisations Research Programme, 2012).

- **Natural Hazards Center at the University of Colorado, US** – is funded by a consortium of US Federal Government Agencies. The Center administers three core programs, related to information dissemination, research and quick response. Since 1975, the Center has hosted an Annual Natural Hazards Research and Applications Workshop, attended by federal, state and local emergency officials, NGOs, researchers and consultants (Natural Hazards Center, 2014).

- **National Earthquake Hazards Reduction Program, US** – is a partnership between the Federal Emergency Management Agency, National Institute of Standards and Technology, National Science Foundation and US Geological Survey. The program is focused on research and implementation, aiming to improve earthquake resilience in public safety, economic strength and national security (NEHRP, 2009).

- **Insurance Institute for Business & Home Safety Research Center, US** – was established by a group of 60 companies within the property insurance industry in 2010. The research facility is designed to test the resilience of one and two story residential and commercial buildings against the effects of simulated 'storms'. The Center co-ordinates and works in partnership with manufacturers, trade groups, government agencies, academic institutions and other research organisations (Insurance Institute for Business & Home Safety, 2013).

Similarly, there is an abundance of examples of collaborative research partnerships across Australia. Through the Cooperative Research Centre (CRC) Program, the Australian Government provides funding to research partnerships between businesses, researchers and community stakeholders, such as the BNHCRC. However, many collaborative partnerships have also been established outside of this program.

In the finance sector, three of the major collaborative research partnerships are listed here:

- **Capital Markets CRC** – facilitates links between industry and over 40 senior researchers in the fields of securities market design, wealth management, language technology and data mining. The CMCRC is also a developer of commercial products (Capital Markets CRC Limited, 2013)

- **Australian Centre for Financial Studies** – a not-for-profit consortium between Monash University, RMIT University and the Financial Services Institute of Australasia, which aims to "to engage industry, academia, regulators and government in knowledge creation, transfer and thought leadership related to the financial sector" (Australian Centre for Financial Studies, 2014)

- **Centre for International Finance and Regulation** – a partnership between Sirca, the Capital Markets CRC, six universities and four industry bodies, sponsored by the Australian and NSW Governments, with the aim of linking academia with policy makers, regulators and industry. The Centre provides funding for research projects (Centre for International Finance and Regulation, 2011).

As a final example, there are many agencies also involved in collaborative research for the medical sector in Australia. For example, there are 43 World Health Organisation (WHO) Collaborating Centres in Australian academic and scientific institutions. These centres lead the implementation of WHO programs as part of an international collaborative network (WHO, 2014).

Overall, these examples highlight the importance of establishing opportunities for stakeholders to leverage the diversity of skills and experience in identifying and addressing key research questions.

5.3 Prioritising investments

The last clear lesson highlighted by international evidence and other sectors of Australia is that mechanisms for prioritising and evaluating research investments can be an effective means of fostering links between researchers and end users.

For example, the New Zealand Natural Hazards Research Platform was established in 2009 to provide secure, long-term funding for natural hazard research and to help research providers and end users work more closely together (NHRP, 2013).

The NHRP is led by GNS Science, and is co-anchored by the National Institute of Water and Atmospheric Research (NIWA), both government-owned companies classified as Crown research institutes. Other partners of the NHRP include the University of Canterbury, Massey University, University of Auckland and Opus Research, an independent research facility. Additional research groups from academia, consultancies and international bodies are also involved as NHRP sub-contractors. The core partners to the Platform form a Management Group, which is also supported by a Strategic Advisory Group consisting of end users, and a Technical Advisory Group of international scientists.

Each year, the Ministry of Business, Innovation and Employment invests approximately NZ$17 million through the platform (NHRP, 2013). The prioritisation of funding to research projects is guided by a research strategy, last published in 2010. While a revised strategy for 2014-2018 is in development, the current strategy identifies six guiding principles, stipulating that the platform should support research that:

- Meets national needs
- Is responsive
- Is of the highest quality
- Has enduring capability
- Is connected and co-ordinated
- Is communicated (NHRP, 2010).

The 2010 Research Strategy also outlines five themes for organising of the research activities supported by the platform. These are:

- Geological hazard models
- Predicting weather, flood and coastal hazards
- Developing regional and national risk evaluation models
- Societal resilience such as social, cultural, economic and planning factors
- Resilient building and infrastructure (NHRP, 2010).

Accordingly, this mechanism helps to ensure that research effort is directed towards key areas of national importance and supports links with end users through governance arrangements. While the platform also helps to increase transparency on the range of research activities being undertaken, there appears to be scope for further improvement by providing online access to research publications.

In Australia, funding for research activities is provided by a range of sources. However, the Australian National Health and Medical Research Council (ANHMRC) demonstrates that national co-ordination of funding can be an effective means for ensuring continued investment in valuable research activities, on both an individual and collaborative basis.

The NHMRC was established in 1936 and became an independent statutory agency on 1 July 2006, within the Australian Government's Health and Ageing portfolio (NHMRC, 2014a). It is Australia's peak body for supporting health and medical research, and is also responsible for developing health advice for the Australian community, health professionals and governments and for providing advice on ethical behaviour in health care and in the conduct of health and medical research.

At the end of January 2014, NHMRC was involved in facilitating or providing support for 2,216 project grants, 68 program grants, 43 development grants, 69 NHMRC partnerships for better health – partnership projects, two partnership centres and the administration of grants at 88 research institutions (NHMRC, 2014b).

Similar bodies have been established to allocate research funding at the state level, such as the State Health Research Advisory Council in Western Australia (Department of Health, n.d.).

The success of health and medical research is also monitored by government at the national level. In 2013, the McKeon Review into health and medical research acknowledged the benefits generated as a result of research and argued for research to be better leveraged to deliver improvements in healthcare delivery. The review outlined a vision for 'better health through research', and made recommendations to:

- Embed research in the health system
- Support priority-driven research
- Maintain research excellence
- Enhance commercial and non-commercial pathways to impact
- Attract philanthropy and new funding sources
- Invest and implement (Department of Health and Ageing, 2013).

Bushfire, Gippsland, Victoria, January 2012

Some of these recommendations could also act as guiding principles for the organisation of natural disaster research, particularly in relation to stronger application of research in practice. Furthermore, this highlights the importance of review processes and evaluations of the impact of research investments, to drive accountability for the outcomes achieved by publically funded research.

Finally, when establishing frameworks for the prioritisation of research funding, it is important to consider the appropriate balance between competitive funding, which typically seeks to foster innovative ideas, and targeted funding, which is more prescriptive regarding its topics and research questions.

For example, in October 2013, the Board of the Centre for International Finance and Regulation made the decision to switch from a competitive funding model based on broad themes to a more targeted funding model (2013). This switch was intended to allow industry end users to play a greater role in shaping the research agenda. In the context of natural disasters, it is likely that some aspects of a targeted approach would help to improve the practical application of research findings by end users.

5.4 Conclusions

International approaches to the organisation of natural disaster data and research, as well as Australian initiatives for data and research in the financial and medical sectors, clearly demonstrate the value of access to information, collaboration and prioritisation of investments.

To an extent, these principles are reflected in areas of Australia's natural disaster data and research spectrum. However, there is significant scope to embed these principles across the overall system through a greater focus on end user needs. The following chapter outlines recommendations that will implement these learnings.
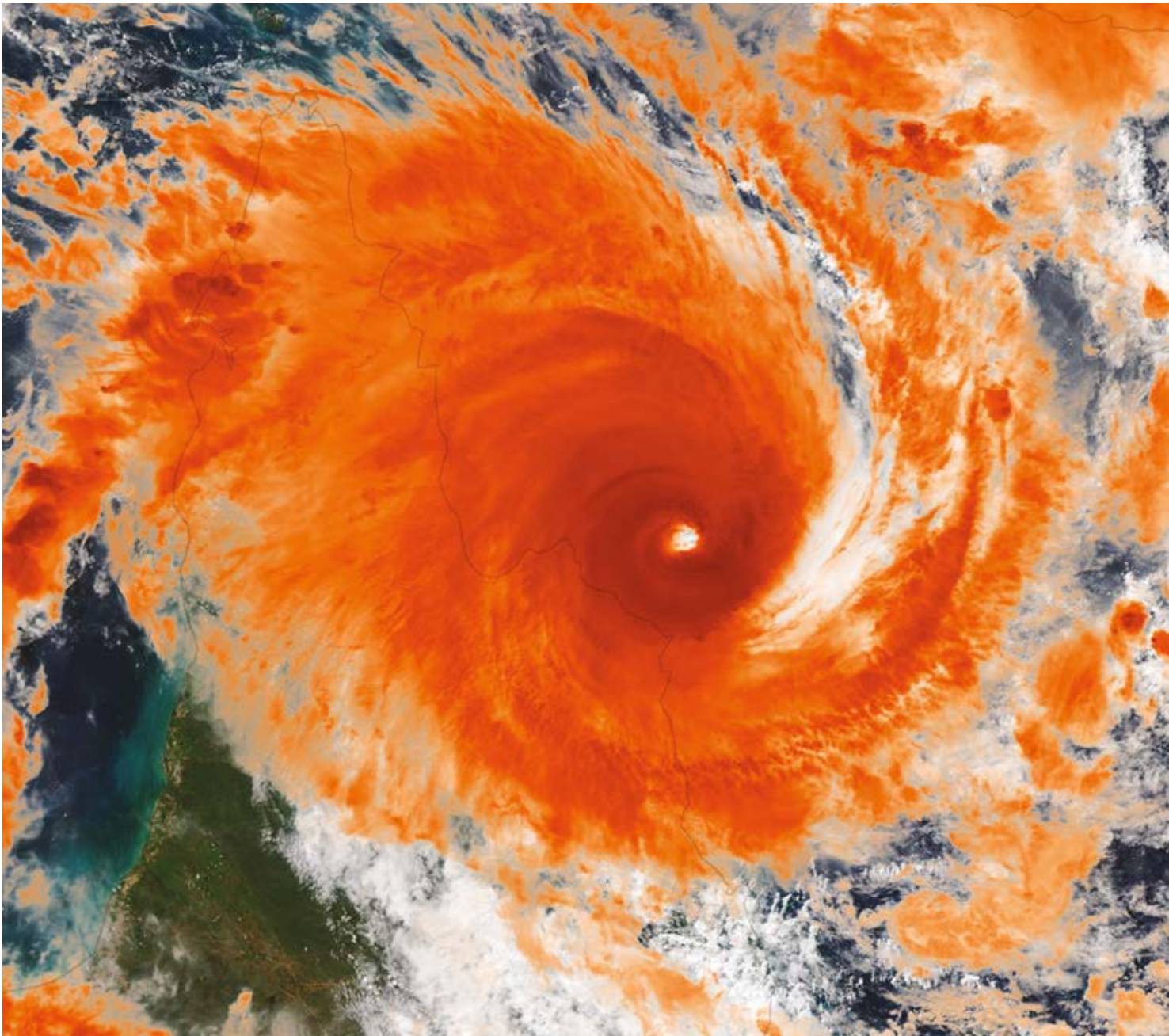
A satellite photo made available by Australian Bureau of Meteorology 20 March 2006 shows Cyclone Larry over the coast of North Queensland. The category five storm slammed into the coast south of Cairns carrying winds of 290 kph and left a trail of destruction in its wake.