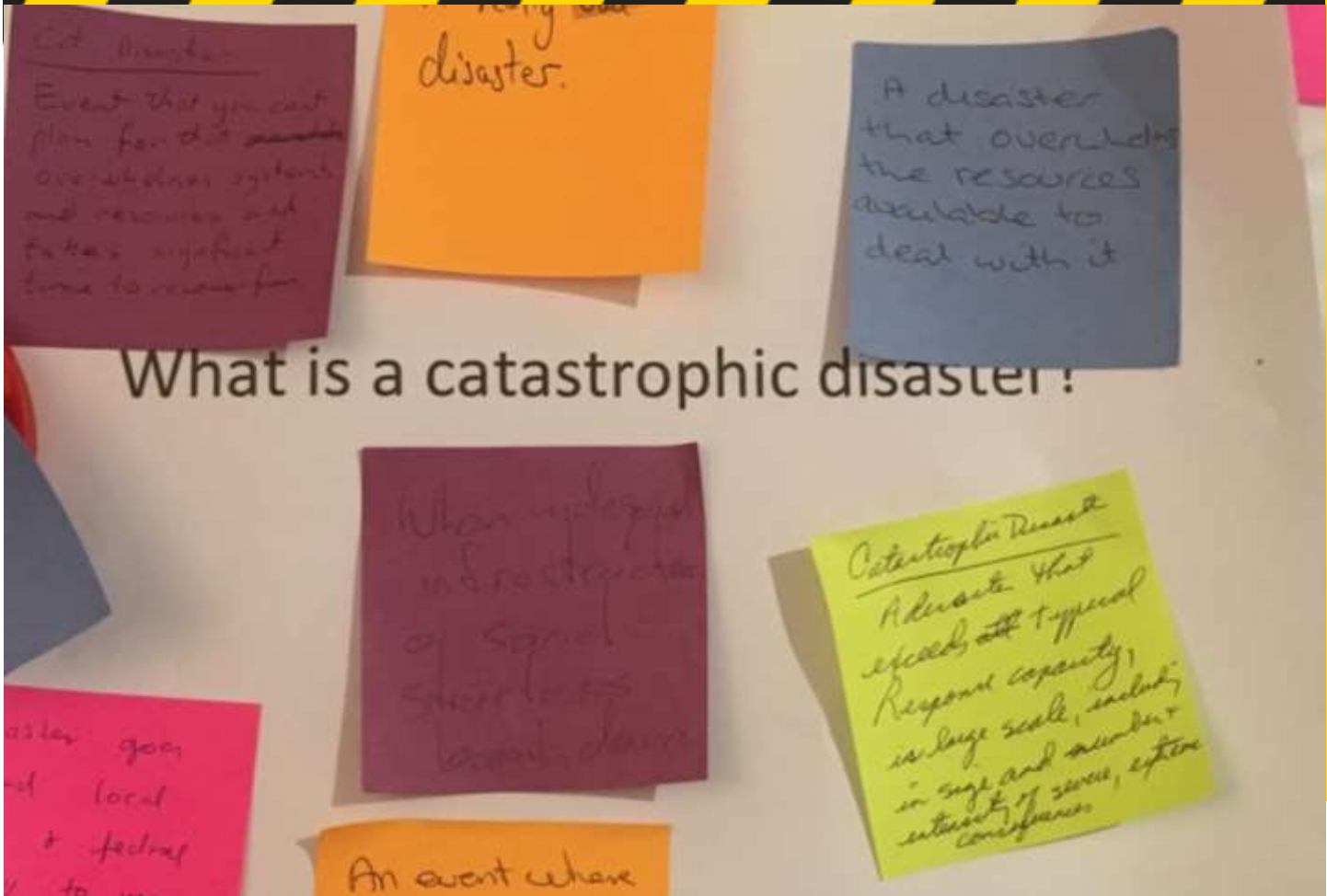




# PLANNING AND CAPABILITY REQUIREMENTS FOR CATASTROPHIC AND CASCADING DISASTERS

Annual Project Report 2017/2018

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## **ACKNOWLEDGMENTS**

The first year of this research has involved extensive collaboration with end-user participants. The research team would like to thank all end-users for their enthusiastic participation and look forward to working with end-user organisations for the remainder of the research program,



## **ABSTRACT**

Catastrophic events pose unique challenges and are inevitable. Previous reviews have highlighted gaps in Australia's preparedness for catastrophic disasters. Australia has no recent experience of a catastrophe, with the Spanish Flu (1918-1919) and Cyclone Tracey (1974) being perhaps two historic examples that have overwhelmed systems of management. Catastrophic events require the adoption of a whole of community approach, which considers the strengths of different partners to contribute. However, this is challenged by the culture of emergency services. This report provides an overview of research completed as part of the first year of the BNHCRC Planning and Capability Requirements for Catastrophic and Cascading Events research.



## END-USER STATEMENT

**Roger Mentha**, NSW Fire and Rescue

The planning and capability requirements for catastrophic and cascading events project has been focused on developing a key conceptualisation of catastrophic events in the Australian context including how end-users perceive these events and how our existing emergency management frameworks address them. Key achievements of the project over the last 12 months include: completion of a global literature and case study review; analysis of key drivers of future catastrophic events; development of a draft model for the involvement of the business sector to expand emergency management capability; a global survey of emergency managers; detailed interviews with over 40 senior emergency managers; and commencement of the development of a benchmarking framework. Opportunities have been taken to communicate the research including presentations at industry conferences and research advisory forums. I know the project team are keen to further explore the issues of capability expansion and risk assessment in the future years of the project. There is also been positive feedback about possible end-user utilisation of a benchmarking tool for Australian emergency service organisations to assess preparedness gaps against.



## INTRODUCTION

*Although Australia is a disaster-prone continent our records of natural disasters go back less than 200 years. . . . Disasters caused by enemy attack are possible but disaster caused by natural phenomena are certain. We must therefore prepare ourselves for this certainty. As part of this preparation we must simply learn from the lessons of the Darwin disaster. We cannot afford to relearn them again during the next disaster, at the expense of more Australian lives (Stretton, 1979).*

Natural disasters are a significant risk globally (World Economic Forum, 2018). The extreme end of possible disasters, so called catastrophic disaster risks, however, attract limited attention compared with either more frequent smaller and thus manageable events, or previous historical events. This is certainly the case in the context of the Australian emergency management sector, which remains strongly response-focused. Previous reviews into the preparedness of the Australian emergency management sector have recognised this limitation (Council of Australian Governments, 2002, Catastrophic Disasters Emergency Management Capability Working Group, 2005, Crosweller, 2015, Australian Government, 2016, Government of Western Australia, 2017) and the same is true for many other western nations (9/11 Commission, 2004, Davis, 2006, US Government Accountability Office, 1993, State of Oregon, 2018).

Crosweller (2015) believes a catastrophe in Australia is inevitable with many scenarios such as extraordinary floods, bushfires, tsunamis, cyclones, pandemics, infrastructure failures and heatwaves all having annual probabilities of less than 1-in-500 years on average. Solar storms, large earthquakes and global volcanic mega-eruptions also pose a risk but at even less frequent or uncertain probabilities. Our nation may also be susceptible to a series of smaller damaging events whose impacts compound into a much larger catastrophe. In some instances, however, the interactions between complex systems (Masys, 2012, t Hart, 2013, Cavallo and Ireland, 2014, Boin and t Hart, 2010) or knowledge gaps due to poor information sharing (Government Office for Science, 2012, Alexander, 2010) may yield unimagined and unpredictable consequences. Almost no Australian emergency manager will have experienced a nationally significant catastrophe event.

### THE PROBLEM

Problems involving catastrophic disasters are complex. This research, however, focuses on the following research problems:

- How does the Australian emergency management sector conceptualize catastrophic events?
- What are the key factors shaping possible future catastrophic events?
- What are key elements for designing planning and capability to cope with the impacts of catastrophic disasters?
- How effectively do existing risk assessment approaches account for catastrophic disasters?
- How can tools assist to measure preparedness and identify capability gaps in the context of coping with the impacts of catastrophic events?



## RESEARCH DESIGN

The research has three main components:

Year 1 – Understanding catastrophe and associated planning.

Year 2 – Understanding the integration of the business sector and development of a rapid expansion model.

Year 3 – Evaluation of existing risk assessment approaches in consideration of catastrophic disasters.

This report provides an overview of key research activities and findings from the first year of the research.





## RESEARCH ACTIVITIES AND FINDINGS

### KEY DRIVERS OF CATASTROPHE

A series of interviews with senior emergency managers and a literature review were utilized to explore the key factors driving possible future catastrophes.

Those interviewed told us how they would define a catastrophic disaster. Most common amongst responses was the concept that a catastrophic disaster would overwhelm capability and capacity to respond and recover.

While there is wide uncertainty regarding future conditions that may shape disaster events, special consideration should be given to the increased risks posed by urban development in at-risk areas; the impact of climate change on extreme weather events; system inter-connectedness and contagion risks; cyber-security; societal reliance on new technologies; and ageing infrastructure.

There are, however, opportunities to positively influence future risk profiles through the adoption of improved building codes and risk-informed land-use planning; urban renewal to enhance the resilience of existing development; climate change adaptation, especially in respect to the consequences of increased air temperatures and sea-level rise; by incorporating resilience considerations into infrastructure design; and the adoption of technological advances to better understand and manage risk. Such opportunities highlight that preparations to cope with catastrophic events must occur within the wider resilience building context, which is applicable across all scales of disaster.

### LITERATURE REVIEW

An extensive review of the global literature was undertaken to identify:

- Definitions of catastrophic disasters
- Core characteristics of catastrophic disasters
- The occurrence of catastrophic disaster risks in the Australian context
- Key elements of a preparedness model to ensure capability and capacity is considered to cope with catastrophic disasters.

Key findings include:

- At the core of many definitions of catastrophe is the concept of becoming overwhelmed. However, context is important meaning that catastrophes can be local, regional, national or global in their scale.
- That catastrophic disasters in the Australian context are inevitable and many are imaginable. In the Australian context there is a need to better understand compound events which may threaten to overwhelm capability and capacity to respond and recover. The interaction of hazards with complex systems may still produce surprises as impacts cascade through interdependent networks.
- The concept of preparing to cope with a catastrophic disaster is complex as it involves decisions regarding the level of risk society is willing to



accept and hence invest in disaster management capabilities. In this context the research concluded that it is key for emergency management organisations to understand societal risk appetite. This understanding must be based on analysis of possible catastrophic risks and may be best documented through planning assumptions.

- The ability to rapidly increase capability and capacity is reliant on the ability to access additional resources in a timely manner or to alter business as usual service requirements to allow existing resources to be stretched further.
- To assist in coping with catastrophes emergency management organisations should adopt a collaborative and adaptive approach which attempts to integrate many different organisations and emergency groups. This includes the integration of local, regional, state, national and international resources, as well as utilization of resources available from the business and community sectors, and emergent groups. Such integration in response is difficult as organisations can differ in their cultures, processes, systems, equipment, training and values. Addressing such issues is key to building a rapid-expansion model that utilises capabilities from outside the typically defined '*emergency management sector*'.
- Preparations to cope with catastrophic disasters must take a strengths based approach. Given limited capacity of organisations to deliver capabilities when catastrophe threatens, it is essential that the emergency management sector prioritizes investment in capabilities that are considered core and that align to their strengths. To expand to the required level of capacity the business and community sector must be engaged to deliver capabilities where they are best suited. Emergency management organisations should also embrace the role of emergent groups as an alternate source of capacity and plan to utilize them in an effective manner.
- Catastrophic disaster planning must clearly outline objectives for response and recovery, whilst enabling a flexible and adaptable approach. Plans must interlink into a wider expandable coordination framework that supports the wider deployment of resources. Key principles to effective planning include:
  - Outlines operational objectives that enable prioritization and proactive responses.
  - To the extent possible be risk based including a knowledge of network interdependencies.
  - Be based upon general principles that encourage flexibility, adaptation and improvisation.
  - Facilitates involvement of all key stakeholders.
  - Be based upon knowledge of communities, their likely responses and values.
  - Identifies resourcing requirements and possible gaps.



- Outlines management structures and accountabilities.
- When necessary takes an inter-jurisdictional approach.
- Considers governance and business continuity.
- Supported by a planning culture and expertise.
- Regularly exercised, reviewed and maintained.

To enable the development of a benchmarking tool the literature review was utilized to define a preparedness framework. This is shown in Figure 1.



Figure 1 – Preparedness System

In the finalisation of defining better practice planning we are also currently exploring the legal basis for enabling national coordination at the time of a catastrophic disaster to enable resource prioritization across jurisdictions.

### **INCREASING EMERGENCY MANAGEMENT CAPACITY THROUGH BUSINESS SECTOR INVOLVEMENT**

The business sector has been identified as an important participant in disaster management across prevention, preparedness, response and recovery. There are significant opportunities to explore enhanced integration with the wider business sector. Through the exploration of case studies and interviews with emergency managers we have proposed a model for business sector integration and several key actions for Australian emergency management organisations to consider. These include:



- Developing arrangements for a two-way exchange of risk and situational awareness information between the emergency managers and the business sector.
- Identifying specific capability strengths that the business sector has and planning to utilize them in an integrated manner.
- Placing specialist procurement expertise within incident management teams.
- Development of a nationally consistent commercial framework for the engagement of large businesses, supported by a national resource coordination model.

These points will be explored further with the business sector in the second year of the research.

## **INTERVIEW AND SURVEY OF EMERGENCY MANAGERS**

Some 40 interviews have been conducted with emergency management leaders and a wider survey of the emergency management sector completed with over 300 responses. Respondents have included representatives for Australia and overseas. A report detailing the outcomes of these activities is currently under preparation. Some key themes, however, arising from work to date include:

- Emergency managers identify significant deficiencies in Australia's planning and capability to cope with a catastrophic disaster across preparedness, response and recovery arrangements.
- Existing capability and disaster planning tends to focus on more routine incidents rather than catastrophic scenarios. Respondents indicated that gaps in capability were not well understood. The key strength in the existing Australian emergency management model was identified as the capacity delivered through volunteerism.
- There are gaps in risk knowledge and some respondents struggle to conceptualise a catastrophic event. For example only 30% of respondents believed that catastrophic disaster scenarios were based on credible scientific modelling.
- Many respondents have little understanding of the risks posed to essential infrastructure and consequences of infrastructure failure and associated interdependencies.
- Information about catastrophic disaster scenarios is not seen as being well shared amongst a diversity of different stakeholders. There is need to involve a greater diversity of organisations when identifying and planning to withstand catastrophe risks.
- Existing disaster planning does not adequately integrate possible assistance from the business sector, community organisations or from the international community.



- Existing disaster planning is often short sighted and does not consider longer-term recovery that would be necessary in the context of a catastrophic event.
- The planning capability of organisations is often under resourced with some stakeholders questioning if the right planning capabilities currently exist within the emergency management sector.

## **BENCHMARKING FRAMEWORK**

To assist with the utilisation of this research a maturity based benchmarking framework is currently under development. At present a series of criteria have been drafted which will be incorporated into an Excel based tool. There has been some encouraging feedback as to how such a tool maybe utilised by end-users. Comments about the potential for the framework from end-users have included:

- *A framework to support more sophisticated emergency management planning with incentives to progress from immature to mature.*
- *To inform organisational risk management and help to identify priority effort of scarce resources.*
- *Good idea – mature model is described so can be aspired to.*
- *Can the framework be used to direct cultural change?*
- *Useful to assess capability and preparedness of the organization.*

An opportunity exists to partner through existing national initiatives for the tool to be utilized nationally.

## **ENDUSER ENGAGEMENT**

Project end-user organisations include: NSWFR, NSW SES, VIC SES, IGEM (QLD), IGEM (VIC), NSW RFS, CFA, MFB, SAFECOM, DEWNR, DFES, SA SES, MFS, TAS SES, NT SES, NSW OEM, QFES, DHHS, EMV and Home Affairs.

End-users have been engaged through a series of teleconferences through-out the first year of the project to outline key research findings. The research advisory forum in April, 2018 provided an opportunity to workshop some key research questions that had been highlighted in earlier interviews.



Figure 2 – End user workshop at April 2018 RAF

### UTILISATION OPPORTUNITIES

In addition to the development of the benchmarking framework there are opportunities for the development of guidelines and seminars utilising the research findings. Interest has also been expressed in exploring key themes of the research through a series of desktop exercises.

The research has been mapped to key activities being undertaken by Home Affairs and information from the project was recently utilized to inform strategic planning by a jurisdiction.

There has been interest in undertaking scenario modelling to illustrate catastrophic disasters and also to better understand risks associated with compounding disaster events. The later could be performed through the utilisation of the PerilAus database.

### PRESENTATIONS

The following oral presentations about the research have been made:

**Gissing, A** (2017) NT BNHCRC research workshop, Darwin

**Gissing, A** (2017) International Day for Disaster Risk Reduction, Sydney

The following poster presentations about the research have been made:

**Gissing, A, Eburn, M,** (2017) Planning and Capability Requirements for Catastrophic and Cascading Events. AFAC Conference, Sydney.

Gissing, A, **O'Brien, J.** (2018) Planning and Capability Requirements for Catastrophic and Cascading Events. Floodplain Management Australia Conference, Gold Coast.



Further presentations have been accepted for the following conferences:

- AFAC Conference, 2018, Perth
- APRU/ANU Conference, 2018, Canberra
- RFS Volunteers Association Conference, 2018, Sydney

Further conference abstracts will be submitted to promote the research in 2018/19.

## **PUBLICATIONS**

The following publications have promoted this research:

Gissing, A (2018) Late bushfire season and extreme heat put pressure on resources. [Available Online] [lighthouse.mq.edu.au/article/late-bushfire-season-will-cost-australia-dearly](http://lighthouse.mq.edu.au/article/late-bushfire-season-will-cost-australia-dearly).

Gissing, A (2018) Could Sydney Be the Next Houston? Fire Australia [Available Online] [bnhcrc.com.au/news/2018/could-sydney-be-next-houston](http://bnhcrc.com.au/news/2018/could-sydney-be-next-houston)

Gissing, A (2018) Could Sydney Be the Next Houston? Asia Pacific Fire Magazine [InPress]





## **TEAM MEMBERS**

Researchers to contribute to the research in 2017/18 include:

- Andrew Gissing – Risk Frontiers and Macquarie University (Project Leader)
- Dr Michael Eburn – ANU
- Professor John McAneney – Risk Frontiers and Macquaire University





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