Measuring capability maturity for severe-to-catastrophic disasters

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Abstract

Severe-to-catastrophic disasters pose unique challenges and are inevitable. Previous reviews have highlighted gaps in Australia's preparedness to manage severe-to-catastrophic disasters (Catastrophic Disasters Emergency Management Capability Working Group 2005).

Introduction

Capability is defined as the collective ability and power to deliver and sustain an effect within a specific context and timeframe. Capability consists of the elements of people, resources, governance, systems and processes (Department of Home Affairs 2018, p.7). Capacity is the key determinant of how long a capability can be sustained at a particular level of ability.

Severe-to-catastrophic disasters, by their nature, threaten to overwhelm the capability and capacity of jurisdictions requiring a nationwide, all-hazards, whole-of-community approach. It is not cost-effective to have a significant investment of resources that might only be employed in the most catastrophic events. However, the inevitability of such disasters means that it is important to consider the extent of capability gaps, where additional capacity might be sourced and how operating models may need to be adjusted.

The Royal Commission into National Natural Disaster Arrangements found that there was a need to take a national approach to capability planning across jurisdictions and that jurisdictions should have a structured process to regularly assess capability and capacity requirements (Binskin, Bennett & Macintosh 2020).

The *Australian Disaster Preparedness Framework*, developed by the Australian Government in conjunction with states and territories, supports a national effort to develop required capability to effectively prepare for and manage severe-to-catastrophic disasters. The framework identifies a suite of national capabilities essential to preparing for, responding to and recovering from these events. A key consideration highlighted in the framework is the need to identify the amount of capability required to ensure it can be sustained, including the identification of capability gaps (Department of Home Affairs 2018).

Some jurisdictions have existing capability frameworks that outline required capabilities and collective development pathways to ensure a multi-agency effort across prevention, preparedness, response and recovery. Efforts have also been made to understand capability maturity to identify and prioritise gaps.

Capability maturity assessment

The objective of a capability maturity assessment is to identify and prioritise capability gaps. Some jurisdictions have used a tool developed by the Bushfire and Natural Hazards Cooperative Research Centre (BNHCRC) called the Capability Maturity Assessment Tool to undertake these assessments (Gissing 2021). The tool uses a series of criteria to measure capability maturity based on input from subject-matter experts.

It provides insights into capability gaps across the capability elements of people, resources, governance, systems and processes for each defined capability. The output of the tool provides a ranking of capabilities by maturity score. Participants in the assessment have benefited from the sharing of information about capability maturity and identified gaps.

The assessment process is risk-based and involves evaluating capabilities against realistic severe-to-catastrophic disaster scenarios, which could include a single extreme event or could be a compounding disaster comprising multiple events that occur concurrently or in sequence. Future scenarios can be used to test the maturity of capability within the context of a warming climate and growing exposure to hazards.

The tool's criteria links to capability targets to provide a defined benchmark of the effect that a capability would be expected to deliver in the context of a severe-to-catastrophic disaster. Capability targets have been used in the United States as a fundamental method of measuring capability maturity, using the Threat and Hazard Identification and Risk Assessment (THIRA) and Stakeholder Preparedness Review (SPR) processes (Department of Homeland Security 2018).

To enhance the application of the Capability Maturity Assessment Tool, research was undertaken by Natural Hazards Research Australia with the NSW emergency management sector to define capability targets for NSW. This included investigation of risk-based principles to guide the level of preparedness for the NSW emergency management sector, definition of targets and consideration of additional processes to measure capability maturity.

Risk-based principles to guide preparedness

In establishing capability targets, it is important to understand the level of risk that a jurisdiction wants to be prepared for. Working with emergency sector leaders, the following principles were suggested:

- **We partner with communities.** Emergency management is a shared partnership. Communities must be aware, connected and empowered. It is critical that community capability is mobilised to build resilience. We partner with communities and will take risks to explore new ways of working to maximise the effectiveness of how we work together.
- **Our work is focused on resilience.** Communities should have the capability and capacity to withstand, recover, adapt, strengthen and thrive. Some level of consequence from emergencies will be inevitable, although we strive to ensure these do not overwhelm communities.
- **We take a whole-of-community approach.** It is not cost-effective to maintain capabilities for severe-to-catastrophic emergencies. To maximise preparedness, we work in a proactive and seamless partnership with the Australian Government, other states and territories, local government, non-government organisations, businesses and industry, media and the community to support our capabilities and capacity.
- **We invest wisely**, ensuring that:
  - capability and risk management treatments are targeted and prioritised based upon the level of risk
  - investments are directed to capabilities that will best manage risk
  - capability and risk management treatments are cost-effective and do not pose downsides (externalities) that outweigh benefits
  - a base level of capability exists across the state that can be mobilised to respond to risks statewide and to support other states and territories
  - where possible, capabilities offer flexibility and adaptability.
- **We innovate to improve community safety outcomes.** We have a high appetite to innovate and take risks to explore new ways of working to improve outcomes with the community. We embrace a sector-wide approach to capability development, acknowledging that strength comes from working together and partnering with elected representatives.
- **Safety is our number one priority.** We work to ensure members of the emergency management sector are safe and healthy, both physically and mentally. We have zero appetite for serious work, health and safety harm.

Defining capability targets

The development of capability targets was informed by the FEMA THIRA methodology, risk-based capability principles and a series of workshops with capability subject-matter experts. Targets were developed to inform planning for severe-to-catastrophic disasters and are not intended to act as performance indicators. Each target was designed to assist in measuring the extent of capability available to respond to a severe-to-catastrophic disaster and hence provide an indication of preparedness.

Targets were developed for each core capability identified in the NSW Capability Development Framework (NSW Government 2020). Planning and preparedness-related targets were informed by existing emergency management policy objectives, while response and recovery targets attempted to comprise 3 components:

- An impact, which represents the size of the capability requirement.
- A critical task, which represents a specific action that is required to achieve a capability target.
- A timeframe metric, which represents the timeframe in which the action needs to be performed.

An example is illustrated in Figure 1.

The process of developing the capability targets consisted of:

- developing realistic severe-to-catastrophic disaster scenarios consistent with the State Level Emergency Risk Assessment to provide information relevant to the definition of the targets (e.g. a major tsunami hitting the Wollongong area resulting in structural collapses and mass injuries and fatalities)
- stakeholder consultation to establish capability narratives, describing a critical task representing a specific action that is required to achieve the capability and to define the impact and timeframe or policy measures consistent with the chosen disaster scenario.
- testing and validation of capability targets with subject-matter experts.

As an outcome of the process, some suggested capability target examples included:

- **Organisational Resilience –** all government departments, agencies and key partners have business continuity plans. Plans are tested and reviewed annually.

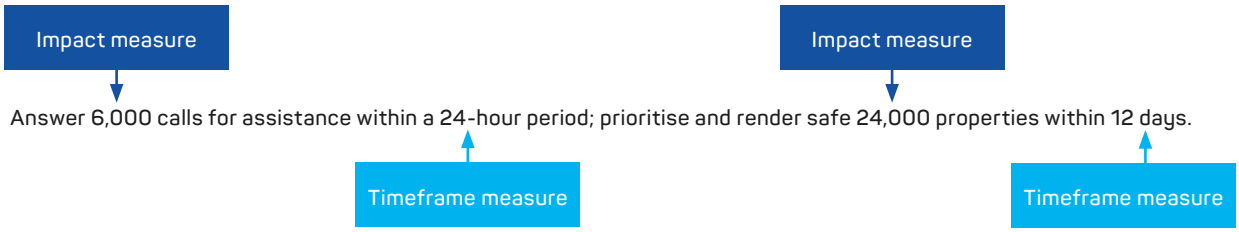

Figure 1: Capability target format sample.

- **Operations Management and Coordination –** within 6 hours of a potential or actual incident, establish and maintain a state-wide Level 3 integrated and coordinated incident control structure, and maintain operations for 6 months in support of an emergency.
- **Evacuation Support –** within 12 hours of a major incident, evacuation facilities are ready to receive 25,000 people and their companion animals (5,000 animals). Sustain capability for 2 weeks.
- **Mass Care –** within 12 hours of an incident, triage 2,000 injured people and commence treatment and transfer to appropriate facilities.

Capability measurement

To investigate methods to complement the Capability Maturity Assessment Tool, 2 methods were tested. Both methods quantitatively measured the gap between what exists and what is required in capability and capacity. These were:

1. **Desktop exercise scenario –** where agencies accountable for a given capability were provided with a scenario and small-to-medium enterprises allocated the people and resources required to achieve the capability target. This exercise assumed that resource allocation would not be constrained by existing capacities. The facilitator recorded the number of people and resources that were said to be required for different roles so that they could be compared with the number of people and resources that would be available given current sector capacity.
2. **Quantitative assumptions-based analysis –** where agencies identified the effect that could be achieved by people and resources specific to a capability. An example is the number of requests for assistance that a storm damage team could complete in a 12-hour shift. These assumptions were used to estimate the people and resources required to meet the capability target, and could then be compared to people and resources that would be available given current sector capacity.

The research identified numerous challenges associated with quantitatively measuring the number of people and resources that would be required to meet capability targets:

- Not all capability elements can be measured quantitatively, for example, governance, systems and processes.
- Assumptions based on subject-matter expert opinion used in the measurement process meant that there was uncertainty in estimates. There was a lack of historical data regarding the number of people and resources required to respond to severe-to-catastrophic disasters to inform or validate estimates. Given the lack of experience in managing severe-to-catastrophic disasters, subject-matter experts may assume a greater efficiency in resource allocations than may occur in reality.

To improve the accuracy of capability maturity assessments, agencies should collect data on the number and type of people and resources required across the timeframe of major incidents to which capabilities relate to. Ultimately, real-world events are the best measure of capability maturity.

A holistic approach

The outcomes of the research provide the basis for a series of principles to guide future capability maturity assessments. Capability maturity assessments should:

- focus on collective capability maturity, not just the capability maturity of an individual organisation
- explore all capability elements of people, resources, governance, systems and processes
- involve a variety of diverse organisations in the delivery of the capability, including all levels of government (local, state and federal), businesses and non-government organisations
- be collaborative and promote sharing of information between organisations about capability
- be supported by data where possible
- enable temporal comparison of capability maturity
- be informed by capability targets to provide a baseline to measure against
- be designed to suit the expertise and resourcing available within a jurisdiction to undertake it
- be regularly reviewed and validated
- be linked to planning and capability enhancement initiatives.

Given the need for Australia to adopt a nationwide approach to capability, as articulated in the Australian Disaster Preparedness Framework, it is important that a consistent approach to

capability maturity assessment be utilised in the future, suited to the Australian context.

Such an approach could be supported by the overall model illustrated in Figure 2, comprising the following elements:

1. **Risk –** all capability maturity analyses should be based on likely severe-to-catastrophic disaster risk scenarios that each jurisdiction faces. The risk-based capability principles can assist to identify the extent of risk that capability should be retained for.
2. **Capability targets –** based on the risk profile of the jurisdiction, targets should be established across each core capability that provide planning benchmarks and represent the desired effect that capabilities aim to deliver.
3. **Capability maturity analysis –** using the targets, a capability maturity analysis should be performed using collective capabilities in a manner that promotes information sharing between agencies involved. The Capability Maturity Assessment Tool can be used to complete this phase.
4. **Validation and review –** the results of the capability analysis should be regularly validated and reviewed. Validation can be performed using data from real-world incidents. Exercises and modelling can assist with validation but should be supported by data and subject-matter expertise. The capability maturity analysis should be updated based upon validation and review activities on an annual basis.
5. **Emergency planning and investment decision-making –** the results of capability maturity analysis should inform emergency planning and capability investment decisions.

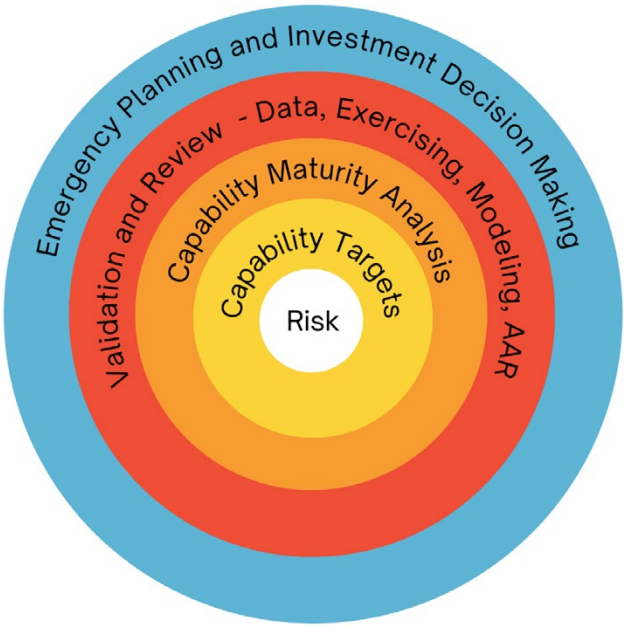

Figure 2: Capability Maturity Assessment Model.

The BNHCRC Capability Maturity Assessment Tool can be accessed at www.bnhcrc.com.au/capability-maturity-assessment-tool.

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