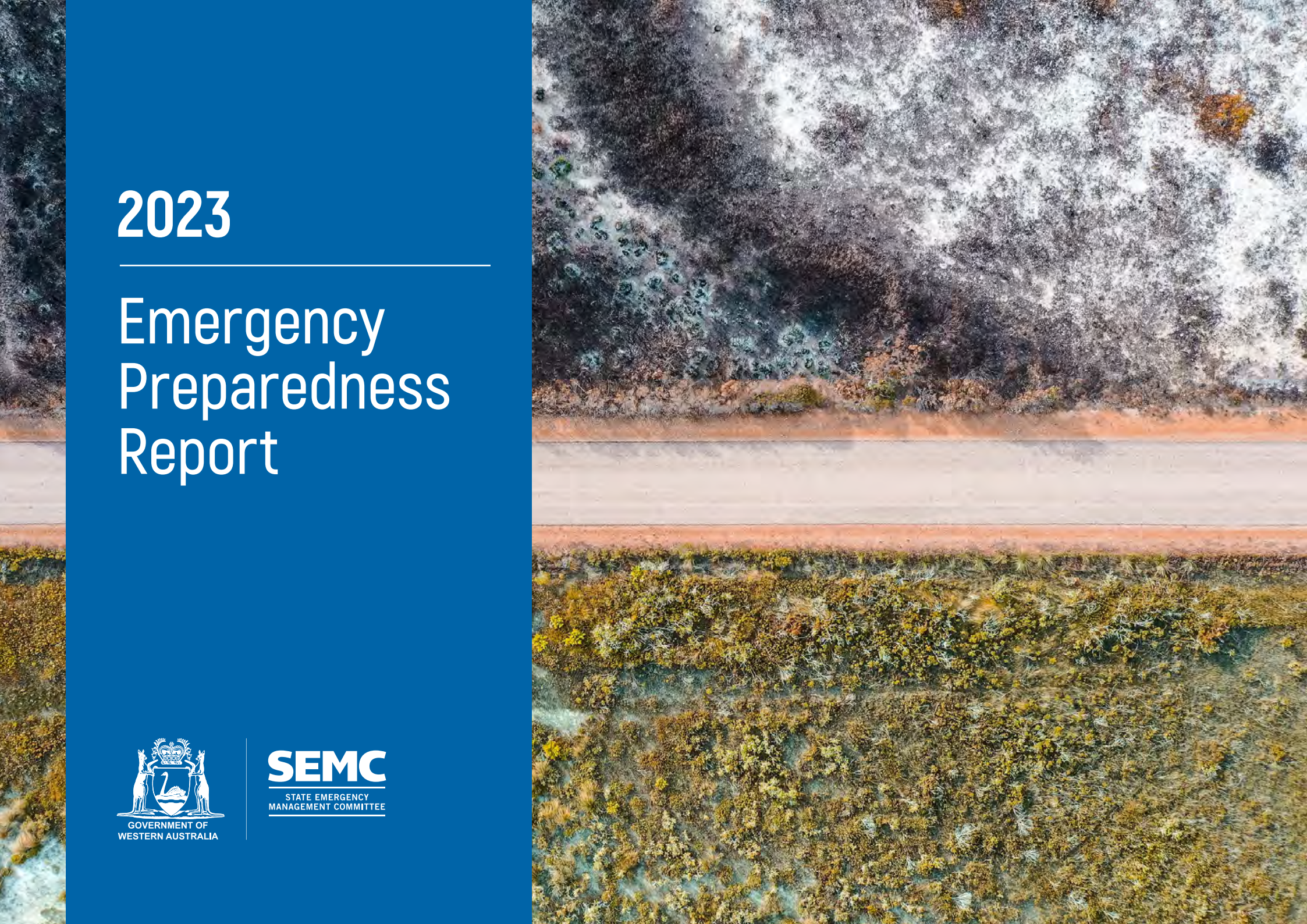
2023

Emergency Preparedness Report



GOVERNMENT OF WESTERN AUSTRALIA

SEMC
STATE EMERGENCY MANAGEMENT COMMITTEE

2013-2018 State Emergency Timeline

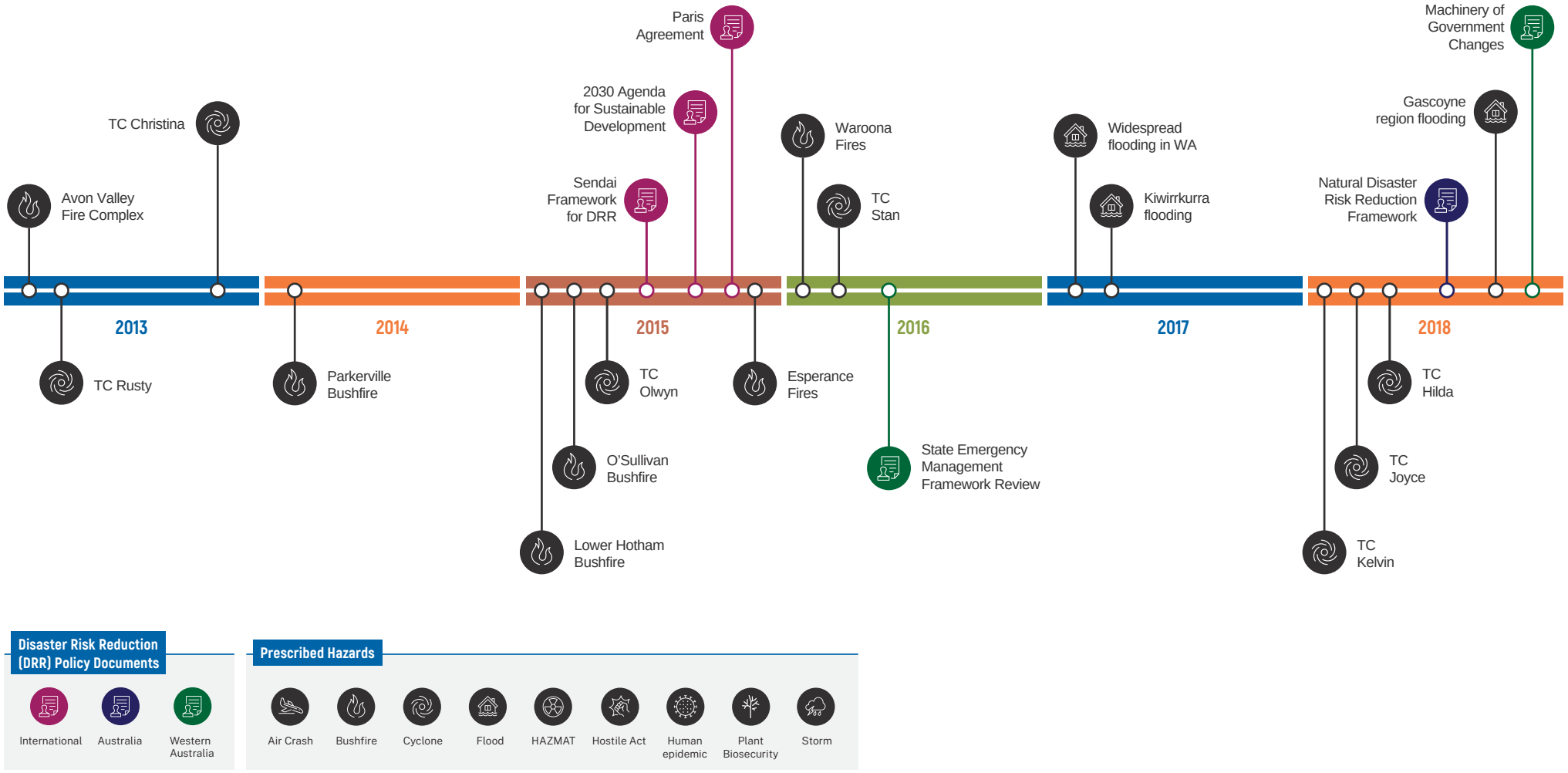
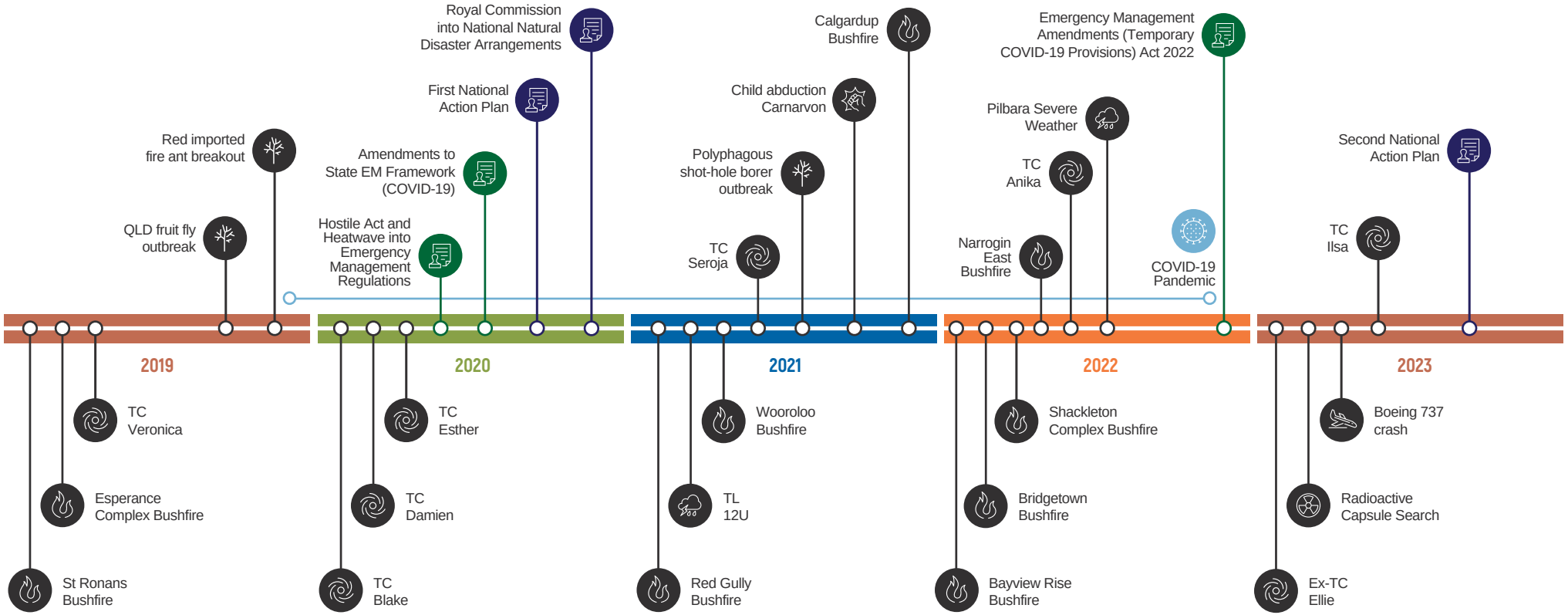


Figure i: Western Australia's emergency timeline since 2013 showing major incidents and policy developments

2018-2023 State Emergency Timeline



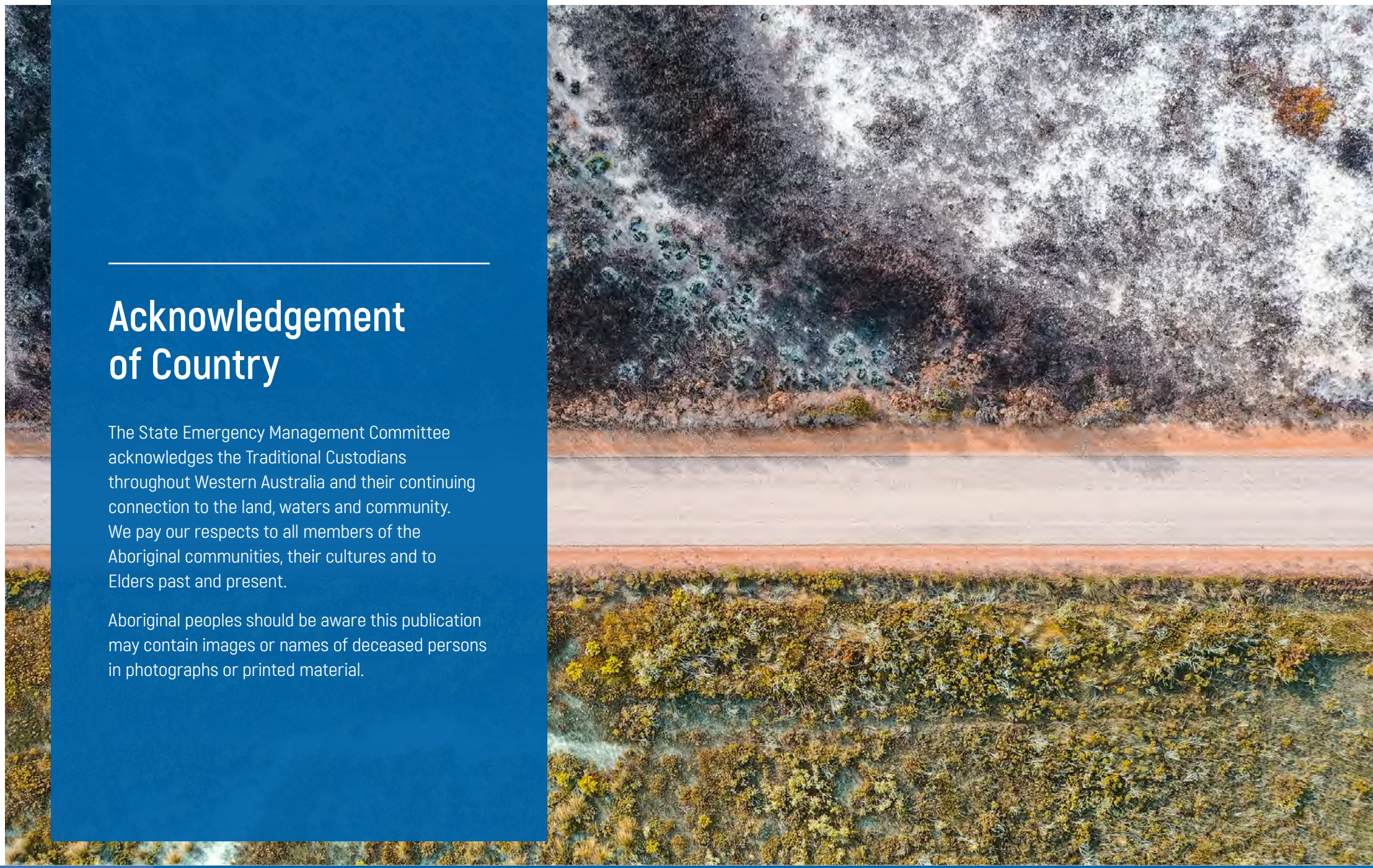
Disaster Risk Reduction (DRR) Policy Documents

International · Australia · Western Australia

Prescribed Hazards

Air Crash · Bushfire · Cyclone · Flood · HAZMAT · Hostile Act · Storm · Plant Biosecurity · Human Epidemic

Contents



Acknowledgement of Country

The State Emergency Management Committee acknowledges the Traditional Custodians throughout Western Australia and their continuing connection to the land, waters and community. We pay our respects to all members of the Aboriginal communities, their cultures and to Elders past and present.

Aboriginal peoples should be aware this publication may contain images or names of deceased persons in photographs or printed material.

From the Chair

It is an honour to be appointed as Chair of the State Emergency Management Committee (SEMC) and it is with great pleasure that I present the 2023 Emergency Preparedness Report on the behalf of the SEMC. The 2023 EPR examines how Western Australia is adopting a systemic approach to disaster risk reduction, as well as opportunities for further adoption to 2030.

Recent emergency events, such as the COVID-19 pandemic, the Kimberley Flood 2022-23, Tropical Cyclone Seroja, amongst many others, have tested the resilience of the Western Australian community and the capabilities of the emergency management sector. The science is clear that emergencies are likely to worsen into the future, and that emergency management must continue to change and evolve to address new and increasingly interconnected risks.

The SEMC is providing strategic leadership to the sector in response to climate change through the development of an Emergency Management Sector Adaptation Plan that will ensure that the sector is prepared and responsive to the challenges of a warming climate.

The last decade has also seen significant changes in the way we think about and conduct emergency management.

The introduction of the Sendai Framework for Disaster Risk Reduction in 2015, coupled with its domestic application through the National Disaster Risk Reduction Framework in 2018, have heralded a new approach to emergency risk management. This new approach acknowledges that risks are increasingly interconnected, that vulnerability is unevenly distributed across society, and that we must continue to find new ways of working together to manage this new era of systemic risk.

The SEMC also acknowledges that our work is ongoing and that we must continue to innovate and evolve. The 2023 EPR reflects upon the changing landscape of emergency risk over the last decade, as well as Western Australia's strategic alignment with evolving international best practice in emergency management. In addition to demonstrating the extraordinary commitment and agility of the sector, it also examines the major challenges in the years ahead and identifies opportunities for further innovation and improvement.

I thank the emergency management sector for their continued work and dedication, and for their contribution to the 2023 EPR.

Ms Emma Cole
Chair, State Emergency Management Committee

Executive Summary

Emergencies are becoming increasingly frequent, severe, and costly. The central challenge for the emergency management sector, both here in Western Australia and overseas, is strengthening the resilience of the sector and our communities despite mounting risks and growing uncertainty.

The 2023 Emergency Preparedness Report (EPR) examines how Western Australia is grappling with this challenge through its adoption of a systemic approach to emergency risk management. Specifically, this report identifies how systems principles are being applied in the context of emergency risk, data, learning, and community resilience.

The 2023 EPR draws on insights provided by members of selected State Emergency Management Committee (SEMC) Subcommittees, as well as risk and capability data gathered through previous Annual and Preparedness Report Capability Surveys.

Analysis undertaken in the 2023 EPR provides the following insights:

Our understanding of risk is changing. Systemic approaches to emergency risk management are being adopted in Western Australia, with an increased focus on capabilities that promote 'general resilience.' These include initiatives that enhance our ability to work together, to leverage insights from big data, and to learn from past experiences. Further, there is increased focus on the drivers that underpin systemic risks, such as climate change and digital technologies. However, further work is needed to develop consistent definitions, methods, and metrics for assessing systemic risk.

Data-driven approaches to emergency management are rapidly expanding. The emergency management sector is rapidly adopting new technologies and leveraging opportunities presented by big data. In turn, the emergency management 'data ecosystem' is expanding and becoming increasingly complex. While the introduction of data strategies and governance frameworks will smooth the transition to an increasingly digitised emergency management sector, addressing resourcing challenges and skills shortages will require careful management.

Learning and continuous improvement processes are embedded but must continue to evolve. Processes of learning and continuous improvement are embedded in the State Emergency Management Framework and are employed throughout the Western Australian emergency management sector. These processes are enabling sector innovation and adaptation. However, as the scale and complexity of systemic risks increase, different types of learning will likely be required, particularly those that enable new kinds of learning, the implementation of lessons, and reflection on the goals and functions of the emergency management sector.

Executive Summary

Social vulnerability is starting to be addressed, but further work is needed. Work is underway to tackle the social drivers of vulnerability, with much of it being undertaken by non-traditional emergency management organisations or through novel collaborations between emergency services and the community sector. Forthcoming strategic frameworks, such as the Community Disaster Resilience Framework and Philanthropic Engagement Framework for Emergency Management, will enhance collaboration between emergency, community, private and not-for-profit sectors, noting that resourcing challenges will need to be managed to drive long-term community resilience.

The SEMC is well placed to continue to provide strategic leadership to the Western Australian emergency management sector as it deals with increasingly complex systemic risks. The outcomes of recent reviews have indicated that there are significant opportunities to embed systemic risk principles and approaches across the emergency management sector via state, district, and local committee structures, and to further enhance sector collaboration, connectivity, and learning.

01
Introduction

1. Introduction

Emergency management in Western Australia has evolved considerably over the last decade. Confronted with increasingly severe disaster events, climate change, and mounting vulnerabilities, the way we think about, assess, and manage emergency risks continues to change and mature.

Western Australia experiences a range of emergency hazards including bushfire, cyclone, earthquake, and flood. Further, there is growing awareness that environmental, social, and economic drivers of change, such as population increase, cost of living pressures, and the rapid rise of digital technologies, are reshaping vulnerabilities and exposing new emergency management risks.

In the future, emergencies are likely to increase in their scale, frequency, and severity. This will likely place additional demands on the emergency management sector and increase community expectations. A central challenge for emergency managers in Western Australia and across the world is how to prepare and remain resilient in the face of unprecedented emergency events.

Over the last decade, the Emergency Preparedness Report[1] (EPR) has highlighted present and emerging risks to Western Australia, as well as the State's capability to manage emergencies. It has presented in-depth case studies, the views of subject matter experts, and data collected through the State Risk and Capability Project.

With the conclusion of the State Risk and Capability Project this year, the 2023 EPR reflects on emergency management in Western Australia over the last decade. Specifically, it explores how the sector has moved towards a 'systemic disaster risk reduction' approach consistent with advances in disaster risk internationally (e.g., United Nations Sendai Framework for Disaster Risk Reduction). It also examines the challenges and opportunities that lie ahead for the emergency management sector as we move towards 2030.

The report consists of four themes:

1. The broadening view of risk
2. Working together in the age of big data
3. Sector learning and continuous improvement
4. Community preparedness and resilience.

Analysis of these themes are informed by a review of relevant literature and policy documents, consultation with members from the State Emergency Management Committee's (SEMC) Subcommittees, and data collected through the Annual and Preparedness Report Capability Survey. Further detail about the methodological approach can be found in Section 1.1.

Given the breadth of emergency management in Western Australia, this report does not comprehensively examine all the changes that have occurred across the sector over the last decade. Instead, the 2023 EPR provides an overview of the ways in which Western Australia has adopted aspects of the systemic approach to emergency management, as well as opportunities and challenges for further implementation.

[1] For previous EPRs, see: https://www.wa.gov.au/government/document-collections/emergency-preparedness-reports

1. Introduction

1.1 Report Methodology

Information contained in this report is drawn from two primary sources: the Annual and Preparedness Report Capability Survey and commentary provided by members of relevant SEMC Subcommittees.

1.1.1 Annual and Preparedness Report Capability Survey

The Annual and Preparedness Report Capability Survey (capability survey) was conducted as part of the State Risk and Capability Project. The capability survey asked participating organisations to self-assess their capability against the former SEMC Emergency Management Capability Framework. Responses were provided in the context of their roles and responsibilities as either a hazard management agency (HMA), combat agency, emergency support service, or local government.

The survey was sent to the majority of organisations with emergency management roles and responsibilities outlined in the State Emergency Management Framework. A full list of participating organisations for each year can be found in previous EPRs.

Survey questions allowed for either a yes/no response or were scaled depending on the content of the topic. Scaled responses were converted to a score between 0 to 100 to facilitate reporting, with higher scores representing greater capability.

Unless otherwise stated, survey respondents were grouped into categories for analysis and reporting (Figure 1). Responses from all HMAs were analysed and reported together. Combat agencies and emergency support services were grouped together and termed 'other support providers' or 'other.' Finally, local governments were divided into three categories – urban, agricultural, and remote, according to descriptions used in the Australian Classification of Local Governments.

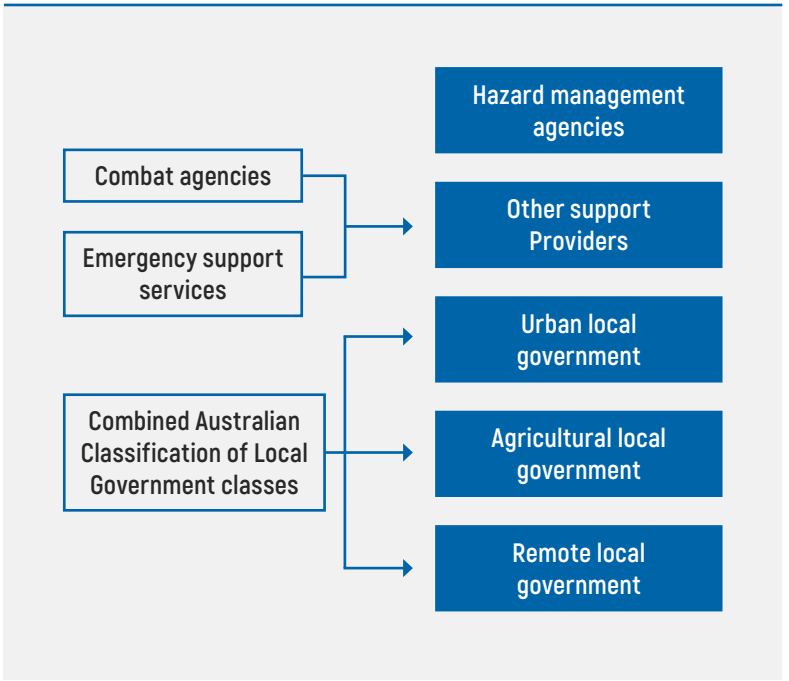


Figure 1 Grouping of respondents used to report findings in the 2023 Emergency Preparedness Report.

For the purposes of this report, capability data was compared using 2018 and 2022 data.[2] Although data is also available for the 2019 and 2021 reporting years, trend analysis was not applied due to limited comparable reporting years

[2] Capability surveys have been conducted since 2013; however, meaningful comparisons can only be made from 2018 onwards due to changes in approach and content. The survey was not conducted in 2020 due to the impacts of COVID-19.

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1.1.2 Sector Consultation

The Western Australian emergency management sector was consulted in the production of the 2023 EPR. Consultation was conducted via the SEMC subcommittee structure, with membership providing broad representation across government, peak bodies, and key philanthropic organisations. Subcommittee members were sent a limited number of survey questions related to the report themes:

- *The Broadening View of Risk:* Risk and Capability Subcommittee, Climate Change Subcommittee
- *Working Together in the Age of Big Data:* Response Policy Subcommittee
- *Sector Learning and Continuous Improvement:* Response Policy Subcommittee
- *Community Preparedness and Resilience*: Community Resilience and Recovery Subcommittee.

Participating organisations are listed below. Responses were collated and analysed for key themes.

- Department of Communities
- Department of Fire and Emergency Services
- Department of Health
- Department of Planning, Lands and Heritage
- Department of the Premier and Cabinet
- Department of Primary Industries and Regional Development
- Department of Transport (Maritime)
- Department of Water and Environmental Regulation
- Energy Policy Western Australia
- Red Cross
- WA Local Government Association
- Western Australia Police Force

1.2 Emergency Management in Western Australia

Emergency management in Western Australia is administered through the State Emergency Management Framework (Figure 2).[3] The Framework, comprised of legislation, policy, plans, procedures, and guidelines, outlines the roles and responsibilities of organisations for emergency management. It also provides a holistic governance structure for the effective management of emergencies.

The SEMC, as prescribed in the *Emergency Management Act 2005*, is the peak emergency management body in Western Australia. Comprised of a committee structure across state, district, and local levels, the SEMC provides strategic advice to the Minister for Emergency Services and provides oversight of emergency management arrangements and capability throughout the State.

[3] See https://www.wa.gov.au/organisation/state-emergency-management-committee/state-emergency-management-framework

1. Introduction

Emergency Management Agencies (EMAs) are organisations with emergency management roles and responsibilities outlined in the Framework.These agencies are responsible for managing emergency risks across the prevention, preparedness, response, and recovery (PPRR) phases of emergency management for the 28 hazards prescribed in legislation (Figure 3). Emergency management in Western Australia is underpinned by a common set of principles:

- Risk management approach
- Shared responsibility for resilience
- All-hazards approach
- Graduated approach
- All-agencies coordinated and integrated approach
- Continuous improvement
- Community engagement
- Integrated information management.[4]

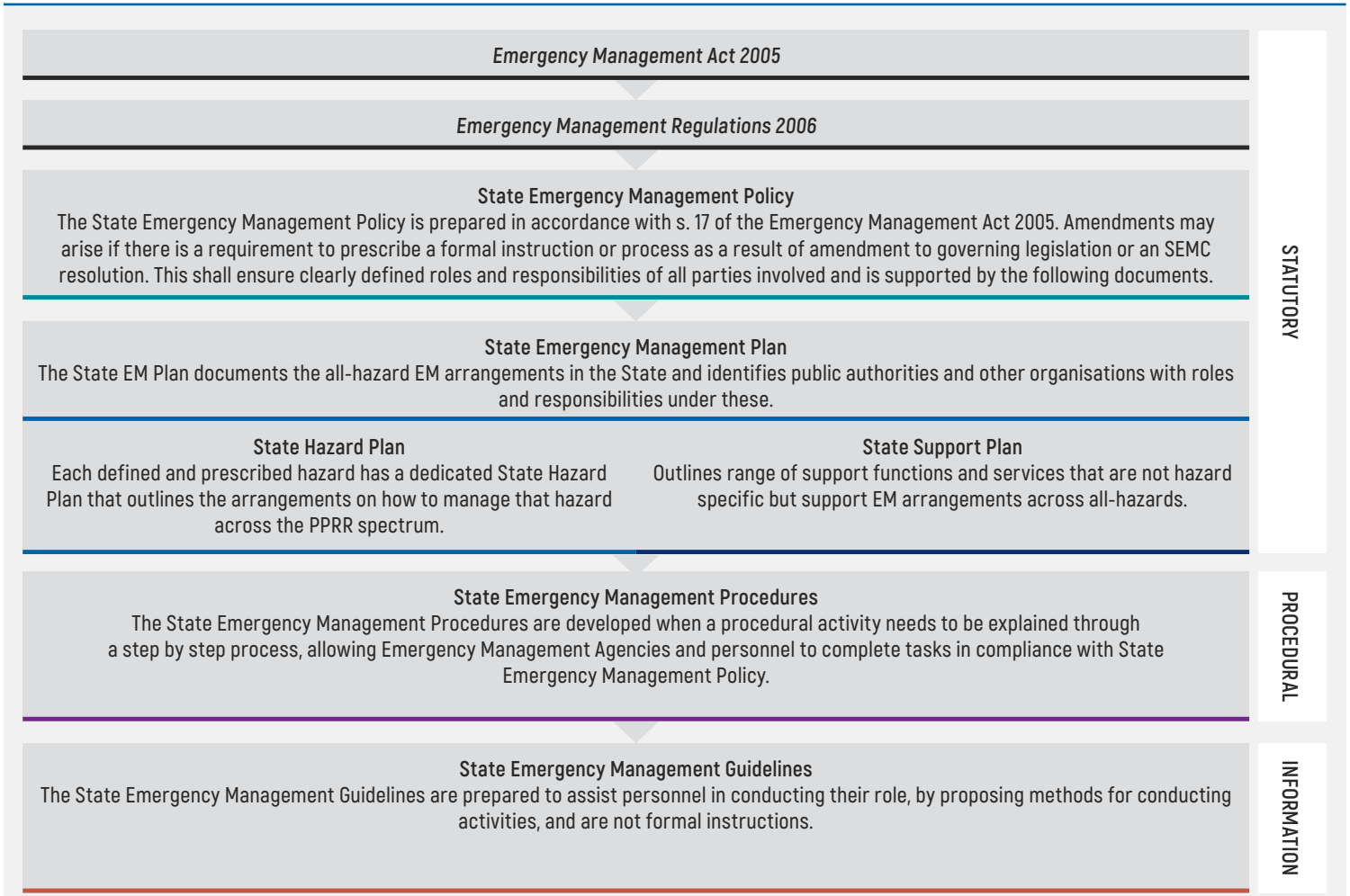


Figure 2 The State Emergency Management Framework.

[4] State Emergency Management Policy, Appendix B

1. Introduction

Figure 3 The 28 prescribed hazards in Western Australia.

Air crash	Gas supply disruption	Marine search
Animal or plant pests or diseases	HAZMAT: release of chemical, radiological or other hazardous materials capable of causing harm to persons, property, or the environment	Marine transport emergency
Biological substance: release of biological substance capable of causing harm to persons, property, or the environment		Radiation escape from a nuclear-powered warship
Collapse	Heatwave	Rail crash
Cyclone	Hostile act	Road crash
Earthquake	Human epidemic	Space re-entry debris
Electricity supply disruption	Land search	Storm
Fire	Liquid fuel supply disruption	Terrorist act
Flood	Marine oil pollution:	Tsunami

See Appendix C of the State Emergency Management Plan for further detail.

02
The broadening view of risk

2. The Broadening View of Risk

2.1 Introduction

A paradigm shift has occurred over the last decade in the way we think about emergency risks. Broadly, risk can be defined as the effect of uncertainty on goals and objectives.[5] However, in emergency management, risk is often defined more specifically as the combination of hazard, exposure and vulnerability. Here, risk manifests when a hazard (such as bushfire) impacts things, people, or places (exposure) that are susceptible to harm (vulnerability). Risk becomes an emergency when the consequences of a risk exceeds peoples' capacity to cope, and when there is a high potential for harm to the things that people value.

Internationally, there has been growing awareness that established understanding of emergency risk management needs to evolve if we are to be resilient in the face of increasingly systemic challenges.[6] This chapter examines the rise of a systemic approach to disaster risk reduction and its application in Western Australia. Specifically, it examines how our understanding of risk is changing, and what this means for emergency risk management in the Western Australian context.

2.2 Environmental Change and The Age of Humans

The development and adoption of the systemic approach to emergency risk management has been driven, in part, by growing recognition of the risks associated with rapid environmental change. Growing evidence suggests human activities have significantly altered the Earth, to the extent that we may have entered a new geological epoch called the 'Anthropocene.'[7]

The Anthropocene represents a shift from a relatively stable period in Earth's history known as the Holocene, which lasted for about 10,000 years and that allowed for the development of complex societies and global industrialisation. The Anthropocene signals a future characterised by rapid and unpredictable environment change, and an associated rise in new and increasingly complex emergency challenges.[8]

This new epoch is often traced back to the 'Great Acceleration' which began after World War II. During this time, and continuing today, economic growth and technological progress skyrocketed, with substantial impacts on the environment. These effects, such as climate change, plastic pollution, species extinction, and ocean acidification, will endure for thousands to millions of years.[9]

2.3 The Growing Costs of Disasters

Human-caused environmental changes are already having notable effects, with a significant increase in economic losses from natural disasters worldwide. Globally, from 2000 to 2019, these losses nearly doubled to $2.97 trillion compared to the previous two decades, mainly due to an increase in climate-related disasters.[10]

Australia has seen a rise in costly disasters, with 28 events each causing over a billion dollars in damage since 1967, ten of them occurring in the last 10 years.[11] Modelling suggests that the cost of disasters in Australia will dramatically increase in the coming years. By 2050, annual disaster costs could range from $73 billion to $94 billion depending on future greenhouse gas emissions.[12] For Western Australia alone, the cumulative economic cost of natural disasters between 2020 and 2060 could reach $120 billion.[13]

[5] AIDR (2020) | [6] UNDRR (2019) | [7] For background, see Crutzen (2006); Steffen et al. (2015), Steffen et al. (2018) | [8] Richardson et al. (2023) | [9] Steffen et al. (2015) | [10] UNDRR (2020)
[11] Gissing, A. Presentation to SEMC March 2023, based on data from the Insurance Council of Australia | [12] Deloitte (2021) | [13] Deloitte (2021)

2. The Broadening View of Risk

Disasters not only impact specific regions but increasingly have far-reaching effects on financial systems and supply chains, affecting everyone. Modelling indicates that Australian households paid an average of $1532.71 due to natural disasters in 2021-2022 and that costs will rise to approximately $2,500 annually by 2050.[14]

While projections of future disaster costs are informative, it is essential to consider that these events will unfold within changing environmental, economic, and political landscapes. The 2023 World Economic Forum Risk Report[15] warns that in the next decade natural disasters and extreme events will occur in an increasingly complex geopolitical setting, characterised by resource shortages, economic shocks, mass migrations, societal divisions, conflicts, and further environmental deterioration. These challenges will be influenced by large-scale 'mega -trends' that will shape societies' overall risk profiles in unexpected ways.[16]

2.4 Systemic Risk and Disaster Risk Reduction Policy

In 2015, a significant shift occurred in international disaster risk management policy. Systems-based approaches became widely adopted in major agreements like the Sendai Framework for Disaster Risk Reduction, the 2030 Agenda for Sustainable Development, and the Paris Agreement.[17] This change led experts to declare in 2019 that "[t]he era of hazard-by-hazard risk reduction is over; present and future approaches to managing risk require an understanding of the systemic nature of risk."[18]

Unlike traditional methods that break problems into smaller pieces, systemic approaches look at the relationships and dynamics that influence how a system behaves. Some key aspects of this approach include:

General Resilience: in addition to preparing for specific hazards, there is an increased focus on building overall resilience. This means being prepared to deal with new and complex challenges (see Box 1).

Understanding Drivers: this includes work to identify what makes a system resilient or vulnerable in the face of sudden shocks or long-term changes.

Interconnected Systems: this is recognition that human and natural systems are interconnected, complex, and can change in unpredictable ways.

Values and Fairness: issues of equity, fairness and representation are considered when deciding how to manage complex emergencies and plan for the future.

[14] Deloitte (2021) | [15] WEF (2023) | [16] Naughtin et al (2022), WEF (2023) | [17] UNDRR (2019) | [18] UNDRR (2019)

2. The Broadening View of Risk

Box 1

Hazard-specific resilience versus general resilience

The shift towards a systemic approach to disaster risk reduction means moving from a focus on 'specific resilience' to 'general resilience.' Specific resilience deals with preparing for and responding to a particular emergency, such as creating a plan for managing the impacts of a cyclone in a specific area.

In contrast, general resilience is the ability to cope with and adapt to various, often unexpected, emergencies. This is crucial for dealing with large, complex, or compounding crises, like COVID-19 or climate change. For instance, communities that invest in resilient infrastructure and foster strong community bonds are often better equipped to handle emergencies, regardless of their type.

It is important to note that the capabilities that promote general resilience are often different to those that promote resilience to specific hazards. General resilience aims to improve the overall ability of a system to innovate, learn, and adapt. This includes building trust and effective leadership, encouraging connection and collaboration, support forward-thinking, and investing in a variety of skills and approaches.[19]

In Australia, this global shift is reflected in the National Disaster Risk Reduction Framework (NDRRF) and its Action Plans. Together, they emphasise a shift from dealing with individual hazards to a more comprehensive approach to reducing disaster risks and building resilience. There are four main areas of focus: understanding disaster risk, accountable decisions, enhanced investment, and governance, responsibility, and ownership.[20]

In 2020, each state in Australia signed the National Partnership Agreement on Disaster Risk Reduction (NPA) which intends to deliver on the priorities of the NDRRF until 30 June 2024. The NPA allocated $104.4 million to states and territories between 2019-2024, of which Western Australia received $12.5 million. Each jurisdiction has its own plans that align with these priorities and oversees the allocation of funding provided under the NPA.

Western Australia has the Western Australian Implementation Plan (WAIP)[21] created in 2020, which outlines eleven key action areas aimed at achieving the goals set in the NDRRF over five years. Under the WAIP, Western Australia distributes the $12.5 million in Commonwealth funding through an annual National Disaster Risk Reduction grant program or through state-level projects as identified by the SEMC. As the existing NPA reaches expiry, a final program report will be delivered in April 2024 to identify whether this approach has sufficiently achieved significant natural hazard risk reduction.

While the NPA is due to expire in 2024, the National Emergency Management Agency (NEMA) have released the Second National Action Plan which intends to drive national NDRRF outcomes.[22] Further work is progressing between NEMA and the states and territories regarding the achievement of the priorities, outcomes, and national actions outlined in the Second National Action Plan. It is likely that another NPA will be required to drive a nationally coordinated and sustainable investment approach.

[19] Carpenter et al (2012), Sillmann et al. (2022)) | [20] NDRRF (2018), NEMA (2023) | [21] Government of Western Australia (2020) | [22] NEMA (2023)

2. The Broadening View of Risk

2.5 From the Sector:

Amid significant shifts in international and national emergency risk management policy, members of the SEMC Risk and Capability Subcommittee and SEMC Climate Change Subcommittee were asked for their insights on emergency management risk. Members were asked to reflect on how the conceptualisation of emergency risk has changed over the last decade, what is driving these changes, and what opportunities and challenges lie ahead. Responses are discussed thematically below.

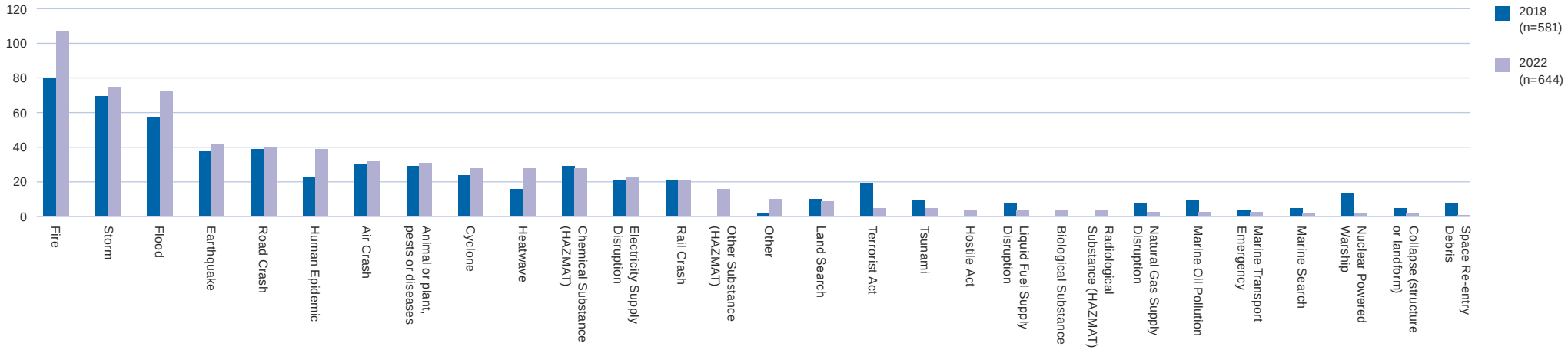
2.5.1 Identifying Risk

Respondents reported that the way we think about emergency management risks in Western Australia has progressed significantly over the last decade. This is despite the difficulties of identifying and assessing risk across an area as large as Western Australia, which is prone to many different hazards.

Organisations across the Western Australian emergency management sector undertake risk assessments for known hazards. These assessments help organisations undertake emergency management planning.

Figure 4 below compares the total number of risk assessments conducted and documented per hazard for 2018 and 2022. Data represents the total number of risk assessments conducted by HMAs, combat agencies, essential service providers, and local governments, with data drawn from the Annual and Preparedness Report Capability Survey. The top three hazards assessed in both years were fire, storm, and flood. There was a 10 percent increase in the total number of risk assessments undertaken between 2018 to 2022. Notably, there has been a significant increase in the number of risk assessments conducted for fire, flood, human epidemic, and heatwave. Less commonly experienced hazards saw little to no increase in the number of risk assessments undertaken over the same period.

Figure 4 : Number of risk assessments per hazard 2018 versus 2022



2. The Broadening View of Risk

The State Risk and Capability Project was singled out as a key project for driving greater awareness of emergency risks. The project, funded through successive National Disaster Risk Reduction grants from 2013-2022, identified hazard-specific risks across state, district, and local levels, and assessed organisational emergency management capabilities via the Annual and Preparedness Report Capability Survey. Information captured through the project has been used to produce capability summary reports for EMAs, hazard fact sheets, and other products, such as the EPR, that aim to enhance awareness and understanding of emergency management risk and preparedness across the sector.

Currently, the SEMC Risk and Capability Subcommittee is working towards using risk assessments collected through the State Risk and Capability Project to develop a state-level risk register for use at state, district, and local levels.

2.5.2 Changed Thinking on Risk

Respondents noted that the sector's understanding of risk is not only increasing, it is also changing. Historically, the focus was mainly on responding to specific hazards. However, recent years have seen a significant shift towards a more systemic approach with the following characteristics:

Beyond Response: risk information is increasingly used to inform prevention and preparedness activities and not just emergency response.

Risk versus Hazard: there has been an increased focus on the combined attributes of risk (i.e., hazard, exposure, and vulnerability) rather than hazards in isolation.

Systemic Effects: there is increased recognition of cascading, compounding, and concurrent events, as well as their implications for resourcing, coordination, and management.

Emergency Baselines: previous baselines used for planning and preparedness need to adjust given the increasing frequency, severity, and complexity of emergency events.

The main drivers for these developments, according to respondents, are climate change and the occurrence of large-scale emergencies like COVID-19 (see also the Special Section on Western Australia's Response to COVID-19). As one respondent observed: "[…] *the conception of risk is changing based on the changing disaster risk being experienced – e.g., COVID, Cyber Risk, increases in '1 in 100 year' events, and unprecedented disasters.*" These events are reshaping how the sector perceives and responds to risk. Other factors cited by respondents include evolving technology and access to better sharing platforms. Interestingly, respondents did not attribute these shifts to major emergency policy changes like the NDRRF. This suggests that changes in the way the sector thinks about risk are being driven more by external factors and experiences rather than top-down policy settings.

Despite these advances, respondents noted that further work is needed to understand the social dimensions of risk. Currently, much of the focus continues to be on the physical environment with substantially less on the social, economic, and cultural conditions that produce vulnerability. As one respondent reported: *"we have not yet got to the point where we factor socio-economic factors into our assessment of how at-risk a community may be. Our focus remains on the physical environment. The reality is that a community displaying a large range of socio-economic weaknesses but with a lower risk to a natural hazard may have a greater risk rating than a more resilient community with a higher risk to a natural hazard."* This theme is discussed further in Chapter 5.

2. The Broadening View of Risk

Box 2

Western Australia's Climate Adaptation Strategy

Western Australia's first Climate Adaptation Strategy was released in July 2023, prioritising 37 actions to ensure communities and the economy are resilient to risks posed by climate change. Almost $40 million has been allocated in the 2023-24 State Budget to deliver the Strategy, which will enhance the State's capability to prepare for the climate of the future. The Strategy sets out four key directions:

- Producing credible climate information
- Building public sector capability and accountability
- Enhancing partnerships to coordinate action
- Supporting the climate resilience of Aboriginal people.

A core commitment includes the development of a Climate Risk Framework by the Department of Treasury in collaboration with the Department of Water and Environmental Regulation (DWER). This Framework, in combination with the recently launched Climate Risk Capability Initiative, will enhance the capability of all government agencies to better understand and manage the risks posed by a changing climate.

As the need for methods of assessing systemic risks increases, observations were made that the demands for complexity must be balanced against useability. This was particularly evident in the context of local governments. As observed by a representative of the local government sector, there is a tension between *"a need for greater understanding of complexity and systemic impact in risk, and the need for simple and practical processes that can achieve an effective outcome for risk management that can be implemented by local level emergency management within the boundaries of capacity and resourcing."* Navigating this tension will likely be a key challenge for the sector moving forward.

2.5.3 Embedding Emergency Risk Management across Government

A significant amount of work is underway to embed emergency risk management across government. While emergency management was once the responsibility of individual agencies with formal emergency management roles, responsibilities are increasingly considered more broadly: "*The consideration of emergency management risk has become a much more prominent issue with broad cross government recognition of its importance. It is no longer only considered by emergency response type agencies."* In turn, there has also been a growing focus on interagency cooperation and interoperability for emergency management (see Chapter 3).

Climate change has prompted a significant volume of activity across government, including the development of the Climate Adaptation Strategy (see Box 2) and a range of other policies and programs. Examples include:

- Western Australian Climate Policy (2020)
- Climate Change Risk Management Guide (2021)
- Climate Risk Framework (under development)
- Sector Adaptation Plans: Health and Emergency Management (under development)
- Climate Science Initiative
- First Nations Climate Resilience Fund

2. The Broadening View of Risk

Credit rating agencies are also increasingly factoring climate risk in their assessment of the State's credit rating. The Western Australian Treasury Corporation coordinated the development of an Environmental, Social and Governance (ESG) Information Pack with the objective of establishing broader credibility for the government's ESG credentials.

Further, in the emergency management sector, the SEMC established the Climate Change Subcommittee (CCSC) in late 2022 to 'provide leadership, advice, and oversight to prepare and respond to the impacts of climate change on emergency management.'[23] The CCSC is also overseeing the development of the Western Australian Emergency Management Sector Climate Change Adaptation Plan which will be delivered early-to-mid next year.

2.5.4 The Future of Risk

As emergency risk management in Western Australia advances, respondents observed the following challenges:

Changing Nature of Risk: the understanding of risk is evolving due to factors like climate change and COVID-19, adoption of systems approaches, and recognition of the importance of values, fairness, and equity in emergency management. Further, new risks are manifesting because of our increasing dependence on digital technologies and energy systems, as well as the complex supply chains that sustain them. Mental models, knowledge systems, concepts, and methods will need to be continually updated as understanding grows.[24]

Assessment Methods: currently there is little consensus on how to implement, monitor or assess systemic risk management approaches. Balancing the need for in-depth understanding with practical, resource-friendly methods remains a challenge.[25]

Resourcing: across the sector, there is a perceived gap between identifying risks and having the necessary human, physical, and financial resources to manage them. Allocation of resources to manage increasingly systemic risks will require considered and innovative management.

Collaboration: to promote an effective and efficient emergency management system, there is growing need for government agencies, communities, and other sectors to work together. This will require new ways of working and facilitating a culture of collaboration and openness (see Chapters 3 and 5).

2.6 Summary and Conclusions

The challenges we face in the Anthropocene, an era marked by significant human impact on the environment and accelerating change, are evident in emergency management. To deal with the pace of change, we must rethink how we understand and assess risk.

Large programs of work are being carried out across the sector to understand and assess emergency risks. Through this work, our understanding of risk is improving, particularly in response to the COVID-19 pandemic and climate change. However, while there has been some progress in using systems-based approaches for emergency risk management, there are limitations. These approaches are often not well-defined, challenge traditional risk concepts, and may conflict with existing legislative and institutional structures.

[23] SEMC Climate Change Subcommittee Terms of Reference, endorsed 2022. | [24] UNDRR (2022a) | [25] AIDR (2022), UNDRR (2022b)

2. The Broadening View of Risk

Further, there is a lack of clear methods to formalise ideas like 'systemic risk' and 'resilience' into assessments. Consequently, risk assessment still tends to focus on specific hazards and their physical aspects.

Despite these challenges, it is evident that Western Australia is changing how it thinks about emergency risk. Systems principles are being increasingly applied and emergency risk management is becoming a core function across government, as is resilience. Here, the SEMC Risk and Capability Subcommittee has significant opportunity to promote practical ways to implement systemic disaster risk management, including new methods of risk identification, capability development, and sector-specific learning.

Key messages and opportunities:

- Emergencies are becoming increasingly frequent, severe, and costly, and the drivers of risk more complex.
- Since 2015, there has been a significant shift internationally towards a systemic approach to disaster risk management. This approach is embedded in major international and national disaster risk reduction agreements and policies.
- There is greater awareness of the emergency risks confronting Western Australia, driven in response to climate change and COVID-19, and by activities undertaken by the sector, including the State Risk and Capability Project.
- The sector recognises that further work is needed to address increasingly systemic risks, including cascading and compounding events, non-traditional hazards, and the social dimensions of vulnerability.
- There is opportunity for the SEMC Risk and Capability Subcommittee to advise on practical ways to implement the systemic approach to emergency management. Areas of focus include:
  - development of a robust state-wide risk assessment process, including progressing work underway on the State Risk Register;
  - development of tools for identifying and assessing systemic risks, informed by emerging approaches[26] and outcomes of the National Emergency Risk Assessment Guidelines Review[27]; and
  - development of capabilities for specific and general resilience in alignment with the new Western Australian Emergency Management Capability Framework.
- There is opportunity for the SEMC Response Policy Subcommittee to provide advice regarding the inclusion of systemic disaster risk principles and approaches in the State Emergency Management Framework, particularly in the context of risk assessment and capability development.

[26] AIDR (2021), Sillmann et al. (2022)

[27] AIDR (2022)

03
Working together in an age of big data

3. Working Together in the Age of Big Data

3.1 Introduction

The scale, pace, and complexity of emergency events are increasingly beyond the ability of any one institution to manage. In turn, effective risk management is dependent on the ability of different sectors and organisations to work together.

Embedded within the State Emergency Management Policy are principles that promote collaboration for emergency management. Particularly applicable is the principle of an 'all-agencies coordinated and integrated approach.'[28] While a coherent approach to emergency management depends upon clear understanding of roles, responsibilities, risks, and capabilities, these functions are also increasingly underpinned by access to, and use of, data.

This chapter examines the rise of big data in emergency management and the implications for the systemic approach to emergency risk management in Western Australia. It also examines the opportunities and challenges associated with the increasing volume and complexity of data, our increasing dependency on the security of digital environments, and what this means for agencies working together for emergency management.

3.2 Data in Emergency Management

Information has always been essential for emergency management. Increasingly, digital data, and its transformation into information via methods of analysis, are used by governments, communities, and individuals to make informed decisions about emergencies across PPRR. In effect, data is what allows actors to 'see' risk and to act. Today, data is so important to emergency management that that it has been termed a 'strategic asset' by the United Nations Office for Disaster Risk Reduction.[29]

Over the past decade there has been a substantial increase in the amount, quality, and types of data available to decision-makers in emergency management. Satellite imaging, remote sensing, electronic field observations, environmental and hazard models, amongst other sources, have become increasingly ubiquitous in emergency response and widespread across the emergency management spectrum.[30] The Royal Commission into National Natural Disaster Arrangements[31] outlines contemporary data demands of strategic and operational decision makers (Figure 5). The availability of such data has fostered development of increasingly sophisticated data products, giving decision-makers access to near real-time insights into unfolding emergencies.

[28] State Emergency Management Policy, Appendix B | [29] UNDRR (2023) | [30] UNDRR (2022a) | [31] RCNNDA (2020)

3. Working Together in the Age of Big Data

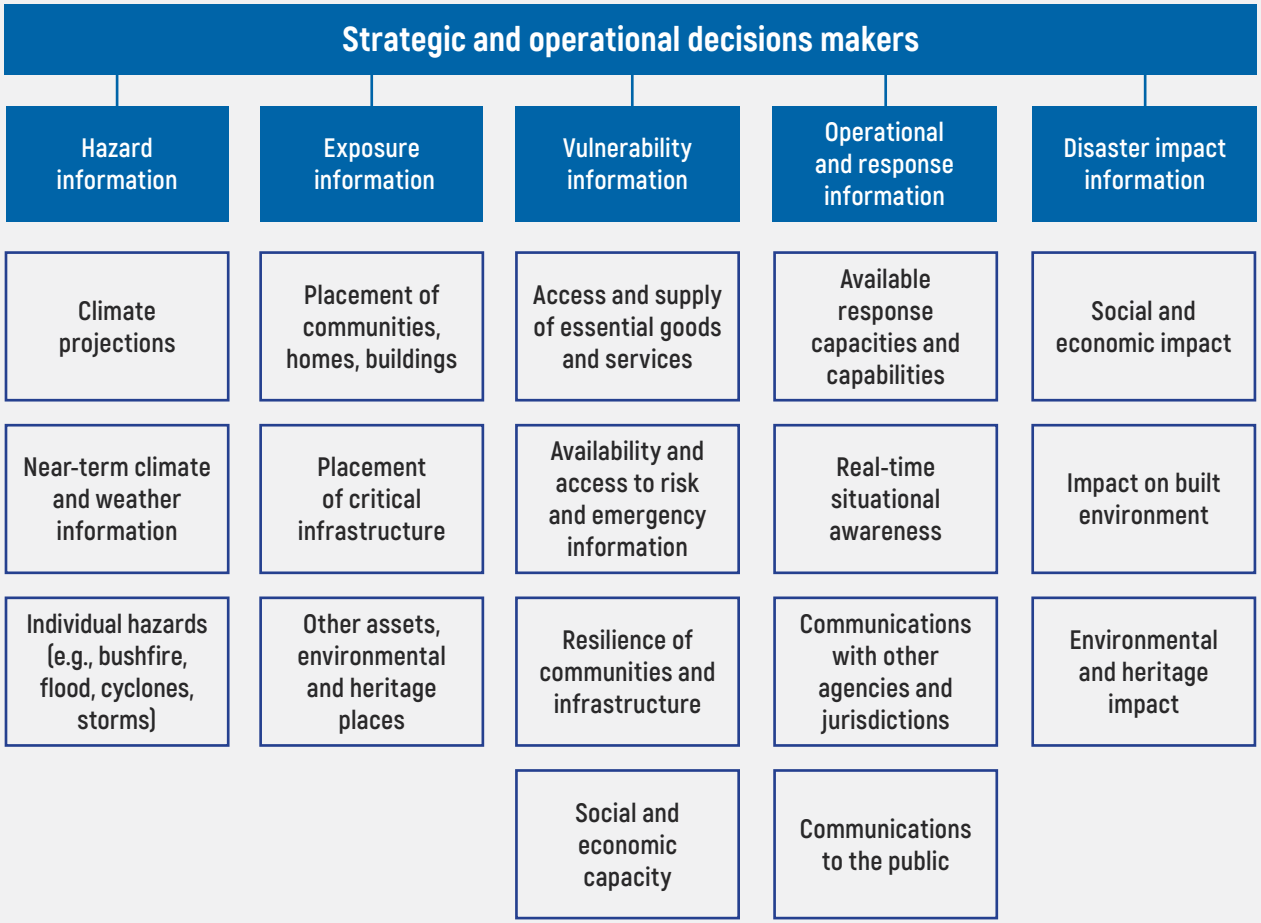


Figure 5 Information needs for strategic and operational decision makers, from Royal Commission into National Natural Disaster Arrangements (2020), p. 113.

The rise of big data in emergency management has been accompanied by the increased automation of service delivery, situational awareness, and risk notification, driven in part by advances in machine learning, artificial intelligence, and cloud computing.[32] While emergency management of the past has relied on data gathered and analysed by people, today's emergency management is increasingly dependent upon data gathered and processed by machines.

Big data and automated approaches present opportunities to improve various aspects of emergency management, including:

- Security, availability and integrity of data and digital environments
- Resource allocation
- Early detection and warning systems
- Communication and public information
- Situational awareness and risk modelling
- Training through simulation
- Inter-agency coordination and collaboration
- Service delivery[33]

[32] https://www.startus-insights.com/innovators-guide/emergency-management-trends-innovation/#big-data-analytics

[33] McLennan et al. (2022)

3. Working Together in the Age of Big Data

3.3 From the Sector

Members from the SEMC Response Policy Subcommittee were asked to reflect on how the sector works together to achieve emergency management outcomes, as well as the opportunities and challenges associated with big data. Responses are presented thematically below.

3.3.1 Increased Collaboration and Interoperability

Respondents reported that there has been a substantial shift towards a culture of working together for emergency management. This has been driven by the increasing risks associated with changed environmental conditions, first-hand experience of large-scale emergency events, and the adoption of more collaborative models in emergency management. As one respondent observed: *"The changing emergency management environment over the last decade has naturally led to an all-hazards approach, with an emphasis on a 'shared responsibility' methodology. It's extremely rare in managing a response to incidents in which there is only a single agency responding."*

As part of this shift, respondents further observed the growing trend towards agency 'interoperability' - the ability of an agency and their respective systems to work with other government, community, and third-party providers or the efficient and effective delivery of emergency management outcomes.[34] Striving for interoperability via use of new technologies was seen as a priority for HMAs: *"The need for increased interoperability between agencies is imperative and must be a priority for all HMAs. Over the last decade there have been a number of opportunities for agencies to work together and explore modern technology and operational procedures for increased engagement and collaboration."*

Respondents provided several examples of increased interoperability for emergency management over the last decade, including:

- representation of agency Liaison Officers within emergency management response and recovery structures, including Department of Fire and Emergency Service's (DFES) State Operation Centre and WA Police Force's State Operations Command Centre;
- joint management of emergency management resources, appliances, and vessels across State Government agencies and through national coordination mechanisms;
- joint agency training and exercising, and
- data sharing for emergency management across PPRR.

The trend towards improved agency interoperability is further evidenced by data drawn from the Annual and Preparedness Report Capability Survey. Figure 6(a) shows average reported interoperability scores for emergency coordination structures between 2018 and 2022, while Figure 6(b) shows average reported interoperability scores for communication systems for the same years. Improvements in the interoperability of coordination structures are reported by HMAs and to a lesser extent by the other organisations between 2018 and 2022. In contrast, minor to very slight decreases were reported in the interoperability of communication systems over the same period.

[34] UNDRR (2019)

3. Working Together in the Age of Big Data

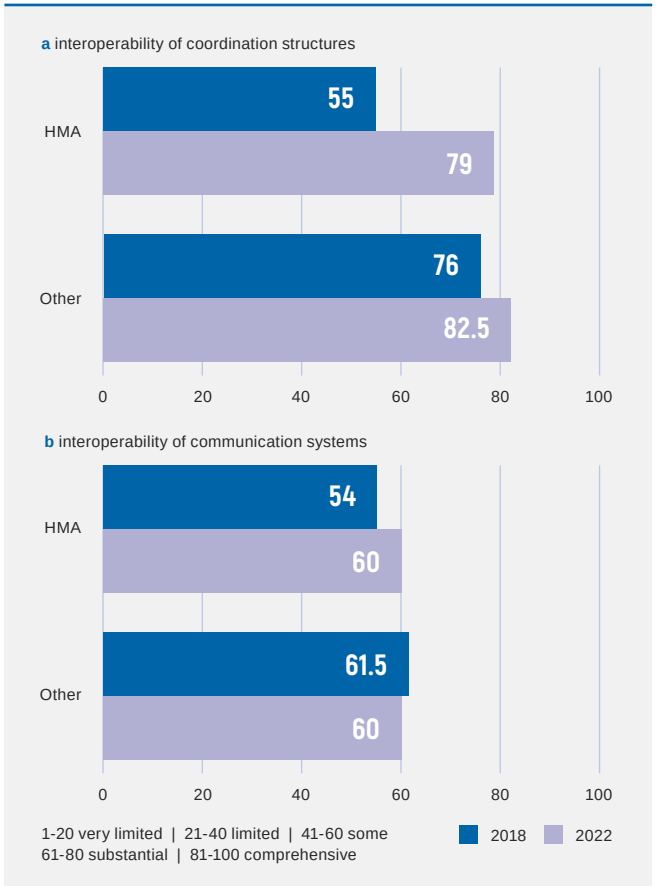


Figure 6 Average reported level of interoperability of (a) coordination structures and (b) communication systems during emergencies 2018 versus 2022.

3.3.2 Interoperability enabled through Data

Interoperability is also being driven by the growing information needs of state government agencies and other stakeholders. State agencies increasingly require robust data to inform decision-making and to deliver citizen-centric emergency management services. These demands are enabled through the growing availability of data-related products. As one respondent put it: *"now more than ever there is an integration of data into incident management. This includes the increasing importance of the intelligence function in many areas for how incidents are managed. Primarily, this has been driven by new technologies that allow for further integration of data and timely analysis to inform incidents."*

Examples from respondents of increased data availability include:

- enhanced remote sensing and satellite capability, as well as increased availability of aerial and drone assets;
- expansion of regional weather detection systems, including the Doppler Weather Radar and Automatic Weather Station systems;
- environmental scanning and impact tools, such as the Australian Fire Danger Rating System, Bureau of Meteorology's (BoM) Met-Eye products, the Australian Exposure Information Portal, and road network information systems;
- COVID-19 dashboards for contact tracing, travel, and vaccination (see Special Section on Western Australia's Response to COVID-19);
- short and long-term modelling tools, including Firewatch Aurora, down-scaled climate change models, BoM cyclone tracking forecasts, and drought predictions;
- increasingly mature logistics and asset management digital systems and processes;
- geospatial and other data derived from mobile devices;
- data analytics for biosecurity; and
- increased availability of third-party data providers across multiple domains.

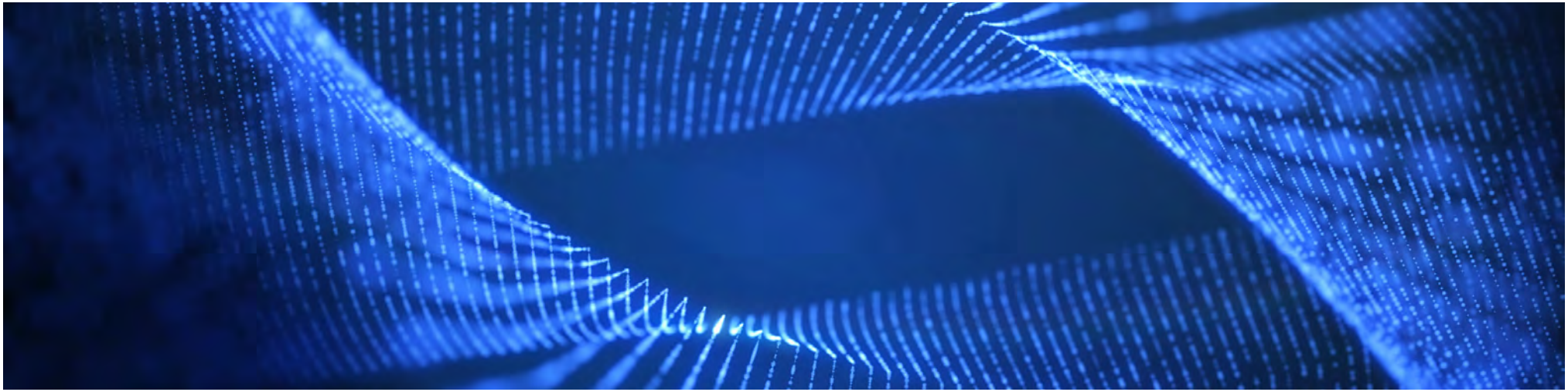
3. Working Together in the Age of Big Data

A key mechanism for sharing data for emergency management is the Shared Location Information Platform (SLIP). Delivered by Landgate, SLIP is the Western Australian Government's platform for sharing spatial information. It provides a wide range of data and related products, including mapping data, web services, and data downloads. Many of these data streams are used by emergency services to build bespoke data products for emergency response and to deliver core business functions. Box 3 details the transformation of SLIP data into data products for emergency management and provides an example of the growing complexity of the emergency management data ecosystem in Western Australia.

Box 3

Evolution of Data Systems for Natural Hazard Risk Management in Western Australia

This case study provides an example of the growing complexity of Western Australia's emergency management data ecosystem, with focus on the DFES Intelligence Systems (IS) team. The IS team is responsible for providing data products to support the management of natural hazards. Currently, the team manages 12 digital applications, including the widely used Fire and Emergency Services Maps application (FESMaps), which enables a common operating picture for Western Australia. These applications rely on a complex system of data providers, data sources, and information and communication technologies (Figure 7 next page).



3. Working Together in the Age of Big Data

Box 3 continued

Intelligence Systems – Complexity and Dependencies

Stakeholders

50+ Orgs\Bus Units

1200+ DFES
Users last year

x 12

Data

400 Datasets symbolised to
300 Map\Data services

100+ Automated FME Data
Scripts working 24/7

ICT

34 Servers\VMs in Cloud

13 Desktops\Laptops

1 SQL database + backup

2 Spatial Server Engines

2 File Stores

Plus 10 field kit data copies

APPLICATIONS

12 Mapping Applications
Incidents, Mitigation, Simulation

3 Mobile Capture Apps
Damage, Recovery,
Fire Investigation

Feeding major systems
like Emergency WA,
CAD, WEBEOC

Broadcasting live incident data for use by other state agencies, utilities, and others

Data to 30+
Desktop Users

INCIDENT RESPONSE

Providing the following:

Ability to capture and see where the incident is.

Ability to see where resources and vehicles are.

Ability to see what is at risk.

Ability to model predictions.

Ability to plan, task and co-ordinate a response.

Ability to capture and tally what has been damaged.

Ability to know the address and owners of properties.

Ability to tell the public and agencies where the incident is.

Ability to track recovery.

CORPORATE PROJECTS

Anyone can ask us to help. Here is a list of major needs that are dependent on our team\functions:

DFES:
EmergencyWA 2.0
Recovery/Damage Data
Observations Collection Apps

National:
National Joint COP
Royal Commission (data)
AFDRS
Australian Warning System
Cwlth-EMA\NRRA
Fire History Project
SDRIP (QLD)
Tell-Us-Once

Intelligence Systems:
ICOPS \ New Tech Env
Corp Report Env
Fire Mapper

Figure 7 The emergency management intelligence data ecosystem (reproduced from R Nowrojee with permission).

Delivering meaningful data products involves several stages, as shown in Figure 8 (next page). The horizontal axis represents the ‘data delivery journey’, while the vertical axis displays a range of software platforms used to process data from collection through to consumption. Much of the sourced data is provided by external providers which is enabled through their own resources, technologies, and governance structures. The complete data ecosystem therefore extends far beyond what is shown.

3. Working Together in the Age of Big Data

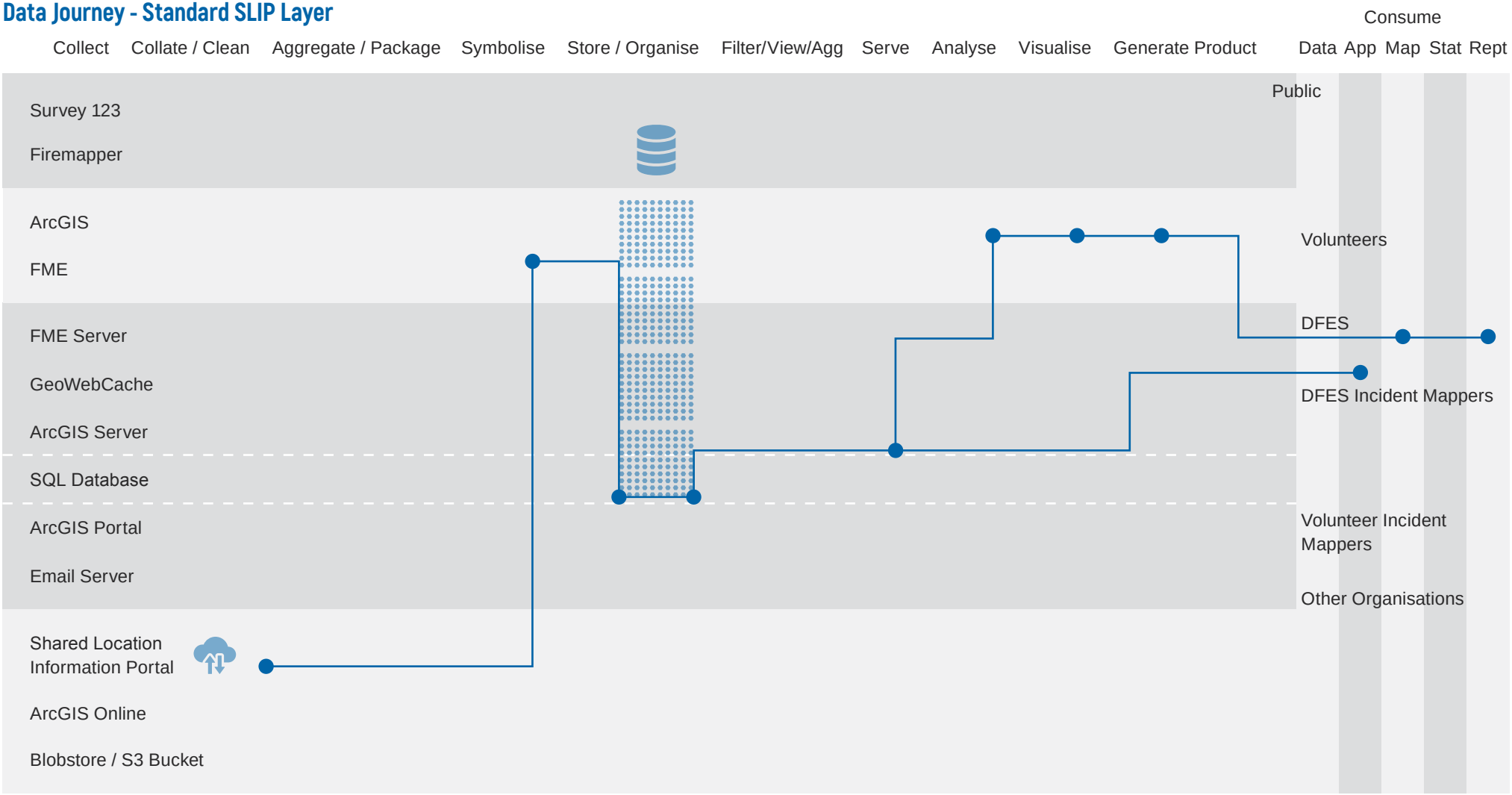


Figure 8 The data journey from collection to consumption (reproduced from R Nowrojee with permission).

3. Working Together in the Age of Big Data

Box 3 continued

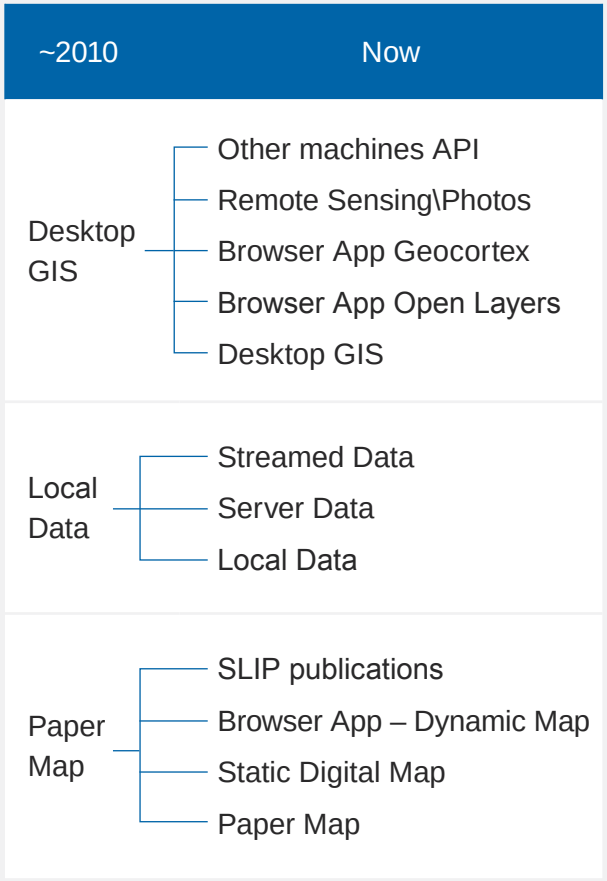


Figure 9 The evolution of data context from ~2010 to present day (adapted from R Nowrojee with permission).

3.3.3 Emerging Challenges of Big Data

Accompanying the significant benefits of increased data and data sharing, respondents also reported the following emerging challenges:

Resource and Capability Limitations: data collection and analysis are supported through technical systems comprised of hardware, software, people, and other inputs. Collecting and making sense of the increasing volume of data requires an increase in resourcing if the benefits of big data are to be realised. As noted by one respondent, a major challenge of increased data and information is: *"gathering and sharing the right data, presenting it in such a way that is timely and useful to emergency managers on the ground at the local level and not adding to the administrative burden of collecting and collating information for the purpose or sharing up the chain."* Also mentioned was the expense of purchasing and implementing technical systems, as well as the cost of upskilling staff.

Data Governance: the effective and ethical use of data is supported by fit-for-purpose governance systems and standards. Currently, as indicated by respondents, data governance systems for emergency management remain relatively immature, with data sharing inhibited by a lack of formalised arrangements. Work is underway to introduce data privacy and data sharing legislation which, in combination with other programs of work, will address these challenges (see Section 3.4).

Limits of Quantification: data systems are typically designed for quantitative data. However, the importance of other types of data, including community values and other non-quantifiable data, are increasingly recognised in emergency management. As one respondent noted, an emerging challenge for data systems involves *"integrating qualitative/community-based information into data systems that are traditionally more quantitative in focus [as well as] developing better ways to monitor and assess less tangible objectives such as community resilience."* Furthermore, collecting this data requires working collaboratively with an ever-expanding network of stakeholders. Part of the challenge is clarifying information needs and identifying what is possible within technical, resource, and time limitations. It was also recognised that data needs often differ between operational and scientific contexts.

3. Working Together in the Age of Big Data

3.4 Leveraging Opportunities and Addressing the Challenges

There is a large body of work to address the emerging challenges associated with big data and to leverage its opportunities for emergency management. Examples include:

Governance and Strategy: the Office of Digital Government within the Department of the Premier and Cabinet (DPC) was created to coordinate the digital transformation of the Western Australian Public Sector. Some of the key initiatives include the implementation of the Digital Strategy for the Western Australian Government 2021-2025, the WA Cyber Security Policy, the Digital Capability Fund, and other policies that support interoperability, open data, and digital services. Privacy and responsible information sharing legislation is also under development. DPC also appointed a Chief Data Officer to manage data strategies.

In addition, DFES initiated a project to develop the Western Australian Emergency Services Digital Strategy 2023-2033. The aim of the strategy is to identify a pathway for the digital transformation of emergency services across the Western Australian emergency management sector. Consistent with the Digital Strategy for Western Australia and recommendations from the RCNNDA, the strategy will deliver a roadmap for the development of a more efficient, consistent, and joined-up approach to data collection, management and sharing to inform emergency management activities across PPRR.

Mitigating Cyber Risks: DPC is undertaking the development of a State Hazard Plan (SHP) to introduce Cyber Security Incident as a hazard under the the State Emergency Management Framework. The SHP formalises the management of cyber security hazards across PPRR and outlines organisational roles and responsibilities. DPC and other state agencies are also undertaking work to manage the increased risks from cyber security threats, including the establishment of the WA Government Cyber Security Operation Centre, review of the WA Government Cyber Security Policy, as well as cyber security reporting and funding.

Partnerships for Enhanced Risk Modelling: partnerships between emergency management agencies and scientific organisations are co-developing sophisticated modelling approaches to forecast emergency risks. Examples include:

Climate Science Initiative WA: led by DWER in partnership with the New South Wales Government, Murdoch University, and the Pawsey Supercomputing Research Centre, this project will deliver high resolution climate projections for Western Australia extending 75 years into the future.[35]

Earthquake Impact and Risk Assessment for Perth and Supporting Infrastructure (EIRAPSI): A joint project led by DFES in collaboration with Western Power, Water Corporation WA, Main Roads Western Australia, Global Earthquake Model Foundation, and Geoscience Australia, this project delivered an improved understanding of earthquake risks to critical infrastructure in the Perth area using catastrophic loss modelling techniques.[36]

Spatial WA – Exposure Modelling for Emergency Management: led by Landgate, Spatial WA is a whole-of-government project that aims to deliver a digital twin technology platform for Western Australia. A digital twin is the digital representation of natural and built environments, used for planning, assessment, and modelling. As part of the larger project, DFES is leading the implementation of the Exposure Modelling for Emergency Management project with the aim of generating detailed and up-to-date modelling insights for hazard exposure throughout the State.

[35] https://www.wa.gov.au/organisation/department-of-water-and-environmental-regulation/climate-science-initiative | [36] Edwards et al. (2021)

3. Working Together in the Age of Big Data

3.5 Summary and Conclusions

The adoption of big data and automated systems present significant opportunities to further enhance the capabilities and effectiveness of the Western Australian emergency management sector. Already, a large volume of work is underway to leverage opportunities and to address the challenges of big data. Indeed, collaborative approaches to emergency risk modelling, as well as forthcoming digital twin platforms, have the potential to transform both our understanding of and the way we assess emergency risks.

Further to technology programs, the rapid development of data policies, as well as forthcoming data sharing and privacy legislation, indicates that gaps in strategy and governance are being addressed. In combination with the development of new service delivery platforms, these advances also have the potential to deliver increasingly powerful citizen-centred services, improving the efficiency and effectiveness with which government interacts with citizens during and after emergencies.

Despite these opportunities, the full potential of big data will only be realised if supported by appropriate investments in digital technologies, infrastructures and security, as well as in people with the skills needed to harness their power. Recent forecasts indicate spending on information technologies will continue to rapidly increase in Australia,[37] while significant skill shortages are likely to remain.[38] Navigating resourcing and skill challenges will be essential as dependency on digital systems continues to grow.

Key messages and opportunities:

- The volume, type, and availability of data for emergency management has dramatically expanded over recent years, driven by rapid advances in computing power and digital technologies.
- While big data has the potential to deliver significant benefits for many aspects of emergency management, there are also risks and challenges associated with resourcing, security, skills, and governance.
- Examples of work underway to address risks and leverage opportunities include forthcoming privacy and data sharing legislation, development of the digital strategy for emergency services, further development and review of the WA Cyber Security Policy, and incorporating Cyber Security Incident as a hazard in the State Emergency Management Framework.
- Through collaboration between emergency services and research organisations, there are significant opportunities for HMAs to further enhance understanding of all aspects of risk (i.e., hazard, exposure, and vulnerability) for relevant hazards, and for the SEMC Risk and Capability Subcommittee to explore options for modelling systemic risks under current and projected future conditions.
- The adoption of digital technologies within robust governance structures will enhance citizen-centric emergency management service delivery.

[37] https://www.gartner.com/en/newsroom/press-releases/2021-10-26-gartner-forecasts-it-spending-in-australia-to-grow-6- | [38] AIIA (2023)

04
Sector learning and continuous improvement

4. Sector Learning and Continuous Improvement

4.1 Introduction

One of the most significant challenges presented by the Anthropocene is maintaining the effectiveness of institutions in an increasingly uncertain environment.[39] Underpinning this task is the ability of institutions to learn and improve. In Western Australia, 'continuous improvement' is a central principle of emergency management. As described in the State Emergency Management Policy,[40] continuous improvement refers to incremental and transformational change informed by the systematic review, monitoring, and exercising of plans, arrangements, and policies, as well as the identification of lessons through post-event analysis.

This chapter examines processes of learning and continuous improvement in emergency management in Western Australia. It focuses on current approaches to learning, including those embedded in the State Emergency Management Framework, and reflections from the sector. The chapter concludes with a discussion on the different types of learning that may be required into the future.

4.2 Learning and Resilience

Learning is a process of gaining understanding that enables individuals and institutions to perform better. It is closely aligned with the idea of continuous improvement, which is a management strategy focused on learning to do better in the context of change.[41]

Learning is also a key feature of resilience. The concept of resilience - the ability to cope with change while functioning in the same kind of way - implies an ability to adapt, which itself is predicated on the ability to learn. As explained by leading resilience theorist Brian Walker: "resilient systems are learning systems […] resilience is largely about learning how to change in order not to be changed."[42]

Various types of institutional learning are recognised in the academic literature. One important type is learning loops.[43] These loops come in three forms (see Figure 10):

Single-loop learning: organisations adjust their actions and functions to better achieve existing goals.

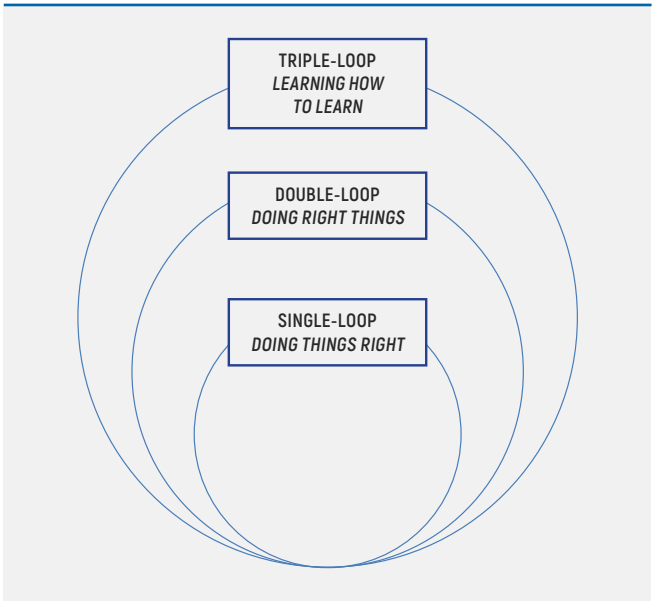


Figure 10 The learning loops model.
The learning loops framework helps us to understand the different types of learning employed in the emergency management sector and is discussed further in Section 4.5.

Double-loop learning: organisations critically examine and change their goals in response to changing circumstances.

Triple-loop learning: organisations change the learning process itself, improving how they learn and adapt.[44]

[39] Dryzek (2016), UNDRR (2022a) | [40] State Emergency Management Policy, Appendix B | [41] Bessant and Francis (1999) | [42] Walker (2020) | [43] Argyris (1977) | [44] Tosey, Visser, & Saunders (2012)

4. Sector Learning and Continuous Improvement

4.3 Learning in Emergency Management

Learning in emergency management is guided by the principles and methods of lessons management. Broadly, lessons management is a process taken by emergency management institutions and other sectors to systematise the process of learning.[45] It is underpinned by the OILL methodology: observations, insights, lessons identified, and lessons learned.

Common processes of institutional learning in emergency management include post-event inquiries, exercising, and capture through the State Emergency Management Framework. These are discussed below.

4.3.1 After Action Reviews and Inquiries

Australia has a long history of undertaking after action reviews and inquiries after an emergency. The RCNNDA identified 240 post-event inquiries published in Australia over the last few decades. Recent examples from Western Australia include Review of Western Australia's COVID-19 Management and Response (August 2023), the Severe Tropical Cyclone Seroja Community Report (February 2023), Adverse Fire Weather Event (February 2023), as well as AFAC's Wooroloo Bushfire Review (March 2022).

Inquiries provide opportunities to learn from experience to improve systems and processes, and to enhance overall service delivery. This is done by providing specific recommendations which emergency service agencies seek to address. However, questions have also been raised about the effectiveness of after action reviews and inquiries in driving institutional learning. Analysis of after action reviews and inquiries published in Australia shows that reviews tend to:

- focus on response and to lesser extent on prevention, preparedness, and recovery;
- address the responsibilities of government and to a lesser extent the responsibilities of other sectors;
- make recommendations to address past events and to a lesser extent to prepare for future conditions.[46]

Further, the same analysis also shows that across Australia lessons identified through reviews and inquiries are not necessarily adopted, or that their adoption is piecemeal.[47] As such, while after action reviews and inquiries will continue to play an important role in driving improvements in emergency management, their limitations for institutional learning must be recognised.

[45] AIDR (2019) | [46] Eburn and Dovers (2015) | [47] Eburn and Dovers (2015)

4. Sector Learning and Continuous Improvement

4.3.2 Exercising

Exercising is a structured activity used in emergency management to simulate actions that would be taken during a real emergency. The main purposes of exercising include testing and evaluating preparedness, building competence, fostering coordination, improving communication, and identifying lessons. Typical types of exercises include desktop exercises (discussion-based) and functional exercises (simulation of specific actions). Exercising has been described as "an essential component of preparedness and should be used to enhance capability to contribute to continuous improvement."[49]

Data drawn from the 2022 Annual and Preparedness Report Capability Survey provides insight into exercising across the sector.[50] Figure 11 shows the number of exercises performed or planned for the 2021-2022 financial year for specified hazards. The data represents the total number of exercises reported by HMAs, combat agencies, essential service providers, emergency support services, local governments, and industry bodies. In total, 186 exercises were reported across the sector, with fire, human epidemic/pandemic, storm, and cyber security the most exercised hazards.

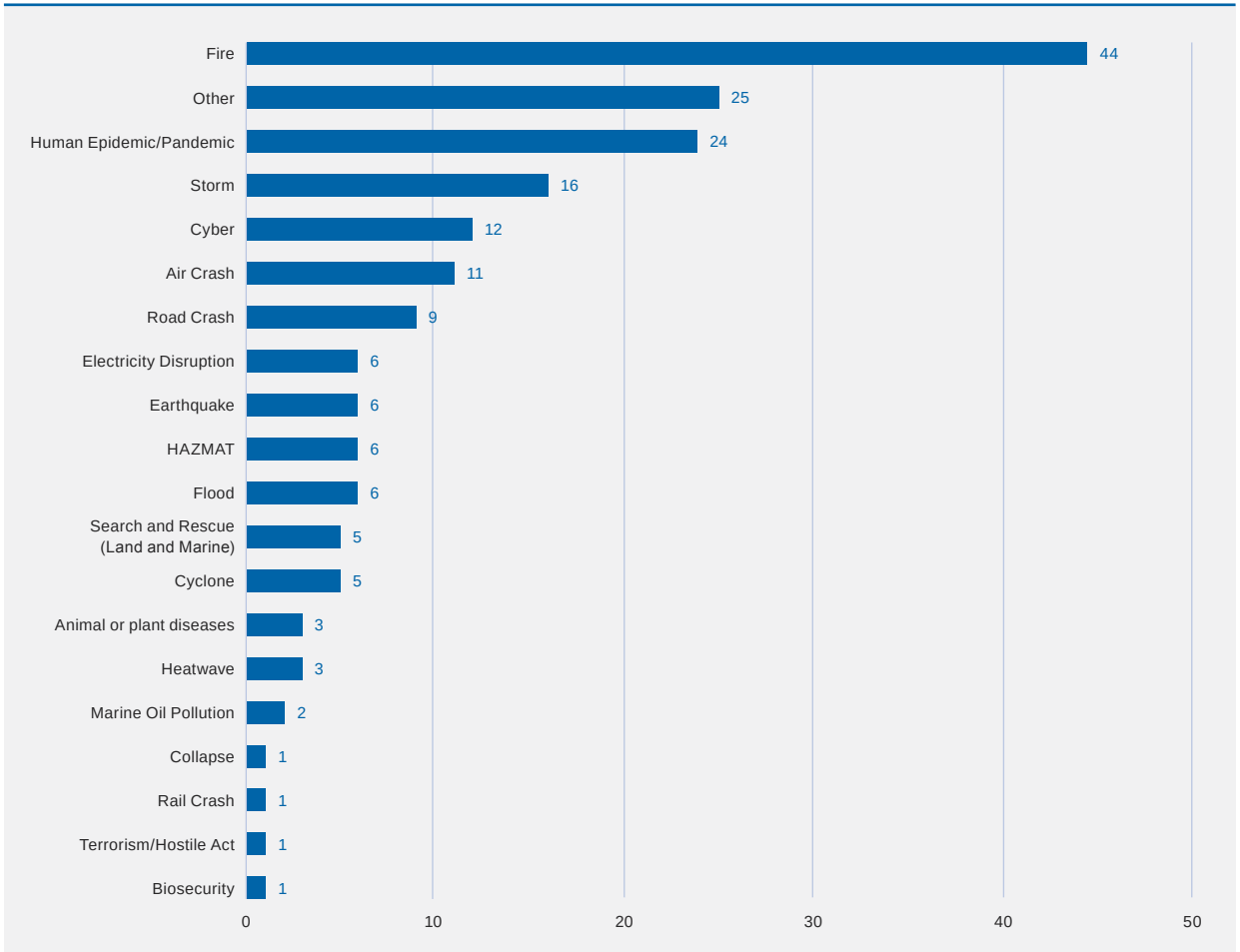


Figure 11 Total number of reported exercises per hazard for the 2021-2022 financial year (N=186) across the Western Australian emergency management sector.

[48] McLennan et al. (2022) | [49] AIDR (2012) | [50] Comparisons between reporting years could not be provided due to differences in survey questions.

4. Sector Learning and Continuous Improvement

Figure 12 shows the types of exercises performed for the same financial year. Exercise types include:

- discussion exercise: discussion of ideas, approaches, and plans for a given scenario;
- desktop exercise: more formalised discussion that includes testing of decision-making and coordination strategies for a given scenario;
- functional exercise: testing and evaluation of specific functions, systems, or processes within a team or organisation, often with focus on team coordination and the delivery of objectives; and
- field exercise: deployment of personnel and resources to a designated location to simulate a real-world event.

There was a near even percentage of discussion, desktop, and functional exercises undertaken in the 2021-2022 year (around 30 percent) with field exercises the least performed type of exercise.

The 2022 Annual and Preparedness Report Capability Survey also asked organisations to report which capabilities they intended to exercise for the upcoming financial year. Individual capabilities are grouped together into capability areas as per the SEMC Emergency Management Capability Framework[51] and shown in Figure 13. Emergency Response and Community Involvement were the two most exercised capability areas. Emergency Response capabilities include those related to evacuation, mass care, situational awareness, and command and control structures, while Community Involvement consists of capabilities focused on the provision of emergency and/or hazard information and information sharing.

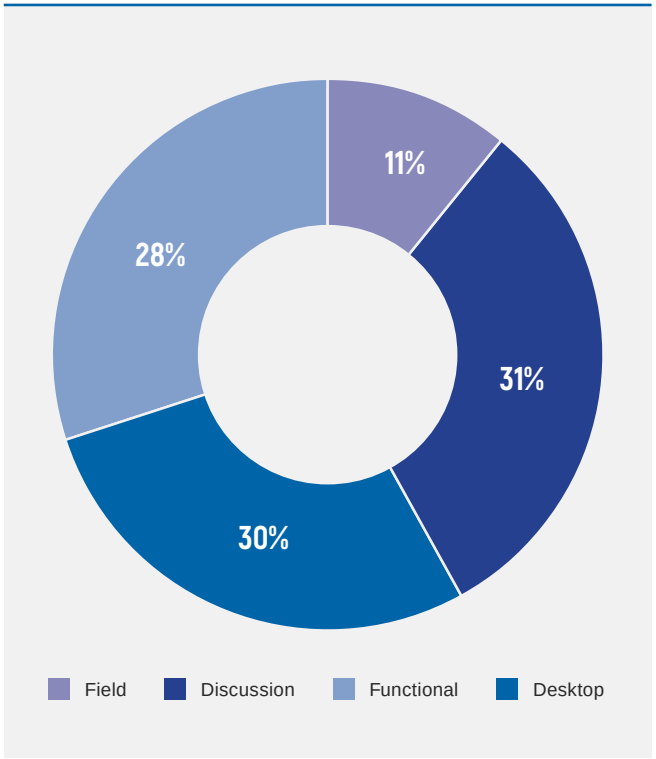


Figure 12 Percentage of exercise types undertaken by the Western Australian emergency management sector for the 2021-2022 financial year.

[51] This framework has been replaced by the Western Australian Emergency Management Capability Framework. The new framework is aligned to national and other jurisdictional approaches, and groups core capabilities across PPRR.

4. Sector Learning and Continuous Improvement

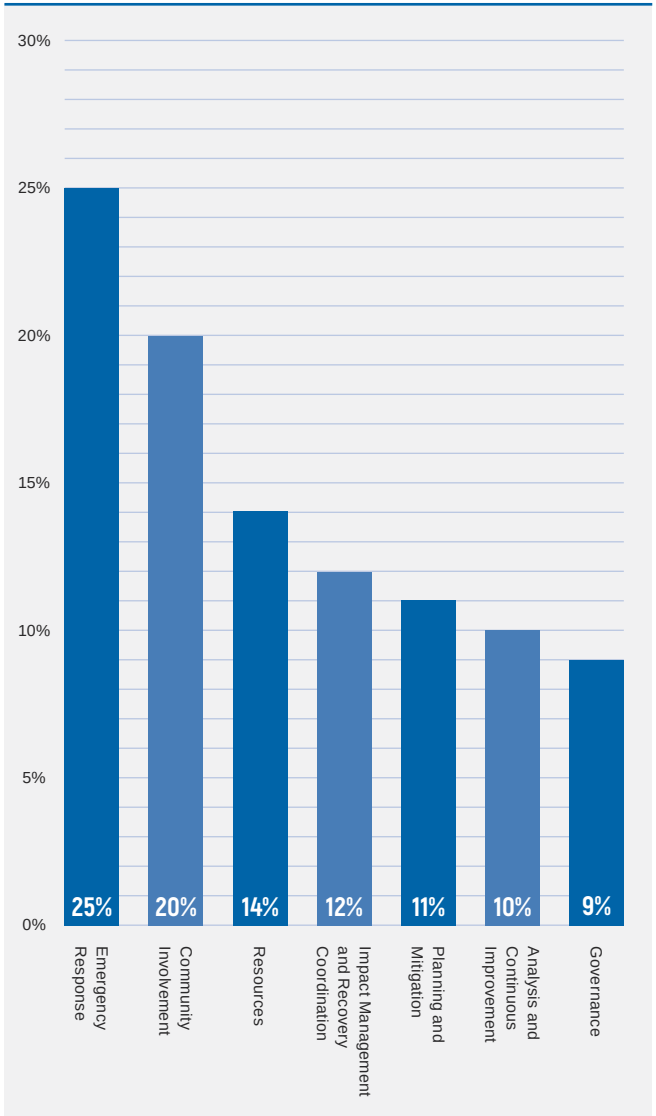


Figure 13 Reported capability areas exercised as a percentage of total exercises for 2022-2023 financial year.

Taken together, the following conclusions can be drawn from results presented in Figures 11 to 13:

- Exercising across the sector is focused mostly on commonly occurring or recently experienced hazards. Here, the disproportionate focus on fire most likely reflects the high number of local governments exposed to fire-related hazards, as well as resourcing dedicated across the sector to manage this hazard.
- The relatively high number of exercises focused on cyber-security indicates that this is becoming a hazard of growing concern across some parts of the sector.
- There is a preference across the sector for discussion, desktop, or functional exercises as compared to field exercises. While field exercises provide the most immersive experience, the capacity of smaller EMAs to conduct them is likely constrained by resources and skills.
- Exercising mostly focuses on response (Emergency Response) and emergency and/or hazard information provision (Community Involvement) capabilities. Activities related to prevention and preparedness are less commonly exercised.
- From the survey data, it is unclear whether exercises are used to enhance the capabilities of a single organisation to manage a specific risk, or to coordinate with others as part of an integrated effort. The ability of organisations to work together to manage systemic risks will become increasingly important as the scale and complexity of risks increases.

It is important to note that exercising data captured through the Annual and Preparedness Report Capability Survey is unlikely to capture the full extent of exercising conducted throughout the sector. This is due to the distributed structure of large HMAs and the capacity of their regional offices to conduct exercises independently of centralised resources.

Further, the SEMC State Exercising Coordination Team, which was created in 2018 to support EMAs to build and test emergency management capabilities through exercising, has recently been merged with the SEMC Lessons Management Reference Group to create the SEMC Lessons Management and Exercising Working Group. Work is underway to draft the Working Group's terms of reference.

4. Sector Learning and Continuous Improvement

4.3.3 The State Emergency Management Framework

In addition to after action reviews, inquiries and exercising, institutional learning also occurs through the State Emergency Management Framework (the Framework). The Framework provides the strategic architecture for emergency management in Western Australia. The structure and content of the Framework has evolved considerably over the last two decades. This section examines three main processes of improvement that have driven the evolution of the Framework over the last decade.

Routine Improvement: the *Emergency Management Act 2005* gives the SEMC the authority to develop and review emergency management policies and plans, and to direct public authorities to assist in their development, review, or testing.[52] Review of policies and plans are undertaken annually for 'statement of fact' changes, while a comprehensive review is undertaken every five years by the responsible HMA with support from the DFES State Emergency Management Policy Branch (Policy Branch).

The Policy Branch maintains a publicly available review schedule and list of amendments.[53]

Current examples of changes and updates to the Framework include:

- State Hazard Plan – Search and Rescue Emergencies (reviewed and updated in 2023)
- State Hazard Plan – Severe Weather (reviewed and updated in 2023)
- State Hazard Plan – HAZMAT (under review)
- State Hazard Plan – Crash Emergency (under review)
- State Hazard Plan – Cyber Security (under development)
- State Support Plan – Freight and Supply (under development)

Strategic Improvement: in addition to regular improvements, the Framework also undergoes substantial changes through sector-led and national reviews of current arrangements, such as the RCNNDA (see Box 4).

The most recent and significant overhaul of the Framework occurred as part of the Policy and Government Review Project, which began in 2013 under the then SEMC Secretariat. The project aimed to streamline the collection of framework documents through the:

- development of a State Emergency Management Plan;
- consolidation of the 26 Westplans into 13 State Hazard Plans (as sub-plans to the State Emergency Management Plan); and
- amalgamation of State Emergency Management Procedures and State Emergency Management Guidelines to create a suite of emergency management documents.

The overarching purpose of the project was to:

- create greater coherence between policy and plans;
- remove duplication between policies, between individual Westplans, and between policies and Westplans; and
- provide greater consistency by embedding emergency management principles throughout the Framework.

The current structure of the State Emergency Management Framework is shown in Figure 2 (page 12). Notably, through this process, the principle of continuous improvement was embedded throughout the Framework.

[52] See State Emergency Management Policy, Section 1.5 for detail.

[53] See https://www.wa.gov.au/government/document-collections/emergency-management-review-schedule-and-document-amendments

4. Sector Learning and Continuous Improvement

Box 4

Royal Commission into National Natural Disaster Arrangements (RCNNDA)

The Royal Commission into National Natural Disaster Arrangements (RCNNDA) was established on 20 February 2020 in response to the extreme bushfire season of 2019-2020. Since its tabling in the Australian Parliament on 30 October 2022, national, state, and territory governments have worked to implement its recommendations as part of their respective commitments to continuous improvement and increasing resilience. Leading national measures include:

- establishment of the National Emergency Management Agency (NEMA);
- review of the Disaster Recovery Funding Arrangements (DFRA);
- establishment of the Australian Climate Service;
- implementation of the new Australian Fire Danger Rating System (AFDRS); and
- delivery and implementation of the Australian Warning System (AWS).

Western Australia is undertaking activities to support the implementation of the RCNNDA and is leading the implementation of the following two recommendations:

15.2: *Australian, state and territory governments should develop arrangements that facilitate greater inclusion of primary healthcare providers in disaster management, including: representation on relevant disaster committees and plans and providing training, and education and other supports.*

15.3: *Australian, state and territory governments should refine arrangements to support localised planning and the delivery of appropriate mental health services following a natural disaster.*

Western Australia, in conjunction with the Commonwealth and other states and territories, is developing arrangements that facilitate greater inclusion of primary healthcare providers in disaster management, including representation on relevant disaster committees and plans, plus provision of training, education, and other support. Further, Western Australia is also leading a collaborative, national approach to refine arrangements to support localised planning and improve the coordination and delivery of mental health services to communities following a natural disaster. These activities will be undertaken with reference to the recently published National Disaster Mental Health and Wellbeing Framework.

4. Sector Learning and Continuous Improvement

Extraordinary Circumstances: targeted reviews and amendments can also be made at the conclusion of a major emergency or inquiry, or in response to significant government reforms or legislative changes. The most significant of these were amendments made in response to the COVID-19 pandemic. This included significant amendments to the *Emergency Management Act 2005* (notably the introduction of Section 72A) and other legislation, as well as changes to other Framework documents.[54] Further detail about the response to the COVID-19 pandemic can be found in the recently released Review of Western Australia's COVID-19 Management and Response[55] (see also Special Section on Western Australia's Response to COVID-19).

4.4 From the Sector

Members of the SEMC Response Policy Subcommittee were asked for their reflections on learning and continuous improvement in the Western Australian emergency management sector. Key themes are discussed below.

4.4.1 Emergency Management as a Learning Sector

Respondents were asked to reflect on whether the Western Australian emergency management sector could be characterised as a learning sector and whether the pace of innovation in the sector was keeping up with the pace of change in society more broadly.

The emergency management sector was generally perceived to be a learning sector. Notably, some respondents observed that a culture-shift had taken place over recent years with respect to learning and lessons, with emergency management organisations becoming increasingly engaged in after action reviews and inquiries and open to sharing lessons. As one respondent noted: *"Yes, there has been a significant cultural shift in the lessons management space. This includes undertaking After Action, Major Incident and Peer Reviews."*

The pace of innovation and adaptation across the sector was also generally perceived as keeping up with the pace of broader environmental, economic, and social change.

Respondents pointed towards the continual review and updating of the State Emergency Management Framework and departmental-specific initiatives as evidence of continuous improvement and the capacity of the sector to adapt to changing circumstances. Respondents noted that such changes were being 'driven out of necessity.' However, several limitations and gaps were also identified. These are described in the next section.

Respondents also commented on the adaptability and resilience of the sector, and the State Emergency Management Framework more specifically. COVID-19 was singled out as providing an extraordinary stress-test of emergency management arrangements, which were seen to have withstood challenging circumstances well. As one respondent reflected: *"The State [Emergency Management] Framework has served the State well, particularly through the challenges of COVID-19. The Framework is robust and by-and-large works under a challenging environment."*

[54] See Amendments made in 2020 and 2021 https://www.wa.gov.au/government/document-collections/emergency-management-review-schedule-and-document-amendments

[55] See https://www.wa.gov.au/organisation/department-of-the-premier-and-cabinet/review-of-was-covid-19-management-and-response

4. Sector Learning and Continuous Improvement

4.4.2 Limitations of Current Learning Approaches

Current approaches to learning and continuous improvement were noted to have limitations. Sector learning was considered by some to be reactive and 'simplistic': *"Generally, its [the sector's] learning is relatively simplistic. This is driven by learning from incidents that have gone well rather than proactively learning before incidents. [This] may become problematic due to changing climatic conditions, risk profiles or community expectations."* While there is a trend towards greater proactivity, particularly in the context of natural hazard modelling, formalised processes of sector learning appear to be largely reactive and limited to post-event analysis.

There was also a sense that, despite there being greater engagement by the sector in the identification of lessons, many organisations were reluctant to commit to sharing fully due to a perceived potential for reputational damage. As one respondent observed *"[…] the State EM arrangements require EMAs to submit exercise reports and post-operational reports to a SEMC Subcommittee. The intent is that these observations and insights that are learned by the relevant agency are shared amongst the EM sector. I feel that many agencies are reluctant to share as this may be received negatively by their EM colleagues."* The lessons management process notes that sector learning is dependent on cultural conditions that promote openness and transparency, including 'no-blame' and a 'just' culture.[56] It is unclear to what extent these cultural conditions currently exist across the sector despite an observed increase in sharing and engagement in after action reviews and inquiries.

Although there has been a tendency towards greater cross-agency collaboration and sharing, some respondents also commented that current approaches are too focused on short-term and incremental change. As noted by one respondent: *"There is a tradition of conducting after action reviews and post incident analysis that has assisted ongoing incremental improvement in EM. However, the EM sector does not engage enough with evaluative findings and more longer-term thinking and analysis which can help it start building capability early and make more transformational changes."* As noted at the start of this chapter, a significant challenge for institutions is to ensure that the pace of innovation is consistent with or faster than environmental, economic, and social change. While incremental approaches have produced benefits, it is unclear to what extent this approach will be able to deliver the innovation needed to maintain the effectiveness of the emergency management sector into the future.

[56] AIDR (2019)

4. Sector Learning and Continuous Improvement

4.4.3 Future Learning

As the complexity of emergency management continues to increase, respondents discussed several potential areas where sector learning can improve in the future. These are distilled into the following three main areas:

Collaboration: there is further opportunity for the sector to work together to identify lessons and share learning to improve overall resilience. While respondents noted that there has been a shift towards a culture of working together, further work is needed to leverage the collective capabilities of the sector: *"Contemporary EM requires a whole-of-state, resilience-orientated approach which goes beyond the command-and-control components. This requires an adaptive style of engagement and learning […] There is a move toward greater collaboration and acknowledgment of cross-agency expertise, which will further enhance emergency prevention, preparedness, response and recovery efforts."* Specifically, respondents noted there is further opportunity to work collaboratively with other jurisdictions, non-traditional emergency management agencies, as well as community sector organisations, to enhance all-of-state capability and capacity.

Systemic Risk: increasingly mature learning approaches are needed to support understanding of systemic risk, including cascading impacts and vulnerability. As observed by one respondent: *"Keeping up with changes to EM best practice is a challenge, especially as this can be a rapidly evolving area – whereas the State EM framework is large, interlinked and has its own timelines and focus for review. For example, at the moment there is a lot of evolution in the areas of vulnerable communities, climate change and cascading hazards. How are these being integrated throughout the State EM Framework [?]"* Increased focus on inclusive planning and co-development was also discussed for ensuring equity and justice in the overall building of preparedness and resilience. This is discussed further in the next chapter.

Strategic Alignment and Resourcing: current allocations of funding was identified as a potential barrier for driving future institutional learning. This includes ensuring resources are available for non-traditional emergency management projects, including those that focus to a greater extent on resilience and recovery; ensuring resources are available for locally-led emergency management capability development, and ensuring alignment of emergency management grant mechanisms to strategic resilience objectives.

4.5 Summary and Conclusions

Emergency management in Western Australia has undergone significant changes in the past decade, driven through processes of learning contributing to continuous improvement. Learning is embedded in current ways of working, notably through review processes established in the State Emergency Management Framework, as well as the sector's wide application of exercising. Further, the capacity for rapid adaption and innovation is also evident, as shown in the State's response to COVID-19.

However, based on respondents' comments, there is also recognition that improvement in the sector's learning approach is required to manage increasingly complex and systemic emergency risks. Most of the learning undertaken to date focuses on single loop learning – that is, ensuring that processes for managing specific hazards are in place and are useable. This is the goal of most exercises and routine improvements made to the State Emergency Management Framework. Double-loop learning – adapting the strategic goals of the sector – is also occurring, though questions remain about the translation of recommendations (lessons) made in after action reviews and inquiries into actual change (learning).

4. Sector Learning and Continuous Improvement

These questions are not specific to the Western Australian emergency management sector, but rather reflect more broadly the limitations of the after action review and inquiry model for sectoral and institutional learning.

The sector also recognises the limitations of current learning approaches and the need for more collaboration and adaptive learning methods to enhance preparedness and resilience. This suggests the emergence of a third loop of learning, focused on improving the learning processes itself. However, systems and activities for enabling different learning approaches require further development.

As the world continues to change rapidly in the Anthropocene, there is growing need for all three learning loops. This requires allocating sufficient resources to learning capabilities and nurturing a culture conducive to learning. The formation of the SEMC Lessons Management and Exercising Working Group offers an opportunity to solidify the strategic direction for learning across the Western Australian emergency management sector.

Key messages and opportunities:

- Learning is a crucial aspect of resilience as it enables innovation and adaptation.
- Processes of learning and continuous improvement are embedded within the State Emergency Management Framework and are implemented by the sector through after-action reviews and inquiries and exercising.
- Current approaches to learning are hampered by a lack of sharing across the sector, limitations inherent in after action review and inquiry processes, and the inactivity of the SEMC State Exercising and Coordination Team.
- Further work is needed to develop and employ robust learning methods and processes, particularly in the context of increasing systemic risks and uncertainty.
- There is opportunity for the new SEMC Lessons Management and Exercising Working Group to advise on improved methods and processes to drive sector learning. Priority areas include:
  - identification of opportunities to better enable the implementation of lessons;
  - fostering a culture of sector-wide lessons sharing and transparency;
  - identification of methods for proactive learning through improved scenario-based exercising enabled by digital platforms and tools;
  - re-establishment of state-level exercising, with focus on the development and testing of capabilities that enhance general resilience;
  - identification of learning methods and processes that better integrate risk assessment, exercising, and capability development.
  - identification of resourcing and funding opportunities for local, district, and state exercising.
- There is opportunity for the SEMC Response Policy Subcommittee to advise on amendments to the State Emergency Management Framework to further promote sector learning through exercising, lessons, and other processes.

Special Section

Western Australia's Response to COVID-19

The COVID-19 pandemic presented the most significant emergency challenge in Western Australia's history. This special section briefly reviews the implications of the COVID-19 pandemic for the major themes discussed in this report. Information presented here is primarily sourced from the Review of Western Australia's COVID-19 Management and Response Report (the Report).[57]

Background: the first case of COVID-19 was recorded in Western Australia on 21 February 2020. The World Health Organisation declared a global pandemic on 11 March 2020. The Western Australian Government moved quickly to declare Western Australia's first state of emergency on 16 March 2020 and public health emergency on 17 March 2020. Doing so enabled the use of powers contained within the *Emergency Management Act 2005* and *Public Health Act 2006*. The state of emergency ended on 4 November 2022 leading to the revocation of all public health directions and associated measures. Through the pandemic, Western Australia had the lowest fatality rate of any state or territory in Australia and half the national rate.[58]

Systemic Risks: the COVID-19 pandemic highlighted the systemic nature of risk, emphasising interdependencies across domains and scales. Examples include:

Interconnected Risks: the pandemic demonstrated how risks in one location can rapidly spread worldwide through transport and trade routes. It also showed how health risks can trigger cascading risks in other areas, affecting economic and social domains. Further, the pandemic also created new risks, particularly those related to cyber security as work increasingly shifted online.

Concurrent Emergencies: while managing the response to COVID-19, Western Australia faced other large-scale emergencies, including the Wooroloo Bushfire in February 2021 and Tropical Cyclone Seroja in April 2021. In both examples, the COVID-19 pandemic increased the complexity of incident response and management, including resource coordination and personnel availability, and complicated recovery efforts.[59]

Data Collection and Sharing: the pandemic placed significant demands on data collection and sharing systems. This led to the rapid development and deployment of new digital systems for contact tracing (e.g., Safe WA mobile application), travel (e.g., G2G travel system), vaccine distribution (e.g., Vaccinate WA online platform), and others, such as Service WA. Legislative changes, such as amending Section 72 and the introduction of Section 72A into the *Emergency Management Act 2005*, enabled the responsible collection and sharing of individual data for COVID-19 management purposes.

[57] See Review of Western Australia's COVID-19 Management and Response (www.wa.gov.au) | [58] Review of Western Australia's COVID-19 Management and Response | [59] AFAC (2021), DFES (2023)

Special Section

The Report noted that data sharing between government agencies was hampered in some instances by to the absence of formal data sharing arrangements. However, the Report also notes that COVID-19 has accelerated the development of data sharing and privacy legislation.

Sector Learning and Continuous Improvement: the Western Australian public sector has undertaken various reviews to distil lessons from Western Australia's response to the COVID-19 pandemic. Examples include:

- review of Western Australia's COVID-19 Management and Response Report;
- Office of the Auditor General's COVID-19 reports and audits;
- Independent Review of Hotel Quarantine Arrangements in Western Australia; and
- Department of Health's evaluation of the WA COVID-19 Vaccination Program.

Amendments were also introduced to the State Emergency Management Framework to better enable emergency management agencies to manage the COVID-19 pandemic. This includes the introduction of the *Emergency Management Amendment (Temporary COVID-19 Provisions) Act 2022 to amend the Emergency Management Act 2005* and other legislation to provide a temporary legislative framework for the ongoing management of COVID-19, and the development of new framework documents including the State Emergency Management COVID-19 Policy and COVID-19 Procedure – Exchange of Information During a COVID-19 Declaration.[60]

Community Preparedness and Resilience: community preparedness and resilience was supported through various government-led initiatives. Examples include:

- delivery of over 80 public communication campaigns, with translated materials available in 54 languages;
- development of targeted communications materials for at-risk groups, including Aboriginal communities, pregnant women, and culturally and linguistically diverse (CALD) communities;
- provision of broad emergency and welfare support coordinated through the State Welfare Incident Coordination Centre (SWICC) from the Department of Communities;
- provision of emergency accommodation;
- provision of payments and financial assistance packages; and
- establishment of the COVID Care at Home initiative.

The Report heard that, despite these efforts, some stakeholders felt engagement with CALD groups, Aboriginal communities and community organisations could have occurred sooner and with more regularity. The Report identified opportunities for Government to enhance collaboration and engagement with at-risk groups during a future pandemic.

[60] See https://www.wa.gov.au/organisation/state-emergency-management-committee/covid-19-policy-and-procedure

05
Community preparedness and resilience

5. Community Preparedness and Resilience

5.1 Introduction

While risks in the Anthropocene have global drivers, many emergencies continue to be most directly experienced by individuals in their communities. These events happen within people's everyday lives, in specific places. The conditions of these places significantly influence the risks people face, their ability to cope with emergencies, and their vulnerabilities.[61]

As the importance of local conditions for resilience is increasingly recognised, there has been a growing focus on involving communities in preparing for and building resilience to emergencies. This shift is tied to the idea of 'shared responsibility' which means that everybody in society, including communities, have a role in managing emergency risks.

This chapter examines how these ideas have developed and been put into action in Western Australia. It begins by discussing the concept of shared responsibility and its connection to community preparedness and resilience. It then explores how these concepts are being implemented within the emergency management sector.

5.2 Shared Responsibility and Community Resilience

Shared responsibility is a central principle in contemporary emergency management, recognised in international frameworks like the Sendai Framework for Disaster Risk Reduction and nationally in Australia's National Disaster Risk Reduction Framework and associated Second National Action Plan.[62] It is also a guiding principle of emergency management in Western Australia.[63] This principle is acknowledgement that all sectors in society, including communities and individuals, have roles in managing emergency risks.

Shared responsibility is based on the belief that the overall resilience of society is strengthened when everyone is actively involved.[64] While generally accepted, putting shared responsibility into practice is difficult. Governments and communities often have different priorities and values, leading to ongoing negotiations about their roles and responsibilities. In emergency management, these responsibilities are continually evolving, leading some social researchers to describe shared responsibility as a "partially articulated social contract."[65]

The acceptance of shared responsibility for emergency management has meant, in practice, that communities take on more responsibility for managing risks while governments do more to support them in building their resilience.[66] In turn, community resilience has become a primary goal of emergency management, broadly defined as a community's ability to prepare for, withstand, and recover from shocks and stresses without compromising its long-term wellbeing.[67]

5.3 Building Community Resilience

Efforts to develop community resilience typically involve actions that reduce a community's risk, enhance self-sufficiency, and facilitate quick recovery after an event. Increasingly, these actions focus on reducing social vulnerability, which is influenced by factors like economic disadvantage, social conditions and cultural factors that marginalise certain groups in society.

For the purposes of this report, three broad categories of community resilience activities are considered: (1) information for emergencies and hazards, (2) addressing social vulnerability, and (3) sector reform. These can be differentiated by the way in which they address social vulnerability. Selected examples are discussed below.

[61] Ribot (2014) | [62] See https://nema.gov.au/sites/default/files/inline-files/28605%20NEMA%20Second%20Action%20Plan_V10_A_1.pdf
[63] State Emergency Management Policy, Appendix B | [64] Atkinson and Cumin (2020) | [65] McLennan and Handmer (2014) | [66] McLennan and Handmer (2014)
[67] Koliou et al. (2020)

5. Community Preparedness and Resilience

5.3.1 Information for Emergencies and Hazards

Traditional emergency management organisations primarily engage with communities by providing hazard and emergency information. This type of engagement aligns closely with the definition of 'community engagement' outlined in the State Emergency Management Policy, that emphasises effective and timely communication before, during, and after an emergency. Key examples are provided below. Box 5 provides a local government perspective (see next page).

Emergency WA (Website): managed by DFES, Emergency WA offers up-to-date hazard and emergency information for Western Australia. It covers natural hazards, hazardous material incidents, traffic accidents, and provides information on community recovery. Information is sourced from various state government agencies and other organisations.

Capability Summary Reports: the former DFES State Capability Team, on behalf of the SEMC, created customised capability summary reports for different organisations involved in emergency management. These reports, issued annually in 2019, 2021, and 2022, provided detailed insights into each organisation's emergency management capabilities. They included capability strengths, areas for improvement, year-to-year comparisons, and group average comparisons. About 450 reports were distributed over the three years.

Hazard-Specific Information: leading emergency management organisations in Western Australia produce various information products tailored to specific hazards. Some examples include:

- Department of Primary Industries and Regional Development (DPIRD) provides resources like foot-and-mouth disease preparedness and agricultural emergency advice on their website.
- WA Police Force offers advice on crime, antisocial behaviour, and counterterrorism on their website, as well as a mobile application called 'Yarning' for pandemic advice in multiple Aboriginal languages .
- DFES and Red Cross collaborate on the Be Disaster Ready program, providing guidance for preparing for natural hazards.
- Department of Health delivers health-related advice, including information on the COVID-19 pandemic via the Healthy WA website, along with heatwave advice via Emergency WA.

5.3.2 Addressing Social Vulnerability

Efforts are underway to address the underlying causes of social vulnerability through programs aimed at tackling inequalities in access to services, skill development, and preparedness. These initiatives are often led by social and community service sectors with support from emergency management services. Examples include:

Disaster Resilience Project (DRP): run by the Centre for Asylum Seekers, Refugees, and Detainees (CARAD) with support from various organisations, including DFES and Red Cross, the DRP aimed to enhance the preparedness of individuals and communities from culturally diverse backgrounds. Eight workshops were conducted in the Perth metropolitan area in the first half of 2023, engaging nearly 200 participants from 15 different cultural backgrounds. The project included presentations and co-developed preparedness plans for pandemic, fire, and flood events, with experienced volunteers and translators on hand to overcome language barriers. Punjabi, Chinese, Arabic, and Somalian communities have expressed interest in similar sessions.

5 Community Preparedness and Resilience

Box 5

Local Government Estimates of Community Preparedness

As part of the Annual and Preparedness Report Capability Survey, local governments were asked to estimate the percentage of their residents who have emergency management plans, monitor emergency messaging, understand the messages, and respond to them.

Figure 14 displays data for 2022 with changes (+/-) from 2018. Note, the figure shows the percentage of local governments that estimate at least half of their residents have emergency plans, and understand, monitor, and act upon emergency messaging.

Results show an overall increase in perceived preparedness since 2018 across most categories. However, when it comes to emergency planning, only a small number of local governments estimate that at least half of their residents have emergency plans.

In 2022, more remote local governments believed that at least half of their residents had emergency plans compared to urban and agricultural areas. This is likely because residents in remote areas face a wider range of hazards and must be more self-reliant due to their distance from major centres.

Estimate of resident's preparedness	LG Type	2022	2018	Dif (+/-)
Have emergency plans in place (>50%)	Urban LG	5%	3%	2%
	Agricultural LG	9%	8%	1%
	Remote LG	13%	4%	9%
Monitor emergency messaging (>50%)	Urban LG	49%	28%	21%
	Agricultural LG	53%	41%	12%
	Remote LG	35%	35%	0%
Understand emergency messaging (>50%)	Urban LG	51%	18%	33%
	Agricultural LG	49%	41%	17%
	Remote LG	35%	35%	0%
Respond to emergency messaging (>50%)	Urban LG	51%	10%	41%
	Agricultural LG	41%	35%	6%
	Remote LG	35%	26%	9%

Figure 14: the percentage of local governments that estimate half or more of their community have emergency plans and undertake actions in relation to emergency messaging.

5. Community Preparedness and Resilience

Box 5 continued

For emergency messaging, there has been a significant increase in the percentage of urban local governments that perceive half of their residents monitor, understand, and respond to emergency messaging.

A higher percentage of urban local governments also perceive residents understand and respond to emergency messages compared to agricultural and remote areas.

It is important to note that figures are based on local government estimates, so caution is needed when interpreting the results. However, the increased focus on emergency messaging in recent years is likely improving the ability of community members across the state to monitor, understand, and respond to emergency messages.

The results also highlight the need for more work to increase residents' emergency planning, especially in areas exposed to natural hazards that are located far from major population centres.

Community Relief and Resilience (CRR) Program: coordinated by the Western Australian Council of Social Services (WACOSS), the CRR Program comprises approximately 300 community-based agencies and outlets across Western Australia. Together, these organisations provide material and financial assistance to individuals and families facing hardship. The program offers support to the emergency relief sector through policy assistance, personnel, and coordination. It includes a monthly forum for frontline staff and volunteers, coordination of the State Emergency Relief Committee, and FairFood WA.

Disability Inclusive Emergency Preparedness (DIEP – forthcoming): led by two local governments with support from DFES, this pilot program aims to create disability-inclusive emergency plans. It involves public forums led by disability-inclusive expert Professor Michelle Villeneuve with input from disability advocacy groups, emergency services, and community members.

The pilot project will produce a report to inform future disability-inclusive emergency preparedness planning across the sector.

5.3.3 Sector Reform for Community Resilience

Work is ongoing to improve the effectiveness and coordination of emergency management governance structures related to community preparedness and resilience. Some of this work is also occurring as part of larger reforms (see Box 6). Notable examples include:

SEMC Strategic Plan 2022-2025: the SEMC Strategic Plan was updated in early 2022 to align with changing priorities and community expectations. It now places stronger focus on Capable Community priority areas, which aims to enhance community safety and resilience through a local approach to emergency management. There is also an increased emphasis on prevention and preparedness.

5. Community Preparedness and Resilience

Local Emergency Management Arrangements Review (LEMA Review) *and* Local and District Emergency Management Committee Review (LEMC-DEMC Review) Projects: local governments are required to develop LEMAs with support from the SEMC and the relevant LEMCs. These related projects aim to enhance the effectiveness of LEMAs and improve connectivity and governance of SEMC committees across state, district, and local levels.

Western Australian Community Disaster Resilience Strategy: this Strategy will provide the strategic direction for community resilience throughout the State. It will establish common principles and indicators to measure the impact of resilience projects and align grant funding opportunities with state and national resilience objectives. The SEMC Community Resilience and Recovery Subcommittee will report annually to the SEMC on the progress of the Strategy.

Philanthropic Engagement Framework for Emergency Management: this framework provides guidance to EMAs on partnering with private and philanthropic organisations to enhance emergency management capabilities across PPRR. The framework has been developed in recognition that emergencies increasingly require an all-of-society approach for their management, and that private and philanthropic organisations are important partners in developing the overall resilience of Western Australian communities.

State Emergency Relief Support Provisions and Services: the Department of Communities (Communities) as the designated support organisation under the State Support Plan – Emergency Welfare works with Community Sector Organisations (CSOs) to provide and coordinate emergency relief and welfare services. Notably, Communities collaborates with a broad range of CSOs through the State Welfare Emergency Committee (SWEC) and the State Welfare Emergency Committee Operations (SWEC Ops). Further, Communities co-convened the *Emergency Welfare Management Partnership Forum* in 2021 with WA Council of Social Services (WACOSS) and Australian Red Cross to design and build an enhanced partnership approach to delivering emergency relief and support services across the State. The forum identified the following key focus areas:

- enhancing governance such as relief and support roles and responsibilities, plans and policies;
- improving coordination and communication between relief and support stakeholders and processes for better integrated case management for impacted people;
- data and information sharing and mapping of expected community needs and available relief and support services. In terms of the latter, Communities is undertaking a capability audit (district by district) to help inform future operation, investment, and preparedness activities;
- building emergency relief and support capability across the sector.

Communities is integrating these focus areas into its planning and response activities.

5. Community Preparedness and Resilience

Box 6

Closing the Gap Priority Reforms and Emergency Management

The National Agreement on Closing the Gap came into effect on 27 July 2020. Underpinned by the belief that Aboriginal and Torres Strait Islander people must have a genuine say in the design and delivery of the policies, programs, and services that affect them, the Agreement seeks to undertake structural and systemic reform to overcome entrenched inequalities.

Under Priority 3 – Transforming Government Organisations, jurisdictions are required to commit to engaging with Aboriginal and Torres Strait Islander representatives before, during and after emergencies. This is to ensure that (a) government decisions take account of the impact of those decisions on Aboriginal and Torres Strait Islander people, and (b) Aboriginal and Torres Strait Islander people are not disproportionately affected and can recover quickly from social and economic impacts.[68] Work is underway in Western Australia to identify a lead agency to implement this action.

[68] See https://www.closingthegap.gov.au/national-agreement/national-agreement-closing-the-gap/6-priority-reform-areas/three

5.4 From the Sector

Members of the SEMC Community Resilience and Recovery Subcommittee were asked to provide commentary on the major trends in community resilience for emergency management over the last decade, as well as opportunities for further improvement. Responses are reported thematically.

5. Community Preparedness and Resilience

5.4.1 Increased Prominence of Community Resilience for Emergency Management

Respondents generally agree that community resilience and preparedness have become increasingly important objectives for emergency management in Western Australia. The increased focus on community resilience is partly driven by growing risks related to climate change and recognition that the emergency management sector alone cannot manage all the challenges posed by larger and more frequent emergencies. As one respondent observed: *"Over the past 10 years we have seen a progressive movement and understanding of the community's role and engagement with preparedness, response, and recovery. The sector has begun to acknowledge that it does not have the resources to manage the breadth of emergencies and community needs during these periods, particularly as climate change results in more intense emergencies. As a result, the Emergency Services sector has recognised the need to encourage active community engagement in their own preparedness, response, and recovery."*

Efforts to boost community resilience were discussed by subcommittee members. Examples include providing additional information through platforms like Emergency WA, offering culturally specific information like the WA Police Force's Yarning mobile app, embedding resilience as a strategic priority within the SEMC (e.g., through the WA Community Disaster Resilience Strategy), engaging Aboriginal organisations on climate adaptation, and implementing more person-centred approaches to emergency preparedness.

However, despite these efforts, many respondents noted that much of the emphasis on community resilience has remained at the level of policy and information provision rather than implementation. While communities receive more information about emergencies and hazards, it is unclear to what extent this may be translating into improved community preparedness and resilience: *"[…] for many in the community there remains little or no appreciation that they have a role to play. For example, bushfire preparedness messaging is now very strong with use of traditional and social media to promote the need for residents to prepare their properties ahead of the high-risk fire season, but I'm not sure that the messaging translates through to a high level of people taking the recommended actions."*

Additionally, some respondents pointed out that community resilience efforts have primarily focused on geographic communities rather than at-risk groups. This has led to a gap in efforts to address the root causes of vulnerability, especially the social dimensions of vulnerability for at-risk groups and communities: *"Emergency Services are good at providing resilience and preparedness programs for communities of place. Funding decisions and program approaches favour these types of programs, and it is a weak point in our work to improve the resilience of the entire community."* There is recognition of the need for further work in this area across the Australian emergency management sector.[69]

[69] McLennan et al. (2022)

5. Community Preparedness and Resilience

5.4.2 Challenging Assumptions about Emergency Services

The increased focus on community resilience is shifting perceptions about how communities should be engaged for emergency management, as well as the role of emergency services in promoting resilience.

Overall, respondents recognised that work to enhance community resilience is in its early stages and that emergency services are having to develop new skills and capabilities to deliver programs that enhance resilience on the ground. *"Our work in the resilience space has essentially just begun and requires us to further develop our skills and capacity to deliver this type of programming in collaboration with agencies with an interest in this work."* This shift is also prompting emergency services to see themselves differently, and to work with a wider range of experts: *"How to encourage active engagement in community let alone in preparedness or resilience is a fundamental issue and only one that can be dealt with by people expert in community development and community psychology. This means that emergency services may need to start to view themselves as community developers or have the capacity to build working relationships with community developers active within the communities they serve."*

The heightened emphasis on community resilience is also raising deeper questions about the concept of resilience itself. Traditionally, emergency management has focused on building resilience against specific hazards, often emphasising the physical environment, as well as response and recovery. However, there is now a growing recognition that efforts to enhance resilience also need to consider social conditions and capabilities that contribute to generalised resilience: *"An important component of this new framing of disaster risk reduction is the distinction between specified and general community risk and resilience. It's the recognition that the traditional emergency management system has been largely focused on specified risks to the exclusion of generalised risks, especially as they relate to community risk and resilience. While the traditional command-control approach to specified risks will always be foundational to our emergency system, it must be recognised that cultural knowledge, capacity, and capability change is required to ensure a greater focus on generalised risks facing the community, at risk populations and broader society."*

Finally, the increasing focus on community resilience is also highlighting challenges and opportunities for funding and resourcing. Many community resilience initiatives in Western Australia rely on competitive grants from the Commonwealth. While such grants are used to good effect to support individual projects, some respondents suggest that they may not be sustainable for long-term resilience building and that an alternative approach may be needed: *"While National Disaster Risk Reduction (NDRR) and Disaster Ready Fund (DRF) grants can potentially be used to support preparedness and resilience outcomes, grant funding is not a sustainable model to effect long term change."*

5. Community Preparedness and Resilience

5.4.3 Opportunities and Challenges for Community Resilience

Respondents highlighted several challenges and opportunities for community resilience in the coming decade:

Growing Community Expectations: community expectations of emergency services are expected to rise, particularly in the face of larger and more complex events. Managing community expectations and resources will likely be a major challenge: *"With the expectation of more events and more significant events due to the impacts of climate change, there will be challenges in decisions about how resources are allocated, and in framing what governments can and can't do (or can and can't be expected to do) in a way that supports a culture of growing community resilience rather than passivity."*

Increasing Vulnerable Populations: the growing population, especially in vulnerable areas like peri-urban and coastal regions, will lead to more people being at risk from multiple hazards. Additionally, the projected increase in the frequency and severity of emergency events will leave communities with less time to prepare and recover.

There is an opportunity to engage different parts of the community, such as retirees, to enhance resilience: *"Retirement of 'baby boomers' is set to continue for the next few years. Retirees have the potential to be a wealthy source of community-based and community-focused volunteers who can be mobilised to support community preparedness and resilience efforts."*

Collaboration Across Sectors: there is further opportunity for traditional emergency management agencies to collaborate with community services and non-for-profit organisations to enhance community resilience. Building partnerships across these sectors will also enhance the ability to identify and address community needs: *"The single biggest challenge is building a collaborative environment across federal, state and local government agencies and the not-for-profit sector to maximise and align available resources, leverage the strengths of each organisation and coordinate activities to meet the development needs of the community."*

Strategic Planning and Resourcing: streamlining and coordinating efforts to build community resilience is crucial. Currently, many initiatives operate independently, leading to competition for limited resources and duplication of efforts: *"Currently government (local, state, and federal) and non-government, not-for-profits, and the private sector are all engaged with creating resilient communities; however, there is no overarching framework or map on how we can all work together and capitalise on the finite resources that are available. Having many different 'players' in this space working independently also has the risk of overwhelming community and individuals with information and leading to less action being undertaken."* Some respondents also noted the need for sustainable funding models to enhance long-term community resilience.

5. Community Preparedness and Resilience

5.5 Summary and Conclusions

Acceptance of shared responsibility in emergency management as a core principle has produced significant changes in the relationship between citizens and the government. Citizens are expected to take on more responsibility for their own resilience, while governments are tasked with providing greater support to communities in this endeavour. This shift has become especially relevant as the limits of government become more apparent in the context of larger, more complex, and interconnected emergency risks.

Overall, the main points raised by respondents include:

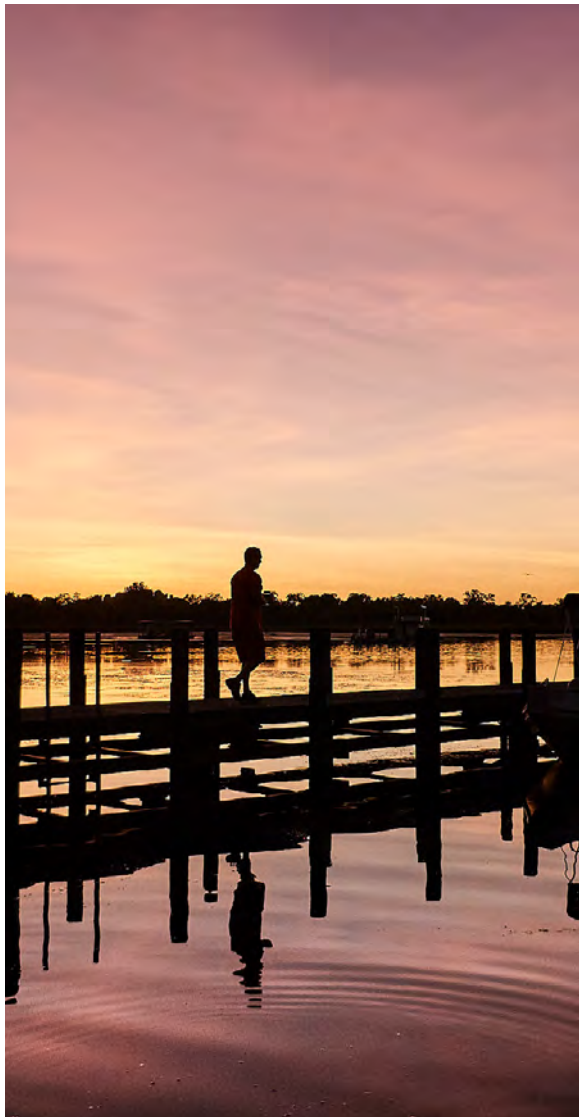
- the growing emphasis on building community resilience by emergency services and community organisations in recent years;
- efforts to promote community resilience is challenging the traditional roles of emergency services and how they collaborate with non-traditional emergency organisations; and
- current resourcing and funding streams may not be well-suited for achieving and sustaining long-term community resilience, particularly for the most at-risk segments of society.

The upcoming release of the Western Australian Community Disaster Resilience Strategy holds promise in addressing some of these challenges. The Strategy aims to provide strategic guidance and connection with existing funding opportunities, laying the groundwork for more coordinated and enduring resilience-building efforts. Furthermore, the adoption of the Strategy by the SEMC Community Resilience and Recovery Subcommittee, along with regular progress reporting to the SEMC, ensures that key priorities will be effectively addressed. This presents further opportunities to integrate these priorities more deeply into the SEMC structure, particularly through the LEMC and DEMC structures, which may be facilitated by ongoing review projects like the LEMA and LEMC-DEMC Reviews.

5. Community Preparedness and Resilience

Key messages and opportunities:

- Shared responsibility has become a key principle of emergency management. In turn, there has been increased focus from the emergency management sector on promoting community resilience.
- Much of the work undertaken to develop community resilience is undertaken by the community and not-for-profit sector, often in collaboration with traditional emergency service organisations.
- Work to address social vulnerability is prompting reflection on the established functions of emergency services and is challenging current models of funding and resourcing.
- There is opportunity for the SEMC Community Resilience and Recovery Subcommittee to further enhance community preparedness and resilience. Priority areas include:
  - identification of methods and processes that enable robust assessment of socio-economic vulnerability (as part of the overall risk assessment process);
  - leveraging opportunities enabled by the forthcoming Community Disaster Resilience Strategy and Philanthropic Engagement Framework for Emergency Management to drive further collaboration between the emergency, community, and philanthropic sectors;
  - advising on an improved approach to community engagement as currently defined in the State Emergency Management Policy, with potential focus on co-development and participatory methodologies; and,
  - identifying and advising on sustainable resourcing and funding opportunities to drive long-term resilience, particularly for at-risk communities.



06
Conclusions

6. Conclusions

The 2023 Emergency Preparedness Report examines key changes to the emergency management sector over the last decade, with focus on Western Australia's adoption of systemic approaches to emergency risk management. Overall, the sector is adopting a systemic approach aligned with principles of systemic disaster risk reduction. Main examples include:

- work undertaken to enhance strategic alignment between national, state, district, and local levels, as well as greater collaboration between government, community, and private/not-for-profit sectors;
- an accelerating body of work to leverage the opportunities of digital technologies and big data;
- the implementation of established and novel processes that facilitate sector-based learning and continuous improvement;
- increasing collaboration and partnerships between emergency services and community and social sectors to address social vulnerability.

Consistent with systemic disaster risk management principles, these examples are not specific to any one hazard, but instead are indicative of work to enhance the overall (general) resilience of the sector. This is being done through programs and projects that seek to better leverage our collective capabilities, improve learning, and further enhance data-driven decision-making and collaboration.

It is important to note, however, that despite advances towards a systemic approach in Western Australia, much of this work is occurring in the absence of formalised strategies, assessment, or evaluation methodologies. In Western Australia, and consistent with observations internationally, the systemic approach to emergency risk management remains only partially developed.

In practice, this means that concepts such as 'systemic' and 'resilience' are being translated into practical actions in different ways by individual agencies using time-limited project funding. Further, much of this work appears to be driven by the necessity for individual organisations to adapt and innovate to changing circumstances rather than in response to national and international policy.

As such, there are significant opportunities for the SEMC to build on work already undertaken to promote the adoption of systemic approaches to emergency risk management. Some of these are listed below, organised by the central themes of this report.

The Broadening View of Risk:

- There is significant opportunity for the SEMC Risk and Capability Subcommittee to advise on assessment methods to enhance understanding of emergency risk across state, district, and local levels. This work is already underway with the commencement of a State Risk Register. However, there is further opportunity to advise on approaches for the assessment of current and future systemic risks, drawing on emerging international and national best-practice, and leveraging opportunities presented by new digital platforms and tools, such as Landgate's Digital Twin.

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- The SEMC Climate Change Subcommittee will also play a significant role in developing and adapting methodologies to identify systemic risks related to climate change. This work is already underway through the Western Australian Emergency Management Sector Climate Change Adaptation Plan, which is aligned to the WA Climate Adaptation Strategy.
- Relatedly, as risk assessment methods evolve, processes that support EMAs to identify and manage increasingly systemic risks will also need to be developed. Here, the SEMC Response Policy Subcommittee has opportunity to advise on amendments to the State Emergency Management Framework to better enable management of systemic risks across PPRR.

Working Together in the Age of Big Data

- The emergence of increasingly powerful modelling tools presents significant opportunities to identify current and future risks associated with specific hazards, as well as emerging systemic risks. Here, the SEMC Risk and Capability Subcommittee, SEMC Climate Change Subcommittee, and SEMC Essential Services Operators Network Reference Group are positioned to provide advice to the sector on modelling approaches to hazard-specific and systemic risk assessment.
- Similarly, the new SEMC Lessons Management and Exercising Working Group is positioned to provide advice on the use of digital platforms and tools for scenario development and exercising.
- The rapid development of new digital platforms and governance structures for data sharing presents significant opportunity to further enhance agency interoperability as well as the effectiveness of public emergency information communications. There is opportunity for further assessment by the SEMC Public Safety Communications Subcommittee and SEMC Public Information Reference Group.

Sector Learning and Continuous Improvement

- The new SEMC Lessons Management and Exercising Working Group has the opportunity to provide advice and lead the development of new lessons and exercising methodologies with focus on specific hazards and systemic risks. Key initiatives may include the revitalisation of state exercising, new scenario-based approaches to exercising, promoting sector-wide sharing of lessons, and identifying opportunities for greater integration of risk assessment, exercising, and capability development.
- The SEMC Response Policy Subcommittee also has opportunity to provide advice on amending the State Emergency Management Framework to better enable EMAs to undertake lessons, exercising, and other activities related to learning and continuous improvement.

Community Preparedness and Resilience

- The SEMC Community Resilience and Recovery Subcommittee, through the adoption of forthcoming strategies, such as the Community Disaster Resilience Strategy and Philanthropic Engagement Framework for Emergency Management, has opportunity to further promote collaboration between emergency, community, and philanthropic sectors to build community resilience.

6. Conclusions

- Furthermore, the SEMC Community Resilience and Recovery Subcommittee is also well positioned to provide advice on the assessment of social vulnerability as part of the overall risk assessment process.

In addition to these specific areas, it is also important to note that the SEMC is also pursuing greater strategic and functional alignment between state, district, and local levels through the delivery and implementation of recommendations from the LEMA and LEMC-DEMC Reviews, contributing to the enhanced general resilience of the Western Australian emergency management system.

Over the longer-term towards 2030, the sector must continue to innovate to maintain an effective and efficient emergency management system. This will include further reflection on the overall aims and objectives of emergency management, increased leveraging of opportunities presented by big data, enhancing opportunities for learning and adaptation, and promoting greater collaboration between emergency management agencies, communities, and private and philanthropic sectors.

As the scale and complexity of emergency risks continues to increase into the future, there will be greater need to respond to events different to those previously experienced and to manage increasingly complex systemic risks. By investing in work to promote general resilience, Western Australia is well placed to deal with future uncertainty. Across these efforts, the SEMC will continue to play a pivotal role in setting the strategic direction and developing the overall resilience of the Western Australian emergency management sector.

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