

Emergency Management Data Strategy



Government
of South Australia



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Executive Summary



Information is the foundation from which all good decisions are made; having the right information available at the right time is crucial to good, timely decision making, especially for emergency management. The challenge is to ensure that all emergency management agencies have the systems, processes and collaborative mechanisms in place to share and utilise actionable, relevant, and timely intelligence to inform the actions of subject matter experts.

The National Disaster Risk Reduction Framework (Commonwealth of Australia 2018:12) states that:

‘Across all sectors, there is an urgent and growing demand for trusted and authoritative disaster risk information and services to inform operational and strategic decisions’.

The recent Independent Review into South Australia’s 2019-20 Bushfire Season (Keelty Review 2020) and Royal Commission into National Natural Disaster Arrangements (Royal Commission 2020) have highlighted several data governance gaps in the emergency management environment. These included interoperability of systems, quality, access and timeliness of data and the need for standards to improve consistency for national harmonisation. It is evident that a data strategy is required to guide and encourage emergency management personnel to gather and share the right data and information effectively.

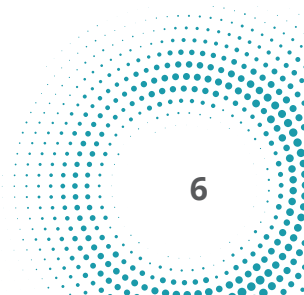
Data governance and information sharing needs to be better coordinated in an ongoing manner. Likewise, we need to establish a common language for emergency management data to improve how we communicate with each other. The application of the principles and actions in this strategy will assist with decreasing confusion in the sharing of data between agencies while also being mindful of how data is used. For example, while the damage assessment data is used to understand the situation and its immediate impact during response, the same data is used throughout the Prevention, Preparedness, Response and Recovery (PPRR) lifecycle in a variety of ways, such as forming the basis for the impact assessment, informing relief and recovery funding arrangements and planning efforts.

In preparing the South Australian Emergency Management Data Strategy (The Strategy) it has also become evident that the business process flows for the exchange of data and information between agencies are not well documented. While agency representatives consulted could articulate the process, very few could provide supporting documentation upon request. The over-reliance upon tacit knowledge in place of standardised process and documentation is a risk to the effective and timely exchange of information should a few key personnel be unavailable.

The extent to which an organisation has implemented appropriate data life-cycles and utilised data varies depending on their relative size, culture, investment (among many factors) and the degree to which decisions are driven by data. From the consultation phase of the strategy, we found that some organisations tended to rely upon informal networks before, during and after an emergency in place of formal and enduring information sharing arrangements. In most cases those organisations would benefit substantially from establishing formal mechanisms to accelerate the seamless exchange of information during times of need. Moreover, the establishment of such protocols would increase confidence that such exchanges were fit for purpose and properly governed.

Most agencies who provided a written response to the discussion paper cited the need for better and timely weather information. For example, forecast for extreme heat and planning for fire or for heat stress among the elderly. In this case making weather data ubiquitously available to all emergency management and subsidiary services in a readily digestible format should be expedited. Likewise, according to the initial response to the discussion paper, a greater emphasis should be put on the consolidation of data collection methods so as to ‘collect once, use multiple times’ as well as increase investment in the use of Artificial Intelligence (AI) and predictive analytics (see Figure 8) for modelling and rapid response.

The Strategy builds on existing frameworks and standards. In particular, the National Disaster Risk Reduction Framework and the Sendai Framework for Disaster Risk Reduction 2015-30 (Sendai Framework). The Strategy is aligned





against three of the seven strategies identified in priority one of the National Disaster Risk Reduction Framework. The Strategy will not only address those issues of importance to South Australia but will also help the state to deliver upon its national commitments. The Strategy further defines 7 guiding principles (Figure 2) to guide decision making and identifies 24 actions under the four framework priorities of:

- Good Governance
- Strong Collaboration
- Consistent Standards
- Capability Investment

These framework priorities inform each of the strategic objectives which are aligned with the National Disaster Risk Reduction Framework i.e. to reduce data gaps will require good governance, standards, investment and collaboration.

Likewise, the Emergency Management Data Principles can guide decision makers in their deliberations on how to implement the actions and therefore be consistent with the intent of The Strategy to achieve greater interoperability. These concepts are applied to form a priority matrix in Appendix C which considers the value and complexity to assist emergency management sector agencies and organisations (e.g. NGOs, local government) that contribute services and expertise to select and prioritise data projects.

Finally, this is the first Emergency Management Data Strategy for South Australia and as such seeks to provide a starting point for future iterations that help to mature the quality, management and exchange of data across the emergency management sector over time.

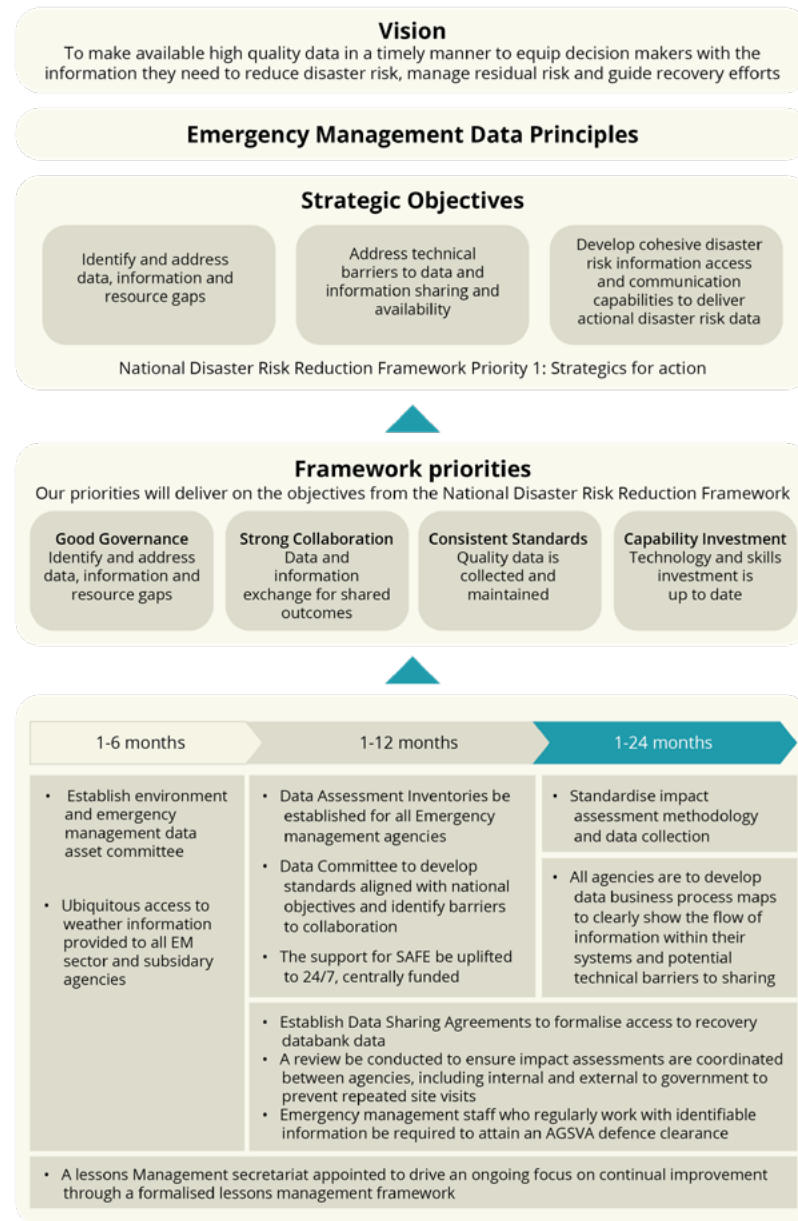
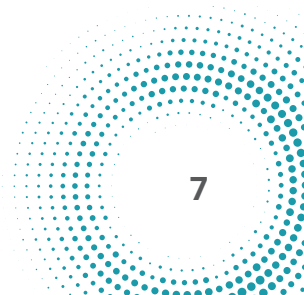


Figure 1 Emergency Management Data Strategy Framework



Emergency Management Data Strategy Principles



The following emergency management data strategy principles are in addition to those defined in the state-wide data strategy.

This set of principles aim to ensure all emergency management organisations utilise data and information for improved coordination across the sector. By adhering to these principles, organisations will value data as an asset that informs effective and efficient services for all South Australian communities.



Figure 2 Emergency Management Strategy Principles



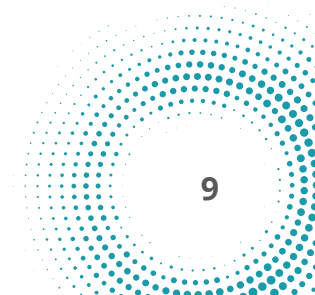
Emergency Management Data Strategy Actions



Good Governance

1. Establish the Data Asset Committee for emergency management, a permanent committee with a secretariat to drive ongoing and proactive initiatives through SEMC. The committee will provide oversight to state emergency management data assets to:
 - a. Coordinate and promote data management and IT systems and data planning
 - b. Coordinate resources/funding to improve interoperability
 - c. Promote application of data relevant to emergency management
 - d. Data retention and management guidelines established in line with relevant state statutes
 - e. Agree a standard methodology for calculating savings from mitigation activities
 - f. Promote the adoption of data quality standards, including national standards, across emergency management agencies, i.e. development of standardized methodology of location
 - g. Promote the data and infrastructure alignment across agencies, i.e. development of change management principles and standing data sharing agreements to facilitate and automate data sharing and reduce duplication
 - h. Facilitate coordination with national data initiatives
 - i. Identify and address data sharing barriers to promote interagency collaboration
2. The Data Asset Committee to actively develop and support a pragmatic approach to predictive analytics (e.g. fire front data) and the use of Artificial Intelligence in emergencies.¹
3. All agencies should develop, update and share their data business process maps to display the flow of information within their systems and potential technical barriers to sharing. These business process maps must document-
 - a. all systems
 - b. all datasets (e.g. catalogue, metadata dictionaries)
 - c. all licences
4. Seek to establish procurement rules to register and to ensure that all future procured tools, systems and data are interoperable and data must be decoupled from the application.
5. Investigate changing the Office for Data Analytics' role from an ad hoc emergency management support to ongoing service and support including;
 - a. Preparing and providing an analytic and technical support surge capacity as needed for emergency management
 - b. Coordinate and lead the development of the Common Operating Picture and establish a sustainable support model
 - c. Promote and support data quality, sharing and management practices in the emergency management community
6. Agencies should be required to maintain a "three-deep" roster of redundancy in critical roles with staff who are knowledgeable in emergency management data systems ensuring information is always available, accessible and utilised at critical times.
7. Emergency Management staff who regularly work with identifiable information to attain an AGSVA defence clearance to enhance interoperability with federal agencies and other state/territory jurisdictions including defence personnel.
8. A Lessons Management secretariat should be appointed to drive an ongoing focus on continual improvement through the existing formalised lessons management framework (See Appendix B).

¹ The development should take into consideration the lessons from the 2019-20 season including the Black Summer 2019-20 research by the Bushfire and Natural Hazards CRC which has published several recommendations in the Established and Emerging Uses of Predictive Services in Victoria report which should be considered in the South Australian context



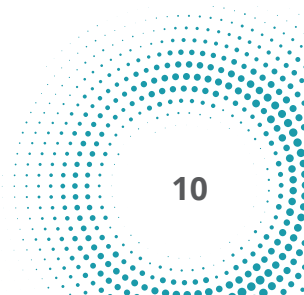


Strong Collaboration

9. The Data Asset Committee could explore collaboration opportunities across government and industry to support innovative initiatives that keep the emergency sector on the forefront of technological advancement. For example, collaboration with the Australian Defence Force to explore emerging technologies for faster and more reliable data feeds.
10. All EM agencies should establish, maintain, and share comprehensive data asset inventories (data systems and catalogue) to be made available from a central secure repository.
11. Onsite impact assessments could be coordinated between agencies, including internal and external to government, that will prevent repeated site visits and expedite information sharing. Minimise government site visits with owners/occupiers to reduce the trauma on both the individual and the staff attending and to provide a more streamlined service to those effected.
12. Establish a standardised impact assessment methodology that incorporates all agencies' requirements and established end user consent at point of collection to support recovery efforts.
13. Establish data sharing agreements to formalise access for all appropriate agencies, internal and external to government, to the recovery databank and information gathered in ECIS and/or similar systems to streamline services for those effected.

Data Standards

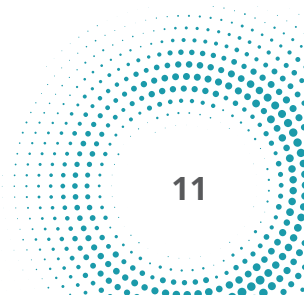
14. The Data Asset Committee to support domain experts to establish data standards specific to project scopes (e.g. flood water study standards). Developing a standardised approach for all data collection activities undertaken, including projects, must be defined and minimum collection requirements met for all data collection.
15. Community profiles are developed and could be made available to better inform vulnerability, risk, damage and impact assessment.
16. The Data Asset Committee to review the methodology and data standard for the recording of location during damage assessment to ensure that all parties can rely on the location of a damage assessment as a consistent and reliable data point in both methodology applied and data format.
17. Damage assessment requirements be reviewed to ensure that the required information is gathered during the initial assessment, including the location of the damaged structure/s. A single approach to damage and impact assessment be agreed and established by EM agencies. This approach includes:
 - a. National standards and methodologies
 - b. Alignment with insurance companies where appropriate





Capability Investment

- 18.** A sector wide data and technology roadmap should be established and coordinated through the Data Asset Committee and SEMC to ensure all agencies have access to the technological capabilities to achieve state-wide data initiatives.
- 19.** Consideration to centrally fund the Situational Awareness for Emergencies (SAFE) Common Operating Picture and uplift to 24/7 support.
- 20.** Development of a comprehensive data asset to be coordinated across all emergency management agencies to form the basis for hazard and risk assessment in South Australia. The dataset will include critical infrastructure, building and structures, social, economic, environmental and cultural assets and be incorporated into the Common Operating Picture (SAFE) by region and ranked by priority according to an agreed level of importance.
- 21.** A portal be established for those effected by an event to “tell their story once” to enable access to multiple sources of support, both government and NGO support offerings. This portal should be integrated with the Damage Assessment process to ensure that the information required to provide relief services is available.
- 22.** Promote further investment in mapping, analytics, modelling and predictive capabilities across the emergency management sector.
- 23.** Invest in an incident management tool for the sector that aligns with the principles of this strategy.



Introduction



The Strategy sits within existing emergency management governance arrangements and spans all phases of the emergency management cycle for the state. South Australia's Emergency Management Act 2004 defines the role and responsibilities of the State Co-ordinator (and other key roles) for emergency management in South Australia and the State Emergency Management Committee (SEMC) which prepares and revises the State Emergency Management Plan (SEMP). The SEMP defines the roles and responsibilities for emergency management within South Australia across the PPRR phases, defining the control agency and hazard leaders for each emergency event type.

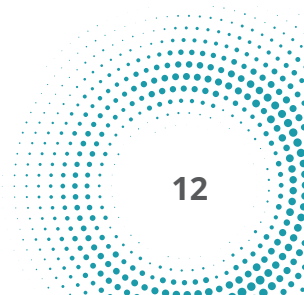
PPRR is an ongoing cycle with many actions requiring constant and ongoing efforts.

- **Prevention** — actions taken in advance to reduce or eliminate the impact of hazards and increase the resilience of the community. This is also referred to as mitigation. Examples include prescribed burning, backup power sources, flood levies or sea walls. Prevention should be an ongoing focus.
- **Preparedness** — actions taken before an incident to establish effective response and recovery arrangements and awareness. Examples include creating and testing response plans and public education. Preparedness should be an ongoing focus.
- **Response** — actions taken to contain, control or minimise the impacts of an incident through the enactment of preparedness arrangements. Examples include the deployment of sandbags during floods or fire crews to fight fires to protect the community. Response usually lasts hours but may be ongoing for days or weeks.
- **Recovery** — actions to assist a community in the restoration of emotional, social, economic and physical wellbeing, reconstruction of the physical infrastructure and restoration of the environment. Recovery may be ongoing for months or years.

The PPRR phases do not occur in isolation. The concurrent nature of the emergency management phases demonstrate that relief and recovery begin with response in the immediate aftermath of an event and mitigation and preparation efforts are always ongoing. From a data perspective, this means data collected or available prior to an emergency may remain relevant to all phases of PPRR.

In South Australia the SEMP defines a network of emergency management bodies to manage all hazards across all phases of emergency management. The SEMP is managed by SEMC, a high-level, strategic planning committee established by section 6 of the Emergency Management Act 2004, to provide leadership and maintain oversight of emergency management planning for South Australia before, during and after an emergency or hazard.

- Before an emergency occurs Hazard Leaders, as defined in SEMP, coordinate the comprehensive planning process relating to its assigned hazard.
- When an emergency event occurs, a control agency is appointed based on the hazard as defined in the SEMP. The State Emergency Centre (SEC) may be activated where the scale of the emergency requires coordination across multiple agencies. The SEC brings together all relevant agencies and support groups to facilitate a coordinated state level response.
- Following an emergency, the State Recovery Coordinator manages the normal recovery operations of government and other non-government recovery organisations. The State Recovery Coordinator will manage the government recovery response to an emergency during a declared emergency by undertaking the role of assistant State Coordinator – Recovery.





The state recovery agencies require access to large complex data sets, during and after an event, to monitor the four Recovery Data Domains - Social, Built, Economic and Environment. This data is provided by a wide range of government agencies to form the Recovery Impact Databank, which is used to understand the context and complexity of the recovery efforts.

The Recovery Impact Databank could provide greater insight with greater coordination, automation and investment.

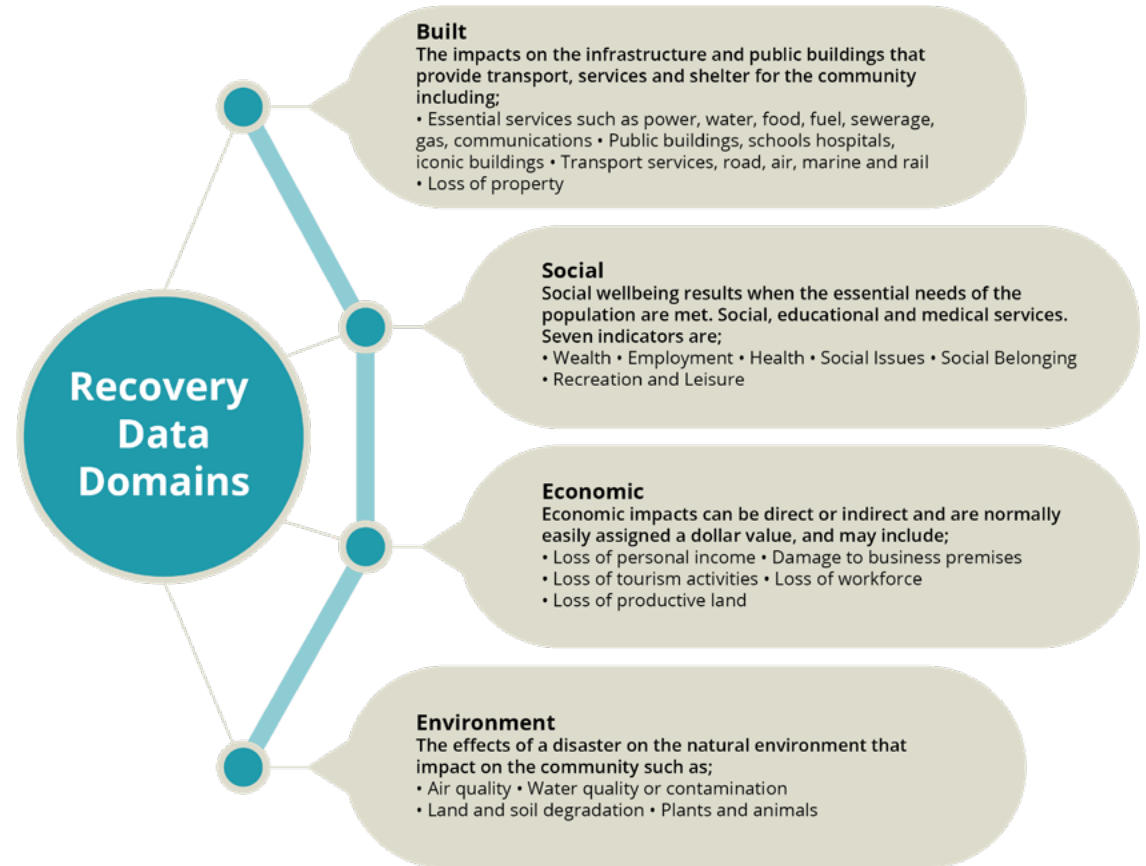
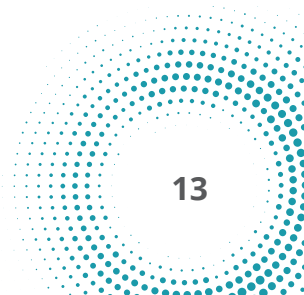


Figure 3 Recovery Data Domains adapted from the AIDR Community Recovery Handbook²

2 <https://knowledge.aidr.org.au/resources/handbook-community-recovery/>



Methodology



The Office for Data Analytics (ODA) has developed The Strategy with extensive collaboration and consultation with South Australia's emergency management stakeholders. An Emergency Management Data Program Governance Committee was established with members from:

- Department of Premier and Cabinet (DPC),
- South Australian Police (SAPOL),
- Department of Environment and Water (DEW),
- Department for Infrastructure and Transport (DIT),
- Primary Industries and Regions South Australia (PIRSA),
- South Australia Health,
- South Australian Country Fire Service (SACFS),
- South Australian Fire and Emergency Services Commission (SAFECOM),
- Attorney Generals Department (AGD),
- South Australian Metropolitan Fire Service (SAMFS) and
- State Emergency Services (SES).

ODA consulted individual committee members, and other relevant stakeholders such as Green Industries South Australia (GISA), South Australian Housing Authority (SAHA), Department of Treasury and Finance, and the Red Cross to discuss their information requirements. Those consultations also included identifying any data and technology constraints and the operational context.

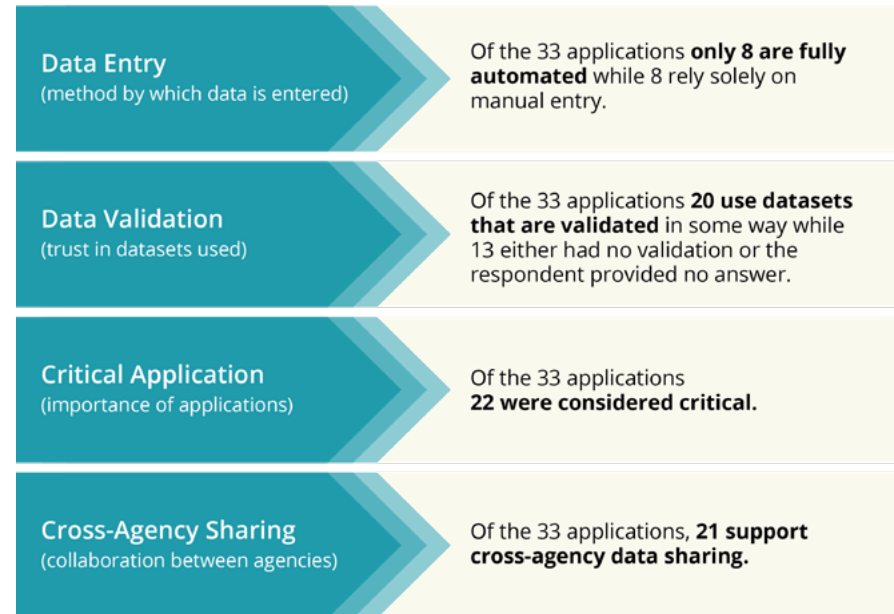


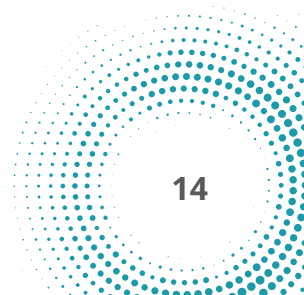
Figure 4 Agency Feedback³

35 participants (18 agencies) received both a discussion paper and survey to complete. However, only nine agencies provided a response. Of the nine responses, 33 applications⁴ used in emergency management were identified.

Given the large number of critical applications there is a greater need to improve validation (to build trust and confidence), automation and sharing among emergency management entities.

3 Critical was defined as providing crucial information in an emergency.

4 Applications are any software platforms used in emergency management. This includes software access via mobile or desktop environments.



Good Governance

Good data and insights do not just happen. There must be good governance at all levels to ensure that data is managed against appropriate definitions and standards throughout the data life cycle to ensure operational intelligence teams have high quality data to delivery high quality outputs. Coordination is required at a state level to ensure all emergency management data is collected, governed and shared effectively across agencies not just during an emergency but across all phases of emergency management.

Across and within each phase of the PRRR cycle there is another cycle; the data lifecycle. The data lifecycle represents all the stages of data throughout its life from creation to distribution, reuse, archiving and destruction. Within this data lifecycle all public sector data must also be appropriately classified in line with the South Australian Information Classification System to ensure data is managed correctly. In doing so data management practices must align with the appropriate frameworks such as the SA Cyber Security Framework, Physical Security Policy Framework and Australian Government Information Security Manual (ISM). How this data is managed through-out its lifecycle will determine quality and hence useability across the PRRR. The challenge for emergency management agencies is to not only manage data and quality within their own systems but also have confidence in the systems of others. Strong overarching data governance can provide the forum for emergency management agencies to build confidence in one another's data and open channels for further integration and sharing.

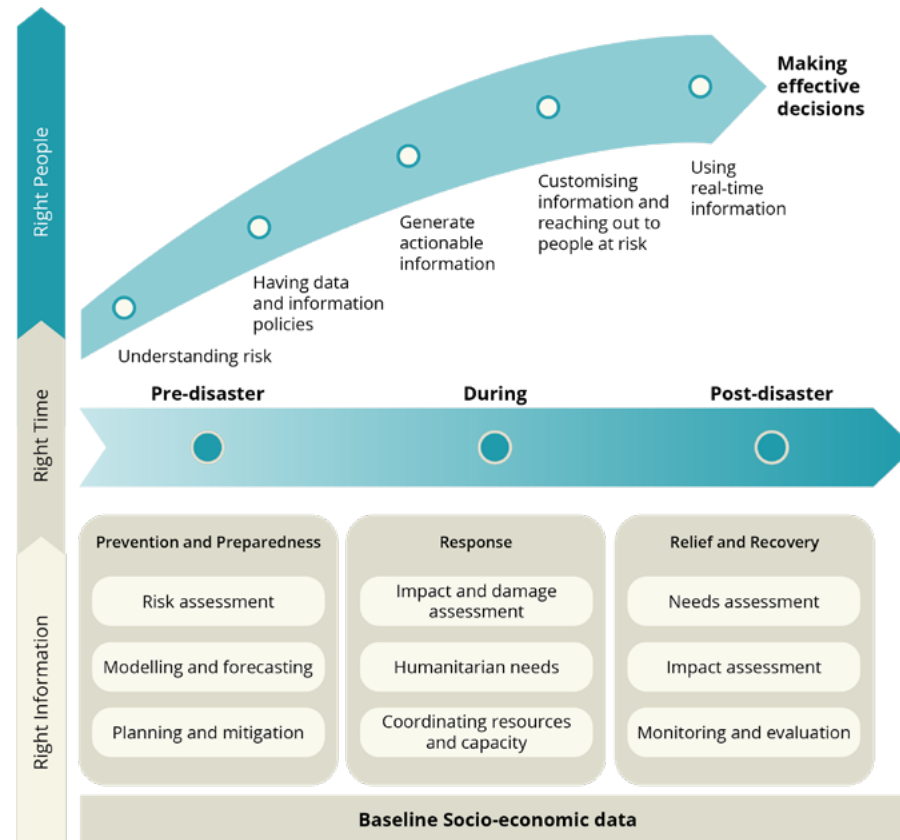


Figure 5 Emergency Data Governance



A Data Asset Committee can play an important role in the development of agreed standards and policies as well as providing a focal point for inter-jurisdictional data and information sharing and collaboration. Currently discussions to do with emergency management data are fragmented across multiple agencies at various levels of authority. Some of these discussions do not always include those agencies reliant on the data who often play an important role in the efficacy of a response or recovery.

For example, the flow of information to a school during a disaster can come via structured internal (hierarchical) mechanisms or via 'on-the-ground' responders (network relationships) e.g. SAPOL, SES, MFS or CFS. Good governance in such situations is crucial for the timely delivery of relevant and accurate information, and directions received by the school must be consistent with the messaging from the incident control centres. Situations where those on the ground deviate from central coordinators create additional risk by causing the central control centres to lose visibility of the situation.

Effective governance of emergency management data needs to span the full PPRR cycle given the complexity and interdisciplinary nature of the issues in emergency management. In other words, the right information needs to be available at the right time to the right people to make more efficient and effective decisions.

Data collected and used in preparedness (e.g. location, asset, value) flows right through to the response phase (e.g. emergency services are able to prioritise assets) and the damage and impact assessment in relief and recovery (e.g. location of damage, value of damage, type of asset destroyed).

Data collected through the PPRR cycle contributes to understanding risk and directly informs mitigation activities that reduce the cost of damage in future events. For example, the US National Institute of Building Services estimated

that for every \$1 invested by three federal government agencies in mitigation activities there was a \$6 saving to society⁵. This point is starkly highlighted in Figure 7 and how the practical use of data is used to inform flood mitigation activities.

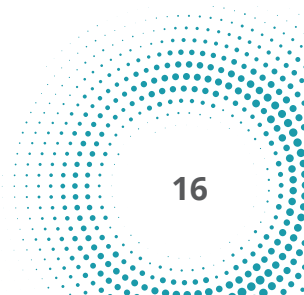


The house on the right in Meyerland, Texas, was elevated above the 100-year floodplain and largely spared damage from Hurricane Harvey while the non-elevated one on the left sustained flood damage. A new study by the National Institute of Building Sciences finds \$6 saved for every dollar invested in mitigation activities to reduce risk and disaster losses.

© Raj Mankad/Rice Design Alliance

Figure 6 Flood Damage Mitigation

5 [https://www.pewtrusts.org/en/research-and-analysis/articles/2018/01/11/every-\\$1-invested-in-disaster-mitigation-saves-\\$6](https://www.pewtrusts.org/en/research-and-analysis/articles/2018/01/11/every-$1-invested-in-disaster-mitigation-saves-$6)



Strong Collaboration



In support of good governance, collaboration should be embedded within the culture of agencies. All data collection should aim to adhere to the mantra “collect once, use multiple times”. Across government data sharing should be utilised to reduce duplication of effort.

In South Australia, data sharing is widely supported by the South Australian Public Sector (Data Sharing) Act 2016, which provides a safe, legal framework to share public sector data between government departments and trusted entities. Despite this legal framework there remain barriers to sharing. The Australian Institute of Disaster Resilience (AIDR) identifies several cultural and behavioural barriers to sharing, as shown in Figure 7.

Why don't people share?

- It's not convenient
- They do not know what they know
- They do not know the value of what they know
- Time is not allocated by the organisation for knowledge sharing
- They believe knowledge hoarding is job security
- They think they will be punished if things were not perfect
- They do not get credit for it
- They do not have time
- They do not know how

Source: https://www.aidr.org.au/media/1760/aidr_handbookcollection_lessonsmanagement_2019.pdf

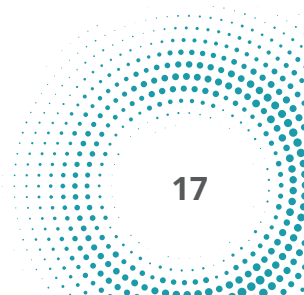
Figure 7 Why don't people share?

Barriers to sharing can also relate to resourcing issues, failure to identify areas of improvement via a formal 'lessons learned' process, insufficient training, technology obsolescence, systems incompatibility, conflicting organisational agendas and many more. There is no single barrier but rather a constellation of barriers, some are stand-alone and others are mutually reinforcing. Despite these barriers there are some good examples among South Australian agencies that are leading the way for others to follow.

Fire prediction and the common operating picture are examples of inter-agency collaboration. The Department of Environment and Water (DEW) are instrumental in the provision of mapping services and fire prediction, and the common operating picture provides overall situational awareness for the State Emergency Centre and control agencies.

Fire behaviour prediction is an extremely complex task relying on a range of qualitative and quantitative information. Data sources include detailed environmental and weather mapping which contribute to vegetation profiles and fire danger ratings. The science and art behind fire predictions has a long complex history from the 1950s onwards in Australia, this is outlined in A Guide to Rate of Fire Spread Models for Australian Vegetation by the CSIRO (2015). Organisations such as BoM and CSIRO are continuing the work to improve the science and tools that are used to make bushfire predictions today.

Current modelling tools do not incorporate the fire suppression efforts of crews and includes very limited consideration of upper atmosphere conditions e.g. extreme weather involving significant pyroconvective events (where the energy of the fire creates its own weather and fire behaviour become driven by the fire plume). Successful fire modelling therefore has a strong reliance on the expertise of the Fire Behaviour Analysts to contribute to the success of the modelling and understand the context including the limitations of the models and data used.





The Pinery Fire on the 25th of November 2015 demonstrates how accurate these models can be. The Pinery Fire started at 1205hrs, within an hour and a half the Fire Behaviour Analysts had developed a fire prediction map that accurately reflected the final fire scar as of 0955hrs the following day. The two figures below demonstrate the impressive accuracy of that model.

Continuing to improve fire behaviour models relies on three main areas of investment: highly skilled analysts, modelling software and high-quality data collection and availability. This is crucial for informing response efforts, including public warnings, modelling for planning mitigations and resilience, relief, and recovery planning.

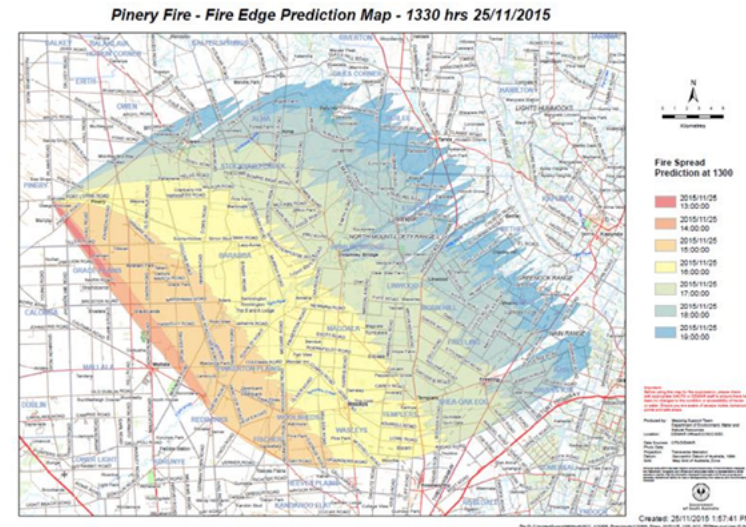


Figure 8 Pinery Fire Prediction

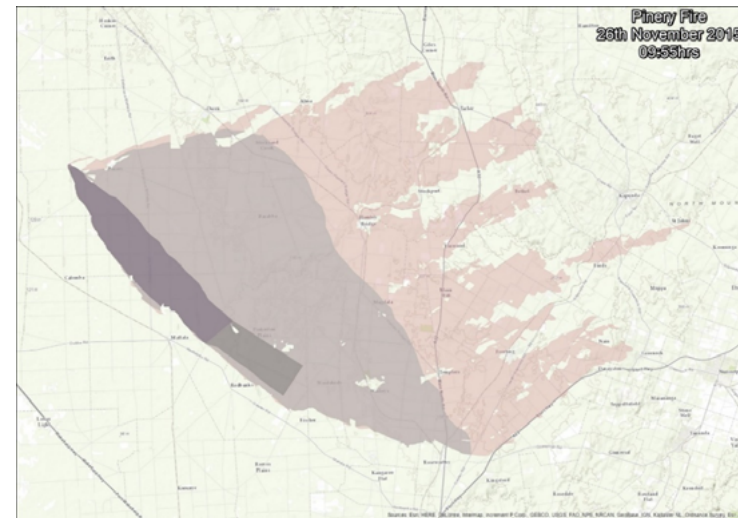
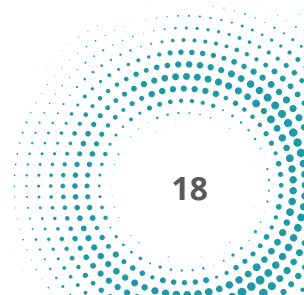


Figure 9 Pinery Fire Scar



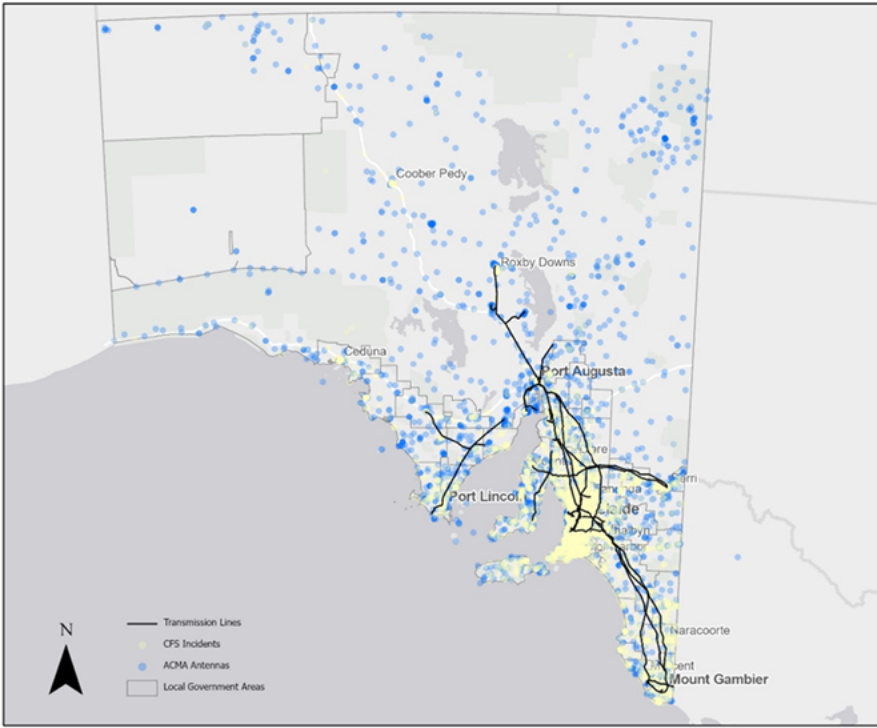
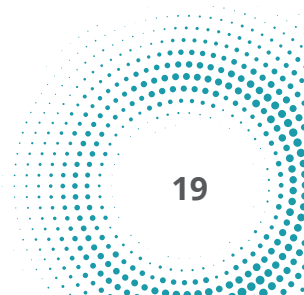


Figure 10 SAFE Platform

As SAFE has shown, sharing can help drive collaboration but what is shared also must be purposeful and useable. Since no data standardisation exists, operational definitions can vary between South Australian Government agencies and between these agencies and other entities. Differences in terms, concepts and technology architectures results in increased manual processing in many circumstances. This manifests in data inconsistencies, misinterpretations of similar data sets, extra processing of the data to align with the standards of the receiving agencies, and delays in getting the correct data to the right decision maker in a timely fashion.



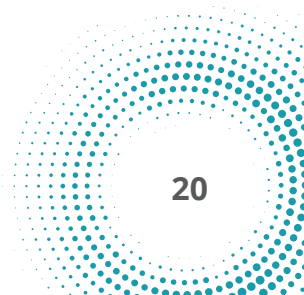


Recovery Case Study: Property data to support clean-up efforts

The multi-million dollar clean-up efforts following the 2019/20 bushfire season were hindered by the lack of available property data. The challenge of determining the land owners and their contact details caused delays in ensuring all land owners within a fire scar had been contacted. The clean-up process was therefore heavily reliant on affected land owners registering through the registration portal.

Land use information is available within the government, however, an appropriate channel to obtain the data is not available or well communicated. As a result multiple agencies, who rely on this data, establish their own dataset, resulting in multiple agencies developing and maintaining separate databases. The current approach forces the collection of the data multiple times across government, and due to a lack of resources to maintain a dataset that is only needed sporadically, they may only use the data once then re-establish a new dataset when the need arises again.

A collaborative approach across government will reduce the need for duplication of efforts across agencies by adhering to the principle of 'collect once, use multiple times'.



Consistent Standards



Data must be consistent and reliable to provide value. Coordinated data standards across the emergency management sector will ensure that high quality data is available to support data-driven decision making in all PPRR phases.

Since the 2002 report titled, 'Natural Disasters in Australia - Reforming Mitigation, Relief and Recovery Arrangements', there have been several reviews at the state and national level that have identified the need for consistency in emergency information and data. A key challenge for achieving this consistency across agencies and between jurisdictions has been the availability, awareness and agreement on definitions.

Standardised data definitions across the emergency management sector are crucial for ensuring that information is universally understood by those who gather and use the data.

An example of where data definitions matter is the definition of a house, which may seem simple on the surface but in practice it can be complicated by the wide variety of ways people live. Some examples identified in recent events include hotel rooms being counted as separate residential buildings instead of a single hotel and a shed used as a home not initially counted in the housing damage data. This raises the question of how an apartment building would be counted? Should a caravan be counted? If there are two houses on a property is the primary residence treated differently to the secondary structures? Data standards for the definition of what is counted as a house or structure should answer these questions to ensure the figures are gathered consistently.

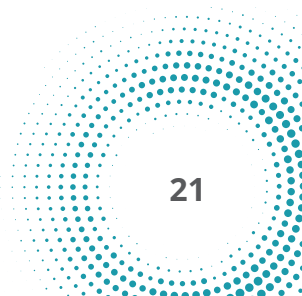
Getting these numbers right is crucial for understanding the impact of an event and the effective delivery of relief and recovery services. It also carries reputational risk to the government and the agencies publicly reporting these figures. This is especially true where the data is gathered by an agency as part of a separate process then used by other agencies to delivery services.

Where agencies are reliant on the information (and are not responsible for the gathering the data), it is essential there is agreement on the data standards and definitions and these are available to all agencies who rely on that data. A data definition eliminates redundancy (e.g. all agencies referencing the same specification) and provides standardization, making it easier and more efficient to create, modify, verify, analyse and share information.

Consistent data standards are especially critical during the damage and impact assessment phases. The data from these processes is relied upon by a wide range of government and non-government stakeholders and informs the relief, recovery, preparation and mitigation efforts across the community.

Damage assessments are illustrative of the importance of data for all phases of emergency management. This data is used to inform the public and forms the basis for targeted initiatives, including local and federal grants, recovery initiatives and future planning and mitigation arrangements.

A recent update to the damage assessment process has centralised the gathering of damage assessment data with SAPOL following the 19/20 bushfires. Damage assessments are undertaken, by aerial imagery and ground crews, as soon as it is safe to do so. A live feed of damage assessments will be displayed through the common operating picture (SAFE) platform and once all damage assessment data has been collected it is provided to the control agency.





Adopting a centralised approach to damage assessments in South Australia resolves a major challenge from previous arrangements where damage assessments conducted by different agencies potentially providing contradictory data. As with the hierarchical and network challenges in the response phase there are challenges in the damage assessment phase that need to be actively managed. These include:

- **Data collection vs responsibility:** The control agency is responsible for the damage assessment data, however where the control agency is not in control of the collection of this data there is a high risk that the information collected may not meet the control agency requirements.
- **Agreed data definitions and collection methods:** Agreed collection methods and data definitions are crucial. In addition to ensuring that all required information is gathered, it is crucial to ensure that all users of the data are in agreement and understand the definitions of the information gathered. For example, the collection of location needs to be standardised and consistently collected on an agreed process, such as the GPS location of the damaged building instead of the driveway entrance or street address.
- **Competing sources of public information:** The control agency is responsible for providing public information on damage assessments. In some cases, the verification of damage and definition of that damage may take several days during which time the media may report contradictory, incomplete or wrong information.
- **Unvalidated live feed:** The control agency should be the single point of information for the public. There is a requirement to ensure that strict protocols are in place to ensure the information is used and shared appropriately. A live feed of damage assessment data collected needs to be checked by the damage assessment supervisor before it is marked complete to ensure no or as little unvalidated data as possible passes into the system and hence is reported on.

Damage Assessment Process

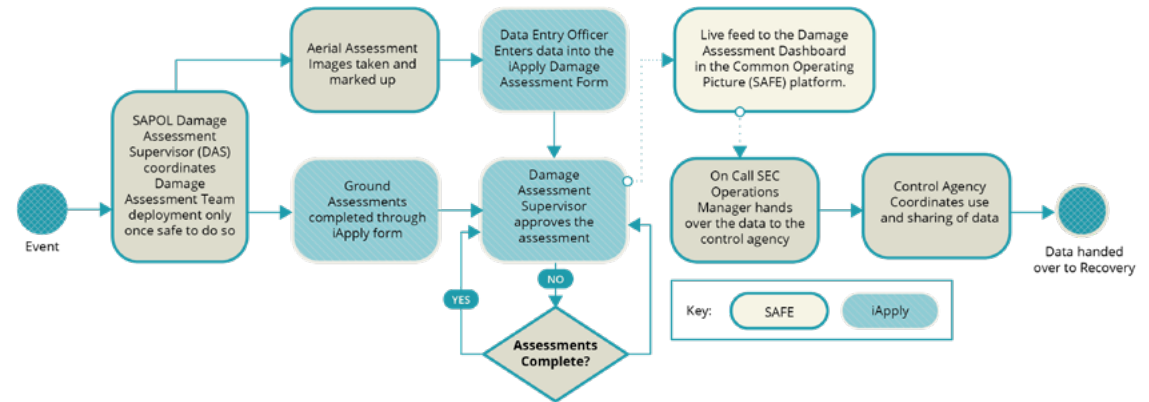
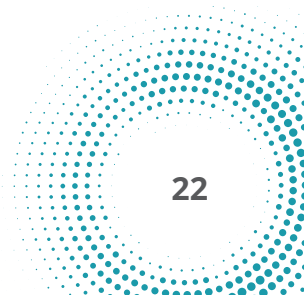


Figure 11 Damage Assessment Process



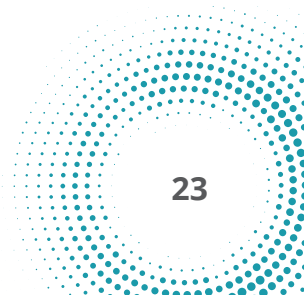


Preparedness Case Study: Standards supporting flood data

Flooding is one of the most costly natural disasters in Australia and even though South Australia has a dry climate, many parts of Adelaide and the state can flood. Flooding is one of the most damaging natural disasters for the state's economy as well and for years the data capture for flood hazard elements were agencies and local government project driven, with no data standardization and a clear gap between methodologies on how data was captured. Data of different critical catchments and locations could not be combined, and elements presents in some projects were not captured in others. Flood awareness, floodplain maps and other flood hazard critical information had been outdated with no reliable and up-to-date data.

Initiatives like the new ePlanning system, an Attorney-General's Department (AGD) online system with a centralised place for all South Australia's planning and development matters, has been providing data standards around local and state government. The flood data will be available through the ePlanning System (SAPPA) and Location SA data repositories allowing data sharing across government through Location SA infrastructure. The Department for Environment and Water (DEW) is working with AGD to centralise procurement for the project related to high- resolution LiDAR elevation data through DEW's Preferred Supplier Panel for Spatial Imagery Services.

This allows the South Australian Government to leverage more than 20 commercial imagery and elevation suppliers from a panel to coordinate procurement needs through the Location SA imagery and Elevation Working Group. This will help with across government data sharing and leverage economies of scale to procure larger areas to be captured using high- resolution LiDAR by shared budgets.



Capability Investment

Capability encompasses technological and skills capability and consistent investment in appropriate and coordinated technology and skills is required to address technical barriers.

The manual processing of data invites errors and inconsistency while taking substantially longer. Whereas the uplift of technological capabilities, supported by a collaborative data sharing approach including established data sharing agreements, allows agencies to get on with the business of providing services to the South Australian community.

For example, disaster recovery requires the gathering of vast amounts of data on all recovery data categories of infrastructure, environment, social and economic impact. The data custodians of this information are spread right across the state government (and may be expanded to include NGOs where data sharing arrangements can be reached). Therefore, the technical capability for recovery coordination to gather, store and share this data effectively underpins the ability to provide services to the community.

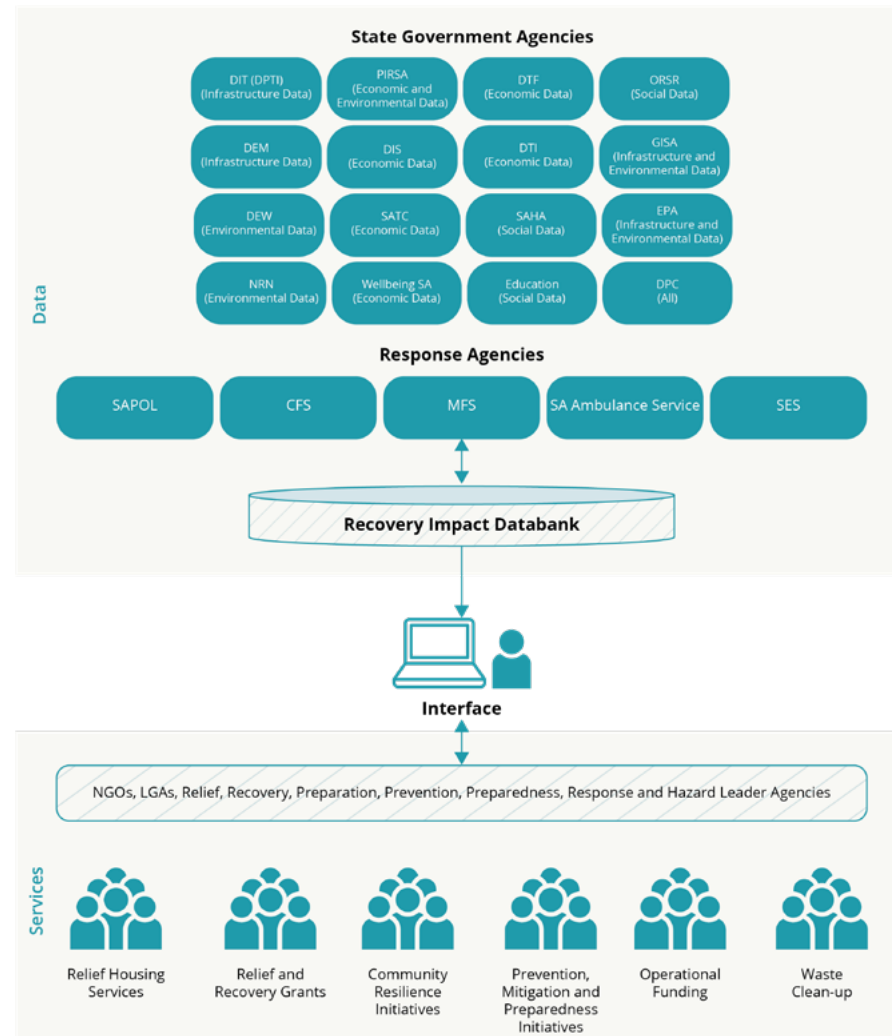


Figure 12 Recovery Single Source of Truth



A major challenge faced by both the service providers and the customers during recovery is the requirement to interact separately with a wide variety of agencies and NGOs who all require similar information to provide their services. This challenge can be particularly frustrating and potentially traumatising for those effected by a disaster who often need to reach out separately to multiple agencies, completing large application forms providing details of how the disaster has impacted them.

The National Bushfire Recovery Agency advocated for a 'no wrong door' and 'one-stop-shop' approach to recovery.

Given full effect, this would allow an individual to access all relevant assistance regardless of the agency they approach, and they would only need to tell their story once. These approaches require processes to enable the exchange of personal information between recovery service providers.

Source: The Royal Commission Into National Natural Disaster Arrangements, 2020

Figure 13 'No wrong door'

In South Australia, the South Australian Housing Authority Emergency Client Information System, known as ECIS, seeks to collect information and connect customers with multiple support agencies and NGOs, these organisations will have a physical presence in the recovery centre. However, the information recorded in ECIS is not sought by any other agency. The lack of sharing between agencies means that customers are required to repeatedly provide their information to any other agencies providing support that may be applicable to them. This is usually via a written form, or in some cases an online application form. This means multiple agencies are collecting the same information into multiple systems.

Prevention Case Study: Bushfire Risk Management Systems

Bushfire Risk Information Management Systems (BRIMS) contains the most comprehensive state-wide dataset of assets at risk from bushfire currently in South Australia. The processes currently in place to support the system only covers asset identification, risk assessment and treatment assignment. Pilot software for a Treatment Report System (TRS) has been developed and trialled with Kangaroo Island and Tea Tree Gully local government areas in order to undertake and report on treatment activities. From here future development will close the loop by integrating the two systems into a virtual application. With the system fully operational, and all hazard managers actively involved in reporting treatments undertaken, the combined BRIMS and TRS systems could not only be a powerful tool in managing bushfire risk but also an invaluable tool for understanding risks, priorities and the hazard levels for an area during an active bushfire response, providing a real time view of the bushfire risks in the state.

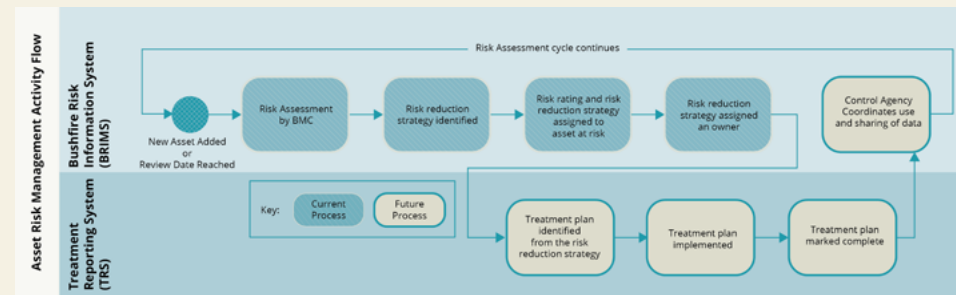
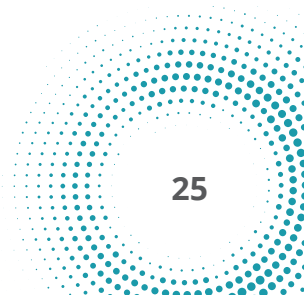
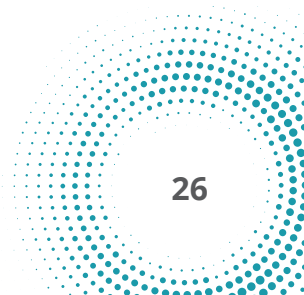


Figure 14 Asset Risk Assessment Process





This disjointed experience can be particularly traumatic where a community member is required to re-tell their story of loss multiple times. Some jurisdictions and NGOs are exploring options for a single portal for customers to ‘tell their story once’ allowing this information to be shared with multiple government agencies and NGOs in order to access all grants and support initiatives available to them based on their experience. A similar approach, like the one outlined in Figure 15 would provide centralised recovery assistance for those experiencing hardship to view and apply for a wide range of available services within the portal allowing them to access services they may not have otherwise been aware of.





Response Case Study: Common Operating Picture

Situational Awareness for Emergencies (SAFE) is a common operating platform that integrates and visualises selected data from emergency management agencies across South Australia and select Commonwealth agencies. Commencing in July 2019 the SAFE project created an emergency management dashboard providing a common operating picture to support the State Emergency Centre with real time information from a range of data sources. Moreover, ODA built SAFE to date and time stamp all datasets to conduct historical analysis.

SAFE is being further developed, throughout 2021/2022, with the active participation of all the South Australian Emergency Management agencies. In many instances, the data used for SAFE is already available in an open format from Location SA or Data.SA. In other cases, the data is a live feed of administrative data. SAFE has been made available due to the South Australian Government's open data policy for agencies to proactively release data for common good.

The SAFE project, funded by a Disaster Risk Reduction Grant through the Commonwealth and South Australian Government and developed by The Office of Data Analytics, has completed the first phase of development of a bushfire portal. SAFE will be extended to all emergency control centres and will include visualising relevant data sets for other types of emergencies, such as flooding, earthquakes, biohazards, pandemic and extreme weather.

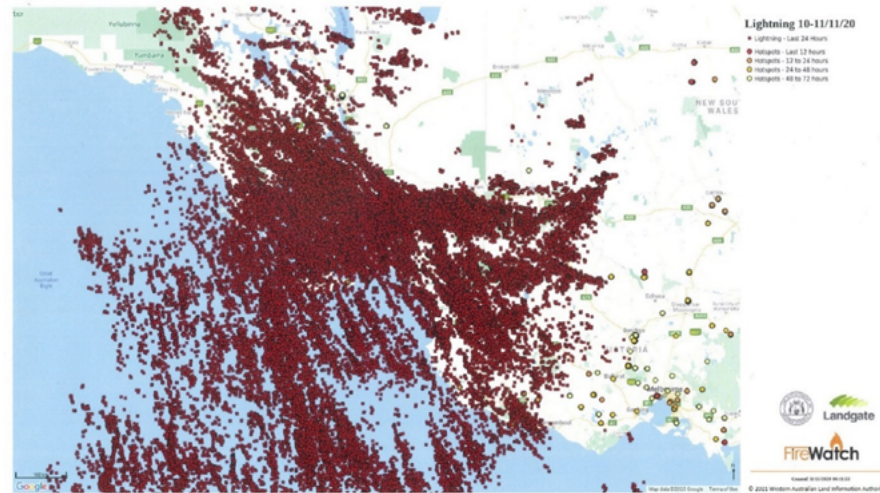
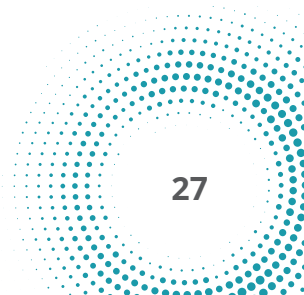


Figure 15 Lightning Strikes Over SA.

Source: Reproduced by permission of the Western Australian Land Information Authority



Appendices

Appendix A – Acronyms

Term	Definition
ADF	Australian Defence Force
AGD	Attorney-General's Department
AIDR	Australian Institute of Disaster Resilience
BOM	Bureau of Meteorology
CC	Control Centre
CE	Chief Executive
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DEW	Department for Environment and Water
DPC	Department of Premier and Cabinet
DPTI	Department of Planning Transport and Infrastructure
EOC	Emergency Operations Centre
EM	Emergency Management
EMA	Emergency Management Australia
EMC	Emergency Management Council
FSG	Functional Support Group
GISA	Green Industries South Australia
ICC	Incident Control Centre
IMT	Incident Management Team
IT	Information Technology
NGO	Non-Government Organisation
ODA	Office for Data Analytics
OILL	Observed Insight Lesson Leant
PIRSA	Primary Industries and Regions South Australia
PPRR	Preparation, Preparedness, Response, Recovery
SAAS	SA Ambulance Service
SACFS	South Australian Country Fire Service, also known as CFS
SAFE	Situational Awareness for Emergencies
SAFECOM	South Australian Fire and Emergency Services Commission
SAHA	South Australian Housing Authority
SAMFS	South Australian Metropolitan Fire Service, also known as MFS
SAPOL	South Australian Police
SCC	State Crisis Centre
SEC	State Emergency Centre
SEMC	State Emergency Management Committee
SEMP	State Emergency Management Plan
SES	State Emergency Service
USAR	Urban Search and Rescue
ZEMC	Zone Emergency Management Committee
ZEST	Zone Emergency Support Teams

Appendix B – Lessons Learned

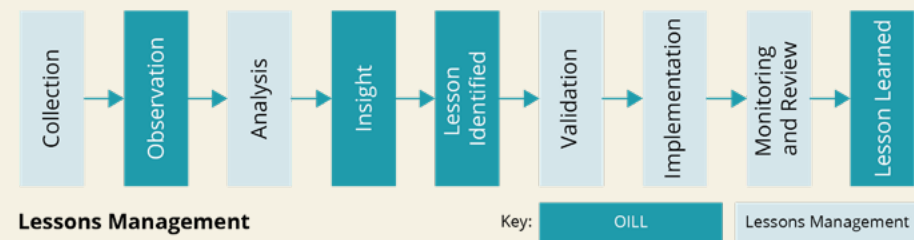
Lessons identified and learned support the development of a culture of continuous improvement which contributes to community safety and resilience, contemporary state arrangements and capability development. The SEMP includes the Emergency Management Lessons Management Framework which aligns with national principles and is established in the spirit of no blame.

Australia has embraced the OILL framework as defined in the Australian Disaster Resilience Handbook Collection Lessons Management 2019. Meaningful implementation of this process requires an ongoing focus and the implementation of this process within agencies and across agencies. At the state level within South Australia there is an opportunity to more actively drive and coordinate the identification and implementation of lessons.

The OILL process (observations, insights, lessons identified, and lessons learned) guides lessons management, defining the phases of lessons management lesson learned.

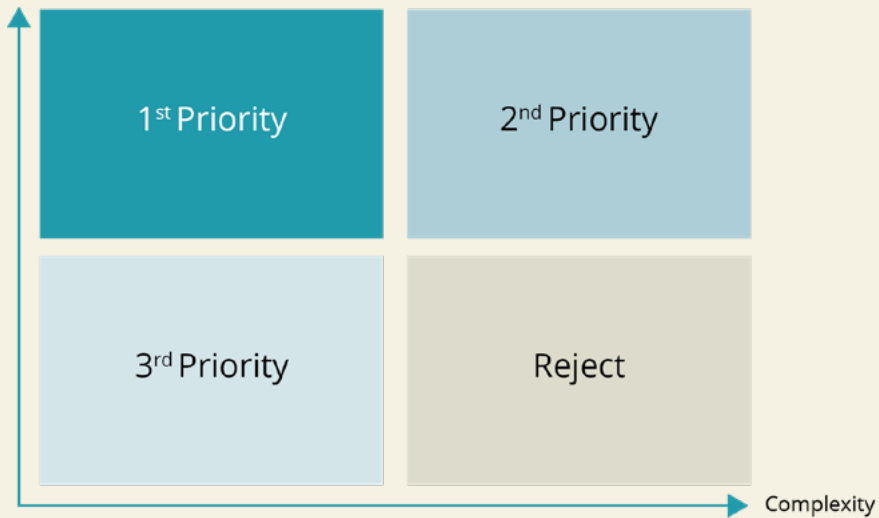
- 1. Observation:** a record of a noteworthy fact or occurrence that someone has heard, seen, noticed or experienced as an opportunity for improvement or an example of good practice.
- 2. Insight:** A deduction drawn from the evidence collected (observations), which needs to be further considered. Insights occur when there are multiple observations (pieces of evidence), which are similarly themed. An insight defines the issue, not the solution.
- 3. Lesson identified:** a conclusion with a determined root cause based on the analysis of one or more insights and a viable course of action that can either sustain a positive action or address an area for improvement.
- 4. Lesson learned:** A lesson is only learned once the approved change is implemented and embedded in the organisation.

A full iteration of a lessons learned cycle would involve the identification of a lesson, an action proposed and agreed, the solution implemented and then tested/validated to ensure the change is an improvement and the desired behaviour is sustained across the organisation.



Appendix C – Applying Emergency Management Data Principles to Project Prioritisation

This matrix can be used to prioritise projects by defining the project's value, complexity, and alignment with the principles of the Emergency Management Data Strategy. Organisations may wish to adopt this matrix in addition to existing procurement processes to ensure alignment to state-wide priorities.



Prioritisation Template

Project Name: Project Name		
Considerations	Explanation	Result
1 – Aligned to EMDS Principles		Aligned / Partially Aligned / Not Aligned
2 – Value		HIGH/LOW
3 – Complexity		HIGH/LOW
Summary	This project aligns to X/7 principles and provides HIGH/LOW value to X agencies. implementation/procurement will be a HIGH/LOW complexity.	
	Value	HIGH/LOW
	Complexity	HIGH/LOW
	Priority	1st/2nd/3rd/Low

Prioritisation Example

Project Name: One Stop Shop Customer Portal for Customers to 'Tell their story once' (Example)		
Considerations	Explanation	Result
1 – Aligned to EMDS Principles	<p>Project aligned to principles 1, 3, 5 and 7 as the data from one stop shop will be owned by the crown and made available to all agencies through a centralised system reducing duplication.</p> <p>A detailed scope analysis will be required to consider the complexity of developing in-house custom software solutions to provide the identity platform and ensure alignment to principle 2.</p> <p>A major requirement of this project is to ensure users also gain access to federal funding therefore it is a requirement of this project to align with principle 4 to ensure compatibility with national arrangements.</p> <p>As part of the project process appropriate data policies and documentation will be created to align with principle 6.</p>	Aligned to Principles
2 – Value	<p>A centralised service for access to relief and recovery initiatives allows for greater insight into the uptake of offers from all sources, with visibility of those who may have been eligible but did not claim the grant. This information will support the development of relevant future initiatives.</p> <p>The sharing of user data will reduce duplication/work and provide a better service for the public.</p>	HIGH value for multiple agencies
3 – Complexity	<p>Project The development of this portal will require consultation with the full range of relief and recovery providers, this may include NGOs to ensure all needs are met. This includes the detailed scope analysis of system requirements to ensure a seamless experience for users between agencies.</p> <p>End User The project will provide a simple and seamless experience for the end user, allowing them to provide their information once, reducing the stress and trauma from re-telling their story to multiple agencies.</p>	HIGH
Summary	<p>This project aligns to 4/7 principles and work undertaken during the project will aim to align to the remaining 3 principles.</p> <p>The project provides HIGH value to multiple recovery and relief agencies, with the potential to expand to NGOs improving recovery services.</p> <p>Implementation/procurement will be a HIGH complexity, due to the number of cross jurisdiction stakeholders and underlying infrastructure requirements.</p>	
	Value	High
	Complexity	High
	Priority	2nd

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