Complex maritime emergencies are large scale and multi-faceted events posing distinct threats to public safety. The Australian Maritime Safety Authority recognises the increased risk of these events occurring in Australia, and is working to improve key national response capabilities. Using Victoria as an initial case study, this project brought together over 100 experts and specialists to develop guidance for decision makers in government and industry as a lead into improvement across all jurisdictions.

The Australian Maritime Safety Authority (AMSA) is the Australian Government agency responsible for maritime safety, the protection of marine environment, and maritime and aviation search and rescue. In recent years, AMSA has directly and indirectly managed a range of significant aviation, maritime, environmental incidents. These events have placed significant demands upon national capabilities, highlighting that the successful management of large-scale emergencies is dependent on the collective ability of stakeholders to coordinate their resources and expertise across jurisdictions, sectors and industry. Further, these events have highlighted the perpetual need to support land-based agencies to operate in often unfamiliar maritime environments.

Complex maritime emergencies are characterised by their large scale, interdependencies, potential for significant consequences and time criticality. Consequences can involve considerable loss of life, economic losses, operational disruption, or, sizable / severe environmental impacts. Complex maritime emergencies typically warrant the involvement of both maritime and land-based organisations and resources to manage these consequences in various phases of the response.

Australia has been fortunate, to the extent that its interface with complex maritime emergencies has been limited. However, globalisation and our enhanced global interconnectivity means that it is now more important than ever to ensure Australia is appropriately prepared for potential complex maritime emergencies. AMSA recognised this need, and initiated this project to develop stronger relationships between key industry and government stakeholders, and develop enhanced guidance for policy makers, planners and operational leaders on the management of complex maritime emergencies.

As part of this project, a workshop was conducted through the application of an iterative design process to enable over 100 participants from Australian and Victorian Government agencies and key maritime industry stakeholders to define, develop and frame a collective understanding of our national capability for managing complex maritime emergencies. Not only did the project seek to understand our national capability but also identify gaps as highlighted in the recommendations.

This approach was selected to push stakeholders outside the bounds of their existing experience and to expedite the collaborative design of key framework elements.

The key principles and recommendations for managing complex maritime emergencies are both the output of this event, and the next step in the process. The following report is the product of the process outputs, which have been consolidated and combined with broader research from the field. Across the process, the key themes of command, control, coordination and collaboration were extensively considered.

It is now evident that in order to implement effective arrangements, first a national approach between jurisdictions is required to clarify resource sharing arrangements, and efficiently respond to a complex maritime emergency.
Principles

Several principles were identified as part of the event, further explained on Page 13:

- The planning process must enhance existing arrangements, not supplant them
- Planning must enable adaptive and improvised responses
- Planning needs to address stakeholder interests, capabilities and limitations
- Collective sharing of knowledge and expertise must be embedded in organisational and individual behaviours
- Collaboration across the collective is vital
- Leadership must span beyond traditional boundaries requiring a prepared environment of connectivity and influence
- Leaders and the organisations they guide must be willing to operate in concurrent domains of activity
- The control of complex maritime emergencies is likely to be distributed, as consequences are realised concurrently in ambiguous operating environments
- Emergency Management must take account of the legal and liability challenges inherent in complex maritime emergencies.

Key recommendations

The event resulted in a range of recommendations to improve the management of complex maritime emergencies in Australia.

1. Develop a national model for multi-jurisdictional responses to complex maritime emergencies.
2. Develop a communication framework across stakeholders.
3. Enhance national capability and accountability network information.
   3.1. Map accountabilities across both maritime and land based agencies, jurisdictions and the private sector.
   3.2. Develop a national capability and resource matrix.
   3.3. Prioritisation framework for resource allocation and investment.
4. Expand the exercising to further understand capabilities and gaps across the management of complex maritime emergencies.
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Background

Context

Australia’s maritime territory is extensive and complex, particularly in comparison and proportion to its national population. Today, growing global interconnectivity and dependence on energy, information and trade has added to the challenges of managing and mitigating risk in the maritime sector.

As an island continent with nearly 60,000 kilometres of coastline, remote from the world’s main trading centres, Australia is heavily reliant on shipping and the transportation industries. Australian seaports trade with over 120 different countries. Over 400 commodities are shipped to and from Australia to hundreds of destinations, using more than 1000 different shipping routes.

Within Australia, the demand for shipping is a derived demand influenced by a range of geographic, macroeconomic, socio-economic, demographic, technical and political factors. The economic and technological drivers affecting the quality of ships have given rise to a need for improved economies of scale. In 2016, 5719 foreign-flagged ships made over 27,500 calls to Australian ports.

Over the past 35 years global trade in goods and services has increased six-fold as emerging economies have become further integrated with the rest of the global economy. Asian ports are emerging as world shipping hubs due to strengthened economic links with the resource rich Middle East and Africa. Asia will continue to drive considerable demand for a diverse range of goods and services while, at the same time, new markets are being created and many services once only delivered locally are now regularly imported or exported due to technological improvements and the reduction of trade barriers.

The cruise ship sector has experienced strong growth, expanding in both in size and displacement, carrying an increasing number of passengers. In 10 years, the number of cruise passengers in Australia has grown more than six–fold, to approximately one million passengers per annum. An increasing number of these ships frequently visit pristine or environmentally sensitive areas such as the Great Barrier Reef, the Coral Sea, and the Kimberley coast, seeking to use anchorages in remote regions in addition to standard port calls.

Cruise ships and passenger vessels traversing environmentally sensitive areas present additional risks. For example, risks in the Antarctic include sea ice cover, seawater temperature, sea conditions, air temperature, traffic levels, search and rescue (SAR) response, and navigational chart coverage and availability.

Further, the globalisation of shipping introduces a range of new players to the maritime industry. With the expected oversupply of bulk carriers and container ships to continue for the foreseeable future, the consolidation of shipping companies and alliances will enable fewer operators to wield greater influence on global trade.
The challenges we face as a regulator and response agency and our operating environment, have changed and will continue to do so in the coming years.

- With the exception of the cruise industry, the growth in commercial shipping experienced over the past 10–15 years has slowed primarily due to the declining growth in the commodities export sector. Thus, the forecasted long-term growth rate in commercial shipping and cruise activity, and Australia’s enthusiasm for recreational boating and general aviation, will have a direct impact on how we plan to meet our search and rescue, marine pollution and maritime casualty intervention responsibilities.

- Industry continues to push the boundaries of technology. Vessels operating within Australian waters are becoming more technologically sophisticated, with increasing automation in navigation, communications and control systems. The increasing numbers of recreational vessels and offshore developments, such as oil, gas and renewable energy projects, coupled with other maritime activities, are increasingly competing with commercial shipping for the use of finite sea room, often near ecologically sensitive areas.

A shift in the maritime risk profile has seen a change in the type, scale and subsequently management, of major maritime incidents. Global trends include:

- a decrease in tolerance of negative environmental and societal impacts in the maritime sector, placing pressure on immediate and effective government–led responses

- domestic and international regulation of the maritime sector has increased, amplifying the legal and administrative complexity that must be navigated during a response

- cyber security threats are increasing in prevalence and are creating a new dimension of strategic threats to vessel operations, such as remote takeover of large shipping vessels

- growth in Australian imports, including consumer goods, has increased demand for throughput of Australian ports

- the emergence of autonomous vessels

- technological advances and innovation have driven safety improvements, subsequently, there is an increased concentration risk, demonstrated through increases in associated incidents

- new vessels are being manufactured to be larger than any previous vessels to minimise fixed operating costs and deliver economies of scale for major markets. This has increased the maritime sectors’ exposure to the cost of wreckages, storm debris, recoveries, environmental sensitivities and liabilities.

In recent years, AMSA has been responsible for the management of several complex maritime emergencies that reflect this changing landscape. In light of these recent experiences and trends, AMSA have identified a need to further develop and refresh national arrangements for managing complex maritime emergencies—and the importance of doing this alongside key partners and stakeholders.
Scope

This event’s scope was designed to explore the effective and collaborative management of complex maritime emergencies across sectorial and jurisdictional boundaries.

The objective of the capability analysis was to improve understanding of current complex maritime emergency response capabilities and capacities; as well as, to identify interdependencies and relationships between government and private sector agencies that manage complex maritime emergency responses and recoveries. The intention is to leverage these outcomes to develop a better practice model for Australia.

Broad consultation through the use of a workshop with industry experts within a single jurisdiction—Victoria—was undertaken to inform the beginning of a national capability analysis and framework for the management of complex maritime emergencies, as well as to identify gaps in existing arrangements and resources.

This event was intended to be the first step in a broader program of consultation with stakeholders from across Australia to develop a fit-for-purpose complex maritime emergency management framework.

Methodology

Selection of methodology

A proven, collaborative methodology was used to analyse existing capabilities for responding to complex maritime emergencies. This methodology provided a platform for co-design using elements of design thinking to understand an issue, consider opportunities to overcome this issue, and ultimately, design a solution—that is, to scan, focus, act.

This approach allowed groups to reach richer insights and make better decisions by achieving deeper engagement with assembled experts; and, provided a platform to cut through common barriers to collaboration. The process achieved this by:

- developing a bespoke physical environment for the event to engage participants, and create neutrality for conversations among stakeholders representing diverse views
- providing time, space and a broad fact base to test and evolve ideas as a group,
- aligning stakeholder’s understanding of the issue, and its complexities, by manufacturing cross-pollination of stakeholder perspectives
- bridging organisational silos in ultimate outcomes through co-design facilitation methods, and iterative recording of all stakeholders’ notes / views for later consideration
- expediting research, design and delivery of solutions into a consolidated ‘sprint’ format.

Project approach

Sponsor process

In order to oversee this project, a multi-agency sponsor team was formed to identify and coordinate the attendance of key stakeholders; identify and draft the scope of the challenge to be overcome, and to assist with the drafting and implementation of outcomes following the event. Further information regarding the composition of the Sponsor Team can be found on Page 22.
Over six weeks, the sponsor team met on five occasions—primarily to discuss the scope of the event, key exclusions, and inputs required to ensure an appropriate fact base was available to participants. This scope was subsequently iterated in consultation with the Victorian Government and key industry representatives.

Following the development of this report, sponsors were re-engaged to collate and enhance event outputs. This included the consolidation of key framework components, and development of improvement recommendations for the sector as further explained below.

**Event objectives**

This scope included the following objectives:

1. define how the response to a complex maritime incident will be managed across sectoral and jurisdictional boundaries
2. identify gaps and impediments within existing arrangements, capability and systems
3. develop inputs to inform an effective national framework or methodology which can be applied to collaborative management of such events.

**Stakeholders**

The stakeholders referred to in this report include responders, coordinators, victims and other parties affected by or involved in the management of a complex maritime emergency.

**Event approach**

From this, a complex scenario-based event was designed to explore the core objectives. Over 100 stakeholders assembled in Melbourne to contribute their expertise, and explore opportunities for improvement across Australia’s complex maritime emergency response capabilities and capacity.

The event included a cross-section of key stakeholders from across the Commonwealth, state, territory, local governments industry and the community. Contributors included key decision makers, influencers, implementers and other interested parties selected to challenge the status quo.

**Scan**

The scan phase introduced participants to the context behind the workshop, and the objectives and complexities of the challenge faced. To prompt the sharing of understanding and ideas, a series of short, expert presentations on relevant ideas, experiences and lessons to small groups of participants (chat rooms) were conducted on key themes:

- complexities of maritime operations
- lessons from the *Costa Concordia*
- complex adaptive systems
- routine versus crisis emergencies.

Following these discussions, a facilitated exercise explored the response requirements for the complex maritime emergency scenario posited—(further explained in Appendix 4: Scenario overview), including:

- key response and recovery activities to be undertaken
- capabilities required to facilitate these activities, as well the limitations of these capabilities, for example capacity, distance, expense, control
- interdependencies and synergies between capabilities and their owners / controllers
- leadership, decision making, command and control.

Groups of specialists focussed on nine capability areas, further explained in Table 1 - Capability Areas (Page 10).
<table>
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<td><strong>Vessel stabilisation, salvage and removal</strong></td>
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Management of impacts to affected vessels and the risks of sinking. Where impossible, such as circumstances where removal or emergency towing to a safer place may be considered as an alternative course of action.

| **Socioeconomic and environmental impact management** |
Consequences to economic and community function, wellbeing and/or performance, or, degradation of the natural or built environment. Economic consequences include financial and economic losses resulting directly from damage caused by the emergency event.

| **Search and rescue** |
Locating and extricating people from potential, or realised harm.

| **Mass medical care** |
The ability to provide social and health care to high volumes of affected people, both in and away from impacted areas. This includes emergency, psychological, pharmaceutical and disability care.

| **Evacuation from the vessel** |
The ability to facilitate mass movement and/or evacuations of affected people, and manage high volumes of displaced or at-risk persons.

| **Move from maritime to shore environment** |
Managing a transfer of impacts/consequences and operational focus from the maritime environment back to the shore and littoral environments.

| **Emergency support for the evacuated, and repatriation of foreign nationals** |
The ability of the community to support the facilitation of hydration, feeding and temporary shelter of affected people, including citizens and foreign nationals.

| **Investigations** |
The management of criminal, insurance, safety and other investigations.

| **Communications and governance** |
The facilitation of information flow and effective management control of an incident, including inbound and outbound communications, and the financial control of the incident response.
Focus

The focus phase explored individual elements of the scope, through a scenario-based discussion. The complex maritime emergency simulation was used to build understanding of:

- the potential consequences of a complex maritime emergency
- stakeholders requirements, including for affected, responding and interested stakeholders
- the likely scale of these consequences, and the nature of impacts which current capabilities would be unable to manage—due to capability or capacity limitations
- other limitations and gaps in current response / management capabilities.

The scenario and activities—explained in Appendix 4: Scenario overview—while based on realistic impacts of a real event were designed to push the stakeholders beyond what they have experienced. As such, the focus of the event was to define how the group can achieve the best possible future for complex maritime emergency response; accepting current budgets, legislation, resources and capabilities.

Following the presentation of this scenario, groups specifically explored the:

- complexity of responding to a maritime incident managed across sectoral and jurisdictional boundaries, particularly where private interests held significant legal standing and the majority of response capabilities were controlled / operated by industry—not government
- application of different organisations and their competencies to a range of maritime emergency scenarios, and potential for interoperability between agencies with similar resources
- responsibilities and capabilities of various organisations and jurisdictions involved in complex maritime emergencies
- effective coordination of multiple organisations under, and external to the control of the state, territory and Australian Governments
- limitations, gaps, or deficiencies present within current arrangements, capabilities and rehearsal of complex maritime emergency responses / management.

Throughout all activities, key aspects of the event scope, notably capabilities and gaps in capabilities for complex maritime emergency responses, were regularly revisited from different perspectives in order to refine these responses.
**Act**

This phase of breakout sessions was designed to define and frame what a national capability to manage complex maritime emergencies would look like, including the development of draft content for consideration in future drafts of a complex maritime emergency framework.

As part of the act phase, groups were divided into focus areas that reflected gaps and improvement opportunities identified throughout the event.

**Table 2 - Final working groups for act phase**

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Applying the scan, focus, act methodology over the two–day event produced an in–depth capability analysis for complex maritime emergencies. This has then informed the suggested inclusions for a future national framework to manage complex maritime emergencies, as detailed in this report.
Principles

Despite Australia’s existing investments in maritime response, AMSA recognises the potential for large-scale, high-impact events in Australian waters. Further, global examples of responses to emergencies of this type have demonstrated exponential increases in the complexity of responses with scale, particularly in instances where large numbers of people are directly impacted.

This complexity is primarily correlated by the unique overlap of government jurisdictions and agency responsibilities; and, the interplay with sovereign and corporate interests in the maritime industry. Limited rehearsal of large-scale responses to such events by primarily land-based agencies is also recognised as a challenge.

Key lessons and identified improvement opportunities drawn from exemplary responses were considered by participating stakeholders, with several key principles identified as being critical to successful management of complex maritime emergencies. These principles are detailed below.
Planning

The planning process must enhance existing arrangements, not supplant them

As complex maritime emergencies are rare, the planning process should not be too burdensome for stakeholders. Additionally the novelty inherent in these events makes it difficult, if not impossible, to develop precise executable plans. Planners should aim to ensure arrangements are capable of quick and easy adaptation for the maritime context—furthering opportunities for integration with existing resources and strategies. This should include leveraging existing commercial resources and arrangements by aligning interests and outcomes.

Each of the below principles should be considered in conjunction with this premise.

Planning must enable adaptive and improvised responses

Planning and preparedness should be driven by strong inter-organisational connectivity, enabling the flexible adaptation of available resources, conventions, jurisdictions, powers, and diverse capabilities for the unique needs of a complex maritime emergency. As such, planning and preparedness activities should create a system of responsiveness, rather than planning a specific response. To achieve this, planners must:

- identify and connect key stakeholders
- creatively adapt—not re-create—existing arrangements, resources and capabilities in response to complex maritime emergencies
- maintain and establish redundancy and inter-related systems—all of which must be resilient to transitions, hand-overs of management and integration with other capabilities as required
- enhance interoperability between plans across all Australian jurisdictions, so as to minimise the planning burden and cater for new and emerging complexities in the dynamic maritime environment, such as incident scenes drifting between jurisdictions.

Principle origin

The nature, scale and potential impact of a complex maritime emergency means that planning and response arrangements must be agile and flexible to meet the evolving needs of an incident.

The chat rooms, evidenced a common culture within the maritime domain to survey and respond; but also showed that during a future complex maritime emergency a first plan of attack may not survive secondary or tertiary consequences. As strategies and demands shift, a strong culture of adaptability and improvisation amongst responders is paramount in changing the approach.

The case study of Costa Concordia demonstrated that adaptable and flexible planning is only effective if paired with an understanding of operability across agencies and sectors. Further, this event evidenced that complex maritime emergencies are likely to have protracted consequences, requiring the transition of strategies and capabilities between organisations, across multiple phases of a response.

The need for flexibility and agility in planning was further highlighted by participants in workshop outputs relating to coordination, communications, resource control and information sharing.
Planning needs to address stakeholder interests, capabilities and limitations

Australia’s relative isolation and finite response resources are likely to be stretched in the event of a complex maritime emergency. It is likely that existing resources will need to be creatively adapted to the demands of the incident, particularly where specialist resources may not be locally available.

Participants acknowledged that the resources and capabilities required to manage complex maritime emergencies are not all held within government or Australia, with significant components held within the maritime industry on an international basis. The formation of an effectively integrated response requires considered planning and rehearsal. As part of a complex maritime emergency response, a range of industry controlled and operated resources are likely to be leveraged in central roles. Operators will bring with them different operational and planning systems, as well as specialist skills and experience which may not be available within some agencies. Additionally, it should be recognised that the private sector have valid commercial interests, which at times will not align with the direct public safety concerns of governments. Government agencies and departments are also likely to have differing, and potentially conflicting interests. Such differences need to be explicitly recognised and managed.

Responding organisations must be cognisant of the broader applicability of their resources, and their potential utility in other capacities as part of a response. Similarly, resources will need to be allocated across agencies and organisations, challenging traditional, agency-based control models—particularly where private operators may form part of an integrated response.

Principle origin

Chat rooms covering the Complexities of Maritime Operations and Lessons from the Costa Concordia highlighted the unique stakeholder mix involved in a complex maritime emergency, and the diverse array of critical, externally held response capabilities. In case studies presented, including for the MH370 search, the integration of different planning and control systems into the traditional models for incident command and control systems proved difficult. Further, government agencies and private providers are all bound by technical, jurisdictional, contractual, financial, political and/or other constraints in any operation.

Participants in the workshop identified numerous gaps and limitations in each capability area (refer to Table 1 - Capability Areas), as well as the challenges in integrating new systems, agencies and providers to overcome these limitations, such as capacity. The final work-round reflected six areas for improvement to overcome these challenges, and included several presentations specifying the need for a holistic response—spanning public and private actors—to effectively manage a complex maritime emergency.

The need to coordinate and de-conflict resource allocation was a key outcome from the command and coordination activity groups.

Alike international examples were considered, where collaborative resource allocation strategies between the private and public sector have been trialled. For example, the incident resource inventory system is a preparedness tool from the United States Preparedness Directorate that provides information to assist community responders. However, the tool falls short of utilising optimisation techniques to balance resource allocation across sectors.

The coordination of resources will require the development of an innovative strategy or model to overcome the inherent challenges of coordinating the public and private sector.
Knowledge

Collective sharing of knowledge and expertise must be embedded in organisational and individual behaviours

To form a holistic operating picture in an event, in lieu of a systematised approach, shared relationships and behaviours across stakeholders is essential. Acknowledging the constantly evolving nature of knowledge and the utility of lessons learned—which reflect the “shared experience”—in the development of knowledge, this process will also need to evolve over time.

However, as a minimum it is critical that regardless of a stakeholder’s role in the complex maritime emergency response ecosystem, they are effectively equipped to identify the information needs of key stakeholders and share this information in a timely manner. This includes the prior agreement on information format; conditions / requirements for the treatment of confidential information and appropriate authority levels for authorisation of information exchange within all organisations prior to a complex maritime emergency occurring.

It is highly likely that these solutions will not be technology based, but driven by organisational and individual behaviours and processes, as knowledge will likely be distributed, and often disconnected. Further, regard must be given to issues potentially created by the diversity of information systems utilised by governments and industries.

Principle origin

The collaboration in complex maritime emergencies and information and common operating picture in complex maritime emergencies working groups in the final act phase noted that advanced sharing of knowledge and resources is paramount in managing an effective response. Advanced communication across all levels of government, and with Industry, requires strong relationships and clearly defined practices for information sharing. This was also noted by the stakeholder mapping and command, control or coordination management structures teams as part of the same round, who discussed the current limitations of system interoperability between jurisdictions.

Collaboration across the collective is vital

A culture of collaboration throughout an event can only be facilitated through open communication. Effective collaboration will identify gaps, failures and deficiencies and will also enable the function of a complex, adaptive system to overcome these together. It will also enable the development of distributed situational awareness and decision making and, unlock expertise in managing events that exists outside of government.

To achieve the required level of collaboration, an effective structure for incident management and communications must be implemented. This must include consideration of leadership, strategic coordination, state-level coordination, communication, roles and responsibilities for lead agencies, access to technical advisory, and, clear avenues for engagement with functional support.

Principle Origin

The need for effective and broad collaboration was a consistent theme across all activities and work outputs of the event. Participants discussed that organisational structures were an integral enabler of effective complex maritime emergency responses. Existing structures were considered insufficient in such complex legislative, jurisdictional and cross-sector contexts.
Leadership

Leadership must span beyond traditional boundaries requiring a prepared environment of connectivity and influence

Leaders must be capable of building and rapidly growing networks and relationships at all stages; connect and unite towards a common goal; and, approach learning with an open mind. Effective emergency managers need to lead organisational networks and influence stakeholders outside their formal bounds of authority. To facilitate such a meta-leadership framework, there is a need to establish and maintain a collaborative environment, and to create new networks of trust.

**Principle origin**

The need for effective leadership was a consistent theme across all activities and work outputs throughout the event, as was the requirement for preparation of leadership arrangements ahead of an emergency. Groups specifically reflecting on jurisdictional divides and arrangements noted that such leadership in an event was likely to be decentralised.

Leaders and the organisations they guide must be willing to operate in concurrent domains of activity

Leaders, stakeholders, organisations and interested parties in the interconnected fabric of a response must have the capacity to work across multiple locations, hazards and activities—simultaneously. As the complex maritime emergency evolves, individuals and the organisations they lead must be able to adapt and flex to needs across domains.

Similar to some land-based emergencies / disasters (such as bushfires), complex maritime emergencies may impact an array of distributed sites / locations. Leaders and control arrangements must facilitate activity across each of these location and operational domains—for example land, sea and air—with the likely added complexity of operations spanning multiple jurisdictions. Further, leaders must be willing to devote resources and capable of leading others to assist where requirements exceed stakeholders’ normal operational focus.

Each component of the temporary network must assume a level of ownership over the response, while balancing the idea that it is the network’s mutual investment—each component with an equity holding—that will resolve the complex maritime emergency.

**Principle origin**

All teams discussed the likely split in operational focus between the operational domains, and the likely requirement for response operations to seamlessly migrate between domains throughout the evolution of the incident.

A key outcome from the focus phase, was the observation of over–lapping jurisdictions, and how this created inter–connected components of a response to a complex maritime emergency, further explained on Page 11. During the scenario, the over–lapping jurisdictional issues created ambiguity regarding roles and responsibilities, delaying effective response actions. This led to the following focus activity groups being developed for the act phase: accountability and responsibility, decision–making and response planning and collaboration in complex maritime emergencies.

In line with the National Strategy for Disaster Resilience, the result of the focus phase was that stakeholders should understand that the management of complex maritime emergencies should be the shared responsibility of all levels of government, industry, business and the community. This aligns with best practice across the nation, and more broadly with international best practice.
Navigating complexities

The control of complex maritime emergencies is likely to be distributed, as consequences are realised concurrently in ambiguous operating environments.

A single point of control may not be effective for managing complex maritime emergencies. Collaboration and coordination become paramount, as all elements of the response system are unlikely to be ordered, commanded or compelled by a single authority in entirety.

The management of complex maritime emergencies may be impeded by strict adherence to command and control model. Formal authorities are likely to be temporary and partial as different organisations become engaged in the response; and, legal, jurisdictional or other boundaries are crossed. Establishment of a single point of control for these events is identified as a significant difficulty, without proven benefit.

Principle origin

The chat rooms were designed to align stakeholder understanding that traditional management models will not most effectively navigate the complexities of a non-linear incident.

Further, agreement could not be reached by participants as to the rightful controller of the scenario explored as part of the event.

Collaboration and coordination principles, in complement to, or replacement of strict command and control models have operated effectively in recent management of complex maritime emergencies across the globe. Such methods of coordination have included, the Joint Agencies Coordination Centre, enacted to coordinate state, commonwealth and international agencies during the search for MH370, and the Joint Information Centre approach utilised by the USA to provide public information during events such as the Gulf of Mexico oil spill.

Emergency Management must take account of the legal and liability challenges inherent in complex maritime emergencies

Maritime incidents face significantly more complex legal questions—spanning multiple legal systems with overlapping regulations, laws, cross-holdings and insurances—than most land-based emergencies. Insurance creates a significant challenge when applying normal recovery arrangements due to its complex interference with government intent and the effect of unclear liabilities; and, the common requirement to leverage highly specialised resources only available to commercial operators. Further complexity is likely to arise from the sovereign rights of vessels operating in some waters.

Principle origin

A key outcome from the focus phase, was stakeholder’s identification that complex maritime emergencies operate in complex legal and liability environments. This led to the following groups being developed in the act phase, accountability and responsibility, decision making and response planning, and collaboration in complex maritime emergencies.

Chat rooms looked at the challenges of the Costa Concordia response. The court in the Costa Concordia’s liability claim were challenged to determine which laws were applicable. Those considered included the jurisdictions where passengers bought their ticket, the country in which the cruise ship sank, and the maritime or Law of the Sea—each of which related to the case.
Recommendations

Bringing together industry experts marks the start of a process to developing an effective national capability framework for the management of complex maritime emergencies. Part of the event’s focus was to look forward, and formulate a vision for the future of managing complex maritime emergencies.

The primary finding of this group was the need for a national agreement for inter-jurisdictional response, which can then act as a platform to build out the supporting recommendations discussed below. The scenario-based event, designed to test management during a complex maritime emergency highlighted a deficiency of existing centralised co-ordination structures; and, ambiguity of roles and responsibilities during response involving private third parties. The development of a national agreement will foster inter-jurisdictional commitment, and an understanding of the guiding principles to support response.

Also of note was the necessary reliance on privately controlled and operated capabilities to support a complex maritime emergency response. This reliance posed a unique challenge to government agencies who are typically empowered, resourced and trained to respond to emergencies within their remit in other contexts—such as for search and rescue and, or firefighting on land.

The recommendations below operate as the link between the participating stakeholder’s comprehensive analysis of the current national capability, and the proposed vision for the future management of complex maritime emergencies.

**Recommendations**

1. **Develop a national model for multi-jurisdictional responses to complex maritime emergencies**

   Based on the fundamental principles outlined above, responsible and interested stakeholder groups should develop a national model for coordinated multi-jurisdictional responses to complex maritime emergencies. Initial steps towards designing this model were made during the workshop, which should be agreed by all jurisdictions and agencies identified by the participating stakeholders. This model should be separate to, but complement an ultimate framework for managing complex maritime emergencies. Future work should be undertaken to expand on the work, and to prove its relevance in the context of complex maritime emergencies.

2. **Develop a communication framework across stakeholders**

   Communications across stakeholders as part of a response is likely to be highly complex, and subject to strict controls where governmental and private capabilities are expected to work as part of an integrated operation. Technical, financial, privacy and other legal constraints pose as recognised challenges in enabling data sharing across stakeholders. A clear framework for information and data sharing, as well as inter-organisational communications should be considered.
3  Enhance national capability and accountability network information

3.1 Map accountabilities across both maritime and land based agencies, jurisdictions and the private sector

Legislation and the responsibilities that it confers are important considerations in developing an understanding of future response models. Further, strict adherence to the command and control model during the management of complex maritime emergencies may impede success. It is recommended that accountability mapping across jurisdictions, agencies and the private sector is undertaken to inform management decision making / planning, and to clearly identify the overlapping responsibilities for response. The development of an accountability map should consider management systems, such as the Joint Agency Coordination Centre / Joint Information Centre model to organise, integrate and coordinate accountabilities that support timely, accurate and consistent response. Further, future work must consider the legislative responsibilities of government organisations in relation to each other, as well as the legal obligations applying to private entities participating in complex maritime emergency responses.

3.2 Develop a national capability and resource matrix

A national resourcing matrix should be developed to provide a more complete view of available resources for application in a complex maritime emergency, including relevant land based resources. This will require surveying of existing resource maps relevant to complex maritime emergencies, and the subsequent consolidation of this data across jurisdictional, sectoral and private stakeholders. It is recommended that innovative models and international case studies are used to develop a resourcing matrix that has secondary benefits. This includes, the identification of overlapping resources to reduce inefficiencies and creative hiring models to address resourcing gaps. Further benefits could include mapping of potential impediments to engaging with key capability owners, taskers.

The following domains should be considered as part of this assessment:

- air and space
- close air
- maritime
- cyberspace, data and information
- sub marine
- terrestrial / ground
- inner space (human capital)
- tasking authorities.

Given the potential scale and complexity of this list, a centrally governed, but decentralised management approach may be considered. The outcome should reflect consideration of people, process, asset and technology resources.
3.3 Prioritisation framework for resource allocation and investment

Following the development of a nationally available resource matrix, a prioritisation framework should be developed to appropriately allocate resources during a complex maritime emergency. The framework will need to consider how to prioritise resource needs based on the incident type and the corresponding response required. The prioritisation framework should be developed to consider, and overcome the challenge of jurisdictional boundaries, foreseeable ethical dilemmas, and divisions between publicly and privately controlled capabilities. Further consideration should be given to the prioritisation of investment in addressing gaps prior to an emergency.

4 Expand the exercising to further understand capabilities and gaps across the management of complex maritime emergencies

To improve responses by land-based agencies, a schedule for the rehearsal of complex maritime emergencies should be developed and implemented nationally. The schedule should include the variety of impacted stakeholders, ensuring the input from land-based agencies.

The exercising schedule should form part of the broader national framework for the management of complex maritime emergencies, and act as mechanism to test and validate the arrangements on an ongoing basis. Exercises should seek to cultivate the leadership, capability, relationships and operational rhythm required to effectively manage a complex maritime emergency.
Appendix 1:

Sponsor Team

Sponsors were drawn from several stakeholder groups with central roles in the regulation of the maritime industry, facilitation of government responses and the management of corporate / private assets likely to be involved, including tug, port and vessel operators.

<table>
<thead>
<tr>
<th>Sponsor</th>
<th>Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jamie Storrie</td>
<td>AMSA</td>
</tr>
<tr>
<td>Alan Lloyd</td>
<td>AMSA</td>
</tr>
<tr>
<td>Joe Buffone</td>
<td>Department of Home Affairs</td>
</tr>
<tr>
<td>Adrian Mnew</td>
<td>Transport Safety Victoria</td>
</tr>
<tr>
<td>Mark O'Rourke</td>
<td>Victoria Police</td>
</tr>
<tr>
<td>Russell Murray</td>
<td>Department of Economic Development, Jobs, Transport and Resources</td>
</tr>
<tr>
<td>Wes Oswin</td>
<td>Emergency Management Victoria</td>
</tr>
</tbody>
</table>
Appendix 2:

Participating Organisations

- Air Services Australia
- Ambulance Victoria
- AMOSC
- AMSA
- Ardent Global
- ATSB
- Australian Pilotage Group
- Australian Volunteer Coast Guard Association
- Bureau of Meteorology
- Cobham
- Coroners Court of Victoria
- Country Fire Authority (Victoria)
- Defence
- Department of Economic Development, Jobs, Transport and Resources
- Department of Foreign Affairs and Trade
- Department of Home Affairs
- Department of Premier and Cabinet
- Dept Environment, Land, Water and Planning
- Dept of Economic Development, Jobs, Transport and Resources
- Emergency Management Victoria
- Emergency Services Telecommunications Authority
- Gippsland Ports
- HFW Australia
- Melbourne Metropolitan Fire Brigade
| Mornington Peninsula Shire |
| Pacific Tug |
| Parks Victoria |
| Polaris Marine Pty Ltd |
| Port of Portland Pty |
| Riverwijs |
| State Emergency Service |
| Svitzer |
| Transport For Victoria |
| Transport Safety Victoria |
| VicRoads |
| Victoria Police |
| Victorian Institute of Forensic Medicine |
| Victorian Ports Corporation |
| Victorian Ports Melbourne |
| Victorian Regional Channels Authority |
| Worksafe Victoria |
## Glossary

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
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<tbody>
<tr>
<td>Complexity</td>
<td>The state or quality of being complex; intricacy.</td>
</tr>
<tr>
<td>Multi-agency</td>
<td>A commercial or other organisation furnishing some form of service for the public.</td>
</tr>
<tr>
<td>Multi-hazard</td>
<td>The cause of risks—a potential source of harm, injury, difficulty—that occur simultaneously.</td>
</tr>
<tr>
<td>Off-shore</td>
<td>Australian waters, the exclusive economic zone (including external territories); or the sea over the continental shelf in Australia (including its external territories).</td>
</tr>
<tr>
<td>Large scale</td>
<td>Being of more than common size, amount or number.</td>
</tr>
<tr>
<td>Casualty</td>
<td>An injured person—a person killed or injured as a result of the incident or emergency.</td>
</tr>
<tr>
<td>Maritime casualty</td>
<td>Collision of vessels, stranding or other incident of navigation, or other occurrence on board a vessel or external to it resulting in material damage or imminent threat or material damage to a vessel or cargo.</td>
</tr>
<tr>
<td>Military casualty</td>
<td>A soldier who is missing in action or has been killed, wounded, or captured as a result of enemy action; someone who is injured or killed in an accident; a person injured accidently.</td>
</tr>
</tbody>
</table>
Appendix 4:

Scenario overview

Incident impact

The MV Complexia of the Oceans—foreign flag and crew—departed Station Pier earlier today, en route to Sydney with 3500 passengers and 800 crew. In poor visibility, the Complexia’s Officer of the Watch noted an expected collision course with a vessel approaching on the starboard bow—at 2 o’clock / 20 degrees right.

Altering to starboard to avoid a collision, the Officer of the Watch sounded horn and signalled the approaching vessel over the radio. The approaching container ship, now in sight at 1500 yards, replied ‘green to green’, asking the Complexia to break standard protocol and allow a pass on the port (left) side.

The Complexia denied this request, and again sounded horn to indicate a starboard turn. The approaching vessel replied ‘green to green’ in broken English as it also appeared to turn starboard—listing as she did, causing several Containers to slide overboard.

The Complexia steered further starboard, sounding again while the approaching vessel’s bearing remained constant.

Incident update 1: response

The Complexia has activated a distress beacon and contacted the JRCC directly over satellite phone. The Master of the vessel has reported a collision with a container vessel—the Ammarsar (foreign flag and crew)—on the port beam, noting damage and injuries are still being assessed. The master also noted engineering reports that propulsion and steering are non-responsive on the port side, and the ship’s automated stability control is subsequently disabled. The ship has become unstable, and is listing slightly, but is still afloat. Pumping operations are underway and proving effective so far.

The master also reported that both vessels had come to a full stop and that contact with the Ammarsar had been ignored. Officers can still be seen on the bridge of the Ammarsar, while other crew are running around the vessel frantically.

Finally, the master warned that over 30 partially submerged containers were visible in the surrounding water.

Incident update 2: escalation

Vessel agents for the Complexia have attended Port Melbourne on behalf of the international operators. The master currently plans to return the vessel to Port Melbourne with the assistance of Tugs in the morning. While grateful for the medical assistance rendered, they note that any Australian Government presence on-board is no longer necessary, and remaining staff will be transferred to a tender and returned to Hastings shortly. The master has advised that pumping operations continue to prove effective, and that the water ingress appears to be contained.

Contact with the Ammarsar remains problematic, with the master failing to respond to radio calls—apparently awaiting instructions from the vessel’s owners.

However, imagery has emerged on social media of oil leaking from the side of the Complexia.
Incident update 3: capsize

Following an anxious night, water inundation has impacted generators aboard the *Complexia*, severely affecting pumping operations. As a result, at 0600 hours this morning a growing list triggered the master of the vessel to call a mayday, and commence a controlled evacuation. Within two hours, the vessel had capsized with less than 1200 of the passengers and crew successfully evacuated. The remaining passengers and crew are either adrift in the water where conditions remain consistent with yesterday or trapped in the hull or superstructure of the ship. Social media shows hundreds of bodies in the water, with others still visible on top of the capsized vessel.

While en route to assist, a tug from Westernport has struck a submerged container and been disabled as a result.

The situation aboard the *Ammarsar* has stabilised. The vessel has gradually drifted closer to the coastline, and subsequently been able to drop anchor approximately four miles offshore. However, unconfirmed reports in the media note containers surrounding the vessel may contain chemicals being transported.

Overview of impacts

During the scenario multiple layers of complexity were added, to analyse the stakeholder’s response to:

- the mass threat to lives, approximately 2500, as a result of the collision and capsizing of a cruise vessel,
- the threat to the environment and surrounding marine life from a severe pollution event
- international criticism of the governmental response operations
- a compromise of public trust in governmental response operations, and effectiveness of operations within a complex legal / jurisdictional circumstances
- critical political and ethical considerations.
Appendix 5:

Joint Agency Coordination Centre & Joint Intelligence Coordination Centre Model