



# DECISION MAKING, TEAM MONITORING AND ORGANISATIONAL LEARNING IN EMERGENCY MANAGEMENT

Annual project report 2015-16

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Cover: As the complexity of natural hazards increases it is important to develop  
the decision making and team monitoring capabilities of emergency  
management personnel.

Credit: Country Fire Authority, Victoria.



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## EXECUTIVE SUMMARY

There is evidence that incidents associated with natural hazards are becoming more complex and that strategic level emergency management is becoming an ever more sophisticated workplace environment. If we are going to expect people to operate in this environment we need to ensure that their skills and tools effectively support them. We need to develop the capability of our people to function in these increasingly complex environments now and into the future.

This project seeks to develop practical decision tools that can help people to function more effectively in complex emergency management environments. Towards this aim the project has three main research streams that seek to: provide enhanced methods of making decisions; develop methods to better monitor and modify the behavior of teams; and to identify the enablers and barriers to organisational learning so that the capabilities needed can continue to adapt and change.

In the team monitoring stream, a comprehensive literature review of methods to monitor teams from the position of operational oversight has been conducted. Based on this literature review and discussions with end users two methods (EMBAM & TBM) have been selected and have received preliminary evaluation. This preliminary evaluation has proved to be encouraging and has led to both NSW SES and CFS proposing to use the tools operationally during the 2016-17 storm and fire seasons. This will provide further opportunities for evaluation and development.

In the decision making stream, research has identified both the context in which decisions are made (e.g. the policies & procedures) and the informal strategies that people use to function within dynamic, pressured work environments. This work has identified opportunities for improvement and ways to bring the formal and informal elements of decision-making closer together. Decision making has also been explored in the context of organisational resilience and the REAG Resilience Health Check Tool. Based on these activities strategies and approaches to enhance decision making have been identified and will be evaluated with end-users through 2016-17.

In the organisational learning stream, interviews have revealed that strategic-level emergency managers need to assess learning through trade-offs where agency values and the complexities involved in managing incidents interact. The findings also suggest that there are sometimes complementary but often conflicting standards against which crisis management may be judged. Finally there is often a difference between assumptions about how emergencies "ought" to be managed (espoused theories) and how they in fact are managed. The research in this stream is now focused in working closely with end users to unpack these tensions and contradictions.

Through these three streams of activity then the project is developing a range of practical tools and strategies that have the potential to enhance decision making, team monitoring and organisational learning. It seems likely that strategic emergency management will be becoming increasingly complex in the near future. The research presented here contributes to developing the capability of people to function effectively in these increasingly complex environments.



## END USER STATEMENT

**Heather Stuart, NSW State Emergency Service**

As the Cluster Lead User I am pleased with the progress of this project. The project will provide practical techniques and strategies to help people to function in the more complex emergency management environments now and into the future. Throughout the project, there has been significant consultation with end users, with 3 end user agencies actively trialling the team performance monitoring tools. Feedback provided by the end users has been adopted by the researchers and tools modified accordingly. The interest in trialling these tools has shown the value of this project to the sector. Work on the decision making component of the project has progressed well and the approaches being developed will be trialled in the coming year, helping to bring formal and informal decision-making approaches closer. The re-alignment of the organisational learning component of the project will, I believe, help agencies across the emergency management sector to address the issues of why learning from experience is limited and potentially provide some strategies to address this. Through these activities I see the project making an important contribution that can help agencies develop their most important capability – their people.



## INTRODUCTION

Evidence from inquiries into major disasters, as well as government-based policy research suggests that incidents associated with natural hazards are increasing in complexity, duration, and require involvement of an increasing number of agencies (Owen et al., 2013, Liu et al., 2010). There is also increasing availability and use of technologies to enhance information management in operational control centers. At the same time financial constraints from government, declining volunteer numbers, an aging workforce and workforce restructuring are presenting agencies with significant challenges (Owen et al., In Press, Canton-Thompson et al., 2008). This creates an ever more sophisticated workplace environment for emergency managers. If we are going to expect people to operate in this environment we need to ensure that their skills and tools effectively support them. We need to develop the capability of our people to function in these increasingly complex environments now and into the future.

The study of human factors (the human elements of performing complex tasks) has contributed extensive information to help improve performance and reduce errors in complex workplaces in other industries (airline cockpits, air traffic control centers, train cabs and operating theatres). In these industries considering human factors has led to better workplace design (Wickens et al., 2004), enhanced use and acceptance of new technology (Bearman et al., 2013), improved procedures and work practices (Helmreich et al., 1999), better management of error-prone tasks (Reason, 1990) and more sophisticated management of risk (Rasmussen, 1997). The research in this project works within the tradition of human factors to develop practical decision tools that can help people to function more effectively in complex strategic emergency management environments

The project has three main research streams that aim to: provide enhanced methods of making decisions in complex situations; develop methods to better monitor and modify the behavior of teams; and to identify the enablers and barriers to organisational learning so that the capabilities needed can continue to adapt and change.

### Team Monitoring

Emergencies are managed by a complex network of teams (Schaafstal, Johnston & Oser, 2001). As operational teams engage in their tasks and deal with performance disruptions they can be said to move around a notional space of safe and unsafe operations (Rasmussen, 1997). If the operation is particularly difficult or there are unresolved disruptions to performance the team can move out of the zone of safe operations, firstly into the zone of coping ugly and then into the unsafe zone where incidents and accidents are more likely to occur (Brooks, 2014). Figure 1 depicts this notional safety space.

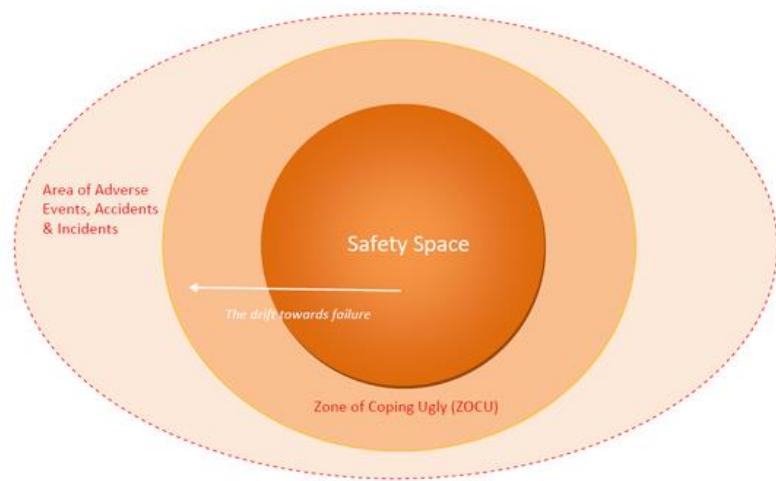


Figure 1. Notional space of safe and unsafe operations (from Brooks, 2014)

One key feature of acknowledging that people may be working in a zone of coping ugly is to accept that the people involved need to continue to operate, despite degraded and unsafe conditions. Our project is focussed on assisting people to recognise when they may have moved into that space and to help them move back into operating within safer conditions.

One of the important roles that regional and state level emergency managers play in this regard is to monitor teams they are responsible for (e.g. teams that operate immediately below them in the organisational structure) to determine how they are performing. This provides an important safety and quality assurance function for agencies that operate in inherently risky environments. This monitoring allows regional and state-level emergency managers to ensure that the team is functioning effectively and to detect disconnects and breakdowns in the team that can lead to impaired operational performance. However, there is currently limited guidance in most agencies' emergency management arrangements on how this should be done. The purpose of this stream of the project is to develop methods to enhance team monitoring by people with operational oversight of teams.

## Decision Making

Decision-making in emergency management can be challenging and stressful due to the dynamism, complexity, uncertainty and time periods (that are sometimes compressed and at others extended) that are inherent in these environments. In emergencies that are less complex (e.g., routine emergencies) AIIMS or AIIMS-like systems and processes work well. As emergencies become more complex, and responses more multi-layered, decision-making can become increasingly difficult.

If we are to support the human side of capability then it is important to invest in their ability to make decisions. We know that the formal management system suggests decisions are made a certain way. That is, in a way that is formal and rational. However systematic reviews of decision-making indicate that people frequently do not make decisions this way. People use intuition as well as rational analysis, they often take the first plausible solution rather than the 'best'



strategy, they are subject to a diverse and subtle list of biases and cognition is prone to a range of 'errors'.

The purpose of this stream is to develop tools to support human decision-making under these emergency management conditions. The premise of the stream is that the decision-maker is an expert and the goal is not to replace their expertise, but rather to more effectively support it. From the notion of the safety space identified above the role of this research is about assisting the decision-maker to define the boundaries between safe operations, coping ugly and the outer zone we might call 'luck'.

### **Organisational Learning**

The organisational performance research stream investigates the need for and application of organisational-wide performance indicators for learning from emergency events. The processes by which agencies can learn from emergency events has long been an area of concern and is receiving increasing attention.

The purpose of the organisational performance stream of the research is to investigate the question: how do organisations systematically review and evaluate their past performance and how do they monitor any changes based on insights that have been learned? Part of the challenge is that, there is no one size fits all when it comes to evaluating organisational performance in emergency management (Boin and't Hart, 2010). Moreover while it is well established that learning lessons from disasters and crises is becoming increasingly important (Borell & Eriksson, 2008; Brower, Jeong, & Dilling, 2009), recording, storing and sharing lessons identified, does not necessarily infer that anything has in fact or will subsequently be learned (Rostis, 2007; Deverell, E. & Hansén, 2009). Typically performance is judged post-hoc and through public inquiry or in the media which does not necessarily have the intention of improving the effectiveness of emergency management systems (Elliott & McGuinness 2002; Owen, Bosomworth & Curnin, 2014).

In keeping with the observation made in the decision-making stream that there are gaps between how work really occurs and how it is imagined the focus in 2016 is on examining some of the challenges in learning from events so that these gaps may be overcome.



## WHAT THE PROJECT HAS BEEN UP TO

A research development and testing group has been formed to guide the research conducted in the project. This group consists of three researchers: Chris Bearman, Ben Brooks & Christine Owen; and three end-users: Heather Stuart (NSW SES), Mark Thomason (CFS) and Sandra Whight (TFS). This group is working closely together to develop and evaluate the tools that are emerging from the project. An iterative design process has been adopted to develop tools that are suitable for use by people at regional and state levels during emergencies. The iterative design process involves developing and testing tools in a cycle of activity in close conjunction with end-users. This is designed to produce tools that meet the needs of the intended users, rather than making the end users adapt to tools that have already been developed. Activities within each of the three streams are discussed below.

### TEAM MONITORING

The research team visited 18 emergency management agencies in Australia and New Zealand. This sought to determine the issues in team monitoring and utilised discussions, semi-structured interviews and observations of real life and simulated emergencies. In this phase the research team talked to chief officers, deputy chief officers, principle rural fire officers (NZ), state coordination personnel, regional coordination personnel, and incident management team personnel. These personnel represented urban fire brigades, rural fire agencies, land management agencies, state emergency services, local government, the Red Cross and the National Rural Fire Authority (New Zealand). This identified that team monitoring was often not done effectively and that there was typically little guidance within agencies' emergency management arrangements on how best to do this.

A comprehensive literature review was then conducted to examine how team monitoring is carried out from the position of operational oversight in emergency management and other related high reliability industries (Bearman et al., 2016). For this literature review a four-phased processes was used that included: initial search, application of inclusion criteria, backward citation search, application of further inclusion criteria. The process revealed 63 articles. These articles were then analysed using a thematic analysis technique that grouped the methods in the articles into different categories according to common themes. The thematic analysis revealed that there were four key approaches to monitoring teams from the position of operational oversight: 1) Coordination, Cooperation and Task-Related Communication (3C); 2) Information Flow (IF), 3) Linguistic Analysis (LA); 4) Team Outputs (TO).

Each of these approaches contained strengths and limitations and no single method was found to be wholly appropriate for emergency management. It was concluded that an off-the-shelf approach where methods from the literature are simply applied to emergency management would be inappropriate. Instead it is recommended that methods of monitoring teams in this literature review be tailored to the specific emergency management context in which they will be used.



Based on the literature review and discussions with the research development and testing group, two methods of monitoring teams have been developed for further examination. These methods are: The Emergency Management Breakdown Aide Memoire (EMBAM) (Grunwald and Bearman, in press) and a Teamwork Behavioural Markers tool (Wilson et al., 2007). The Emergency Management Breakdown Aide Memoir (EMBAM) is a guide to assist the identification of teamwork breakdowns across the various organisational levels by listing indicators of breakdowns. This includes categories, such as: missing information, conflicting expectations, inconsistent information, intuition, familiarity, and networks. The team behavioural markers tool is based on a set of behavioural markers of teamwork developed by Wilson et al. (2007). It is designed so a person can scan the list and think about the items to ensure that aspects of good team performance are being followed and if not, to be able to identify what is going wrong.

A preliminary evaluation study was conducted to determine whether EMBAM and TBM were worthy of further consideration. The preliminary evaluation study was conducted during a simulated multi-agency emergency that required response teams to manage a mock aircraft accident at a small rural airfield. Four external observers used EMBAM and TBM to consider the teamwork of their agency's incident management response during the emergency. Observers raised issues with some of the questions in the tools, particularly in the TBM but all of the observers felt that EMBAM and TBM had potential as methods of monitoring teams from the position of operational oversight. Based on feedback from the observers the tools have been modified for the next round of field testing.

Based on the preliminary evaluation The CFS are implementing the team monitoring tools in conjunction with their lessons learned program and the NSW SES will be using them operationally during the 2016 storm season. This provides further opportunities to evaluate the tools in the field. Once the tools have been evaluated we will look to develop an app that is compatible with operational checklists, such as those contained in AIIMS 4.

## DECISION MAKING

The initial research completed in this stream used semi-structured interviews from the 18 end-user agencies. It has demonstrated that mechanisms for decision-making are deeply embedded in the incident management system and that individual decision-makers supplement those policies, procedures and other tools with informal strategies in order to manage within this dynamic, pressured work environment. This finding is not surprising, and aligns with other research that demonstrates that work as it is 'imagined' (within a formal management structure) is different to work as 'enacted', day to day. This work has served to identify the opportunities for improvement and bringing formal and informal elements of decision-making closer together.

Our second focus has included broadening the research to explore decision-making with respect to other hazards. Specifically we have interviewed the commander that led the Australian USAR team to Fukushima – which was a response to a tsunami complicated by radiological hazards. We have



collected an entire set of decisions from that deployment, reinterviewed the commander twice, and interviewed senior members of his team. The purpose of this part of the research is to deeply understand the decision process and its context. We will use the research for training-related interventions, and to test hypotheses around the value of hazard-specific knowledge for strategic decision-making during crises. This will contribute to capability by informing our understanding of inter-operability.

Our third focus has been to explore decision-making in the context of a broader concept – organisational resilience, which is obviously a key concept for the BNHCRC as well. The Australian Attorney General's Resilience Expert Advisory Group (REAG) recently developed a Resilience 'Health Check' tool, and we have been working to specify the decision-making aspect of this tool. We are currently producing a psychometric survey tool, an observation tool and a debriefing tool associated with the Health Check. This will be tested with Woodside Petroleum's Crisis Management Team at a spill event in August, then with Westpac in an exercise, and finally with BNHCRC end-users. We plan to identify how the outcome of the research can be applied to the aide memoir for an Incident Controller in the AIIMS 4 documentation.

Between June 2016 and June 2017 we will therefore be designing and testing tools that address the challenges associated with managing cognition (such as checklists to 'catch' typical errors). This is part of the work that will inform efforts to bring formal and informal decision-making approaches closer. There are, however problems with this approach – which might be simply summarised as one size might not fit all decisions. Such problems led Klein to consider whether we might be able to train people to 'learn' like experts. Because of this – we are also pursuing a different approach, using a training intervention and then tracking participants over a period of time to investigate what they use and don't use, what works and doesn't work in their decision-making context. The Table below identifies a set of strategies and the possible approach:

**Table 1: Strategies to Achieve Expertise in EM Decision-making**

<b>Strategies for Achieving Expertise in Decision Making</b>	<b>Approach within Emergency Management</b>
Engaging in deliberate practice, so that each opportunity for practice has a goal and evaluation criteria	Clarify decision-making goal and evaluation criteria in exercising at the strategic level
Using attentional control exercises to practice flexibility in scanning situations	Implement brain training exercises associated with attentional control
Compile an extensive experience bank; Enriching experiences via review to derive lessons learnt and identify mistakes	Supplementing Lessons Learnt databases with case studies of decision-making from significant incidents
Building mental models	Use structured (check-lists) and unstructured (mind-maps/brain-dumps) to build models of particular hazard events.



(Adapted from: Klein, 1997)

## ORGANISATIONAL LEARNING

In keeping with the other research streams, the research methods included conducting 18 interviews with end-user agency personnel to ascertain what strategies they currently have in place to learn from incidents and/or a season of events. Having established that, whilst there is much localised activity occurring within agencies, there are challenges and no overarching framework in use to provide a cohesive approach across the industry. A secondary analysis has been conducted and a framework developed that examined the tensions and trade-offs.

The interviews revealed that strategic-level (i.e., regional and state) emergency managers need to assess learning through trade-offs where agency values and the complexities involved in managing incidents interact. The findings also suggest that whether the management of an event is deemed a success is subjective. There are also sometimes complementary but often conflicting standards against which crisis management may be judged (see Owen, Brooks, Bearman & Curnin, 2016 for more information). These findings are in keeping with the work of McConnell (2011) as well as that of Eburn & Dovers (2015). McConnell (2011) for example suggested that evaluating what happened (and thus what can be learned from events) matches the following storylines perpetuated in the media: The management of the event

- was as good as could be expected in the face of extraordinary circumstances and those involved obtain plaudits and rewards for doing so (outright success)
- is better described as mismanagement, and those involved should accept the consequences (outright failure)
- wasn't perfect, but on balance it got more right than it got wrong (durable success)
- got much right, but they also got too much wrong (conflicted success).

A conclusion that can be drawn from the research to date is that there are fundamental differences between what, in organisational learning theory terms, are called "espoused theories" compared with "theories-in-use" (Argyris 2000; Edmondson & Moingeon, 1998). These are organisational proxies of the same contradiction that Brooks and Curnin have found in the decision-making research stream: that is there are assumptions about how emergencies "ought" to be managed (espoused theories) and how they in fact are managed. Without explicating these differences in assumptions it can be argued that learning will indeed be limited. The research is now focused in working closely with the Research Development and Testing Group to unpack these tensions and contradictions using a critical theory of work organisation to support organisational learning, known as Cultural-Historical Activity theory (Daniels, et. al., 2013).



Given that the tools from Research Streams 1 and 2 are to be embedded into these organisational contexts, it is important to also have an understanding of the ways in which these organisational learning assumptions mediate what will be possible in terms of their application.



## PUBLICATIONS LIST

### Journal Articles Accepted for Publication.

Owen, C., Brooks, B.P., & Bearman, C., & Curnin, S. (in press). Values and complexities in assessing emergency management response effectiveness. *Journal of Contingencies and Crisis Management*.

Grunwald, J. & Bearman, C. (in press). Identifying and Resolving Coordinated Decision Making Breakdowns at the Regional Coordination Level of Wildfire Management. *International Journal of Emergency Management*.

Bosomworth, K, Owen, C. & Curnin S. (2016), Addressing challenges for future strategic-level emergency management: reframing, networking and capacity building, *Disasters*, doi:10.1111/disa.12196

Bearman, C., Grunwald, J. A., Brooks, B. P., & Owen, C. (2015). Breakdowns in coordinated decision making at and above the incident management team level: An analysis of three large scale Australian wildfires. *Applied ergonomics*, 47, 16-25.

Bhandari, R. B., Owen, C., & Trist, C. (2015). Incident management approaches above the Incident Management Team level in Australia. *Journal of Homeland Security and Emergency Management*, 12(1), 101-119.

Curnin, Steven, et al. "Role Clarity, Swift Trust and Multi-Agency Coordination." *Journal of Contingencies and Crisis Management* 23.1 (2015): 29-35.

Owen, C., Scott, C., Adams, R., & Parsons, D. (2015). Leadership in crisis: Developing beyond command and control. *Australian Journal of Emergency Management*. 30(3), pp. 15 - 19.

Owen, C. (2015). Diagnosis and Culture in Safety Critical Environments. In Wiggins, M. & Loveday, T. *Diagnostic Expertise in Organisational Environments*, Ashgate, Aldershot, UK.

### Journal Articles Under Review

Brooks, B., Curnin, S., Bearman, C., Owen, C., & Rainbird, S. (2016) A Review of Decision-Making in Emergency Management. Submitted to *International Journal of Emergency Services*.

Bearman, C., Rainbird, S., Brooks, B., Owen, C., & Curnin, S. (2016). A literature review of methods for providing operational oversight of teams. Submitted to *International Journal of Emergency Management*.

### Peer-Reviewed Conference Papers

Bearman, C., & Bremner, P. (2016). Don't just do something, stand there!



Mitigating goal seduction in emergency management. Proceedings of the Australia and New Zealand Disasters and Emergency Management Conference, Gold Coast, Qld.

Owen, C. Scott, C., Parsons, D & Adams, R. (2016). Leadership in crisis: some challenges for learning. Proceedings of the Australia and New Zealand Disasters and Emergency Management Conference, Gold Coast, Qld

Owen, C., Brooks, B., & Bearman, C. (2014). Challenges of Measuring Emergency Management Performance Under Adversity: The good, the bad the ugly. In Maddock, N. (Ed.). *Proceedings from the Bushfire and Natural Hazards CRC and AFAC 2014 Research Forum*, Wellington, New Zealand. Melbourne: Bushfire and Natural Hazards CRC

#### *Invited Talks*

Bearman, C. (2015). Decision Making, Team Monitoring and Organisational Learning. Invited talk to the Capability Development Subcommittee, National Security Resilience Policy Division, Australian Attorney-General's Department. Brisbane, Australia.

Brooks, B. (2016) Shared Mental Models in Emergency Management. SPILLCON – Biennial Oil Spill Conference of the Australian Maritime Safety Authority. Perth, Western Australia.

Bearman, C. (2015). Decision Making and Teamwork in Emergency Management. New South Wales State Emergency Service Regional Controllers Workshop. Manly, NSW.

#### *Conference Posters*

Brooks, B., Lock, J., Bearman, C., Owen, C., & Curnin, S. A (2015). Twelve step program towards safety redemption in emergency management. Poster presented at the AFAC Conference. Adelaide, Australia.

Grunwald, J., and Bearman, C. (2013). Identifying and resolving breakdowns at the regional management level. Poster presented at AFAC conference. Melbourne, Australia. 2<sup>nd</sup>-5<sup>th</sup> September.

Brooks, B., and Curnin, S. (2016) Can I Train My Brain To Make Better Decisions During Disasters? Poster presented at ANZDMC conference. Gold Coast Australia. 30<sup>th</sup> May – 1<sup>st</sup> June.

#### *Reports*

Bearman, C., Rainbird, S., Brooks, B., & Owen, C. (2016). *Proposed tools for monitoring teams in emergency management: EMBAM and TBM*. Bushfire and Natural Hazards CRC Report. Melbourne: Bushfire & Natural Hazards CRC.



Brooks, B., & Curnin, S. (2016) Options for development and testing of cognitive decision making tools. Bushfire and Natural Hazards CRC Report. Melbourne: Bushfire & Natural Hazards CRC.

Bearman, C., Brooks, B., Owen, C., Curnin, S., Fitzgerald, K., Grunwald, J., & Rainbird, S. (2015). *Decision Making, Team Monitoring & Organisational Learning in Emergency Management*. Bushfire and Natural Hazards CRC Report. Melbourne: Bushfire & Natural Hazards CRC.



## ENGAGEMENT

- The Country Fire Service are implementing tools developed by the project in order to enhance team monitoring at the state and regional level (in conjunction with lessons learned).
- A cohort of regional coordinators at the New South Wales SES will be using the team monitoring tools during operations in the 2016/17 storm season.
- The Country Fire Service, New South Wales SES and Tasmanian Fire Service (together with the research team) have formed a research development and testing group that is developing the tools that are being produced from the project.
- Ben Brooks and Steve Curnin have been invited to participate in Woodside Petroleum's Crisis management event in August. At this event we will test one of the cognitive decision tools for the project.
- Steve Curnin and Ben Brooks have been approached by Westpac to explore the possibility of applying the work they are doing with the decision-making attributes of the Attorney General's REAG Organisational Resilience HealthCheck tool.
- Christine Owen is assisting the TFS with their operational review of their recent extensive fire season (2015-16).
- The team have negotiated with QFES on the next stage of the cognitive decision tools research to include trialling the training and associated decision tools, integrating tools into QFES exercises and a review of the North Stradbroke Island fire by senior personnel and stakeholders on North Stradbroke Island.
- Arrangements have been made with TFS & NSW SES for end users to participate in critical work analysis interviews.
- The research team have conducted extensive interviews with 18 emergency management agencies in Australia and New Zealand to discuss the context and issues surrounding decision making, team monitoring and organisational learning. The team discussed these issues with: chief officers, deputy chief officers, principle rural fire officers (NZ), state coordination personnel, regional coordination personnel, and incident management team personnel. These personnel represented urban fire brigades, rural fire agencies, land management agencies, state emergency services, council officers with responsibility for search and rescue, the Red Cross and the National Rural Fire Authority (New Zealand).
- Chris Bearman and Jared Grunwald conducted desktop simulation/semi-structured interviews on identifying and recovering from team breakdowns with regional controllers from three difference emergency management agencies.



- Chris Bearman (with Mike Rumsewicz) gave a talk about the project to the Capability Development Subcommittee, Australian Attorney-General's Department.
- Chris Bearman has given two talks (in 2015 & 2016) about research in the project at New South Wales State Emergency Service Regional Controllers workshops.
- Chris Bearman has been invited to give a talk to AFAC Workforce Development Group.
- Ben Brooks gave a presentation to SPILLCON on the issue of Shared Mental Models in Emergency Management.
- The research team have participated or observed the following events with our end user partners
  - Kingscote Airport Multi-Agency Response Exercise (South Australia)
  - 2016 NSW Storm Event at a Regional Coordination Centre (New South Wales)
  - 2016 State Headquarters Preparedness Simulation (South Australia)
  - Early Season Fire Management at the State Headquarters (South Australia)
  - TFS Operational Review (2015-2016) that includes personnel operating at regional and state operations level
  - G20 operation (Queensland)
  - 2015 Sydney Storm Event (New South Wales)
  - Planned Burns (South Australia)
  - "Operation Headache" (Queensland)
  - 2014 seasonal preparedness simulation (Tasmania)
  - Staff Ride in Tasmania
- The team is currently on stand-by to observe significant storm/flood events in New South Wales.
- The project leader (Chris Bearman) meets approximately twice a year with most of the end-users in the wider reference group for the project
- The project leader (Chris Bearman) and the lead end user (Heather Stuart) have a telecon every three weeks to discuss the project.



## CURRENT TEAM MEMBERS

Dr Chris Bearman (CQUniversity) – Lead Researcher & RDT Group  
Dr Benjamin Brooks (University of Tasmania) – Researcher & RDT Group  
Dr Christine Owen (University of Tasmania) – Researcher & RDT Group  
Dr Steven Curnin (University of Tasmania), Research Assistant  
Dr Sophia Rainbird (CQUniversity) – Research Assistant  
Heather Stuart (NSW SES) – Lead End User & RDT Group  
Mark Thomason (CFS) – End User & RDT Group  
Sandra Whight (TFS) – End User & RDT Group  
John Santiago (Red Cross) – End User  
Alen Slijepcevic (CFA) – End User  
Mike Grant (NZ SRFA) – End User  
Mike Wouters (DEWNR) – End User  
Phil Robeson (NSW FRS) – End User  
Mark Swiney (MFB) – End User  
David Launder (SA MFS) – End User



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