

DECISION MAKING, TEAM MONITORING & ORGANIZATIONAL LEARNING IN EMERGENCY MANAGEMENT

Annual project report 2016-2017

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EXECUTIVE SUMMARY

Strategic level emergency management is becoming ever more sophisticated as emergencies caused by natural hazards become more complex and dynamic. If we are going to expect people to operate in this increasingly complex environment we need to make sure that they have the necessary skills and tools. This is especially true of non-technical skills such as teamwork and decision making. This project aims to develop simple practical tools that help people to make better decisions and manage teams more effectively. As part of this work we are also interested in understanding some of the enablers and barriers to effective research utilization. The project therefore has three streams: team monitoring, decision making and organizational learning.

In the team monitoring stream, two teamwork checklists have been developed based on an extensive literature review and discussions with our end-user partners. These checklists (known as EMBAM & TPC) have been trialed during exercises, real time operations and debriefs with encouraging results. Qualitative and quantitative studies have so far shown that these checklists are clear, concise and provide useful information that can be used to improve teamwork.

In the decision making stream, we have conducted three interrelated studies that examined how emergency management organisations maintain, assess, and improve the quality of their decisions. The three studies included using a critical decision method to explore strategic decision making during an international disaster, exercising teams in simulated emergency events and training focused on improving decision making skills and knowledge. The resultant qualitative and quantitative research has identified several consistent themes in terms of where participants perceive their organisations to be performing well and areas that can lead to improvements in decision-making. Further tranches of data collection have been scheduled to verify these results across 2017.

The key aim of the organizational learning stream is to help emergency management staff to function more effectively in increasingly complex environments. Its overall approach is to help agencies to 'learn how to learn', so they understand how to embed effective learning practices and systems into their organisation's culture. The experiential learning model, which is grounded in real-world experiences rather than classroom training, is a key focus of this research. No organisation can forgo learning. All experiences provide opportunities for learning to occur. A key insight for agencies interested in facilitating improvements in learning is to locate potential weak links in the learning cycle and to develop a better understanding of how to learn.



END USER STATEMENT

Heather Stuart, *NSW State Emergency Service, NSW*

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



BACKGROUND

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 inter-agency involvement (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., 2016, 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 particularly their non-technical skills (such as decision making and teamwork) effectively support them. We need to develop the skills of our people to function in these increasingly complex environments now and into the future.

Human performance in the context of real world operational environments has been extensively studied by researchers working in the field of human factors. Human factors has contributed information to help improve performance and reduce errors in complex workplaces in industries such as: aviation, railway, medicine and the military. Research into human factors in these industries 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). This project works within the tradition of human factors to: develop ways to better monitor and modify the behavior of teams; provide enhanced methods that can facilitate decisions making in complex situations; and to identify the enablers and barriers to research utilization so that the capabilities needed can continue to adapt and change.

TEAM MONITORING

At the beginning of the project the research team visited 18 emergency management agencies in Australia and New Zealand to form a solid basis for the research grounded in operational requirements. This sought to determine the issues in team monitoring and utilised discussions, semi-structured interviews and observations of real life and simulated emergencies. 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.

The next stage was to complete a comprehensive literature review that examined how team monitoring is carried out from the position of operational oversight in emergency management and other related high reliability industries



(Bearman et al., in press). This literature review 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). Because each approach has limitations when applied to emergency management the literature review recommended that different methods be used in combination.

Based on the literature review and discussions with end users, two methods of monitoring teams are being developed and tested: The Emergency Management Breakdown Aide Memoire (EMBAM) and the Teamwork Process Checklist (TPC) (Bearman et al., 2017). EMBAM is a guide to assist the identification of teamwork breakdowns across the various organizational levels. The checklist includes categories, such as: missing information, conflicting expectations, inconsistent information, intuition, familiarity, and networks. EMBAM also included a number of ways to resolve breakdowns. If EMBAM detects a problem or a more detailed health check of the teams is required then the TPC is used. The TPC is based on research into breakdowns by Wilson et al. (2007) and Bearman et al. (2015) and contains questions about the communication, coordination and cooperation of the team. If an issue is highlighted, then this prompts further discussion with the team about what may be causing the problem.

DECISION MAKING

Decision-making is a skill that permeates every incident or disaster and every level of emergency management. The decision environment is often complex and uncertain, with challenging physiological contexts such as fatigue and major consequences for poor decisions.

In an earlier phase of this study, an evaluation of decision-making structures and processes with end-users identified a number of aspects of good decision-making knowledge and skills. This includes how organisations build psychologically safe environments where team members can speak up, and where decision-makers are engaging in 'sense-making'. However, the findings also indicated that there is less effort being put into recognizing when shifts in decision styles occur, in monitoring for bias and errors through meta-cognitive processes, or in managing the effect that recording has on 'anchoring' or fixing a decision-maker to a particular course. The purpose of this stream is to produce research utilisation products in the form of a training course and tools that can be embedded in emergency management practices to support decision making.

ORGANIZATIONAL LEARNING

The key focus of the organisational learning stream over the past year has been to investigate how organisations can improve their capacity to learn through experience. It has developed an experiential learning framework to examine enablers and constraints to organisational change.

This is because the need for emergency services agencies to demonstrate learning is an increasing concern. In an earlier phase of the research the project



group (see Owen *et al.*, 2015), has demonstrated that many agencies were actively working to identify learning opportunities. These include after-action reviews, externally led inquiries, and practice-led research projects. The agencies also evaluated research insights and their implications for reinforcing or changing current practices. However, while agencies were developing 'lessons learned' frameworks, these frameworks were not always effective in translating research outcomes into practice. This is because, too often, the structures for managing lessons were disconnected from the structures for reviewing and evaluating research. That is, there was no channel between research outcomes and lessons management.

Broad challenges continue to be identified that agencies need to manage in order to enhance and sustain learning. These include shifting value from action post an event, to reflection, focusing on the bigger picture and allowing enough time to effectively embed the new practices after an emergency.



WHAT THE PROJECT HAS BEEN UP TO

At the heart of the project is a research development and testing group that guides the research, development and utilization activities. 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). An iterative design process has been adopted to develop tools that are suitable for use during emergencies by people at regional and state levels. 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


Five studies of the teamwork checklists have now been conducted, focusing on real time performance evaluation and after action reviews.

Study 1 was conducted to determine whether EMBAM and TPC were worthy of further consideration (Bearman et al., 2017). The 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 TPC to consider the teamwork of their agency's incident management response during the emergency. Observers raised issues with some of the questions, particularly in the TPC but all of the observers felt that EMBAM and TPC had potential as methods of monitoring teams from the position of operational oversight.

Study 2 focused on observers using the TPC during five regional exercises. Four state-level observers used the TPC as part of their evaluation of the performance of regional level teams dealing with one or more significant large-scale fires. During the exercise, actors simulated radio traffic on the fire-ground and adopted the roles of key stakeholders (such as police). After the exercise the evaluation team met to consider whether each question yielded useful information and should be amended or removed. Any changes were made before the next exercise, where the process was repeated.

Study 3 focused on interviews with strategic level personnel who were managing large-scale storm and flood events. Seven regional and state level coordinators were interviewed by telephone during or shortly after the event. In the interview participants considered the performance of their team and evaluated whether the checklists provided useful information. This allowed the participant to identify issues in those teams that needed to be considered in the next hour, the next shift, the next day and the next week.

Study 4 is ongoing and focuses on the use of the checklists throughout a fire or storm and flood season. So far, two state level officers have used the checklists throughout a fire season. This fire season contained many significant bushfires which the agency needed to manage. At the end of the fire season the participants were interviewed about their use of the checklists. The participants found the tools to be valuable, and had used them as memory aids to ensure



nothing had been overlooked, to do team health checks and to resolve team problems before they escalated.

Study 5 is also ongoing and focuses on the use of the tools to facilitate after action reviews. Fifteen state, regional and incident management team personnel have taken part in a workshop where they used the TPC to consider the performance of their team during a significant storm and flood event. In this workshop good and not so good teamwork was highlighted and discussed with recommendations emerging from this analysis. Usefulness of questions on communication, coordination and cooperation was rated between 4.06 and 4.26 out of five. Clarity of questions were rated between 4.06-4.13 and comprehensiveness was rated as 4.08 out of five.

In each of the studies that have been conducted so far participants considered the tools to provide useful information about team functioning. The clarity of the questions has been rated as very good and the questions appear to capture all of the issues that participants think are important. While further evaluation is necessary the tools do show considerable promise as a way of helping people to better manage teams before, during and after an emergency response.

DECISION MAKING

Recent research completed in this stream built upon the previous phase that involved a series of semi-structured interviews with eighteen end-user agencies and a review of decision making concepts in the literature. This phase of the study involved conducting extensive empirical research with emergency management agencies to explore how organisations can maintain, assess, and improve the quality of their decisions. To examine this area, we conducted three interrelated studies. Study One detailed the analysis of the set of decisions made by a commander during an international Urban Search and Rescue deployment to evaluate the core skills utilized. Study Two included the observation and survey of participants following multiple exercises in a range of end-user organisations. Study Three involved a training intervention – a one-day decision-making course where participants were provided with both knowledge and tools to assist them in their decision-making.

In the first study, we interviewed an Urban Search and Rescue Commander and explored their decisions making during an international deployment using the Critical Decision Method. The purpose of this study was to deepen our understanding of the challenges associated with strategic decision making during emergencies and align this to contemporary decision making literature conducted in high reliability environments. Following the commander's interview, we identified a set of ten decisions that were made. We then interviewed four of his team members also on the deployment. Subsequent to this we re-interviewed the commander.

This analysis created several insights. Good strategic emergency management decision-making addresses a range of issues previously identified in this research project (Brooks et al., 2016).

It requires team leaders to build psychologically safe environments where team members can speak up.

It requires decision-makers to be aware of their own thinking (meta-cognition), particularly when they are moving between different decision-styles (e.g., from intuitive to more rational analyses).

It requires they evaluate important decisions for the influence of possible bias or error.

This study also identified broader questions that need to be examined in order to improve decision-making competence in emergency management and in particular, if an incident controller or commander requires hazard specific expertise in order to make effective decisions. This study consolidated our findings from the literature and enabled us to define several key decision making concepts that are utilized by strategic decision makers. The findings from this study were used to develop the survey for the second study.

In the second study a survey was developed to assess decision-making in a series of crisis and emergency management exercises. The statements in the survey were based on the decision-making indicator in the Australian Government's Organisational Resilience Good Business Guide. The various components of resilience are shown in Figure 2.



Figure 2: The Components of Resilience (Attorney Generals Department, 2016).

The survey consisted of twenty-one decision-making statements grouped into seven themes. The preliminary results demonstrated that the participants considered their exercise teams (be they an Incident Management Team or Crisis Management Team) had built solid structures in order to be flexible and adaptive in their decision-making; were effective in making sense of the emerging situations and consistently managed bias in their decisions. Opportunities for improvement included creating psychologically safe places for employees to speak up, and improved record-keeping of decisions. Participants also rated issues associated with the clarity of the decision processes – such as documenting alternative options and info/events that might change decisions; exploration of future scenarios as slightly lower. Findings from this and the first study enabled us to develop a training course that provided the knowledge and support skills for strategic decision makers in emergency management.

The third study involved a training intervention – a decision-making course where participants were trained in both knowledge and support skills that assist them in their decision-making. Figure 3 identifies the different modules included in the course. The two lower modules we considered the foundations of good decision-making, whereas the skills around scenario planning and anticipatory thinking we considered to be more advanced skills. Based on findings from the previous studies a set of checklists (aides-memoire) were developed. The participants then engaged in an exercise that had been specifically designed with injects to test the concepts in the aide-memoire, but embedded within a realistic emergency scenario.



Figure 3: Modules of the Decision-Making Training Intervention

Exercise participants evaluated the usability of the checklist following the exercise. To do this they used the Quality In Use Scoring Scale. Quality in use is a usability measure of the degree to which a product enables specified users to accomplish specified goals with effectiveness, productivity, safety and satisfaction. This approach and the triangulation of the results from the aforementioned studies has allowed us to assert, with a significant degree of confidence, that the aspects of decision-making identified in this research are important in emergency and crisis management and can be trained and supported with aides-memoir.

ORGANIZATIONAL LEARNING

In emergency management internationally, the drive to learn is growing. This increasing interest is evidenced by a review of the literature conducted to inform the project which noted that of the 266 publications identified using the search terms 'learning lessons' and 'emergency management' more than half had been published in the past five years. However, the research has found that many of these publications are not that helpful in providing insights into how learning in emergency management agencies can be improved.

In previous research, the project group (see Owen *et al.*, 2015), had found that many agencies were actively working to identify learning opportunities. The agencies also evaluated research insights and their implications for reinforcing or changing current practices. However, while agencies were developing 'lessons learned' frameworks, these frameworks were not always effective in



translating research outcomes into practice. This is because, too often, the structures for managing lessons were disconnected from the structures for reviewing and evaluating research. That is, there was no channel between research outcomes and lessons management.

These observations align with this study's literature review, which showed that many of the 'lessons learned' publications fall into a theme that we have dubbed 'the creation myth' (see for examples of this Farazmand, 2007; Kenney *et al.*, 2015). In this scenario, researchers review a crisis event, publish their insights, and assume that the act of publication itself signifies that 'lessons' have now been learned. Other literature themes included how emergency services organisations are establishing processes for managing and learning from lessons (see Jackson 2016), why learning is so hard and, some argue, almost impossible (see Birkland 2009; Donohue & Tuohy 2006).

Over 2016-2017 the project has drawn on the literature review and interviews with 18 end-user agency personnel from South Australia, New South Wales, Victoria and Tasmania to ascertain their strategies for learning from incidents to develop an experiential learning model that helps explain how contextual elements enable or constrain opportunities for learning.

The experiential learning model, developed by David Kolb (2014) and adapted by Christine Owen (2017), was selected because of several key factors. It grounds learning in actual experiences rather than classrooms or training environments. It is well established in both education and organisational learning. It draws upon the ways people in organisations may experience problems and then learn from them. Kolb's model is based on explicit processes that are necessary for effective learning. Its useful framework explains the phases of learning that personnel may seek in a range of work activities.

The model suggests that learning results from a resolution of a contradiction or conflict between opposing ways of dealing with the world. That is, between reflection and action on one hand and between doing and thinking on the other. Beneath these processes is the notion of apprehending (initial sense-making based on experience) and comprehending (understanding and improved action – see Figure 4). An impetus for learning can start anywhere, for example, through reflecting on an experience, considering a problem or trial-and-error experimentation. The key is that all four elements indicated in the learning cycle in Figure 1 are important if learning is to lead to a change or a reinforcement of existing ways of acting – because the practitioner now better understands why these actions work.



Challenges for emergency management agencies

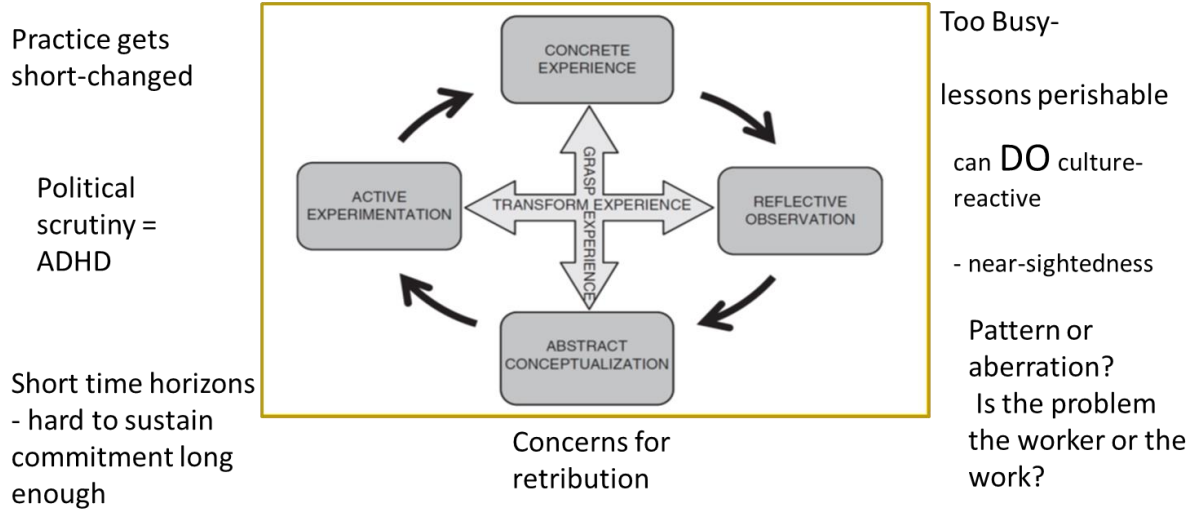


Figure 4: The experiential learning cycle and some challenges for agencies to learning

Based on the study's interviews with practitioners involved in lessons learned, after-action reviews or research-usage activities, the researchers have identified broad challenges that agencies need to manage in order to enhance and sustain learning (indicated in Figure 4).

Valuing action over reflection

Staff often lack adequate time to reflect on and gain meaning from their experiences. Their potential insights may then be lost rather than embedded in their organisation's practices. Reflection can also be inhibited by a tendency to focus on the immediate and the tangible, which is reinforced by the 'can-do culture inherent in many organisations that encourages action, sometimes at the expense of reflection.

Blind to the big picture

When emergency agencies do reflect on their experiences, their vision may be too near-sighted, focusing on the individual as the aberration, rather than identifying broader, systemic problems. Where the focus is on individuals, the individual may fear possible retribution, and be less likely to voice concerns that could contribute to improved practices.

Short term-ism

When organisations identify the need for changes and trial the changes, they may not allow enough time to effectively embed the new practices. This is exacerbated by the demands placed on staff, noted earlier. And when external pressures, including political scrutiny, are the impetus for new practices, the changes may be short term, rather than sustained

The next phase of the project will be to further develop some indicators that can inform a learning and research-utilisation maturity matrix, in collaboration with lessons learned practitioners and end-user agencies. The purpose of this tool will



be to assist agencies to more systematically assess and evaluate their own internal processes to support learning and change. This engagement will be written up in a way that other agencies may be able to use and to learn from.



PUBLICATIONS LIST

Books

Adams, R. Owen, C. Scott, C. Parsons, D. (2017) *Beyond Command and Control: Leadership, Culture and Risk*, Taylor and Francis, CRC Press. New York

Journal articles

Bearman, C., Rainbird, S., Brooks, B., Owen, C., & Curnin, S. (in press). A literature review of methods for providing enhanced operational oversight of teams in emergency management. *International Journal of Emergency Management*.

Bearman, C., & Thomason, M. (in press). Teamwork Checklists. *Volunteer Magazine*

Bearman, C., Rainbird, S., Brooks, B.P, Owen, C., & Curnin, S. (2017). Tools for monitoring teams in emergency management: EMBAM and TBM. *Australian Journal of Emergency Management*, 32 (1), 40-43.

Grunwald, J. & Bearman, C. (2017). Identifying and Resolving Coordinated Decision Making Breakdowns at the Regional Coordination Level of Wildfire Management. *International Journal of Emergency Management*. 13 (1), 68-86.

Owen, C., Brooks, B.P., & Bearman, C., & Curnin, S. (2016). Values and complexities in assessing emergency management response effectiveness. *Journal of Contingencies and Crisis Management*, 24 (3), 181-190.

Bearman, C., & Bremner, P. (2016). Don't just do something, stand there! Mitigating goal seduction in emergency management. *National Emergency Response*, 29 (4), 18-23.

Brooks, B., Curnin, S., Bearman, C., Owen, C., & Rainbird, S. (2016). An Assessment of the Opportunities to Improve Strategic Decision-Making in Emergency and Disaster Management. *Australian Journal of Emergency Management*, 31 (4), 38-43

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. (under review at AFAC2017 and Australian Journal of Emergency Management). Identifying Lessons from Exercising & Training for Strategic Emergency Management Decision-making.

Brooks, B., Owen, C., Curnin, S., & Bearman, C. (under review at the Journal of Contingencies and Crisis management). Human error during the multilevel response to three Australian disasters.

Owen, C. Bearman, C. Brooks, B. Curnin, S. (under review) *Enhancing learning in emergency services organisations and work*, Australian Journal of Public Administration

Owen, C. Hayes, P. Brooks, B. Scott, C. Conway, G. (under review) Identifying the evidence to support incident management team capability, Australian Journal of Emergency Management

Owen, C. Krusel, N. Bearman, C. Brooks, B. (under review) From research outcome to agency change – mapping a learning trajectory of opportunities and challenges- Australian Journal of Emergency Management as part of 2017 Conference

Peer-reviewed conference papers

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

Hazard Notes

Bearman, C., Rainbird, S., Brooks, B., Owen, C., & Curnin, S. (2017). Enhancing Team Performance. Hazard Note, 33, 1-4.

Owen, C. Bearman, C. Brooks, B. (2017) *Helping agencies learn from experience* Bushfire and Natural Hazards CRC. Melbourne.

Invited Talks

Bearman, C. (2017). Practical decision tools for complex, multi-team environments. AFAC Urban Operations Group. Melbourne, Australia



Bearman, C. (2016). Teamwork and Decision Making in Emergency Management. South Australian Country Fire Service Incident Management Team Annual Workshop. Adelaide, South Australia.

Bearman, C. (2016). Team Monitoring in Regional Coordination. New South Wales State Emergency Service Regional Controllers Workshop. Wollongong, NSW

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, Team Monitoring and Organizational Learning. Invited talk to the Capability Development Subcommittee, National Security Resilience Policy Division, Australian Attorney-General's Department. Brisbane, Australia.

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

Owen, C. (2016) Information flows: Looking Backwards – Looking forwards, presentation to the AllMS 4 2017 Steering Group.

Owen, C. (2016) What does the research tell us about learning lessons? Presentation to the AFAC Knowledge Information Network symposium on *Learning lessons*, held 15th-16th November 2016.

Conference posters

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. 30th May – 1st June.

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. 2nd-5th September.

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 & Organizational Learning in Emergency Management. Bushfire and Natural Hazards CRC Report. Melbourne: Bushfire & Natural Hazards CRC.



Industry commissioned reports

Owen, C. (2017) Debrief of Tropical Cyclone Debbie and associated flooding events - Summary of debrief findings. Interim Report submitted to the Queensland Fire and Rescue Services



ENGAGEMENT

- 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 guiding the research, development and utilization activities in the project.
- 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 used the team monitoring tools during operations in the 2015/16 storm season.
- Members of TFS used the team monitoring checklists during the 2015/16 fire season.
- Chris Bearman assists the CFS to evaluate regional responses to emergencies.
- Christine Owen and Chris Bearman conducted an extensive operational review with QFES following Tropical Cyclone Debbie
- Chris Bearman conducted a Teamwork After Action Review with NSW SES following Tropical Cyclone Debbie.
- Christine Owen assisted TFS with the operational review of their recent extensive fire season (2015-16).
- Christine Owen Assisted the TAS SES with their After Action Review of the extensive flooding (2016)
- Christine Owen, Chris Bearman and Kirsty Vogel assisted Queensland Fire and Rescue Service to develop capability in debriefing by conducting a Debriefing Clinic with Team Leads as well as developed an online survey that was completed by 715 personnel involved in the response to Tropical Cyclone Debbie and Associated Flooding events.
- Ben Brooks and Steve Curnin participated in the Australian Maritime Safety Authority National Response Team workshop and tested one of the cognitive decision tools for the project.
- Ben Brooks and Steve Curnin participated in Woodside Petroleum's crisis management exercise and applied the work they are doing with the decision-making attributes of the Attorney General's Organisational Resilience HealthCheck tool and tested one of the cognitive decision tools for the project.
- Steve Curnin participated in the Australian Antarctic Division's crisis management exercise and applied the work they are doing with the decision-making attributes of the Attorney General's Organisational Resilience HealthCheck tool and tested one of the cognitive decision tools for the project.
- Steve Curnin and Ben Brooks have been approached by a number of organisations in the Attorney General's Department Trusted Information Sharing Network for Critical Infrastructure Resilience to explore the possibility of applying the work they are doing with the decision-making attributes of the Attorney General's Organisational Resilience HealthCheck tool.
- Steve Curnin was invited by the Attorney General's Department to conduct a Decision Making Master Class for the Trusted Information



Sharing Network for Critical Infrastructure Resilience with Brigadier Michael Mahey from the ADF and facilitated by Marc Bellette from AIDR.

- 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 organizational 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 (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 gave a talk on the teamwork checklists to the South Australian Country Fire Service Incident Management Team Annual Workshop. Adelaide, South Australia.
- Chris Bearman will be giving a pre-fire season briefing on the teamwork checklists to the Tasmanian Fire Service.
- Chris Bearman will be giving a talk at BNHCRC Showcase.
- Chris Bearman gave a talk about the research to AFAC Urban Operations Group
- Chris Bearman and Mark Thomason have written an article on the teamwork checklists for the CFS Volunteer Magazine.
- Chris Bearman & Mark Thomason were interviewed about the research for Radio Station 5CC, Port Lincoln, Australia.
- Ben Brooks gave a presentation to SPILLCON on the issue of Shared Mental Models in Emergency Management.
- Chris Bearman and Jared Grunwald conducted desktop simulation/semi-structured interviews on identifying and recovering from team breakdowns with regional controllers from three different emergency management agencies.
- 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 events in South Australia and 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 (Central Queensland University) – 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 (Central Queensland University) – Research Assistant

Heather Stuart (NSW SES) – Lead End User & RDT Group

Mark Thomason (SA CFS) – End User & RDT Group

Sandra Whight (TFS) – End User & RDT Group

John Santiago (Red Cross) – End User

Alen Slijepcevic (CFA) – End User

David Nichols (CFA) – End User

Mike Grant (NZ SRFA) – End User

Rob Hands (NZ SCRFA) – End User

Mike Wouters (DEWNR) – End User

Phil Robeson (NSW FRS) – End User

Mark Swiney (MFB) – End User

David Launder (SA MFS) – End User



REFERENCES

- ARGRYIS, C. 2000. Double-Loop Learning. *Wiley Encyclopedia of Management*.
- ATTORNEY GENERAL'S DEPARTMENT, (2016). Organisational Resilience Good Business Guide. Australian Government Publishing, Canberra.
- 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.
- BEARMAN, C., NAWEED, A., DORRIAN, J., ROSE, J. & DAWSON, D. (eds.) 2013. *Evaluation of Rail Technology: A practical human factors guide*, Aldershot, UK: Ashgate.
- BEARMAN, C., RAINBIRD, S., BROOKS, B., OWEN, C. & CURNIN, S. 2017. Tools for monitoring teams in emergency management: EMBAM and TBM. *Australian Journal of Emergency Management*, 32, 40-43.
- BEARMAN, C., RAINBIRD, S., BROOKS, B., OWEN, C. & CURNIN, S. in press. A literature review of methods for providing enhanced operational oversight of teams in emergency management. *International Journal of Emergency Management*.
- BIRKLAND T 2009. 'Disasters, lessons learned, and fantasy documents', *Journal of Contingencies and Crisis Management* **17**(3), pp. 146-156.
- CANTON-THOMPSON, J., GEBART, K. M., THOMPSON, B., JONES, G., CALKIN, D. & DONOVAN, G. 2008. External Human Factors in Incident Management Team Decisionmaking and Their Effect on Large Fire Suppression Expenditures. *Journal of Forestry*, 106, 416-424.
- DONAGHUE A & TUOHY R 2006. Lessons we don't learn: A study of the lessons of disasters, why we repeat them, and how we can learn them, *Homeland Security Affairs*, **2**(2).
- FARAZMAND A 2007. Learning from the Katrina crisis: A global and international perspective with implications for future crisis management, *Public Administration Review* **67**, pp. 149-159.
- HELMREICH, R. L., MERRITT, A. C. & WILHELM, J. A. 1999. The evolution of Crew Resource Management training in commercial aviation. *Int J Aviat Psychol*, 9, 19-32.
- JACKSON LM 2016. The influence of organisational culture on learning lessons: Implementing a lessons management life cycle, *The Australian Journal of Emergency Management* **31**(1), pp. 18-23.
- KENNEY CM, PHIBBS SR, PATON D, REID J and JOHNSTON DM 2015. Community-led disaster risk management: A māori response to ōtautahi (Christchurch) earthquakes, *Australasian Journal of Disaster and Trauma Studies* **19**(1), pp. 9-20.
- KOLB DA 2014. *Experiential learning: Experience as the source of learning and development*, Indianapolis: Pearson FT press.



LIU, Y., STANTURF, J. & GOODRICK, S. 2010. Trends in global wildfire potential in a changing climate. *Forest Ecology and Management*, 259, 685-697.

OWEN, C., BEARMAN, C., BROOKS, B., CHAPMAN, J., PATON, D. & HOSSAIN, L. 2013. Developing a research framework for complex multi-team coordination in emergency management. *International Journal of Emergency Management*, 9, 1-17.

OWEN, C., BEARMAN, C. BROOKS, B., & CURNIN, S. FITZGERALD K, GRUNWALD J and RAINBIRD S 2015. *Decision making, team monitoring and organisational performance in emergency management*, Bushfire and Natural Hazards CRC.

OWEN, C., BROOKS, B., BEARMAN, C. & CURNIN, S. 2016. Values and complexities in assessing strategic level emergency management effectiveness. *Journal of Contingencies and Crisis Management*, 24, 181-190.

RASMUSSEN, J. 1997. Risk management in a dynamic society: A modelling problem. *Safety Science*, 27, 183-213.

REASON, J. 1990. *Human error*, New York, Cambridge University Press.

WICKENS, C. D., GORDON, S. E. & LIU, Y. 2004. *An introduction to human factors engineering*, Upper Saddle River, N.J., Pearson Prentice Hall.