



DECISION MAKING, TEAM MONITORING & ORGANISATIONAL LEARNING IN EMERGENCY MANAGEMENT

Annual project report 2017-18

Chris Bearman ^{1,4}, Benjamin Brooks ^{2,4}, Christine Owen ^{2,4}, Steve Curnin ^{2,4} & Heather Stuart ^{3,4}

¹ Central Queensland University, Appleton Institute

² University of Tasmania

³ New South Wales SES

⁴ Bushfire and Natural hazards CRC





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EXECUTIVE SUMMARY

The focus of this project is on providing simple practical tools that can help people to make better decisions and manage teams more effectively in emergency management. In addition to the creation of the tools themselves we are also seeking to understand how agencies can better utilise the products from research. The project therefore has three streams: team monitoring, decision making and organisational learning.

In the team monitoring stream, two teamwork checklists have been developed. These checklists are the Emergency Management Breakdown Aide Memoire (EMBAM) and the Team Process Checklist (TPC). These checklists were developed using a human centered design process that places the end-user at the center of a cycle of development and testing. These tools are being used by the South Australian Country Fire Service and Tasmanian Fire Service and have been used to evaluate team performance at Queensland Fire & Emergency Services, Northern Territory Emergency Services and the New South Wales State Emergency Service. The tools are now available from the Bushfire and Natural Hazards CRC website.

The decision making stream has developed a decision making aide memoire and associated training materials. The development of the decision making aide memoire also followed a 'User-Centred Design' process that is suitable to support decision making in highly complex, high consequence, emergency management events. In addition, the decision making stream has collaborated with the Resilience Expert Advisory Group at the Department of Home Affairs to develop a publication titled, A practical guide for crisis decision making.

The organisational learning component has worked in consultation with agencies to conduct an evaluation framework for organisational self-assessment that has been subsequently reviewed by end-user agencies and further developed into a research utilisation maturity matrix. This has now been trialed and used as the basis for a national survey into research utilisation practices across all agencies and the findings have informed the utilisation strategy for the BNHCRC.



END-USER STATEMENT

Heather Stuart, *NSW State Emergency Service*

This project is providing practical techniques and strategies to help people function in more complex emergency management environments now and into the future. All three streams of the project have made significant progress this year, with significant consultation with end users continuing. It is pleasing to see that a number of agencies have implemented the team performance monitoring tools in a variety of settings include real time evaluations, debriefs, exercising and individual use by IMT members. I am looking forward to the formal launch of the team performance monitoring tools in the coming months. The collaboration with the Department of Home Affairs to develop the publication A practical guide for crisis decision making is a significant achievement for the decision making stream of the project.



PRODUCT USER TESTIMONIALS

“These types of tools that support incident management and fire operations, or indeed any other hazard, are invaluable. Any assistance they can provide through a body of research that has been undertaken to validate findings is invaluable.” (Jeremy Smith, Tasmanian Fire Service)

“The straightforward, practical tools developed through this research are of great benefit to emergency managers to ensure their teams are functioning to the best of their ability.” (Mark Thomason, South Australian Country Fire Service)

“They [the team monitoring tools] are invaluable not only during operational response, but also in debriefs and training,” (Mark Thomason, South Australian Country Fire Service).

“The importance of strategic decision making is crucial in any type of disaster. We need to provide our emerging leaders with tools to assist them to build their capability to make sound strategic decisions focusing on critical factors pertaining to the incident and impacted communities. The outputs from this project will greatly assist the industry in preparing our future leadership for disasters and the decisions they will be expected to make.” (Rob McNeil, Fire & Rescue NSW)

“Those tools are bloody fantastic.” (Neil Cooper, ACT Parks and Wildlife)



BACKGROUND

It seems fair to say that emergencies are increasing in complexity, duration and the number of people who need to be involved (Owen et al., 2013). There is also increasing availability and use of different technologies to enhance information management in operational control centers. At the same time there are financial constraints from government and increasing media coverage and political scrutiny of the emergency response (Owen et al., 2013). This creates an ever more sophisticated workplace 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. While emergency management agencies have been very good at the technical aspects of managing emergencies they have sometimes been less good at the non-technical aspects. As a state coordination officer has said to us “we do the technical stuff really well but we’re just not as good at the people stuff. We know how to put the wet stuff on the hot stuff but how do we deal with people?” This project is all about the ‘people stuff.’



SUMMARY OF WORK FROM PREVIOUS YEARS

TEAM MONITORING

Identification of current practice, needs and requirements.

We started the team monitoring stream by identifying the different practices, needs and requirements of a wide range of emergency management agencies in Australia and New Zealand. We observed several large-scale response operations (both real and simulated) and interviewed people from 18 different agencies that were responsible for urban fire, rural fire, land management, storm and flood response, urban search and rescue and human recovery. We had extensive discussions of our findings with numerous end-users, including: chief officers, deputy chief officers, principle rural fire officers (NZ), state coordination personnel, regional coordination personnel, and incident management team personnel. From these observations, interviews and discussions we found that team monitoring was often not done very effectively and that there was little or no guidance in most agencies about how to do it.

Identification of potential team monitoring tools

To identify potential tools that could be used for real time team monitoring in emergency management we conducted a comprehensive literature review (Bearman et al., in press). This review considered literature from both emergency management and other related high reliability industries. From this literature review two methods of monitoring teams were identified: The Emergency Management Breakdown Aide Memoire (EMBAM) and the Teamwork Process Checklist (TPC).

EMBAM (Grunwald and Bearman, 2017) is a checklist that focuses on the output of teams and the networks that people have in order to identify team breakdowns at a high level. EMBAM is essentially a set of prompts that focus on: missing information, conflicting expectations, inconsistent information, intuition, familiarity and the available networks. EMBAM also includes suggestions for resolving breakdowns, such as: delegation, resourcing, mentoring, asserting authority and finally replacing people.

The TPC provides a more detailed examination of a team performance based on the literature on high performing teams (Bearman et al., 2015, Wilson et al., 2007). It focuses on three aspects of team functioning: communication, coordination and cooperation. Checklist items identify behaviours that would be expected to be observed. If these behaviours are not observed then this initiates a discussion with the team about what is occurring and why.

Development of the Team Monitoring Tools

The two tools that were identified were subject to extensive development and testing in close conjunction with end-users using the human-centred design approach (Bearman et al., 2018). Four studies were conducted that developed and evaluated the tools in simulated and real-life emergencies. The emergencies were: a multi-agency response to a simulated aircraft accident at



a small rural airfield; five regional coordination centre exercises which required the management of one or more large scale fires; interviews with regional and state level personnel who were managing extensive storm and flood responses; and interviews with personnel who used the tools to manage numerous large-scale fires. In the first two studies the tools were given to observers who rated the team performance. In the second two studies the participant reflected on team performance using the tools. In each study participants were asked whether the checklist as a whole provided useful information, whether it captured all of the information that was deemed to be important, whether each question on the checklist was clear and whether any of the questions needed to be amended or removed. This process has now yielded two team monitoring tools that are simple, straight-forward and able to be used in the time constrained environments typical of regional and state level emergency management.

DECISION MAKING

Our previous research identified a range of possible opportunities for improvement in strategic decision making and specifically around the response to Level 3 incidents. Based on this, the team commenced three interrelated studies to develop and test cognitive tools that help to integrate knowledge about human performance that fosters a supportive environment for strategic decision making. The aim was to discover whether the decision maker can be effectively supported.

The first study developed a survey to assess decision making in a series of emergency management exercises. The survey was completed by participants representing multiple agencies across a number of different exercises simulating different types of incidents. The data indicated opportunities for improvement that included creating psychologically safe places for employees to speak up, and improve the record keeping of decisions. Issues were identified that were associated with the clarity of the decision processes, such as documenting alternative options and how new intelligence might change decisions. In addition, the exploration of future scenarios was identified as a weakness among the teams suggesting that Options Analysis and consequence management remain areas for significant improvement in emergency management.

The second study used a Critical Decision Method to deepen our understanding of the challenges associated with strategic decision making during an international disaster. We conducted a series of semi-structured interviews with the leadership team of the Australian Urban Search and Rescue (USAR) team that was deployed to Japan following the 2011 earthquake off the Pacific coast. This study identified broader questions that also need to be examined in order to improve decision making competence in emergency management. Specifically, if an Incident Controller requires hazard specific expertise in order to make effective decisions.



The third study drew upon the findings from the two previous studies to develop a decision making training intervention course. In this intervention training, participants were trained and provided with both the knowledge and support skills to assist them in their strategic decision making during a series of emergency management discussion exercises. Participants were provided training in the following four areas: (1) managing pressure; (2) managing bias and errors; (3) psychological safety; and (4) anticipatory thinking that examined concepts including situational awareness, mental models, sense-making and cognitive predictions.

A common theme that was identified across all three studies was the ability to make decisions in out of scale events that do not 'play by the rules'. Our research identified that it is challenging to make decisions in these types of environments that require flexibility so that decision makers can think creatively yet still manage the consequences of their decisions. The current phase of this research stream is investigating flexibility during decision complexity and the intersection with consequence management. The research team will explore this phenomenon and provide practitioners with guidance tools and the necessary skills to address these challenges.

ORGANISATIONAL LEARNING

Based on the previous research and consultations that have been conducted an *evaluation framework for organisational self-assessment* was reviewed and discussed by the KIRUN (Knowledge, Innovation & Research Utilisation Network) of AFAC in September. The framework has then been adjusted based on feedback received from the consultation and a pilot of the framework was conducted with one of the end user agencies (CFA). Part of the feedback included a request that the tool be called the research utilisation maturity matrix.

In addition the findings have been reported in a range of publications and presentations. These have included industry forums such as the Lessons Learned forum, Melbourne, 2017; AFAC conference (Sept 2017) and workshops conducted with stakeholders at the Research Advisory Forum in April 2018. To date 3 peer reviewed journal papers have been written and published or approved

- Owen, C., Krusel, N., Bearman, C., & Brooks, B. (2017). From research outcome to agency change: Mapping a learning trajectory of opportunities and challenges. *Australian Journal of Emergency Management*, 31 (4), 42-46.
- Owen, C., Brooks, B.P., Curnin, S., & Bearman, C. (2018). Enhancing learning in emergency services organisational work. *Australian Journal of Public Administration*, pp. 1-14. [doi:10.1111/1467-8500.12309](https://doi.org/10.1111/1467-8500.12309) ISSN 0313-6647



- Owen C. (2018) How emergency services organisational can – and do – utilise research, *Australian Journal of Emergency Management*, (in press)

The insights gained in 2017 were then applied in a national research study as part of a longitudinal investigation of utilisation practices across Australia. In total 190 participants from 29 agencies provided feedback on the degree to which they perceived their agencies engaged in a number of important processes in research utilisation.

The findings (in part) found agencies had different approaches to keep up-to-date with research advances. An examination of the activities described by respondents identified four developmental levels of what we have called *research utilisation maturity* (basic, developing, established and leading). Agencies at high levels of utilisation maturity reported higher levels of perceived effectiveness on disseminating, assessing and evaluating research as well as monitoring and communicating changes. Leading agencies were ones that had:

Established governance processes. They have established governance processes where business goals include research review (e.g. such as having a research review committee and a research framework as part of the business strategy). They also have active connections between research engagement and operations.

Utilisation embedded into job roles. People have responsibilities for learning and review built into their job roles and into their group work. There is a widespread expectation that all personnel are responsible for learning and innovation and will adopt evidence-informed processes. This is supported by access to professional development opportunities.

Active testing of outputs. They actively engage in testing outputs rather than accepting off-the-shelf products. They consult widely and know where to go for help and can access networks of expertise (internal or external to the agency) when needed.

Communities of practice. They are actively engaged in agency and sector communities-of-practice (including other industries such as health) to communicate and innovate. They recognise that there are no magic solutions and they are able to articulate what is not known, problematic or uncertain that needs investigation. They recognise that learning is a process of continuous improvement.

These findings suggest that the approaches discussed by those in the higher research utilisation maturity group may provide insights for others. However, it is also important to recognise that change and innovation is developmental and requires adjustments to governance processes, job responsibilities and participation in communities-of-practice. The findings suggest more work is needed to better understand the enablers and constraints to utilising research to support development of evidence-informed practice.

RESEARCH APPROACH

The research approach that was adopted in this project centres around Human Centred Design. See Bearman et al. (2018) for more information. The basic premise of human centred design is that products are designed to suit the characteristics of intended users and the tasks they perform, rather than requiring users to adapt to the product. A key component of human centred design is usability testing, where end users are at the centre of a cycle of development and testing activities. This allows the end users to play a central role in the creation of the products, helping to shape them so that they better meet their needs and requirements. The process can be simply described as an iteration around four key stages and is described below in Figure 1.

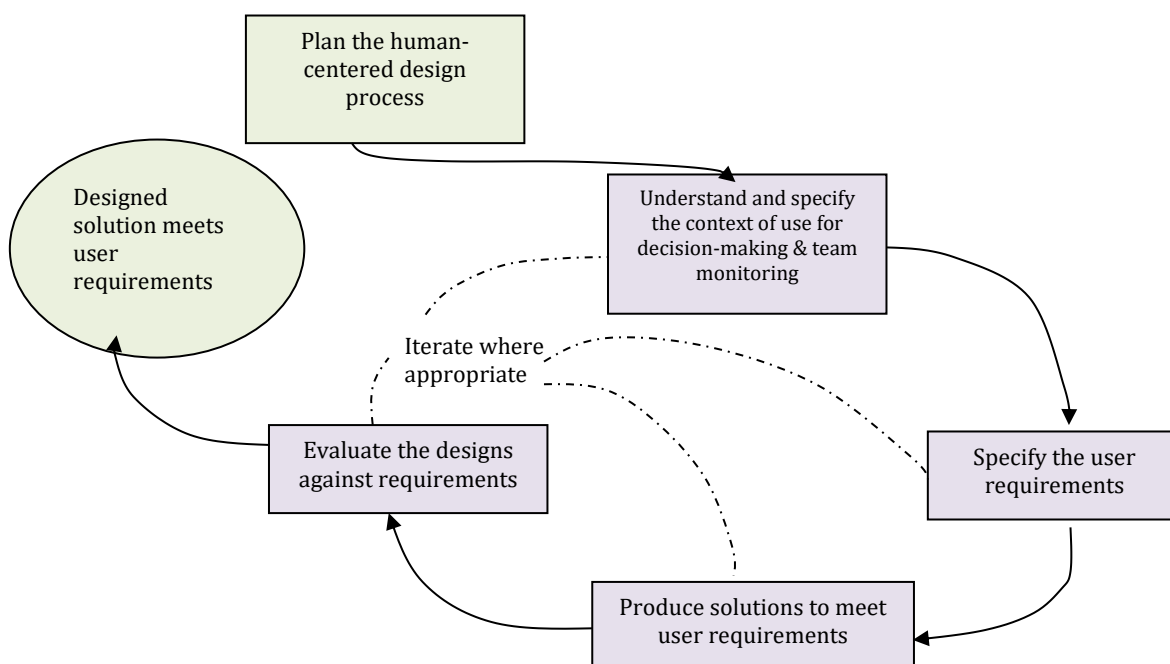


Figure 1 – Interdependence of human centred design activities (adapted from ISO 9241-210:2010(E) p.11)

Our approach in this project then has been to develop and evaluate the tools in real life emergency responses and exercises, or, where this was not possible, in dedicated workshops that focused directly on evaluating usability using an expert group of likely users. Where possible we have also sought to embed end-users into the research process so that they become a central part of the creation of the tools. Bringing end-users into the research process creates a partnership where the researchers contribute their knowledge of literature, theory and the research process and the end-users contribute their requirements, operational knowledge and understanding of the barriers to utilisation and adoption.

Embedding end-users into the research and design process therefore has two goals, 1) to produce tools that can help people to make better decisions and manage their teams more effectively, and 2) to create the right context for the



adoption of the tools by emergency management agencies. In this way we have brought utilisation to the centre of the project, embedding it within the research process so that utilisation informs and is informed by the research from the beginning of the project. For us utilisation is not a separate activity but an integral part of the research process.



KEY MILESTONES

Develop a Website to Present the Deliverables to Industry

A website has been developed in conjunction with the Bushfire and Natural Hazards CRC that presents the deliverables from the project to industry in a more accessible way. On the website a short paragraph describes the key activities in the project and a hyperlink is provided to a report, research paper or hazard note that provides more information. The website also includes short videos of end-users talking about the value of some of the deliverables that we have produced. See <https://www.bnhcrc.com.au/research/hazard-resilience/242> for more details.

A Report Outlining the Method to Develop and Evaluate and Cognitive Decision and Team Monitoring Tools

A report was prepared describing the human-centred design process that was adopted in this project to develop and evaluate the decision making and team monitoring tools. Human centred design places the end-user at the centre of a cycle of development and testing so that the products are optimally designed for use in operational environments. The human centred design process was described above in the section on research approach. See Bearman et al. (2018) for more details.

Evaluation of the Effectiveness of the Team Monitoring Tools

Three studies have been conducted to evaluate the effectiveness of the team process checklist. Study 1 and 2 had participants watch a video of a team performing a set of actions and used the checklist to rate that team's performance. In Study 3 participant used the checklist to conduct an after-action review in a workshop format. Participants were asked to rate the checklist on how useful it was, how clear the questions were, and the extent to which it detected all of the important issues (comprehensiveness). Across the 3 studies, 50 emergency managers rated the checklist (out of 5) on usefulness as 4.12, clarity as 4.32 and comprehensiveness as 4.02.

Evaluation of the effectiveness of the cognitive decision tools

Two studies were conducted to evaluate the effectiveness of the cognitive decision tools – which have been identified as a series of aide-memoirs. The first was a one-day decision making course that incorporated a training intervention. The participants were provided with both the knowledge and the tools to assist them in their decision-making and following the training, they formerly evaluated the tools. The second study involved the specific identification of certain elements in one of the tools in a group setting with 58 emergency management specialists. Following this initial process, the participants then evaluated the tool.

Evaluation of utilisation self-assessment

The evaluation framework for organisational self-assessment has been reviewed and discussed by peak bodies such as the KIRUN (Knowledge, Innovation & Research Utilisation Network) of AFAC as well as by members of the lead end-



user team. Adjustments have been made and has (based on feedback) been titled the research utilisation maturity matrix.



UTILISATION OUTPUTS

Team Monitoring

- EMBAM and TPC have been formatted by a graphic designer and are now available on the BNHCRC website.
- 81 copies of the team monitoring checklists have now been provided to emergency managers in Australia and New Zealand.
- The checklists are being used by members of the South Australian Country Fire Service and Tasmanian Fire Services.
- The checklists have been used for debriefs and after action reviews with the New South Wales SES and Queensland Fire and Emergency Services.
- The checklists have been used to evaluate the Northern Territory emergency management arrangements.
- AFAC are promoting the team monitoring checklists and they have been included as a resource in a recent AFAC publication on Coaching and Mentoring.
- EMV have recently distributed the checklists to their members through their Lessons Management Update.
- Team monitoring was selected by the Bushfire & Natural Hazards CRC as one of their Utilisation Case Studies (BNHCRC [2018] Highlights and Achievements 2013-2017. Melbourne: Bushfire and Natural Hazards Cooperative Research Centre).

Decision Making

- Keynote presentation with the project stream end-user titled, *An Exploration of a SAR Commander's Decision-Making*, was provided at the 2017 Australian & New Zealand Search and Rescue Conference.
- A series of checklists have been created to support decision-making associated with managing cognitive bias, promoting psychological safety, avoiding situational awareness traps, and individual and team coping.
- A self-assessment tool for managing pressure during incidents and exercises was developed.
- A three-day decision-making training course with associated learning activities, PowerPoints and assessment tasks was developed and implemented with end-users. The course was subsequently delivered in Tasmania in a reduced version over two half-day sessions.
- Oral presentation with the project stream end-user titled, *Is an Incident Controller JUST an Incident Controller*, will be provided at the main AFAC2018 conference



- Oral presentation with an industry partner titled, *Exercise Management as a Public Private Partnership: a good idea or impossible dream*, will be provided at the main AFAC2018 conference
- The Department of Home Affairs are currently formatting a publication based on our research, that is titled, *A practical guide for crisis decision making*, and will be freely available on their website
- A Hazard Note titled, *Strategic decision making in emergency management: enhancing knowledge and skills*, has been provided to the BNHCRC and will be published in August 2018

Organisational Learning

- A Hazard Note has been prepared for agencies entitled “Helping agencies learn from experience”
- The findings have informed the Case studies prepared by the BNHCRC highlighting the ways in which agencies are utilising research
- A presentation on the findings has been provided to the Lessons Management Forum in 2017
- A presentation on the findings and their implications was delivered to the Research Advisory Forum in April
- Two strategies to support research utilisation workshops were facilitated at the Research Advisory Forum in Sydney, April, 2018.
- A report on the findings was prepared and provided to inform the BNHCRC mid-term review.



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TEAM MEMBERS

- A/Prof Chris Bearman – CQUniversity
- A/Prof Benjamin Brooks – University of Tasmania
- A/Prof Christine Owen – University of Tasmania
- Heather Stuart – NSW State Emergency Service
- Mark Thomason – SA Country Fire Service
- Sandra Whight – Tasmanian Fire Service
- Dr Peter Hayes – CQUniversity
- Dr Steve Curnin – University of Tasmania



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