



IMPROVING DECISION MAKING, TEAMWORK AND ORGANISATIONAL LEARNING IN EMERGENCY MANAGEMENT

Final project report

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

1 CQUniversity, 2 University of Tasmania, 3 NSW State Emergency Service, 4 Bushfire and Natural Hazards CRC





Version	Release history	Date
1.0	Initial release of document	15/01/2021



Australian Government
Department of Industry, Science,
Energy and Resources

Business
 Cooperative Research
 Centres Program

© Bushfire and Natural Hazards CRC 2021

All material in this document, except as identified below, is licensed under the Creative Commons Attribution-Non-Commercial 4.0 International Licence.

Material not licensed under the Creative Commons licence:

- Department of Industry, Science, Energy and Resources logo
- Cooperative Research Centres Program logo
- Bushfire and Natural Hazards CRC logo
- All other logos
- All photographs, graphics and figures

All content not licenced under the Creative Commons licence is all rights reserved. Permission must be sought from the copyright owner to use this material.



Disclaimer:

CQUniversity, the University of Tasmania and the Bushfire and Natural Hazards CRC advise that the information contained in this publication comprises general statements based on scientific research. The reader is advised and needs to be aware that such information may be incomplete or unable to be used in any specific situation. No reliance or actions must therefore be made on that information without seeking prior expert professional, scientific and technical advice. To the extent permitted by law, CQUniversity, the University of Tasmania and the Bushfire and Natural Hazards CRC (including its employees and consultants) exclude all liability to any person for any consequences, including but not limited to all losses, damages, costs, expenses and any other compensation, arising directly or indirectly from using this publication (in part or in whole) and any information or material contained in it.

Publisher:

Bushfire and Natural Hazards CRC

January 2021

Citation: Bearman C, Brooks B, Owen C, Currin S, Hayes P & Stuart H (2021) Improving decision making, teamwork and organisational learning in emergency management – final project report, Bushfire and Natural Hazards CRC, Melbourne.

Cover: Regional Coordination Team. Source: SA Country Fire Service.



TABLE OF CONTENTS

ACKNOWLEDGMENTS	3
EXECUTIVE SUMMARY	4
END-USER PROJECT IMPACT STATEMENT	6
PRODUCT USER TESTIMONIALS	7
BACKGROUND AND INTRODUCTION	8
Teamwork	8
Decision making	9
Organisational learning	11
RESEARCH APPROACH	13
RESEARCH AND TOOL DEVELOPMENT	15
Teamwork	15
Decision making	17
Organisational learning	18
KEY MILESTONES	21
Teamwork	21
Decision making	22
Organisational learning	22
UTILISATION AND IMPACT	24
Summary	24
The Team Process Checklist	24
Regional and State Coordination Centre Key Tasks Cognitive Aides	26
Research Utilisation Maturity Matrix (RUMM)	27
Decision making tools	27
CONCLUSION AND NEXT STEPS	31
Teamwork	31
Decision making	32
Organisational learning	33
PUBLICATIONS LIST	35
Books	35
Book chapters	35
Peer-reviewed journal articles	35
Conference papers	36
Extended abstracts and Hazard Notes	37
Technical reports	37
Other	37
TEAM MEMBERS	38
Research team	38
End-users	38
REFERENCES	39
APPENDIX	41



ACKNOWLEDGMENTS

We would like to thank all of the agencies that have worked with us to develop the theory and tools in this project. These agencies include: the South Australian Country Fire Service, the New South Wales State Emergency Service, the Tasmanian Fire Service, the Australian Red Cross, the Victorian Country Fire Authority, the Victorian Metropolitan Fire Brigade, Emergency Management Victoria, Fire and Rescue New South Wales, Fire and Emergency New Zealand, the Tasmanian Police and NSW Police. We particularly thank all of the people who participated in the research studies that we have conducted, many of whom took time out from very busy schedules to talk to us. We would not have been able to conduct the research without them. We would also like to thank AFAC and the Bushfire and Natural Hazards CRC for their continued support. In particular we would like to thank: Dr Richard Thornton, Dr John Bates, Dr Desiree Beekharry, Dr Noreen Krusel, Sandra Lunardi, David Boxshall, David Bruce, Nathan Maddock and Loriana Bethune. Finally, we would like to thank an anonymous reviewer for their helpful comments and suggestions.



EXECUTIVE SUMMARY

Background: Each year Australian emergency management organisations coordinate the response to thousands of emergency events. While a successful outcome is achieved in the vast majority of these events, notable and ongoing concerns are being raised as to how well some of the emergency management teams have functioned. Often the problems are not based on technical skills (such as the use of equipment) but on the non-technical skills, such as: communication, coordination, situation awareness, and decision making. In addition, skills such as creativity and divergent thinking may be important in helping people to manage ever more complex emergencies. This project seeks to develop simple practical tools that can help people to better manage their teamwork, improve their decision making and develop more creative solutions. In addition to developing these tools this project also considers how organisations utilise the outcomes of research. Application of research in support of organisational learning is critical not just for organisational growth, competitiveness and sustainability but also for wide-scale industry development, community and economic well-being. However, maximising organisational learning from research often falls short. As part of this project we will seek to develop a tool to help agencies to utilise research more effectively.

Method: The tools were developed using a human-centred design approach. This approach placed the end-user very much at the heart of the development process so that the tools were effectively co-created with end-users. Embedding end-users into the research and design process has two goals, 1) to produce effective tools that are designed around the end-user 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.

Research and tool development: A number of tools were developed to help people to better manage their teamwork and decision making. These tools include:

- Team Process Checklist (TPC)
- Emergency Management Breakdown Aide Memoire (EMBAM)
- Key Tasks Cognitive Aides for State and Regional Coordination Centres
- Emergency Management Non-Technical Skills (EMNoTS)
- Psychological Safety Checklist (PSC)
- Cognitive Bias Aide Memoire (CBAM)
- Individual and Team Coping Concept (ITCC)

In addition to creating tools that help better manage teams and make more effective decisions, members of the project team have also developed methods to help people to act more creatively during operations (such as stretch thinking loops for team decision making). To help end-users to diagnose their capacity to utilise research a self-assessment tool was developed (known as the self-assessment research utilisation maturity matrix or RUMM). This tool can be used



by practitioners to identify steps needed to move along the path towards research implementation.

Utilisation: These tools have now seen excellent utilisation by emergency management agencies in Australia and have attracted growing interest from international partners in the UK and Spain. The teamwork tools have been used to help manage both simulated and real-life emergencies; to conduct debriefs and after-action reviews; to design response plans; and to evaluate emergency management arrangements. The research utilisation maturity matrix (RUMM) has been used to inform future research planning, to assess existing capability in research utilisation and to inform future policy decisions. The tools that we have created have been included in a number of key industry publications (such as AFAC Lessons Management Handbook) and a number of agencies have changed their standard operating procedures to facilitate use of the tools.

Conclusion and next steps: This project has developed a number of products that can help people in emergency management to better manage non-technical skills, improve creativity and assess their ability to utilise the products of research. The next steps are to help agencies to better embed these tools so that they become part of normal everyday business.



END-USER PROJECT IMPACT STATEMENT

Heather Stuart, *Manager Operational Improvement and Lessons, NSW State Emergency Service*

The tools and products developed through the Decision Making, Teamwork and Organisational Learning in Emergency Management project are already showing their value in developing emergency management leaders and assisting organisations to improve the delivery of their services. Enhancing team functioning and decision making skills of emergency managers will help prepare the individuals and emergency service organisations to better respond to the increasing challenges being faced across the emergency management sector. The third stream of the research will assist organisations to better integrate research to inform individual and organisational learning and practice. I believe that the knowledge and products developed through this research project have the potential to greatly increase the ability of the sector to deal with an increasingly complex and challenging disaster environment.



PRODUCT USER TESTIMONIALS

Jeremy Smith, *Tasmanian Fire Service*

“These types of tools that support incident management and fire operations, or indeed any other hazard, are invaluable.”

Mark Thomason, *SA Country 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.”

Rob McNeil, *Fire and Rescue NSW*

“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.”

Neil Cooper, *ACT Parks and Wildlife*

“Those tools are bloody fantastic.”



BACKGROUND AND INTRODUCTION

TEAMWORK

Emergency management agencies are called to many incidents every year, helping people through personal and community disasters. Most of these incidents are managed quickly and effectively, however, on occasions problems arise that are due not to the technical skills of the people involved, but their non-technical skills. Such problems are often based on the way the team communicate, coordinate, cooperate, maintain situation awareness, and make decisions. Periodic independent reviews and inquests have continued to highlight significant deficits in this regard. Coordination, cooperation, communication, situation awareness, decision making and leadership have all been highlighted as problematic in numerous public inquiries (e.g., Linton (Johnstone, 2002), Canberra (McLeod, 2003), Wangary (Schapel, 2007), Black Saturday (Teague, McLeod, & Pascoe, 2010), the Lake Clifton, Red Hill, and Roleystone fires (Ellis, 2011)). Initial reports from the 2019/2020 Australian Bushfires have identified similar issues. This issue is not unique to Australia. A review of 32 major UK emergencies between 1986 and 2010 found a consistent and repeated pattern of serious failures in these areas by teams managing incidents (Pollock, 2013). It is likely that problems with non-technical skills didn't just emerge 'out of the blue,' during these situations but are inherent in many everyday operations. There are likely to be many examples where the non-technical skills of a team broke down but because of good fortune there were no adverse consequences or the adverse consequences were minimal¹. Hence, it is likely that the actual occurrence of non-technical skill issues in emergency management teams is much more common than the inquiry data may indicate.

There is now a good understanding in many industries that to be effective, teams not only need to be skilled in the technical aspects of the job (what is known as taskwork), they also need to be skilled in managing the non-technical aspects of their teams (Burke, Wilson, & Salas, 2003; Morgan, Glickman, Woodard, Blaiwes, & Salas, 1986). Non-technical skills can be defined as clusters of inter-related skills and behaviours that allow teams to maintain collaborative relationships, enable sensemaking, formulate suitable goals, plan and adjust to changing conditions, and to effectively coordinate activities and decisions. While many non-technical skills have been proposed in the literature, a recent comprehensive literature review by Hayes, Bearman, Butler and Owen (in press) has identified the core non-technical skills for emergency management based on commonalities in the literature. These non-technical skills are: communication, cooperation, coordination, situation awareness, decision making, leadership and coping with stress and fatigue. Although recently Brooks and Curnin have advocated that creativity should also be included in this list (cf. the sections on Decision Making in this report).

A comprehensive literature has investigated non-technical skills and there is good evidence for benefits from enhancing their management. Improving non-technical skills supports more efficient and effective operations and reduces the

¹ We thank an anonymous reviewer for making this point.



friction and stress associated with managing challenging events. The effective management of non-technical skills is widely accepted in industries such as aviation, healthcare, and military settings (Salas, Bisbey, Traylor, & Rosen, 2020; Salas et al., 2008; Weaver, Dy, & Rosen, 2014; Wolf, Lawrence, & Stewart, 2010). There is also a growing acceptance of the need to manage non-technical skills in fire and emergency services both worldwide (e.g. the UK and Germany) and in Australia. While emergency management agencies have expressed much interest in non-technical skills there is as yet no comprehensive approach to managing these skills. The continuing presence of these issues in public inquiries, after-action reviews and post-incident reports suggests that we still have much work to do. To a large extent these core non-technical skills form the basic building blocks that enable emergency management teams to more effectively deal with the challenging environments represented by more frequent large-scale events, pressure on resources and increasing multi-agency responses. Building on this strong, well-researched foundation provides the best opportunity to help our people succeed in a complex and ever more challenging future.

The purpose of this stream of the project then is to develop tools that can be used by emergency management agencies to better manage the non-technical skills of their teams. These tools seek to provide: a common language to discuss non-technical skills in teams, a method to observe the non-technical functioning of teams, a way to conduct debriefs and after-action reviews and a way to build more effective teams prior to the onset of emergencies.

DECISION MAKING

In recent times one of the most significant changes in capability has been for emergency services to embrace human factors. Contributing to this, our previous research agenda has explored cognition in the context of decision making, developing training and aide memoires to support personnel in areas such as the management of cognitive biases and maintenance of situational awareness. The research supporting this work identified other problems around developing options analysis and predicting consequences for out-of-scale events. This has led our end-users to ask how we can prepare our future leaders for the new norm? The future will demand leaders to think outside the box and use of higher cognitive skills such as creativity and divergent thinking. Processes in creativity include thinking skills that are conducive to taking new perspectives on problems, pivoting among different ideas, thinking broadly, and making unusual associations.

Research on creativity has its origins in psychology where a need for empirical work on this topic was initially identified (Guilford, 1950). Subsequent research focused on identifying the traits of creativity and understanding the creative process (Hennessey, 2010). However, this early research concentrated specifically on the individual and assessing their creativity (Torrance, 1966). Later, empirical research expanded from exclusively investigating individuals and started exploring why some groups are more effective than others. This research focused on creativity as an outcome of teamwork (Hackman & Morris, 1975). Researchers that referred to creativity as an outcome product or a service invariably conducted research on teams within an organisational environment (Amabile, Conti, Coon, Lazenby, & Herron, 1996). In organisational contexts,



creative solutions may be expressed in both tangible and intangible forms such as strategies and ideas (Oldham & Cummings, 1996; Woodman, Sawyer, & Griffin, 1993). This marks a shift in creativity research that was historically confined to psychology and then branched into management and organisational studies. In the latter disciplines, creativity can be defined as the development of novel and useful ideas in any domain (Amabile et al., 1996).

Much of what we understand about creativity, particularly in how we measure it, has come from studying divergent thinking. "Divergent thinking is clearly the backbone of creativity assessment and has held this position for many decades" (Kaufman, Plucker, & Baer, 2008). Divergent thinking can be defined as cognitive thought that leads in various directions which is to suggest that it does not intend to converge on one correct answer but diverges to a range of possible answers. Four aspects of divergent thinking are frequently measured, which is therefore a more complex phenomenon than Sommer and Pearson's (2007) articulation of creativity in decision making. Given divergent thinking is a sub-set of creativity this tends to suggest Sommer and Pearson's definition of a creative decision is too simplistic.

- Fluency – The number of responses to a particular stimulus.
- Originality – The uniqueness of the responses.
- Flexibility – The number and uniqueness of the categories of response, adapting and changing the meaning, use or interpretation of something.
- Elaboration – Extending or adding detail to the responses.

The dominant test of divergent thinking is the Torrance Tests of Creative Thinking (TTCT) that is "by far the most commonly used test of divergent thinking and continues to enjoy widespread international use" (Kaufman et al., 2008) (p.25).

A creative decision can be defined as "a decision that is both a novel contribution and of value to a decision context. A novel decision is unusual, uncommon, unconventional or unique from past decisions and reflects responses to new or unique choices for solving a problem in a crisis. In regard to crisis management, a valuable or effective decision occurs when potential crises are averted or when key stakeholders believe that the short- and long-term successes of crisis management efforts have outweighed the failures" (Sommer & Pearson, 2007) p.1236.

Sommer and Pearson (2007) argue that novelty and value are complementary but separate characteristics, and both must be present for creativity to occur in a crisis context. This is borne out by a logical examination of those characteristics individually. Training pigeons to carry water balloons is a novel option which is nonetheless of little value to fighting a wildfire. Solutions that are of high-value but not novel have presumably already been evaluated and either implemented or discarded – and is how an individual or team came to the need for a creative solution.

This project seeks to improve creativity in decision making in the context of emergency management. The aim is to identify when and how this type of thinking or decision-making "style" might be appropriate and therefore what knowledge, skills and processes might be necessary to develop in a cohort of



decision makers. As particular 'styles' are appropriate in different situations, the effective emergency management decision-maker is one who knows when and where to use a particular style. Psychologists refer to the skill of being able to identify the appropriate decision style 'meta-cognition' – or thinking about their 'thinking'. It is also likely that meta-cognitive thinking requires a degree of neural plasticity on the part of the individual. In Table One we link the focus area of this document (creative thinking and divergent thinking skills) with key aspects of brain plasticity to demonstrate the connections between these concepts.

Possible training approach	Aspect of brain plasticity	Associated cognitive effect	Application in EM
Teaching creativity and divergent thinking skills.	Greater cerebral blood flow, functional connections and structural plasticity associated with regions of the brain that deal with reasoning and memory.	Divergent thinking facilitated; various types of reasoning (associated with causes, effects, elaboration and novel use of objects/assets). Improved capacity for meta-cognitive awareness.	Being more creative in novel situations; improved ability to reason in difficult contexts. Developing an increased number of options in options analysis.

TABLE ONE: LINKING BRAIN PLASTICITY AND CREATIVITY

ORGANISATIONAL LEARNING

Application of research in support of organisational learning is critical not just for organisational growth, competitiveness and sustainability (Lin et al., 2014; Wickramasinghe, 2006) but also for wide-scale industry development and community and economic wellbeing (Cutler, 2008; Ratten et al., 2017).

However, maximising organisational learning from research insights often falls short. It has been reported that in some cases insights from research can take decades before they are applied in practice, if they are applied at all (Chesla, 2008; Donaldson et al., 2004). It has been argued that the research process is not complete until the impact and extent of innovation use are examined and understood (Donaldson et al., 2004). In short, investigating how to improve organisational learning in emergency services organisations in support of innovation is important.

Although using research to inform practice sounds straightforward, as Kay et al., (2019) point out, negotiating this in the real world is not as simple as it might seem. This is because researchers produce findings in published papers and these are not easily or directly usable by practitioners. Moreover, decision-makers face barriers to integrate research into practice. In some circumstances, research is disconnected from practitioner experience and lacks credibility. Sometimes research findings are just too costly to implement relative to the proposed benefits.

Yet the need to demonstrate evidence-informed practice has never been greater. This is particularly so in the emergency services public safety sector. Emergency services organisations grapple with complex and 'wicked' problems (Bosomworth et al., 2017). The costs from disasters is rising worldwide (United Nations Office for Disaster Risk Reduction, 2019). Over the past decade there has been increasing scrutiny on emergency management organisations to justify actions (see for example Boin and t' Hart, 2010; Comfort et al., 2012). There is an



urgent need for these organisations to “learn about learning” (Adams et al., 2015) and to innovate. Indeed, in the emergency services sector we have seen a growing interest in learning from major events. Participation in forums like the AFAC Lessons Management Forum continue to increase in number and similar forums are now occurring in New Zealand

One way to do this is to actively engage in utilising research outcomes from partnerships with researchers and their institutions. When research utilisation is successfully implemented it enables:

- the pace of adoption processes to be accelerated (Helmsley-Brown, 2004, Marcati et al., 2008);
- the number of adoptions possible from conducted research to be increased (Dearing, 2009; Retsas, 2000);
- the quality of research implementation to be enhanced (Kothari et al., 2005);
- the use of worthy innovations (Glasgow, et al., 2003; Standing et al., 2016); and
- the research effectiveness at agency and sector levels to be demonstrated (Elliott & Popay, 2000).

In this component of the research we have a particular interest in better understanding what enables and constrains emergency services organisations from organisational learning, to utilise research insights and incorporate these into practice. We conceptualise research utilisation as a sub-component of innovation, of which implementing new practices based on research is just one small part. This research contributes to assisting how emergency services organisations can better utilise the insights gained from research they have commissioned. In so doing it addresses the research question: What are the organisational conditions that facilitate successful implementation of research findings commissioned by emergency services organisations?

RESEARCH APPROACH

As described in previous annual reports, the research approach that has been adopted in the 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.

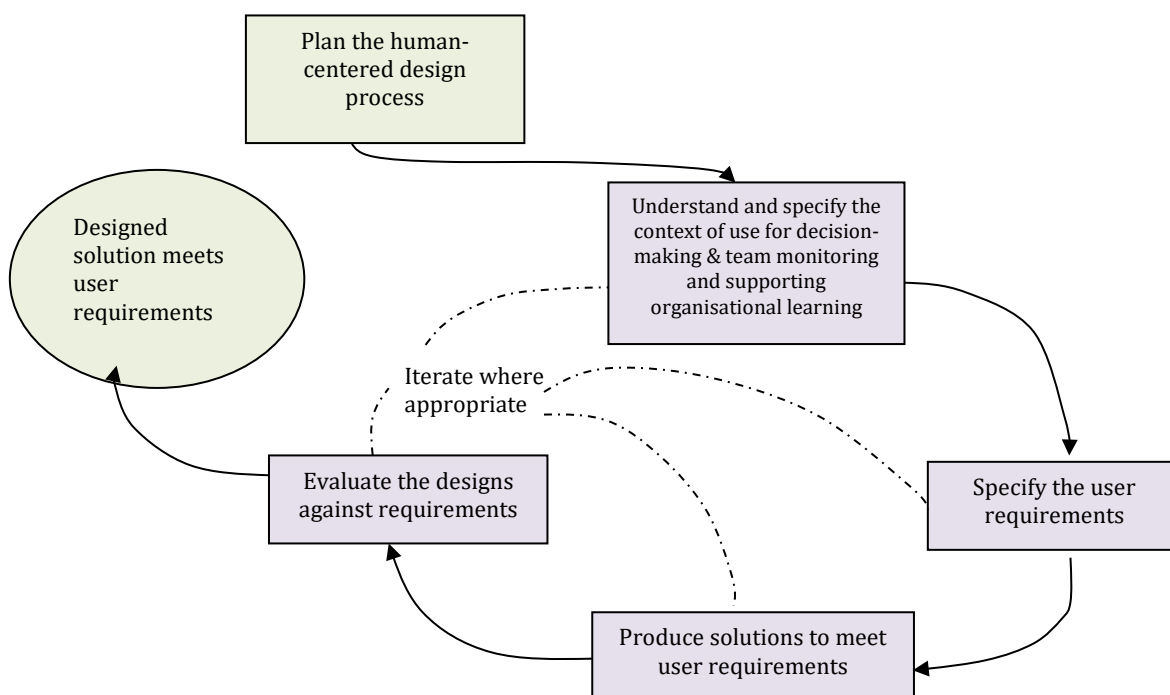


FIGURE ONE: INTERDEPENDENCE OF HUMAN-CENTRED DESIGN ACTIVITIES (ADAPTED FROM ISO 9241-210:2010(E) P.11)

Our approach in this project then has been to develop and evaluate the tools in operational contexts (e.g., 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, application of 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 effective tools that are designed around the end-user, 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.



RESEARCH AND TOOL DEVELOPMENT

TEAMWORK

The teamwork stream began in 2014 by identifying the different practices, needs and requirements of a wide range of emergency management agencies in Australia and New Zealand. Observations were conducted with several large-scale response operations (both real and simulated) and interviews were held with a wide range of 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. Based on these observations, interviews and discussions we found that team management was often not done very effectively and that there was little or no guidance in most agencies about how to do it.

Since then we have developed five tools to help agencies to better manage their teams. These tools are:

- Team Process Checklist (TPC),
- Emergency Management Breakdown Aide Memoire (EMBAM),
- State Coordination Centre Key Tasks Cognitive Aide (SCC KTCA),
- Regional Coordination Centre Key Tasks Cognitive Aide (RCC KTCA), and
- Emergency Management Non-Technical Skills Checklist (EMNoTS).

The TPC provides a detailed examination of a team's 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. TPC was officially launched by the Bushfire & Natural Hazards CRC in 2018 and is freely available in both English and Spanish from the Bushfire & Natural Hazards CRC website. An example of TPC is provided in the Appendix.

EMBAM (Grunwald & 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 lists common indicators of breakdowns and suggests ways to resolve them. EMBAM was officially launched by the Bushfire & Natural Hazards CRC in 2018 and is freely available from the Bushfire & Natural Hazards CRC website. An example of EMBAM is provided in the Appendix.

The State and Regional Coordination Centre Key Tasks Cognitive Aides (SCC KTCA & RCC KTCA) are checklists that detail the key tasks that need to be performed by teams in state and regional coordination centres. They present a set of prompts that can be used to ensure that all of the key tasks have been completed. The SCC KTCA & RCC KTCA were published in an AFAC article in 2020 (Hayes, Bearman, Thomason & Bremner 2020). An example of the combined SCC KTCA & RCC KTCA checklist is provided in the Appendix.

EMNoTS is a comprehensive checklist that manages non-technical skills at a team level in emergency management. The checklist identifies the core non-technical skills for emergency management as: communication; coordination;



cooperation; decision making; situation awareness; leadership; and coping with stress and fatigue.

The TPC was developed using the human-centred design method in close conjunction with end-users in a number of studies that used simulated and real world emergency situations. These studies included: a multi-agency response to a simulated aircraft accident at a small rural airfield, four realistic regional coordination centre exercises where the participants were required to manage a significant fire/fires and a series of interviews with regional coordinators who were managing large storm and flood events. Following development TPC was quantitatively evaluated by end-users in four studies. In Study 1, 2 & 3 participants watched a video of a team performing a set of actions and used the checklist to rate that team's performance. In Study 4 participant used the checklist to conduct an after-action review in a workshop format. Following their evaluation of the team's performance participants were provided with an evaluation form and asked to rate the checklist on a scale of 1-5 on usefulness, clarity and comprehensiveness. In the rating scale 1 was defined as 'useless', 2 was defined as 'limited', 3 was defined as 'good', 4 was defined as 'very good' and 5 was defined as 'excellent.' The score was further described in words for each category. For example, a score of 5 for comprehensiveness was described as "Excellent" "identified all the important issues and some that I hadn't previously thought of." Across the 4 studies, 76 emergency managers rated the checklist (out of 5) on usefulness as 4.17, clarity as 4.31 and comprehensiveness as 4.1. According to the rating scale provided to participants for the evaluation, a score of 4 was defined as "very good." For usefulness a score of 4 was further described as "provides a very good understanding of teamwork," for clarity it was described as "nearly all the questions were clear" and for comprehensiveness it was described as "identified all the important issues."

EMBAM was developed in two of the studies that were also used to develop the TPC. These studies were: the multi-agency response to a simulated aircraft accident at a small rural airfield and the four realistic regional coordination centre exercises where the participants were required to manage a significant fire/fires. EMBAM has been used to manage a series of large fires and was rated highly by participants. However, the evaluation data is as yet too small to yield meaningful results.

The State and Regional Coordination Centre Key Tasks Cognitive Aides (SCC KTCA & RCC KTCA) are derived from hierarchical task analyses. They were developed from a series of interviews with state and regional controllers and the four regional coordination centre exercises where the participants were required to manage a significant fire/fires. They have been used to manage fires by industry partners but have not yet been subject to formal evaluation beyond that conducted during the development phase.

EMNoTS is based on a comprehensive literature review that identified the core non-technical skills required in emergency management (Hayes, Bearman, Butler & Owen, in press). The checklists was developed in two incident management team (IMT) exercises conducted by one of our end-user partners. The IMT exercises were a final evaluation of trainee incident management team personnel to determine whether they were competent to perform that role. One formal evaluation study has been conducted on EMNoTS and this initial



evaluation has proved to be very positive. Similar to the evaluation for TPC participants watched a video of a team and evaluated their performance using the checklist. Following their evaluation of the team's performance they were provided with an evaluation form and asked to rate the checklist on a scale of 1-5 on usefulness, clarity and comprehensiveness. The scores were defined with the same word descriptions as the previous study on TPC. In this study the EMNoTS checklist was rated (out of 5) as 4.37 for usefulness, 4.25 on clarity and 4.24 on comprehensiveness across all of the different elements. As before, a score of 4 was described for usefulness as "provides a very good understanding of teamwork," for clarity it was described as "nearly all the questions were clear" and for comprehensiveness it was described as "identified all the important issues."

These tools are designed to help people better manage teamwork by identifying potential problems and starting conversations. The solutions to many of the issues identified by the checklists are often obvious (although not necessarily easy to implement) once the problems have been identified. As such, these tools are not an objective tool and shouldn't be considered as a way to rate different teams or establish benchmarks.

DECISION MAKING

Strategic decision making in high consequence environments is challenging and stressful due to the dynamism, complexity, uncertainty and time constraints that occur in this environment. In addition, if poor decisions are made at a strategic level, it can also have a cascading effect on the tactical and operational levels of emergency management. Decision making is a skill that is required for every type of incident and every level of emergency management. In this environment, decision makers are confronted with incidents that are often dynamic, complex and uncertain. This presents challenging physiological contexts that can contribute to poor decisions, resulting in potentially catastrophic outcomes for affected communities.

This project is supported by three studies that examined different elements of strategic decision making: (1) analysis of decisions made during a series of exercises, (2) analysis of decisions made during an international deployment for a disaster, and (3) a training course on strategic decision making. The findings identified a consistent set of decision themes that can change the quality of strategic decision making in emergency management. Appropriately managed, these themes can support effective, efficient and safe decision making. The results of this project provide evidence for a suite of cognitive decision tools and training aides that have been developed and tested for industry use. This led to the development of the following tools:

- The Psychological Safety Checklist (PSC) – based on the principles of psychological safety, swift trust, and principles from 'How to Win Friends and Influence People' this simple checklist supports leaders to build and maintain environments that support effective decision-making.
- The Cognitive Bias Aide Memoir (CBAM) – was developed with the support of over 60 emergency management personnel to identify the top 10



cognitive biases that influence decision-making in high consequence environments.

- The Individual and Team Coping Concept (ITCC) – otherwise known as the 'Coping Ugly Tool' this simple heuristic supports individuals and teams to interrupt dysfunctional momentum in decision-making.
- Stretch Thinking Loops for Team Decision-Making – this process combines an understanding of the principles of divergent thinking with scenario-based/options development to lead a team through their decision-making processes. They are especially useful in novel situations.

Due to the time and resource constraints of the research project, there was no formal evaluation of these tools. However, end-users have informed the research team that the Psychological Safety Checklist has been incorporated into the strategic decision-making processes in several local government councils and was initially evaluated as a supportive adjunct to their decision making processes. In addition, the Stretch Thinking Loops were recently used with the Western Australia Government COVID-19 Recovery Unit, the Disaster Recovery Branch at Emergency Management Australia, and the Tasmanian Premier's Economic and Social Recovery Advisory Council, all in the context of COVID-19 recovery, with positive feedback about their utilisation received from all the end-users.

ORGANISATIONAL LEARNING

The work commenced in 2014 with a focus on better understanding what enables and constrains fire and emergency services agencies from learning. This was identified as important because the need for emergency services agencies to demonstrate learning is an increasing concern. The focus in the organisational learning stream was on examining the tools agencies were developing to conduct post-hoc analyses of incidents and following a season of events to identify lessons that can be learned for continuous agency-wide organisational improvement.

The first phase (2014-2016) of the project involved engagement with industry partners in discussions and workshops, and included a literature review, interviews and survey work. The review showed how many of the 'lessons learned' publications fell into three themes we called 'the creation myth'; "build it and they will come" and finally "ground-hog day" (for more information see Owen 2018a, Owen et al., 2018). In the "creation myth" (e.g., Farazmand, 2007; Kenney et al., 2015), researchers reported reviewing a crisis event, publishing their insights, and then appeared to assume that the act of publication itself signified that 'lessons' had been learned. Other literature themes included how emergency services organisations are establishing processes for managing and learning from lessons ("build it and they will come" e.g., Jackson 2016), and finally much literature discussed why learning in emergency services contexts is so hard and, some argue, almost impossible ("ground-hog day" e.g., Birkland 2009; Donohue & Tuohy 2006).

The research activities during this first phase involved consultations with end-user agency personnel from South Australia, New South Wales, Victoria and Tasmania



to ascertain their strategies for learning from incidents – what they currently have in place to assess performance following an incident, or season of events. This revealed that there is considerable activity occurring in agencies to capture lessons that may be learned from after-action reviews and post-incident review (see Bhandari, Owen & Brooks, 2015). Nearly all agencies, for example, were developing their own localised processes to evaluate performance and to learn including:

- developing processes and strategies to systematically review data and insights collected from other forms of monitoring, including real-time performance monitoring;
- appointing personnel to be responsible for analysing patterns in after-action reviews and seasonal debriefs to ensure that actions taken to redress problems as well as that there is alignment between organisational policies, procedures and training; and
- establishing lessons learned databases and lessons management systems.

The agencies also reported how they were attempting to evaluate research insights to identify their implications for reinforcing or changing current practices. However, there were challenges identified. The ways in which agencies were evaluating previous incidents or periods of activity was highly variable. In addition, it appeared that there was high variability in the training provided to personnel to conduct these evaluations of performance. Also, there appeared to be limited systematic sharing of learning from evaluations across the sector, partially due to agency cultural issues, and partly because there are structural impediments to sharing reviews and evaluation of performance across the sector. These include agencies using different terminologies and limited shared language with which to aid collective understanding. The research also showed that while agencies were developing 'lessons learned' frameworks, these frameworks were not always effective in translating research outcomes into practice. This was found to be the case because, too often, the structures for managing lessons were disconnected from the structures for reviewing and evaluating research. That is, there was a gap - no channel between research outcomes and lessons management.

These insights brought a shift in focus and a realignment of the deliverables to meet end-user need. During the next phase of the project (2017-2018) an experiential learning model was developed as part of an *evaluation framework for organisational self-assessment*. This was reviewed and discussed by the KIRUN (Knowledge, Innovation & Research Utilisation Network) of AFAC as the core stakeholder group to inform the project. Based on their feedback the framework was adjusted and a pilot of the framework 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. The research informed a number of items that were then included in a national 2016 survey of agencies which examined the strategies agencies have in place to keep up to date with research. Analysis and discussion with members of the KIRUN then further developed the indicators that could be identified as part of the research utilisation maturity matrix. The theory development work (completed during 2017) then informed a further



testing of the indicators as part of the longitudinal investigation of utilisation practices across fire and emergency services agencies in Australia.

The insights gained in 2017 were then applied in a national research study in 2018 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.

These insights were again discussed with the AFAC KIRUN membership and in the third phase (2018-2020) the research utilisation maturity matrix (RUMM) trialling was completed. The maturity model was reviewed by members of the KIRUN as well as participants attending a workshop at the Lessons Management Forum in July 2019. During 2019-2020 the matrix has been desktop published and guidelines prepared for its use.

The Research Utilisation Maturity Matrix (RUMM) is the key output from the organisational learning stream. The tool guides users through a number of elements that have been found to be important in successful research utilisation in support of organisational learning or continuous improvement. A copy of the RUMM is provided in the Appendix. The matrix tool can be used to:

- indicate how well established are the necessary infrastructures to support utilising research within a unit or organisation, and
- inform what activities and behaviours can be developed to increase levels of research utilisation maturity in order to assist agencies to get the best value from their investment in research.

The tool assists end-users with:

- benchmarking current research utilisation capability,
- identifying differences in perceptions, and building consensus across different roles, functions and teams about research utilisation,
- helping units and agencies to identify their own areas of strength and areas for improvement, and tracking these over time,
- demonstrating characteristics of an organisation and/ or team with a more developed approach to research utilisation; and,
- encouraging peer support – matching those with something to share to those with something to learn.

Use of the tool is now also supported by a set of guidelines to assist agencies in their research utilisation infrastructure, helping agencies and the CRC to ensure best value from the research conducted.



KEY MILESTONES

Selected milestones achieved in the project include:

TEAMWORK

Paper 1 submitted to the CRC

Paper No1 is a comprehensive literature review of contemporary and historical research on non-technical skills, crew resource management and teamwork. The review examines the extensive research on these topics in both emergency management and in domains that are related to emergency management (such as aviation, maritime, military, healthcare, offshore oil and gas, and nuclear energy). From this analysis a set of core non-technical skills was identified that are important to manage in emergency management. These core non-technical skills are: communication; coordination; cooperation; decision making; situation awareness; leadership; and coping with stress and fatigue. Finally, a number of unique properties of emergency management are highlighted that affect the interpretation of non-technical skills in this domain. This paper has been accepted for publication in the Journal of Crises and Contingency Management.

A report outlining the method to develop and evaluate and Cognitive Decision and Teamwork 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 Teamwork Tools

Four studies have been conducted to evaluate the effectiveness of the team process checklist. Study 1, 2 and 3 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 4 participants 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 four studies, 76 emergency managers rated the checklist (out of 5) on usefulness as 4.17, clarity as 4.31 and comprehensiveness as 4.1.

Report on task analyses submitted to the CRC

The report outlines the development and initial testing of two checklist-based cognitive aides for state and regional incident coordination. These cognitive aides are based on hierarchical task analyses and are designed to help teams remain focused on key tasks that need to be completed. The cognitive aides



can be used in several ways. The first is as a prompt to help emergency managers ensure they are addressing the key tasks they have oversight for. The second is as a training and development resource. The third is as a diagnostic and monitoring tool to assess how well a control centre is operating, which can be assessed both in real time and through the after-action review process. While further validation is required the cognitive aides presented in the report provide a flexible tool that have the potential to help people better manage strategic-level emergency response. A generic version of the cognitive aides was published in Hayes et al. (2020).

DECISION MAKING

A series of reports and publications have been submitted as key milestones for the decision-making stream in this project. In 2018 we wrote a report that reviewed the current literature around brain plasticity and divergent thinking and investigated the potential application of this knowledge in emergency management. This led to a research method being designed around a combined training intervention and two discussion exercises. We then implemented the research with a range of end-users and extended the dataset by including critical infrastructure providers and adapting the work from response to recovery. Subsequently we've produced final reports for the CRC and published journal papers on the work in the Australian Journal of Emergency Management, Cognition, Technology and Work, and the Journal of Crisis and Contingencies Management, exceeding our deliverable requirements. We also produced Hazard Note #74 on the cognitive aides developed in the project. Beyond the identified deliverables we designed a 5-day decision-making course and a one day stretch thinking course with all associated learning materials.

ORGANISATIONAL LEARNING

Based on the 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. The framework was then adjusted based on feedback received from the consultation and a pilot of the framework was conducted with one of the end-user agencies (CFA).

Evidence-based utilisation maturity model trialled with end-user stakeholders and adjusted

A draft of the evidence-based utilisation maturity model was trialled with two end-user stakeholder groups. First, it was distributed to the 35 members of the KIRUN (Knowledge Innovation and Research Utilisation Network) at its meeting in July. Participants were requested to review and complete the tool and bring their thoughts to a following meeting where the tool was discussed. A number of positive comments were received about the value of the tool for providing a foundation for discussion. Also provided were a number of constructive comments for feedback. Second, the tool was trialled at a workshop conducted during the 2019 AFAC/AIDR Lessons Management Forum. In total 13 participants



took part in the consultation. Again, based on the discussions held in relation to the tool, the tool has now been updated.

Paper 4 submitted for approval

The paper implementing research to support disaster risk reduction has been submitted, reviewed and revised and is shortly to be published in the Australian Journal of Emergency Management in its July edition.

Paper 5 submitted for approval

A paper titled *Closing the research-practice gap* has been submitted to the Australasian Journal of Disaster and Trauma Studies and is currently under review.

Paper 6 submitted for approval

A paper titled *Assessing models of research utilisation for emergency management practice* has been prepared for the International Journal of Innovation and Learning and is awaiting discussion with the second author prior to its submission.

Guidelines submitted for agencies to enhance evidence-based utilisation maturity

The guidelines have been desktop published and the completed version of both the guidelines and the accompanying Research Utilisation Maturity Matrix (RUMM) have been reviewed and are about to be uploaded to the AFAC resources site shortly once the site itself has been revamped.

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 2018 and lessons management forums held in 2017, 2018 and 2019. For a full list of the publications please see the section included at the end of this report.



UTILISATION AND IMPACT

SUMMARY

The research that we have conducted in the project has been undertaken in conjunction with end-users, with the end-users having considerable input into the development and testing processes. This has allowed us to create practical tools that are tailored to the environments in which emergency managers work. The high level of engagement by end-users in the project has allowed us to produce outputs that are being well utilised by emergency management agencies.

The team process checklist (TPC) has now seen considerable use in operational environments and some agencies are changing their policies and doctrine to support its use. We have supported the use of the TPC by running training workshops for agencies and TPC has been incorporated into AFAC documents, such as the Coaching and Mentoring Resource. Recently TPC has been translated into Spanish and is being promoted by local groups throughout Spain. The RCC KTCA and the SCC KTCA have been produced relatively recently but are already seeing some use in the field.

The RUMM can be used by individuals, in teams, or across a whole agency at a strategic level. The matrix provides a mechanism for supporting structured and ongoing conversations about the level of utilisation maturity in the organisation. There are also guidelines available to provide advice on how agency practitioners can use the matrix to review and develop research utilisation maturity in their team or organisation.

THE TEAM PROCESS CHECKLIST

Extent of use

- Over 250 copies of TPC have now been provided to emergency managers in Australia, New Zealand, Spain and the UK.
- TPC was used by members of the SA CFS throughout the 2019/2020 fire season.
- TFS used the TPC throughout one of their worst fire seasons (2017) on record and continue to do so.
- TPC has been used to conduct debriefs during real life storm and flood events with NSW SES.
- TPC was used to evaluate teamwork in 4 Regional Exercises conducted by the SA CFS.
- TPC has been used to conduct an after-action review workshop following NSW SES response to Tropical Cyclone Debbie.
- TPC was used as part of an after-action review conducted after QFES response to Tropical Cyclone Debbie¹.
- TPC was used to evaluate the Northern Territory's Emergency Management Arrangements.



- TPC was used to evaluate teams at an AMSA Oil Spill Exercise in Cairns.
- TPC has been included as a resource in the AFAC publication on Coaching and Mentoring².
- TPC is being taught to postgraduate students at Macquarie University in the unit “Team Factors in the Workplace” coordinated by Dr Melanie Taylor.
- TPC is being taught to students at York University, Canada in “The Psychology of Disasters” unit coordinated by Dr Eric Kennedy.
- TPC is being taught to students at Central Queensland University in the unit “Individual Differences and Psychological Assessment” coordinated by Dr Cassy Dittman.
- Training on TPC has been provided to members of the Youth Advisory Council in South Australia.
- Training on TPC has been provided to EMV Real-Time Monitoring and Evaluation personnel.
- Training on TPC has been provided to the SACFS.
- TPC has been translated into Spanish for dissemination throughout Spain by local partners.

Utilisation potential

- The utilisation potential of TPC is very high.
- A Spanish version of TPC has been provided to Spanish Government Ministries and local partners for dissemination in Spain.
- Discussions are being held with AFAC about how to include TPC in AIIIMS, Emergency Management Professionalisation Scheme (EMPS) and Public Safety Training Units.

Utilisation impact

- In evaluation studies conducted to date emergency managers rated the TPC (out of 5) on usefulness as 4.17, clarity as 4.31 and comprehensiveness as 4.1.
- EMV have amended their operational doctrine and have provided TPC to all of their Real Time Monitoring and Evaluation personnel.
- SACFS amended their policy to include use of TPC for real time performance evaluation³.
- Fire & Rescue New South Wales have included the TPC in their firefighter resources.
- TPC was selected by the Bushfire & Natural Hazards CRC as one of their Utilisation Case Studies⁴.
- TPC was the subject of a lessons management update by Emergency Management Victoria⁵.



- TPC was the focus of a news article in Fire Australia⁶.

Utilisation and impact evidence

- 1 Queensland Fire & Emergency Services (2018). QFES Post-Incident Review. Final Report for Tropical Cyclone Debbie and the South East Queensland and Rockhampton Flooding Events, March/April 2017. Brisbane: Queensland Fire & Emergency Services.
- 2 Australasian Fire and Emergency Service Authorities Council. 2018. Coaching and Mentoring – Research Insights into Good Practice. AFAC Ltd. East Melbourne, Victoria, Australia.
- 3 South Australian Country Fire Service (2019). 12.4 *Conducting and Managing Real Time Evaluations* Command, Control, Coordination and Emergency Management Standard Operating Procedures. Adelaide: South Australian Country Fire Service.
- 4 BNHCRC [2018] Highlights and Achievements 2013-2017. Melbourne: Bushfire and Natural Hazards Cooperative Research Centre
- 5 Emergency Management Victoria Lessons Management Update, May Edition, 2018.
- 6 Haritos. C. [2018]. Teamwork when the heat is on. *Fire Australia*, 2, 24-25.

REGIONAL AND STATE COORDINATION CENTRE KEY TASKS COGNITIVE AIDES

Extent of use

- The Regional Coordination Centre KTCA was used to evaluate operational performance in 4 Regional Exercises conducted by the SA CFS.
- The Regional Coordination Centre KTCA has been used by the SACFS to construct response plans for Kangaroo Island.

Utilisation potential

- The utilisation potential of the key tasks cognitive aides is high.
- Further utilisation of the cognitive aides is being discussed with Emergency Management Victoria, the Country Fire Authority and the Metropolitan Fire Brigade.

Utilisation impact

- SACFS used the Regional Coordination Centre KTCA to inform the Standard Operating Procedure for regional command centres¹.
- SACFS used the State Coordination Centre KTCA to inform the Standard Operating Procedure for the state command centre².
- SACFS amended their policy to include use of RCC KTCA and SCC KTCA for real time evaluations³.

Utilisation and impact evidence

- 1 South Australian Country Fire Service (2019). 1.6 *Regional Command Centres*. Command, Control, Coordination and Emergency Management Standard Operating Procedures. Adelaide: South Australian Country Fire Service.
- 2 South Australian Country Fire Service (2019). 1.5 *State Command Centre*. Command, Control, Coordination and Emergency Management Standard Operating Procedures. Adelaide: South Australian Country Fire Service.
- 3 South Australian Country Fire Service (2019). 12.4 *Conducting and Managing Real Time Evaluations* Command, Control, Coordination and Emergency Management Standard Operating Procedures. Adelaide: South Australian Country Fire Service.



RESEARCH UTILISATION MATURITY MATRIX (RUMM)

Extent of use

- The RUMM was used to collect data for the principal advisor, research Fire and Emergency New Zealand and the 16 self-assessment responses were then collated and used to inform the agency's next research plan.
- The RUMM has been used by the Director, Knowledge Research and Implementation at AFAC to assess existing capability in research utilisation to inform future policy directions.
- The RUMM has been used in WA by the Manager, Knowledge and Engagement, Bushfire Centre of Excellence to commence discussions about their future research planning.
- The RUMM has been used by the Program Manager, Research and Evaluation Country Fire Authority with the Research Committee to inform self-assessment of capability within the agency.
- It has also been included as a key component in a Victorian Safer Together proposal to facilitate discussions regarding innovation and learning.
- The structure used in the RUMM has been adapted and used in the AFAC Lessons Management Handbook.

Utilisation potential

- The utilisation potential of the RUMM is high. The guidelines will assist in increasing extent of use.

Utilisation impact

- As indicated above the RUMM has been used to inform policy and directions in New Zealand (Fire and Emergency New Zealand) at a national level in Australia (AFAC) policy and Handbooks and at a jurisdictional level in Western Australia and Victoria.

DECISION MAKING TOOLS

The following list of organisations have provided participants who have been trained in the use of the decision-making tools identified in this report:

- Australian Red Cross
- Tasmania Fire Service
- Tasmania State Emergency Service
- Tasmania Police
- Fire and Rescue New South Wales
- New South Wales Rural Fire Service
- New South Wales State Emergency Service



- New South Wales Police
- New South Wales Department of Justice
- Urban Utilities
- Seqwater
- Powerlink
- SunWater
- Queensland Department of Natural Resources, Mines and Energy
- Queensland Department of Transport and Main Roads
- Queensland Department of Housing and Public Works
- Queensland Reconstruction Authority
- Government of South Australia Department of the Premier and Cabinet
- South Australian State Emergency Service
- South Australian Metropolitan Fire Service
- South Australian Country Fire Service
- South Australian Police
- South Australia Department of Human Services
- South Australia Local Government Association
- South Australia Health
- South Australia Department for Environment and Water
- Primary Industries and Regions South Australia
- South Australia Department of Education
- South Australian Fire and Emergency Services Commission
- Department of Planning, Transport and Infrastructure South Australia
- South Australia Department of Treasury and Finance
- Western Australia Department of Fire and Emergency Services
- Western Australia Department of Local Government Sport and Cultural Industries
- Western Australia Mental Health Commission
- Western Australia Department of Jobs Tourism Science and Innovation
- The Royal Society for the Prevention of Cruelty to Animals Western Australia
- Energy Policy Western Australia
- Western Australia Department of Primary Industries and Regional Development



- Western Australia Department of Water and Environmental Regulation
- Western Australia Department of Transport
- Main Roads Western Australia
- Western Australia Department of Treasury
- Western Australia Department of Biodiversity Conservation and Attractions
- Small Business Development Corporation
- Western Australia Department of Planning Lands and Heritage
- Western Australia Department of Premier and Cabinet
- Water Corporation
- Volunteering WA
- Government of Western Australia Department of Education
- Western Australia Police Force
- Essential Services Network Operators Reference Group
- Western Australia Local Government Association
- Town of Cambridge (Western Australia)
- City of Rockingham (Western Australia)
- City of Vincent (Western Australia)
- Shire of Mundaring (Western Australia)
- City of Joondalup (Western Australia)
- Shire of Brookton (Western Australia)
- Shire of Merredin (Western Australia)
- Shire of Dardanup (Western Australia)
- Shire of Moora (Western Australia)
- Shire of Victoria Plains (Western Australia)
- City of South Perth (Western Australia)
- City of Rockingham (Western Australia)
- City of Wanneroo (Western Australia)
- City of Kwinana (Western Australia)
- Shire of Murray (Western Australia)
- Shire of Boyup Brook (Western Australia)
- City of Cockburn (Western Australia)
- City of Mandurah (Western Australia)
- Shire of Gingin (Western Australia)



- City of Bunbury (Western Australia)
- City of Kalamunda (Western Australia)
- Town of Bassendean (Western Australia)
- City of Wanneroo (Western Australia)
- City of Albany (Western Australia)
- City of Stirling (Western Australia)
- Shire of Serpentine Jarrahdale (Western Australia)
- City of Perth (Western Australia)
- Town of Cottesloe (Western Australia)
- City of Rockingham (Western Australia)
- City of South Perth (Western Australia)
- Shire of Brookton (Western Australia)
- Australian Capital Territory Department of Justice and Community Safety
- Emergency Management Victoria



CONCLUSION AND NEXT STEPS

TEAMWORK

Non-technical skills are clearly an important aspect of effective teamwork in emergency management. While emergency management agencies in Australia are starting to embrace this concept there has not previously been a comprehensive way to manage these skills. The continuing appearance of such issues in inquiries shows that we have not yet been able to effectively manage these issues.

This project has identified the core non-technical skills for emergency management based on a comprehensive literature review of all the non-technical skills that have been proposed in the literature. These core non-technical skills are: communication, coordination, cooperation, situation awareness, decision making, leadership and coping with stress and fatigue.

Five key tools have been produced to help people in emergency management agencies to manage non-technical skills more effectively. These tools are: Team Process Checklist (TPC), Emergency Management Breakdown Aide Memoire (EMBAM), State Coordination Centre Key Tasks Cognitive Aide (SCC KTCA), Regional Coordination Centre Key Tasks Cognitive Aide (RCC KTCA) and the Emergency Management Non-Technical Skills Checklist (EMNoTS).

These tools were developed in close conjunction with end-users using a human-centred design method. In this method the products are designed to suit the characteristics of intended users and the tasks they perform, rather than requiring users to adapt to the product. The end-users play a central role in the creation of the products, helping to shape them so that they better meet their needs and requirements. While TPC in particular has been quite extensively evaluated, other tools such as EMNoTS will require further validation. These evaluation studies have shown that the tools are useful, clear and comprehensive as judged by end-users. Further work to evaluate the tools could employ experimental methods to determine whether use of the tools can improve performance in emergency management.

The tools (particularly TPC) have seen excellent utilisation by emergency management agencies and have a very high potential for further utilisation. A number of training workshops have been held and the tools have been used to actively manage fires and other emergencies. Some agencies have already changed their policies to facilitate use of the tools and they have been included in key resources (such as AFACs Coaching and Mentoring Guide). The TPC has recently been translated into Spanish for dissemination throughout Spain by our local partners. However, use of the tools is at present somewhat sporadic and there is a need for a more comprehensive approach to developing capability within agencies to develop knowledge and deliver training in non-technical skills. If this can be achieved then there is every likelihood that management of non-technical skills will be seen as normal business in emergency management, as it is in a wide range of other safety-critical industries. The core non-technical skills form the basic building blocks that enable emergency management teams to more effectively deal with the ever more challenging environments represented



by more frequent large-scale fires and floods, pressure on resources and increasing multi-agency responses. Providing a firm building block for success for our people is clearly an important goal as we move into a more complex and uncertain future.

DECISION MAKING

This research has explored the development of new human capabilities to support the response to incidents that are unable to be solved using standard procedures. A number of factors can lead to teams needing to 'think-outside-the-box' in emergency management. Some of these are driven by a changing climate, some by the scale of the event, others by the interconnectedness of the modern world.

We have demonstrated that the concepts embedded in divergent thinking are aligned and valuable in emergency management. This led to the design of a training intervention to test whether we could improve the creative output of a team of people involved in emergency management. Achieving an improvement in the creative output of emergency management teams demonstrated that the inclusion of divergent thinking techniques in the decision making process is feasible and can assist decision makers that have to make strategic decisions in high consequence environments.

The challenge of making strategic decisions for low probability, yet high consequence disasters, where decision makers are expected to think outside the box, is not insignificant. One aspect of emergency management is using structured, standardised approaches. Standardisation promotes repeatability and this supports efficient, effective and safe operations. This is acceptable in routine operations, where decision makers can draw on their experiences from similar incidents. However, novel and unprecedented situations necessitate creativity. A challenge with creativity is that the level of creativity in humans quickly erodes from the 'genius' ability level in childhood to something much more constrained in adulthood. Using the Torrance Tests of Creative Thinking, that was initially developed for children and later modified for adults, our limited sample indicated that the distribution of creativity among emergency managers is negatively skewed compared with the general population. The strategic leaders in our study also identified that their creativity was often bound by contextual factors such as legislation, an expectation from their agency that they should operate within the standard operations procedures, political pressure, and community expectations. The conclusion to be drawn is that we cannot train emergency management personnel 'inside-the-box' for 20+ years and then, when they get to senior roles, ask them to quickly transition their thinking outside the very framework they've spent 20 years inside of.

Instead, we need to consider creativity as a non-technical skill aligned with other non-technical skills like situational awareness, leadership and communication. A prudent approach would be to develop or enhance a creative capability earlier in a person's emergency management career. This has two benefits. Firstly, it may arrest a decline in natural levels of creativity. Subsequently, it provides more time to develop creativity before the individual finds themselves in a senior role that requires this skill at a high level.



This requires a small shift in the paradigm we use to train and understand non-technical skills, and potentially some additional training resources at different levels of progression through public and private training packages. The most effective utilisation resources to support this were considered to be a package that included, but was not limited to training resources. Instead, end-users require training packages plus information that will support policy, doctrine, operations, exercising, reviews/knowledge management and the training resources.

ORGANISATIONAL LEARNING

The research within this component has investigated what enables and constrains emergency service organisations from learning and in particular, from utilising insights from research in support of innovation to enhance capability.

The research found emergency services agencies had different approaches to keep up-to-date with research advances. An examination of the activities described by practitioners identified four developmental levels of what, in collaboration with the AFAC KIRUN group we have called *research utilisation maturity* (basic, developing, established and leading).

The results from the potential barriers to research utilisation section are interesting in that they provide insights into the challenges facing the emergency services sector. The analysis suggests that for significant leverage from utilisation to occur there is a need to build agency and sector-wide capability in assessment and evaluation of potential impacts, as well as in processes of sense-making and assessment and evaluation.

To maximise the possibility of overcoming barriers to change for innovation what is needed are, in part, incremental adjustments to workplace practice brought about through an ongoing dialogue between researchers and practitioners. The findings also suggest it is no longer appropriate for researchers to remain isolated from the real practitioner world where their publicly funded research projects are intended to make a difference. Researchers have a responsibility to work at demonstrating relevance, facilitating meaning and implications for practitioners, and making their research accessible and transparent.

A self-assessment research utilisation maturity matrix has been developed in collaboration with practitioners involved in the KIRUN group. The self-assessment tool allows practitioners to diagnose the stage of their organisation in terms of organisational capacity to utilise research. The tool developed can be used by practitioners to identify steps needed to move along the path towards research implementation.

The research utilisation maturity matrix is designed to aid reflection, inform development and promote change. The findings have shown that there is prevalence for emergency services practitioners to engage in quick and reactive thinking and dismiss an idea as irrelevant, leaving assumptions and biases untested (Owen et al., 2018). Such conditions may lead to a lack of innovation and learning (Donohue & Touhy, 2006). Facilitators of processes such as those outlined by Brooks and Curnin that support stretch thinking slow down default thinking processes to ones that are deliberate, effortful, logical and



conscious. Drawing on the Research Utilisation Maturity Matrix as a tool enables conversations to occur around the types of infrastructures required to support utilisation of research and organisational learning.

Implications for future research from these findings suggest there is a need to tease out the elements that comprise learning and innovation cultures and what skills, processes and structures are needed. Further work is needed to better understand how perceived barriers can be overcome in order to increase and strengthen cultures of learning within agencies and the sector. Doing so will support goals of agility and innovation within the sector through research utilisation, which include the acceleration of adoption, maximising the value of research and increasing the worthiness of innovation.

As Donahue and Tuohy, (2006, p. 14) concluded from their research, “According to our focus group experts, fixing the weak links in the lessons learning cycle requires that response agencies have a deeper understanding of how to learn.”

Given the importance in the industry (including supporting resilience in the face of litigious scrutiny for agencies) to be able to demonstrate evidence-based practice and to enable responsiveness to change and agility, then a better understanding of learning cultures within the industry would seem critical.



PUBLICATIONS LIST

BOOKS

- 1 Adams, R. Owen, C. Scott, C. Parsons, D. (2017). *Beyond Command and Control: Leadership, Culture and Risk*, Taylor and Francis, CRC Press. New York.
- 2 Owen, C. (Ed.). (2014). *Human factors challenges in emergency management: Enhancing individual and team performance in fire and emergency services*. Ashgate Publishing, Ltd.

BOOK CHAPTERS

- 1 Herrington, V., Blackman, D., Carroll, J., & Owen, C. (2019). Connected policing: The importance of social capital and boundary spanning in Australian police leadership. In *Police Leadership* (pp. 255-275). Palgrave Macmillan, Cham.
- 2 Curnin, S. (2016). *Organizational Boundary Spanning*. In *Global Encyclopedia of Public Administration, Public Policy, and Governance* (pp. 1-5). Springer, Cham.
- 3 Owen, C. (2015). Diagnosis in safety critical environments: emergency management and air traffic control. In Wiggins, M. (Ed.) *Diagnostic expertise in organisational environments*, Ashgate.
- 4 Brooks, B. (2014). Coping ugly: Errors, decisions, coping and the implications for emergency management training. *Human factors challenges in emergency management: Enhancing individual and team performance in fire and emergency services*, 171-193.
- 5 Hayes, P. (2014). The Impact of Team Member Familiarity on Performance: Ad hoc and Pre-formed Emergency Service Teams. *Human Factors Challenges in Emergency Management: Enhancing Individual and Team Performance in Fire and Emergency*, 97-124.
- 6 Owen, C. (2014). Leadership, communication and teamwork in emergency management. C Owen, (ed), *Human factors challenges in emergency management: Enhancing individual and team performance in fire and emergency*, 125-147.
- 7 Owen, C., Bosomworth, K., & Curnin, S. (2014). The challenges of change in future emergency management: Conclusions and future developments. *Human Factors Challenges in Emergency Management: Enhancing Individual and Team Performance in Fire and Emergency Services*, 219.
- 8 Owen, C., & Hayes, P. (2014). Human factors in emergency management. *Human factors challenges in emergency management: Enhancing individual and team performance in fire and emergency services*, 1-16.
- 3 Perry GLW. *Current approaches to modelling the spread of wildland Fire: a review*. *Prog Phys Geogr* 1998;22(2): 222–45.
- 4 Fons WL. *Analysis of Fire spread in light forest fuels*. *J Agric Res* 1946;72(3):93–121.
- 5 Emmons HW. *Fire in the forest*. *Fire Res Abs Rev* 1964;5: 163–78.
- 6 Hottel HC, Williams GC, Steward FR. *Modelling of Firespread through a fuel bed*. Tenth Symposium (International) on Combustion, Pittsburgh: The Combustion Institute; 1965. p. 997–1007.
- 7 McArthur AG. *Weather and grassland Fire behaviour*. Forest Research Institute, Forest and Timber Bureau of Australia; 1966. Leaflet No. 100.
- 8 Van Wagner CE. *Calculations on forest Fire spread by flame radiation*. Canadian Department of Forestry; 1967. Report No. 1185.

PEER-REVIEWED JOURNAL ARTICLES

- 1 Hayes, P., Bearman, C., Butler, P., & Owen, C. (in press). Non-technical skills for emergency incident management teams: A literature review. *Journal of Contingencies and Crisis Management*.
- 2 Curnin S, Brooks B, Owen C (2020). 'A case study of disaster decision-making in the presence of anomalies and absence of recognition', *Journal of Contingencies and Crisis Management*, 1-12.
- 3 Hayes, P., Bearman, C., Thomason, M., & Bremner, P. (2020). Staying on task: a tool to help regional and state coordination centres. *Australian Journal of Emergency Management*, 35, 38-44.
- 4 Brooks, B., Curnin, S., Owen, C., & Bearman, C. (2020). Managing cognitive biases during disaster response: the development of an aide memoire. *Cognition, Technology & Work*, 22, 249-261.
- 5 Brooks, B., Curnin, S., Owen, C., & Boldeman, J. (2019). New human capabilities in emergency and crisis management: from non-technical skills to creativity. *Australian Journal of Emergency Management*, The, 34(4), 23.
- 6 Curnin, S., & O'Hara, D. (2019). Nonprofit and public sector interorganizational collaboration in disaster recovery: Lessons from the field. *Nonprofit Management and Leadership*, 30(2), 277-297.
- 7 Bearman, C., Rainbird, S., Brooks, B., Owen, C., & Curnin, S. (2018). A literature review of methods for providing enhanced operational oversight of teams in emergency management. *International Journal of Emergency Management*, 14(3) 254-274.
- 8 Brooks, B., Curnin, S., Bearman, C., & Owen, C. (2018). Human error during the multilevel responses to three Australian bushfire disasters. *Journal of Contingencies and Crisis Management*, 1-13.



- 9 Cumin, S. (2018). Collaboration in disasters: A cultural challenge for the utilities sector. *Utilities Policy*, 54, 78-85.
- 10 Owen, C., Brooks, B.P., Curnin, S., & Bearman, C. (2018). Enhancing learning in emergency services organisational work. *Australian Journal of Public Administration*, 1-14.
- 11 Owen C. (2018) How emergency services organisational can – and do – utilise research, *Australian Journal of Emergency Management*, 33(3) 28-35.
- 12 Owen, C., Hayes, P., Brooks, B., Scott, C., & Conway, G. (2018). Identifying the evidence to support incident management team capability, *Australian Journal of Emergency Management*, 33(3) pp. 44-49.
- 13 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.
- 14 Bosomworth, K, Owen, C. & Curnin S. (2017), Addressing challenges for future strategic-level emergency management: reframing, networking and capacity building, *Disasters*, doi:10.1111/disa.12196 8.
- 15 Owen, C & Martin, F. (2017). Country Fire Authority establishes an evidence base to guide future leadership development, *Australian Journal of Emergency Management*, 32 (4), 14-15.
- 16 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.
- 17 Grunwald, J, & Bearman, C. (2017). Identifying and resolving coordinated decision making breakdowns in emergency management. *International Journal of Emergency Management*, 13(1), 68-86.
- 18 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.
- 19 Curnin, S., & Heumüller, E. (2016). Evaluating emergency management capability of a water utility: A pilot study using exercise metrics. *Utilities Policy*, 39, 36-40.
- 20 Curnin, S., Owen, C., Brooks, B., Paton, D. and Trist, C. (2015). Role clarity, swift trust and multi-agency emergency coordination, *Journal of Crises and Contingencies Management*, Volume 23(1). DOI:10.1111/1468-5973.12072
- 21 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.
- 22 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
- 23 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.
- 24 Bhandari, R.B., Owen, C., and Brooks, B. (2014). Organisational features and their effect on the perceived performance of emergency management organisations, *Disaster Prevention and Management*, 23(3) pp. 222-242.
- 25 Curnin, S. Owen, C., Paton, D. & Brooks, B. (2015), A theoretical framework for negotiating the path of emergency management multi-agency coordination, *Applied Ergonomics* 47(11) pp. 300-307.
- 26 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.
- 27 Curnin, S., & Owen, C. (2014). Spanning organizational boundaries in emergency management. *International Journal of Public Administration*, 37(5), 259-270.
- 28 Curnin, S., Owen, C., & Trist, C. (2014). Managing the constraints of boundary spanning in emergency management. *Cognition, technology & work*, 16(4), 549-563.

CONFERENCE PAPERS

- 1 Brooks, B., Curnin, S., Owen, C., & Boldeman, J. (2019). Preparing for the new norm: does emergency management need to be more creative? AFAC Conference 2019, Melbourne, Australia.
- 2 Curnin, S., Brooks, B., & Owen, C. (2019). Augmented expertise in strategic decision making: lessons from Fukushima. In *The Fourth Northern European Conference on Emergency and Disaster Studies*.
- 3 Long, S. Martin, F, Owen, C (2019). The shadow side of learning, in emergency service organisations presented at the Psychoanalytic Study of Organizations, New York, June 24-30.
- 4 Long, S. Martin, F, Owen, C (2019). The shadow side of learning, leadership and culture in emergency services organisations presented at AFAC 19 August 2019 Conference: AFAC 19 At: Melbourne, Australia.
- 5 Owen, C. & Singh, A. (2019). Building better police leaders: Collective leadership, emergent knowledge and professional development, Australian and New Zealand disaster Management conference, 12-13 June 2019, Gold Coast, Queensland.
- 6 Brooks, B., Curnin, S., and Spence, A. (2018). Emergency Management Exercising as a Public-Private Partnership: a good idea or impossible dream? AFAC Conference 2018, Perth, Australia.
- 7 Curnin, S., Brooks, B., McNeil, R., & Owen, C. (2018). Is an Incident Controller JUST an Incident Controller? AFAC Conference 2018, Perth, Australia.
- 8 Curnin, S., McNeil, R., & Brooks, B. (2017). Is a SAR Commander JUST a SAR Commander?. In *Australian & New Zealand Search and Rescue Conference*.
- 9 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.



- 10 Cumin, S., Brouggy, P., Roylett, B., Muller, C., & Riley, M. (2016). Organisational resilience: building and enhancing capability. In *Australian & New Zealand Disaster and Emergency Management Conference*.
- 11 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, Melbourne.*
- 12 Curnin SW, Brooks B, 'Decision making as an enabler of organisational resilience', Programme for the 2016 Annual DMDU Workshop, 15-17 November 2016, Washington DC, USA, pp. 1. (2016) [Conference Extract].
- 13 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.
- 14 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.

EXTENDED ABSTRACTS AND HAZARD NOTES

- 1 Bearman, C., Rainbird, S., Brooks, B., Owen, C., & Curnin, S. (2017). Enhancing Team Performance. *Hazard Note*, 33, 1-4.
- 2 Owen, C., Brooks, B. & Bearman, C., (2017). *Helping Agencies Learn From Experience. Hazard Note*, 34. 1-4.

TECHNICAL REPORTS

- 1 Brooks, B., & Curnin, S. (2019). Evaluation of Pre-Intervention Data: Divergent Thinking and Brain Plasticity. Melbourne: Bushfire & Natural Hazards CRC.
- 2 Brooks, B. & Curnin, S. (2018). *Creativity and Brain Plasticity in Emergency Management. Melbourne: Bushfire & Natural Hazards CRC.*
- 3 Bearman, C., Brooks, B., Owen, C., & Curnin, S. (2018). Using the Human Centered Design method to develop tools for non-technical skills in emergency management. Melbourne: Bushfire & Natural Hazards CRC.
- 4 Bearman, C. (2018). *How to use the team monitoring tools. Melbourne: Bushfire and Natural Hazards CRC.*
- 5 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.*
- 6 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.*

OTHER

- 1 Bearman, C., & Thomason, M. (2017). Teamwork Checklists. CFS 2017 Volunteer Yearbook. Adelaide: South Australian Country Fire Service. (International) on Combustion, Pittsburgh: The Combustion Institute; 1965. p. 997-1007.
- 2 Bearman, C. (2017). *Improving Teamwork. Brigade*, 37, 14.
- 3 Owen, C. (2017). Information flows: Looking Backwards – Looking forwards, presentation to the AIIMS 4 Steering Group. Melbourne.



TEAM MEMBERS

RESEARCH TEAM

- A/Prof Chris Bearman (Central Queensland University)
- A/Prof Benjamin Brooks (University of Tasmania)
- Dr Steven Curnin (University of Tasmania)
- Dr Peter Hayes (Central Queensland University)
- A/Prof Christine Owen (University of Tasmania)

END-USERS

- Heather Stuart (NSW SES)
- Mark Thomason (SACFS)
- Roger Mentha (FRS NSW)
- Rob McNeil (FRS NSW)
- Sandra Whight (TFS)
- Jeremy Smith (TFS)
- Mike Grant (Fire & Rescue New Zealand)
- Mark Swiney (Metropolitan Fire Brigade)
- Alen Slijepcevic (Country Fire Authority)
- Mike Wouters (Department for Environment & Water)



REFERENCES

- 1 Adams, D, Colebatch, H.K. and Walker, C.K. (2015). 'Learning About Learning: Discovering the Work of Policy', *Australian Journal of Public Administration*, Vol. 74, No. 2, pp.101-111.
- 2 Amabile, T. M. (1988). 'A model of creativity and innovation in organizations', in Cummings, B. S. (ed.) *Research in organizational behavior*. Greenwich: JAI Press, pp. 123–167.
- 3 Amabile, T. M., Conti, R., Coon, H., Lazenby, J., & Herron, M. (1996). Assessing the Work Environment for Creativity. *The Academy of Management Journal*, 39(5), 1154–1184.
- 4 Bearman, C., Brooks, B., Owen, C., & Curnin, S. (2018). *Using the Human-Centred Design Method to develop tools for non-technical skills in emergency management*. Bushfire and Natural Hazards CRC Report. Melbourne: Bushfire and Natural Hazards CRC.
- 5 Bearman, C., Grunwald, J., Brooks, B., & 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, doi:10.1016/j.apergo.2014.08.009.
- 6 Bhandari, R.B., Owen, C., and Brooks, B. (2014). Organisational features and their effect on the perceived performance of emergency management organisations, *Disaster Prevention and Management*, 23(3): 222-242.
- 7 Birkland, T. (2009). Disasters, lessons learned, and fantasy documents. *Journal of Contingencies and Crisis Management*, 17(3): 146-156.
- 8 Boin, A. and 't Hart, P. (2010). 'Organising for Effective Emergency Management: Lessons from Research', *Australian Journal of Public Administration*, Vol. 69, No. 4, pp.357–371.
- 9 Bosomworth, K, Owen, C. and Curnin, S. (2017). 'Addressing challenges for future strategic-level emergency management: reframing, networking, and capacity-building', *Disasters*, Vol. 41, No. 2, pp.306–323.
- 10 Brooks, B., Curnin, S., Bearman, C., & Owen, C. (2018). Human error during the multilevel responses to three Australian bushfire disasters. *Journal of Contingencies and Crisis Management*. Pp 1-13 doi:10.1111/1468-5973.12221 ISSN 0966-0879.
- 11 Brooks, BP, and Owen, C (2012). Report on testing of scenarios to enhance communication, Organising for Effective Incident Management, Bushfire Co-operative Research Centre, Melbourne, 1, (1), pp. 1-24.
- 12 Chesla, C. (2008). 'Translational research: essential contributions from interpretive nursing science', *Research in Nursing & Health*, Vol. 31, No. 4, pp.381–390.
- 13 Comfort, L.K, Waugh, W.L. and Cigler, B.A. (2012). 'Emergency management research and practice in public administration: Emergence, evolution, expansion and future directions', *Public Administration Review*, Vol. 72, No. 4, pp.539–547.
- 14 Cutler, T. (2008). 'Venturous Australia Report for the Minister for Innovation, Industry, Science and Research', Cutler and Company, Melbourne.
- 15 Donahue, A., and 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): 1-10.
- 16 Dearing, J. (2009). 'Applying Diffusion of Innovation Theory to Intervention Development', *Research on Social Work Practice*, Vol. 19, No. 5, pp.503–518.
- 17 Donaldson, N, Rutledge, D. and Ashley, J. (2004). 'Outcomes of adoption: measuring evidence uptake by individuals and organizations', *Worldviews on Evidence-Based Nursing*, Vol 1, pp.41–52.
- 18 Eberle, R. (1971). SCAMPER games for imagination development. New York: DOK Publications.
- 19 Elliott, H. and Popay, J. (2000). 'How are policy makers using evidence? Models of research utilisation and local NHS policy making', *Journal of Epidemiology and Community Health*, Vol 54, No. 6, pp.461–468.
- 20 Ellis, S. (2011). Major incident review: Lake Clifton, Red Hill and Roleystone Fires. Perth: Fire and Emergency Services Authority of Western Australia.
- 21 Farazmand, A. (2007). Learning from the Katrina crisis: A global and international perspective with implications for future crisis management. *Public Administration Review*, 67: 149-159.
- 22 Glasgow, R, Lichtenstein, E. and Marcus, A. (2003). 'Why don't we see more translation of health promotion research to practice? Rethinking the efficacy-to-effectiveness transition', *American Journal of Public Health* Vol. 93, No. 8, pp.1261–1267.
- 23 Guilford, J. P. (1950). Creativity. *American Psychologist*, 5(9), 444–454.
- 24 Grunwald, J, & Bearman, C. (2017). Identifying and resolving coordinated decision making breakdowns in emergency management. *International Journal of Emergency Management*, 13(1), 68-86.
- 25 Hackman, J. R., & Morris, C. G. (1975). Group tasks, group interaction process, and group performance effectiveness: A review and proposed integration. In L. Beckowitz (Ed.), *Advances in experimental social psychology* (Vol. 8, pp. 47–101). New York: Academic Press.
- 26 Hayes, P., Bearman, C., Butler, P., & Owen, C. (in press). Non-technical skills for emergency incident management teams: A literature review. *Journal of Contingencies and Crisis Management*.
- 27 Hayes, P., Bearman, C., Thomason, M., & Bremner, P. (2020). *Staying on task: a tool to help regional and state coordination centres*. *Australian Journal of Emergency Management*, 35, 38-44.
- 28 Hemsley-Brown, J. (2004). 'Facilitating research utilisation: a cross-sector review of research evidence', *International Journal of Public Sector Management*, Vol. 17, no. 6, pp.534–552.
- 29 Hennessey, B. A. (2010). The creativity-motivation connection. In C. Kaufman & R. J. Sternberg (Eds.), *The Cambridge Handbook of Creativity* (pp. 342–365). New York: Cambridge University Press.
- 30 International Organisation for Standardisation (ISO) (2006) 9241: Ergonomics and Human-System Interaction- Part 110: Dialogue Principles. Geneva, International Standards Organisation.
- 31 International Organisation for Standardisation (ISO) (2010) 9241: Ergonomics of human-system interaction - Part 210: Human-centred design for interactive systems. Geneva, International Standards Organisation



- 32 Jackson, L. M. (2016). The influence of organisational culture on learning lessons: Implementing a lessons management life cycle. *Australian Journal of Emergency Management*, 31(1): 18-23.
- 33 Johnstone, G. (2002). Report of the investigation and inquests onto wildfire and the deaths of five volunteers at Linton on 2 December 1998. Melbourne: State Coroner's Office Victoria.
- 34 Kaufman, J., Plucker, J., & Baer, J. (2008). *Essentials of Creativity Assessment*. New Jersey: John Wiley & Sons.
- 35 Kay, E, Stevenson, J.R, Becker, J, Hudson-Doyle, E, Carter, L, Campbell, E, Ripley, S, Johnston, D, Neely, D, and Bowie, C. (2019). 'Operationalising theory-informed practice: Developing resilience indicators for Wellington, Aotearoa New Zealand', *Australasian Journal of Disaster and Trauma Studies*, Vol. 23, No. 2, pp.113–123
- 36 Kenney, C. M., Phibbs, S. R., Paton, D., Reid, J., and Johnston, D. M. (2015). Community-led Disaster Risk Management: A Māori Response to Ōtautahi (Christchurch) Earthquakes. *Australasian Journal of Disaster and Trauma Studies* 19(1):9-20.
- 37 Kothari, A, Birch, S. and Charles, C. (2005), 'Interaction and research utilisation in health policies and programs: does it work?' *Health Policy*, Vol. 71, No. 1, pp.117–125.
- 38 Lin, M, Chuang, M. and Wei, K. (2014). 'Relationships between collective learning, absorptive capacity, and innovation performance', *International Journal of Innovation and Learning*, Vol. 16, No. 3, pp.338–352.
- 39 Marcati, A, Guido, G. and Peluso, A.M. (2008), 'The role of SME entrepreneurs' innovativeness and personality in the adoption of innovations', *Research Policy*, Vol. 37, No. 9, pp.1579–1590.
- 40 McLeod, R. (2003). Inquiry into the operational response to the January 2003 bushfires in ACT. Canberra: Department of Urban Services, ACT.
- 41 Oldham, G. R. ., & Cummings, A. (1996). Employee Creativity: Personal and Contextual Factors at Work. *The Academy of Management Journal*, 39(3), 607–634.
- 42 Osborn, A. F. (1953). *Applied imagination: principles and procedures of creative problem-solving*. New York: Scribners.
- 43 Owen C. (2018). How emergency services organisational can – and do – utilise research, *Australian Journal of Emergency Management*, 33(3): 28-35
- 44 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 ISSN 0313-6647
- 45 Pollock, K. (2013). Review of persistent lessons relating to interoperability from emergencies and major incidents since 1986 (Occasional Paper No. 6). York: Emergency Planning College.
- 46 Ratten, V, Ferreira, J. and Fernandes, C. (2017). 'Innovation management-current trends and future directions', *International Journal of Innovation and Learning*, Vol 22, No. 2, pp.135–155
- 47 Retsas, A. (2000), 'Barriers to using research evidence in nursing practice', *Journal of Advanced Nursing*, Vol. 31, No. 3, pp.599–606.
- 48 Rosso, B. D. (2014). 'Creativity and Constraints: Exploring the Role of Constraints in the Creative Processes of Research and Development Teams', *Organization Studies*, 35(4), pp. 551–585. doi: 10.1177/0170840613517600.
- 49 Schapel, A. E. (2007). Inquest into the deaths of Star Ellen Borlase, Jack Morley Borlase, Helen Kald Castle, Judith Maud Griffith, Jody Maria Kay, Graham Joseph Russell, Zoe Russell-Kay, Trent Alan Murnane and Neil George Richardson. Adelaide: Coroner's Court of South Australia.
- 50 Serrat, O. (2017). *The SCAMPER Technique, Knowledge Solutions: Tools, Methods, and Approaches to Drive Organizational Performance*. Springer. doi: 10.1007/978-981-10-0983-9.
- 51 Sommer, A., & Pearson, C. M. (2007). Antecedents of creative decision making in organizational crisis: A team-based simulation. *Technological Forecasting and Social Change*, 74(8), 1234–1251. <https://doi.org/10.1016/j.techfore.2006.10.006>
- 52 Standing, C, Jackson, D, Larsen, A, Suseno, Y, Fulford, R. and Gengatharen, D. (2016). 'Enhancing individual innovation in organisations: a review of the literature', *International Journal of Innovation and Learning*, Vol. 19, No. 1, pp.44–62.
- 53 Teague, B., McLeod, R., & Pascoe, S. (2010). 2009 Victorian Bushfires Royal Commission: Final Report. Melbourne: Parliament of Victoria.
- 54 Torrance, E. P. (1966). *The Torrance Tests of Creative Thinking-Norms-Technical Manual Research Edition-Verbal Tests, Forms A and B-Figural Tests, Forms A and B*. Princeton, NJ: Personnel Press.
- 55 United Nations Office for Disaster Risk Reduction. (2019). 'Global assessment report on disaster risk reduction.' Retrieved from <https://reliefweb.int/report/world/global-assessment-report-disaster-risk-reduction-2019> (Accessed 23 June 2020).
- 56 Wickramasinghe, N. (2006). 'Knowledge creation: a meta-framework', *International Journal of Innovation and Learning*, Vol. 3, No. 5, pp.558–573
- 57 Wilson, K. A., Salas, E., Priest, H. A., & Andrews, D. (2007). Errors in the heat of battle: Taking a closer look at shared cognition breakdowns through teamwork. *Human Factors*, 49(2), 243-256. doi:10.1518/001872007X312478.
- 58 Woodman, R. W., Sawyer, J. E., & Griffin, R. W. (1993). Toward a theory of organizational creativity. *The Academy of Management Review*, 18(2), 293–321.

APPENDIX



I Team Process Checklist

PURPOSE

This tool is designed to provide a health check for teams and if there is a problem to help determine what that problem is. It assists people to think through three aspects of teamwork: communication, coordination and cooperation. If a 'no' response is recorded for any of the items this should be used as the starting point for a discussion with members of the team. Please note that while this tool is as comprehensive as possible it will not detect all of the ways teams can become impaired.

COORDINATION

- Are the roles and responsibilities of team members clear?
- Are actions always carried out as expected?
- Does everyone have a common understanding of information relating to the operation?
- Is there a clear and common purpose?
- Is everyone adjusting to meet the demands of the situation?
- Are team members requesting assistance from others, where necessary?
- Are team members correcting any mistakes made by others?

COMMUNICATION

- Is information being passed on in a timely manner?
- Is information being passed on accurately?
- Are team members ensuring that information has been received and understood by others?
- Are appropriate communication procedures being used?
- Are situation updates being provided?

COOPERATION

- Does everyone show a willingness to work as a team?
- Do team members exhibit confidence and trust in each other?
- Is everyone following team objectives without opting for independence?
- Are any differences of opinion being resolved effectively?
- Is anyone creating unnecessary conflict?

The content of this document is provided for information purposes only. As the tool is currently under development by the Bushfire and Natural Hazards CRC research team led by A/Prof Chris Bearman, the content may change at any time without notice. The Bushfire and Natural Hazards CRC does not accept any liability to any person for the information or advice (or the use of such information or advice) which is provided in this document or incorporated into it by reference. The tool is provided on the basis that you undertake responsibility for assessing the relevance and accuracy of its content for your purpose.



Emergency Management Breakdown Aide Memoire

PURPOSE

This guide is proposed to help people recognise breakdowns within collocated and distributed teams, and provide some practical resolution strategies.

WHAT ARE BREAKDOWNS?

A breakdown occurs when teams lose the ability to coordinate or communicate effectively.

Breakdowns are caused by differences in understanding between teams. For example, not having a shared understanding across teams may lead to teams

developing different operational plans, which in turn can lead to operational dysfunction. This guide aims to assist you in identifying breakdowns across the various organisational levels by listing some of the key indicators of breakdown. It also lists some strategies you may find useful in resolving a breakdown should one be detected.

WHAT TO LOOK FOR WHEN IDENTIFYING BREAKDOWNS...

- Missing information:** How confident are you that you have the relevant information about the incident?
- Conflicting expectations:** Is the information consistent with what you would expect to be happening in that situation?
- Consistent information:** Is the information you have consistent across all sources?
- Intuition:** Does your gut tell you something isn't right about the situation?
- Familiarity:** Is someone familiar to you not behaving in a manner you have come to expect of them?
- Networks:** Have you spoken about plans and problems with key personnel recently?
- Feedback:** Have you received confirmation that the tasks you delegated have been completed?

HOW YOU MIGHT RESOLVE BREAKDOWNS...

- 1. Delegate:** Find someone who is close to the breakdown or has the most appropriate skills and have them resolve the issue. Remember to receive confirmation.
- 2. Resource:** Breakdowns can be caused by missing resources. Find out what is missing, or what will assist the other teams, and get it to them.
- 3. Mentor:** A subtle form of resolution, mentoring allows you to suggest alternatives, opinions and strategies without stepping on people's toes.
- 4. Assert:** If you've tried more subtle strategies and they haven't worked you can use your authority to resolve the problem.
- 5. Replace:** If breakdowns are occurring because of disruptive personalities in the management team, or even things like fatigue, you can stand them down or give them alternate duties.

LASTLY, ENSURE THOSE UNDER YOUR COMMAND UNDERSTAND WHAT A BREAKDOWN IS AND TO REPORT IT TO YOU.

The content of this document is provided for information purposes only. As the tool is currently under development by the Bushfire and Natural Hazards CRC research team led by A/Prof Chris Bearman, the content may change at any time without notice. The Bushfire and Natural Hazards CRC does not accept any liability to any person for the information or advice (or the use of such information or advice) which is provided in this document or incorporated into it by reference. The tool is provided on the basis that you undertake responsibility for assessing the relevance and accuracy of its content for your purpose.



Checklist for Regional Control Centres and State Control Centres

This tool is designed as a prompt to help regional and state-level incident management teams ensure they are undertaking the tasks important to their effective performance.

The list is reasonably high level and identifies the key activities across five phases of incident management.

READINESS PHASE >	ESCALATION PHASE >	COORDINATION PHASE >	DE-ESCALATION PHASE >	TERMINATION OR CLOSE THE RCC PHASE
<p>Preparing for the likely escalation of incidents</p> <ul style="list-style-type: none"> Understand what resources* are available for incident(s) versus those likely to be required Reviewed the current & forecast weather conditions Reviewed relevant intelligence (e.g. planned community or other events) Reviewed what other incidents are currently underway & their status Identified the potential risks to the community Reviewed any precautions or restrictions in place (e.g. fire bans, road closures) Checked for existing information relevant to likely incidents (e.g. pre-action review) Identified the staff required to adequately resource the control centre Ensured the control centre: <ul style="list-style-type: none"> Is organised (e.g. personnel know their roles & are working in them) Is suitably configured (e.g. no significant constraints to information flow or collaboration) Has sufficient facilities for the current incidents & capability to expand at short notice Ensured adequate liaison and coordination is occurring with the internal (e.g. other regions or state) & external parties (e.g. other agencies) Issued Chief Officer's or Commissioner's intent 	<p>Responding to escalating incident activity</p> <ul style="list-style-type: none"> Reviewed the resources available for incident(s) versus those likely to be required (i.e. gap analysis) Reviewed the forecast weather conditions & other relevant intelligence Reviewed the incidents currently underway & their respective status Reviewed the potential risks to the community & identified the likely consequences Ensured the control centre: <ul style="list-style-type: none"> Is suitably resourced (e.g. activation level, staffing, & facilities) Is organised (e.g. personnel know their roles & are working in them) Suitably configured (e.g. no significant constraints to information flow or collaboration) Ensured adequate liaison & coordination is occurring with internal parties (e.g. state & other regions) Ensured adequate liaison and coordination is occurring with external parties (e.g. other agencies, media) who we need to work with or keep informed 	<p>Coordination of resourcing and the response to the incidents</p> <ul style="list-style-type: none"> Understand what is happening (e.g. prediction, situation reports, IMT reports, broader regional/state intelligence) Understand the status of all incidents Predicted the likely trajectory of the incidents Identified the likely risks & impacts posed by the incident as well as by the response to the incident Implementing consequence management Ensured adequate warnings are being issued Ensured the public are being provided with appropriate advice & information on a timely basis Implemented a clear plan to coordinate, allocate, & procure resources (addressing any shortfalls) Ensured the control centre is adequately resourced, operating effectively (i.e., meeting task requirements) & is being appropriately briefed Updated the SCC, Chief Officer or Commissioner with situation reports Ensured adequate liaison & coordination is occurring with the internal (e.g. state & regions) & external parties (e.g. other agencies, media) SCC - Arrangements been made for any incident related investigations (e.g. arson, OHS, environment) Ensured OHS & wellbeing concerns are being adequately addressed (e.g. fatigue management) Ensured the collection of information required for a possible post-incident report or inquiry Implemented a clear plan in place to resolve the incident & for de-escalation, recovery & rehabilitation 	<p>Scaling back activities to match the requirements of current incidents</p> <ul style="list-style-type: none"> Identified what level of activation is required to support the incidents in play The control centre been appropriately reconfigured for the reducing workload Ensured the control centre is operating effectively Adequate liaison is occurring with the internal & external parties who we need to maintain dialogue with or otherwise keep informed Ensures coordination with recovery & rehabilitation activities Debriefs planned 	<p>Termination of SCC & RCC operations</p> <ul style="list-style-type: none"> The appropriate debriefing for control centre staff has been completed All required administration activities been completed All other parties been informed that the control centre has been stood down or in the case of the SCC returned to standard operational duties



*Note: resources might include State Control Centres (SCC), Regional Control Centres (RCCs) and Incident Control Centres (ICCs), response resources, aviation (available & on standby), other agencies such as police, fire, SES, local government, health, EPA, agriculture, BoM, ADF, & utilities (gas, electricity, water, sewage), communications, fire towers, control centre food supplies & backup power.

Assessing capability in research utilisation

The research utilisation maturity assessment tool has been designed to assist people in agencies who have an interest in understanding how their unit or agency is making use of research. The tool guides users through a number of elements that have been found to be important in successful research utilisation in support of organisational learning or continuous improvement.

TIPS FOR USE:

- 1) The true value of the tool is in the discussion that it fosters. Perform the assessment as a group activity involving a diversity of different stakeholders utilising a workshop style.
- 2) Appoint a facilitator to assist the group in working through the assessment.
- 3) Circulate the tool prior to the workshop so that stakeholders may consider and prepare their responses for discussion at the workshop.
- 4) A workshop could be held to complete all the criteria or the assessment might occur over a series of meetings. For example the assessment could be placed on the agenda of regular management meetings with a few criteria covered at each meeting. Over time the assessment will then be completed.
- 5) The assessment is qualitative in nature and participants should be focused on identifying maturity descriptions that best fit their context. It is likely that there will be occasions when descriptions do not perfectly fit the activities or systems available. In such situations, choose the description that best fits. The overall purpose of the tool is not to provide a perfect representation but to promote discussion and identify areas that require improvement.

Instructions

Step 1: Decide if you will complete the tool thinking about a specific project or research utilisation in general.

Write answer for Step 1:

Step 2: Decide if you will use the tool thinking about how research is utilised in a specific unit or functional area or whether you will think about the agency as a whole.

Write answer for Step 2:

Step 3: Using the indicators of research utilisation practice found in the *Assess Utilisation Practice* tab, put a score in the column on the right hand side that best describes the practice in your unit or agency. The map below the items in that tab will provide you with a visual map of where your agency or unit is in terms of the indicators of utilisation maturity.

Step 4: Review the descriptors of research utilisation maturity outlined in the *Maturity Matrix* tab. In terms of the key elements identified, use the comments box to note any aspects you think your unit/agency is doing well/could be doing better.

Step 5: Bring your self-assessment and notes to your meeting and discuss with your colleagues.

Research utilisation capability is about using research in practice to support your agency's decision making, drive innovation, highlight gaps and opportunities and deliver the desired results. The Research Utilisation Maturity Matrix was developed to help you understand your agency's level of maturity and strengthen areas identified for improvement. It was prepared by a working group KIRUN, based on insights gained from analysis of two surveys (2016 and 2018) conducted by Christine Owen, Noreen Krusel and Loriana Bethune and then tested and modified following feedback from AFAC member agencies.

Version May 2020



Assessing capability in research utilisation



The indicators outlined here came from findings that have linked how people and agencies connect research utilisation to organisational learning. Organisational learning is defined as one where the agency learns by the experience of its own members and/or the experience of others. We are also interested in connecting this capability to utilising research so individual and collective learning continues.

Element	Indicators of research utilisation practice	Maturity Level – Collective Capability				Score = (the appropriate numerical rating, e.g. 0-3)	What is needed to improve?
		1 = Basic	2 = Developing	3 = Established	4 = Leading		
People	People have research utilisation formally embedded in their job roles	1= rarely / almost never	2 = sometimes (on occasion)	3 = often / frequently	4= almost all the time	0	
	Evidence is used by people to continually adopt and change practice	1= rarely / almost never	2 = sometimes (on occasion)	3 = often / frequently	4= almost all the time	0	
Learning culture	Differences in opinion are welcome	1= rarely / almost never	2 = sometimes (on occasion)	3 = often / frequently	4= almost all the time	0	
	Openness is valued in the organisation	1= rarely / almost never	2 = sometimes (on occasion)	3 = often / frequently	4= almost all the time	0	
	Lessons identified lead to action	1= rarely / almost never	2 = sometimes (on occasion)	3 = often / frequently	4= almost all the time	0	
	We are good at learning from experience	1= rarely / almost never	2 = sometimes (on occasion)	3 = often / frequently	4= almost all the time	0	
Support Systems - resources	There are resources available to implement changes needed to utilise research based on findings.	1= rarely / almost never	2 = sometimes (on occasion)	3 = often / frequently	4= almost all the time	0	
	Resources are available to drive change based on research to make changes part of core business.	1= rarely / almost never	2 = sometimes (on occasion)	3 = often / frequently	4= almost all the time	0	
Support Systems - Professional Development	Research products are supported through professional development events.	1= rarely / almost never	2 = sometimes (on occasion)	3 = often / frequently	4= almost all the time	0	
	Resources are in place for individuals to attend/participate in specific events (e.g. BAU/conference).	1= rarely / almost never	2 = sometimes (on occasion)	3 = often / frequently	4= almost all the time	0	
Support systems - engagement	There are active communities of research and utilisation practice in the organisation where people discuss the implications of research findings	1= rarely / almost never	2 = sometimes (on occasion)	3 = often / frequently	4= almost all the time	0	
	There is active engagement of people within the agency in testing and prototyping of research products to make them suitable for our context	1= rarely / almost never	2 = sometimes (on occasion)	3 = often / frequently	4= almost all the time	0	

Research Utilisation Maturity Matrix

Using the maturity levels put a score in the column on the right hand side that best describes your agency based on the descriptors. The map below will provide you with an outline of where you think your agency or unit is in terms of the indicators of utilisation maturity

Element	Maturity Level – Collective Capability				Score = (the appropriate numerical rating, e.g. 0-3)	Comments: write an example of one thing you think your unit or agency is going well	Comments: Write an example of one thing you would like your unit/agency to be doing better
	1 = Basic	2 = Developing	3 = Established	4 = Leading			
People	Individuals bring prior skills & find own professional development Limited research literacy Limited interest in building RU skills	Person designated with RU in job role Limited organisational support for RU Some research literacy Some interest in building RU skills	Inquiry related practices embedded in all/most job roles All have the opportunity to develop research and RU skills	People willing and able to proactively question Open knowledge sharing & evidence used to continually improve, adopt, change & anticipate	0		
Culture	Small pockets of RU Value is contested	Value of RU formally acknowledged but limited in reach & resourcing Limited questioning of the status quo	Value of RU is widely acknowledged Valuing an evidence base is demonstrated but limited to safe questions	Everyone knows how and where RU fits & value RU contribution to organisational success	0		
Support Systems - resources	Limited by individual influence	Stand-alone research unit Support for some events but little connection to agency business Limited attention to implementation	Technical systems in place to monitor, review and evaluate RU activities Human resources available to conduct RU with capacity to make change RU is resourced as BAU	Resourced as part of core business Personnel are mobile, diverse & inclusive Borders are permeable within & external to sector	0		
Support Systems - policies, procedures, doctrine	PPD largely tacit PPD locally organised	PPD exist but with limited reach	PPD codified & clearly visible & accessible RU are cross referenced in other core business PPD	PPD fully embedded & regularly updated with feedback loops between researchers, decision makers & practitioners	0		
Support systems - engagement	Occurs through passionate individuals who use their own resources and networks. Not acknowledged or resourced	Some systematic attention is paid to engagement Some "lead users" but not linked to organisational processes Pockets of people "in the know" but knowledge held as "power" Dissemination is often one-way	Active and widespread engagement in utilisation and learning activities Both internal and external to the organisation May include engagement outside of sector	Proactive engagement between researchers and practitioners Widespread participation in integrating research insights into multiple aspects of business Extensive internal and external engagement	0		
Structure	RU undertaken by individuals as an add-on RU not in core job responsibilities	Reactive structures put in place when problem emerges Limited follow up beyond project & RU is likely to be one-off	RU is strategic, planned and systematic There is sustainability & continuity (i.e. a committee). Problems are well defined & research is problem led	Structures have capacity for risk taking & innovation embedded in job roles Agile project management Open to new approaches & problem seeking	0		
Governance	No systematic quality assurance, monitoring and reporting on RU RU may not be acknowledged	Project based governance Some processes largely episodic and unconnected	RU monitoring and reporting is reasonably established with governance structures Active management of research findings & recommendations Regular review and alignment with strategy	RU monitoring & reporting well established Governance allows for "safe fail" & transformational change	0		
Products	Products sit on the shelf Some passionate individuals know & use them but disappear when they leave	Products one-off and tied to a specific project. Experience of their use is often short-lived and organisational memory of utilisation is partial Utilisation not well sustained – i.e. does not get built into	Products are user friendly, fit for purpose, easily accessible, widely known and actively incorporated into BAU. Widely disseminated & resourced and may have a cost/benefit assessment. Link to systems. These are built to be used in	Active engagement in testing and prototyping of products Widespread knowledge and use of products Products may be further tested and transformed and there is application beyond the immediate sector	0		