



FOLLOW UP OF STUDY PARTICIPANTS: BRAIN PLASTICITY AND DIVERGENT THINKING

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SUMMARY

Unprecedented future disasters will require those in emergency management to be creative in their thinking. The backbone of creativity is divergent thinking; cognitive thoughts that do not converge on one correct answer but diverge to a range of possible options. This Bushfire and Natural Hazards CRC project has explored the skills associated with divergent thinking during a series of workshops conducted with our end-user partners agencies.

This document identifies the results from a series of interviews conducted with end-user participants to understand the utilisation of the research provided in the series of workshops on divergent thinking.

Results indicate that the maturity of those agencies involved in this project regarding the utilisation of the divergent thinking research within their individual agency was in the 'developing' phase.

This low level of maturity can be attributed to a lack of formalised research utilisation structures within agencies that are hampered by resource and financial constraints. Compounding the ability for agencies to fully utilise research outputs are the challenges of embedding research within the entire policy cycle. To achieve this requires an ongoing collaborative partnership between agencies, research centers and academic institutions that occurs throughout the entire policy cycle, long after the initial research has been delivered.

INTRODUCTION

DIVERGENT THINKING RESEARCH

Between 2018 and 2019, the decision making stream of the project, *Improving decision-making in complex multi-team environments*, conducted a series of workshops with our end-user agencies to explore how leaders in emergency management think outside the box. This required those participating in the workshops to learn about the use of higher cognitive skills such as creativity, that includes divergent thinking, to respond and recover from disaster. A total of four workshops were conducted with one workshop conducted in Tasmania, one in Victoria and two in New South Wales. The aim of the workshops was to identify whether it was possible to increase the level of creative output in an options analysis by teaching participants to use methods that promote creativity.



IMAGE 1: DIVERGENT THINKING WORKSHOPS HELD IN NEW SOUTH WALES

The workshops sought to improve creativity in decision making in the context of emergency management. This required the participants to develop a set of options during two discussion exercises that were embedded in the workshop. Options in response to an emergency or crisis has been targeted as one of the most significant opportunities for personnel to use creative thinking strategies. Figure 1 is a summary of a method to develop creative solutions in emergency management.

Initial results from the workshops indicated that teams scored significantly higher on a creativity scale after being taught the methods to enhance their creativity. The improvement can be traced to improvements in the criteria of fluency (the number of options) and elaboration (embellishment of the information provided). Teams did not demonstrate evidence of the other two criteria for creativity (flexibility in the use of the intelligence provided and originality) (Brooks, Curnin, Owen, & Boldeman, 2019). Consideration of how to build flexibility and originality into the existing method will drive the next iteration, which will be translated into updated products over the remaining time of the project.

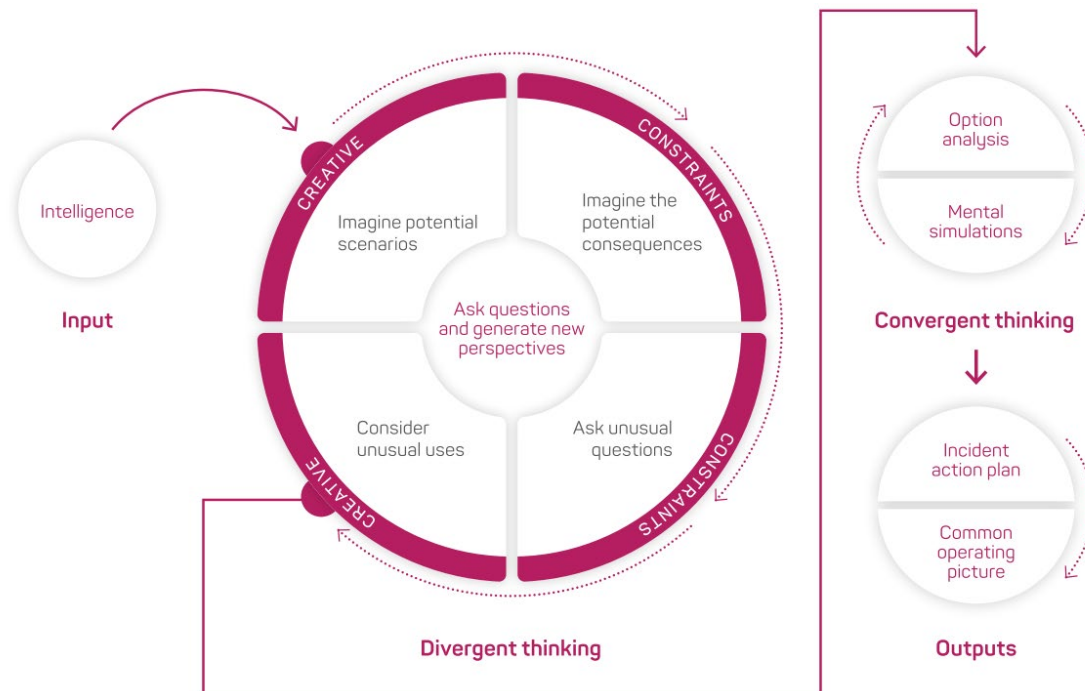


FIGURE 1: A METHOD TO DEVELOP CREATIVE SOLUTIONS IN DISASTERS AND CRISES

RESEARCH UTILISATION

Research utilisation is critical for organisational growth and widescale sector development. In many countries, collaboration and innovation are supported by government policies and initiatives that fund cooperative research centres to take a collaborative approach to research and development. These research centres produce ideas and outputs that can be adopted by organisations and implemented into organisational policies, plans and procedures (Owen, 2018).

However, research is only one of several ingredients for successful innovation and, in many respects, only the start of the process. Utilisation from research does not magically follow from research outputs. What is needed is a systematic follow through from research insights to consider the implications and to develop processes that support review and, where needed, implementation and change (Owen, 2018). Many agencies in emergency management have their own lessons management cycles and structures to review and evaluate research outputs. Nevertheless, these two activities are often not connected so more attention needs to be given to how agencies learn, not just from their own experience but also how they learn and change based on research outputs (Owen, Brooks, Curnin, & Bearman, 2018). Owen (2018) identified that research is utilised through a process by which new information or new ideas are communicated through certain channels, over time and among members of a social system. This process involves the following:

- disseminating new ideas or findings among the workforce
- assessing and evaluating the ideas in terms of their relevance to members of the agency
- implementing changes that may be needed



- monitoring the effects of the changes put in place
- reporting outcomes of changes made as a result of the new idea.

Successful research utilisation occurs through social interaction and the development of shared understanding as well as organizational processes that can embed new ideas into work practice (Owen, 2018).



METHOD

In order to shed light on how the agencies that attended the divergent thinking workshops utilised the research, this study sought to follow up a cohort of end-users that are senior leaders that could provide a strategic whole-of-agency perspective. A cohort of senior leaders were chosen from the end-user agency's that participated in the workshops. To follow up how the research from the divergent thinking workshops was utilised by the agencies, an approach that was exploratory in nature was warranted (Bluhm, Harman, Lee, & Mitchell, 2011). Complementing this approach, the research team also drew upon an established research utilisation framework to provide rigour and aid in the thematic analysis of the data.

SAMPLE

A purposive sampling technique was deemed most appropriate as the study sought to generate a sample that would allow for exploration of the study aims (Teddlie & Yu, 2007). Consequently, one senior leader from each of the five agencies that participated in the divergent thinking workshops and understood the objectives of the workshop, were invited to take part in this study.

DATA COLLECTION

The data collected was from a series of in-depth semi-structured interviews. This method was chosen due to the flexibility combined with the rich and illuminating material it can yield (Fontana & Frey, 2005). Importantly, the use of semi-structured individual interviews allowed for the unanticipated and spontaneous responses that emerge through open-ended questioning (Babbie, 2012). The five senior leaders that were approached were all involved with organising the workshop's and recruiting personnel from their respective agencies to participate. Table 1 summarizes the profile of the interviewees. Both researchers were involved in conducting the interviews. Due to the location of the senior leaders, two interviews were conducted face to face and three by telephone. The two face to face interviews were conducted by both researchers to ensure inter-rater reliability. Two of the remaining telephone interviews were conducted by one of the researchers with the other researcher conducting one interview. The average duration of each interview was approximately 60 minutes. Extensive written notes were taken by the researchers and accuracy was confirmed during the interview by the participant. The study asked the interviewees eight questions that were grounded on a set of elements from a different but aligned project from the Bushfire and Natural Hazards CRC, that linked how people and agencies connected research utilisation to organisational learning. The research utilisation maturity matrix developed by Associate Professor Christine Owen provided a suitable platform to explore the utilisation of the divergent thinking research provided in these previous workshops.

No.	Agency	Abbreviation	Gender
1	Tasmania Fire Service	TFS	Male
2	Tasmania State Emergency Service	TAS SES	Female
3	Fire and Rescue New South Wales	FRNSW	Male



4	New South Wales State Emergency Service	NSW SES	Female
5	Australian Red Cross	ARC	Male

TABLE 1: INTERVIEWEE DETAILS

RESEARCH UTILISATION MATURITY ASSESSMENT MATRIX

The research utilisation maturity assessment matrix was prepared by a working group of AFAC's Knowledge, Innovation and Research Utilisation Network. The assessment matrix was based on insights gained from a national survey that was completed in 2016 by 266 respondents in 29 fire and emergency services agencies. Questions sought answers on: perceived effectiveness in disseminating research within agencies; assessing and evaluating the impacts on agency practice of the research; implementing agency changes that may be needed; monitoring processes to track changes; and communicating outcomes of changes made as a result of research (Owen, 2018). The research utilisation maturity assessment matrix has been released as a draft and is currently under trial and soliciting feedback from interested agencies. One part of the matrix identifies nineteen indicators that are aligned to eight core elements. These indicators came from findings that have linked how people and agencies connected research utilisation to organisational learning. For the purpose of this study, the nineteen indicators were translated into eight interview questions that corresponded to each of the eight elements as per Table 2.

No.	Element	Interview question
1	Shared experiences	Has your organisation encouraged participants that attended the workshop to share their experience with other people in your organisation?
2	Learning Culture	How many insights were identified from this workshop and fed into formal or informal lessons management?
3	Support Systems	Are the appropriate systems in place (e.g. technical) to support the organisation using the research from the workshop?
4	Professional Development	Are the resources in place that provide continual support for professional development such as that offered in the workshop (are the participants encouraged to attend other research events, etc.)?
5	Internal engagement	Has there been active engagement of people within your agency to trial the aide memoires from the workshop in an operational setting?
6	Policy implementation	Has your organisation explored how the outputs from the workshop can be applied to policy?
7	Utilisation governance	Has a dedicated committee or group reviewed the research from the workshop for potential utilisation?
8	Product utilisation	Does your organisation explore how to use the products from the workshop in different contexts (e.g. can it be used in exercises, can it be used operationally in briefings, can it be used in policy development, etc.)

TABLE 2: RESEARCH UTILISATION ELEMENTS AND QUESTIONS



DATA ANALYSIS

Analysis of the data was a two-stage process. The first stage was thematic analysis of the raw data. To ensure validity and reliability during data analysis, both researchers identified the themes from the two face to face interviews that were conducted by both researchers. Themes that were not initially agreed upon were revisited and discussed until there was mutual agreement between the two researchers.

The second stage involved giving a score for each agency based on the answers provided in the interviews. This involved both researchers revisiting the notes from the interviews and making an individual and then collective decision to determine the maturity level of the agency regarding the utilisation of the divergent thinking research provided in the workshops. The eight elements were given one of four possible scores as per Table 3. The scores from the five senior leaders representing their agency were scored individually and then combined to give an aggregated score of the perceived research utilisation of all the agencies involved in the workshops.

	SCORE			
	1	2	3	4
MATURITY LEVEL	Basic	Developing	Established	Leading
DESCRIPTION	Rarely or almost never	Sometimes or on occasion	Often or frequently	Almost all the time

TABLE 3: RESEARCH UTILISATION MATURITY LEVEL AND COLLECTIVE CAPABILITY



RESULTS

The results are presented in two parts. The first part presents the findings extracted from the raw interview data and are presented as a synopsis in a tabular format. The second part presents the individual scores regarding the agency's research utilisation maturity level.

PART I

The following synopsis for Question 1 indicated that the majority of agencies had encouraged wider dissemination of the research, but this was predominantly informally.

Q1	Has your organisation encouraged participants that attended the workshop to share their experience with other people in your organisation?				
Agency	TAS SES	TFS	FRNSW	NSW SES	ARC
Answer	No	Yes, but informally they have talked about it in Level 2 OPS, Planning and IC training, and in operational reviews during the last bushfire season.	Not formally but they have encouraged it in After action reviews (AAR) and discussing involvement informally with peers.	Not formally but they have had some informal discussions about how to use it.	Yes, the group that attended were encouraged to share with their colleagues and many said they did informally.

TABLE 4: QUESTION 1

The responses for Question 2 indicated that the insights identified were not fed into formal lessons management either because there was either no formal system, or because it was not solely about lesson management but the wider policy cycle. However, some interviewees did identify that research from the workshops was implemented into after action review (AAR) processes.

Q2	How many insights were identified from this workshop and fed into formal or informal lessons management?				
Agency	TAS SES	TFS	FRNSW	NSW SES	ARC
Answer	Tasmanian emergency management doesn't have a formal lessons management processes but there has been an attempt to weave it in to	Unless it gets embedded into the policy cycle embedded in AIIMS there is apperception that the agency does not need to train to it.	Not yet but the intention is to implement them into the agency's incident management (IM) training program and focus on the critical decision making of IM	No, the workshops don't fit neatly into lessons management and need to feed into a wider management process, but the agency has focused on AAR.	Informally at some meetings people that attended the workshops were raising the need to monitor our unconscious biases in decision making.



	anything and everything.		within the AAR.		
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TABLE 5: QUESTION 2

For Question 3, the interviewees suggested that the agencies involved in this study had differing levels of maturity regarding the systems in place to facilitate research utilisation. However, the majority of agencies in this study had no formal systems and most support was reliant on a small group of people when the systems were absent.

Q3	Are the appropriate systems in place (e.g. technical) to support the organisation using the research from the workshop?				
Agency	TAS SES	TFS	FRNSW	NSW SES	ARC
Answer	No, but a few people do monitor key insights from the BNHCRC, AIDR and FEMA.	The agency is forced to do things when changes are made to AIIMS but not if they need to do their own research, there is also no research and development arm at TFS.	Yes, in the AAR process that are part of the FRNSW capability framework for IM and outputs are also incorporated into online courses when deemed fit for purpose.	Often knowledge sits in silos, but the agency is starting to put the systems in place to get people to start thinking about research utilisation.	No formal systems to support this and certainly no designated IT system.

TABLE 6: QUESTION 3

The responses for Question 4 suggested that continual support for professional development such as provided in the divergent thinking workshops is at best, ad hoc, and dependent upon the financial constraints within the respective agency.

Q4	Are the resources in place that provide continual support for professional development such as that offered in the workshop (are the participants encouraged to attend other research events, etc.)?				
Agency	TAS SES	TFS	FRNSW	NSW SES	ARC
Answer	The focus is on training for volunteers rather than for staff and there is little training budget for	Never done in a structured way (i.e., who is the cohort that needs to be exposed; how will they filter it back to the workforce/workplace) and there is no process to	It is very ad hoc and there is no structured framework, the agency targets individuals we think will get value from things like the workshop, but this is very	Performance planning process is quite immature and there is minimal funding available for professional development .	The agency has just introduced a Capability Framework training pathway as a formal structure for training nationally but the opportunities for attending workshops is still ad hoc.



	operation s let alone other profession al developm ent.	adopt the learnings.	very labour intensive.		
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TABLE 7: QUESTION 4

The data identified that for Question 5, trialling of the aide memories was not common practice within the agencies involved in this study but there was some impromptu implementation of the aide memories by those personnel that attended the workshops.

Q5	Has there been active engagement of people within your agency to trial the aide memoires from the workshop in an operational setting?				
Agency	TAS SES	TFS	FRNSW	NSW SES	ARC
Answer	No, there is no real focus at the moment on developing the non-technical skills of volunteers.	No, for this to be effective it would be a total change in organisational policy.	Not yet but there is an intention to do so and if they are used in an operational setting, they have to be evidenced within a structure, but the agency is still finding their way with this really.	No, but some workshops participants have taken them and adapted them for their own operational purposes.	No, but there are people that attended the workshop that are introducing elements of it locally but again, this is ad hoc.

TABLE 8: QUESTION 5

The responses for Question 6 indicated that implementing the outputs into policy is complex as it is not just about the policy, but the entire policy cycle and how this intersects with other agencies involved in emergency management.

Q6	Has your organisation explored how the outputs from the workshop can be applied to policy?				
Agency	TAS SES	TFS	FRNSW	NSW SES	ARC
Answer	Yes, investigating how to embed within internal lessons management processes.	No, this is not just about policy but implementation throughout the entire policy cycle.	Not yet, but this really needs to be embedded into state policy across all NSW emergency services so there is a common language and understanding.	Currently no linkages between research and policy but any training must be included in the policy cycle.	No, the change process at ARC is very complicated as it is a national organisation with autonomous states and territories.



TABLE 9: QUESTION 6

Question 7 highlighted that many agencies did not either have a dedicated committee or group to review the research from the workshop, or the review process of the divergent thinking research had not yet occurred due to competing interests.

Q7	Has a dedicated committee or group reviewed the research from the workshop for potential utilisation?				
Agency	TAS SES	TFS	FRNSW	NSW SES	ARC
Answer	No, there is a belief that professional staff don't have time to learn lessons because they are busy just managing day to day operations.	No, as there is a need for operational people with a background in research development.	No, not yet but there is a Community Leadership Management Unit that looks how to use research at FRNSW.	No, but there are plans in place to pull together participants from the workshops to identify how the research can be used.	There is a national research arm and that was given all the information, but little feedback was received from them.

TABLE 10: QUESTION 7

In the responses for Question 8, the interviewees tended to focus on using the products from the workshop in exercise management. However, even the implementation of the products into exercises was challenges due to a lack of resources and the requirements for most exercise to be mutli-agency and the complexities associated with this.

Q8	Does your organisation explore how to use the products from the workshop in different contexts (e.g. can it be used in exercises, can it be used operationally in briefings, can it be used in policy development, etc.)?				
Agency	TAS SES	TFS	FRNSW	NSW SES	ARC
Answer	No, the agency doesn't have any formal exercise program and due to operational requirements, the Tasmanian interagency exercise coordination group hasn't met for over 12 months.	No, the exercise management program was ramped up after 2013 but it's not resourced, the agency doesn't conduct any desktop exercises.	Yes, in FRNSW exercises but not done it yet, however, the agency needs to explore how it can be used in multi-agency exercises.	No, the agency is way down on research utilisation maturity and get distracted by operations, so have no strategy how to share the outcomes of training.	No, Police deal with exercises and imbedding in policy and operational plans is very complex due to the fact the agency operates nationally.

TABLE 11: QUESTION 8



PART II

The individual and aggregated scores would indicate that there is currently a low level of maturity of the agencies that participated in this study. The majority of scores indicated a basic or developing level of maturity where agencies scored either 'rarely/almost never' (score = 1) or 'sometimes/on occasion' (score = 2) for the specified element. There were certain elements where the maturity level was deemed to be established and 'occurred often/frequently' (score = 3) but this only happened on four occurrences. None of the maturity levels were deemed leading that required the agency to achieve the element 'almost all the time' (score = 4). The collective scores would suggest that all the agencies in this study were 'developing' their maturity with regards to utilisation of the divergent thinking research provided in the workshops.

No	Element	Agency research utilisation maturity score					Collective score
		TAS SES	TFS	FRNSW	NSW SES	ARC	
1	Shared experiences	1	2	2	2	2	1.8
2	Learning Culture	2	2	2	2	2	2.0
3	Support Systems	2	1	3	1	1	1.6
4	Professional Development	1	2	2	1	2	1.6
5	Internal engagement	1	1	2	1	2	1.4
6	Policy implementation	3	1	2	1	1	1.6
7	Utilisation governance	1	1	3	2	3	2.0
8	Product utilisation	1	2	3	1	1	1.6

TABLE 12: AGENCY RESEARCH UTILISATION MATURITY SCORES



DISCUSSION AND CONCLUSIONS

The results indicated that the agencies in this study had commenced the journey of utilising the divergent thinking research provided in the workshops, but this was informal. Much of the socialisation of the research outputs within the agencies involved in the workshops was via the participants that had attended one of the workshops. This would indicate that the utilisation of the research at best, was ad hoc and dependent on the enthusiasm of the workshop attendee and flexibility of their training arrangements so that additional information could be incorporated as required.

A lack of formal approaches could be associated with the low levels of research utilisation maturity identified by the agency senior leaders in this study. A central issue regarding this immaturity was linked to financial and resource constraints.

In addition, the reason why the research utilisation maturity level was in the 'developing' stage may be due to the fact that the implementation of research outputs is not as simple as 'adding' it into a policy or training manual. Successful research utilisation needs to encompass the entire policy cycle and consider the formal structures to achieve this. All the interviewees in this study discussed the challenges and complexities of embedding research outputs into existing agency policy cycles. This was explained by one of the interviewees who stated that:

“Unless it [research outputs] gets embedded into the policy cycle it won't go too far. But it would be a total change in organisational policy. Trying to change decision making process is almost unbelievable, it's almost insurmountable.” (Participant 2)

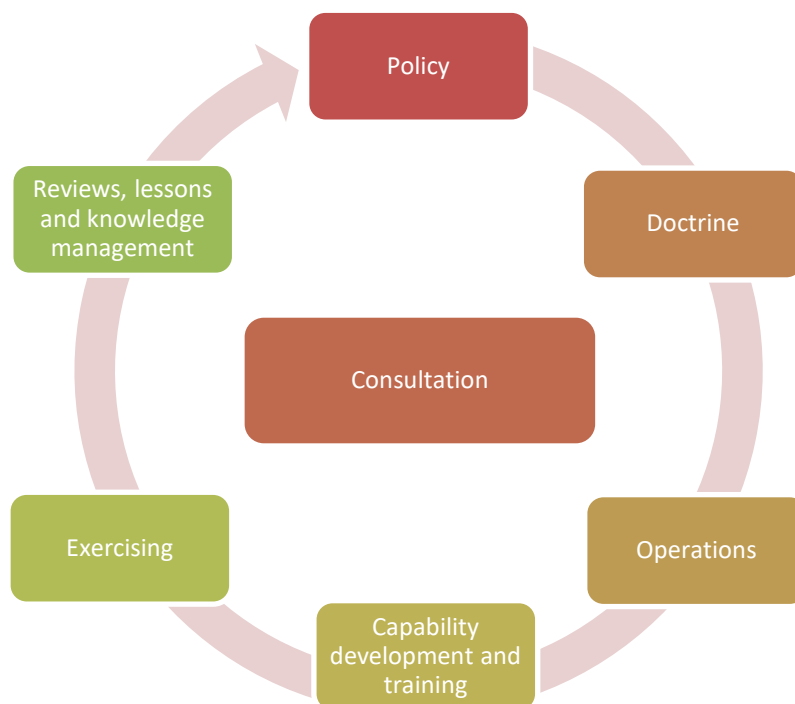


FIGURE 1: TYPICAL POLICY CYCLE IN AN EMERGENCY SERVICES AGENCY



The results also identified that the challenges of utilising the research from the divergent thinking workshops was not only due to the agency's having a 'developing' level of research utilisation maturity, but a lack of research guidance.

This challenge points the finger at academic institutions, including universities and research centers, to provide greater and continuing support to agencies beyond the research projects, to the successful utilisation and implementation of research products within the entire policy cycle. This was reiterated by the following interviewees comments:

“The key is knowing how to apply it into our organisation, what we need are digestible tools and advice how to implement them.” (Participant 5)

“The Bushfire and Natural Hazards CRC should have a team of people going around to integrate outcomes into the workplace.” (Participant 2)

Research utilisation is a partnership between agencies, research centers and academic institutions that requires a collaborative partnership throughout the entire policy cycle. In following up with participants involved in the divergent thinking workshops, we have confirmed that research does not magically follow from research outputs. What is needed is a systematic follow through from research insights to consider the implications and to develop processes that provide continual support where needed (Owen, 2018).



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