The challenges of decision-making in emergency management, the cognitive aids people use and the decision-making training they receive.

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THIS ARTICLE INTRODUCES 3 LITERATURE REVIEW PAPERS THAT TOGETHER EXAMINE THE CURRENT PRACTICE, TRAINING AND CHALLENGES OF DECISION-MAKING IN EMERGENCY MANAGEMENT.

The challenges of decision-making in emergency management, the cognitive aids people use and the decision-making training they receive

Peer reviewed

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Introduction

Emergency management is a complex socio-technical system in which people operate in hierarchies of teams (Bearman et al. 2023). At the heart of this system are people making decisions to achieve the best outcomes possible for the community. In this context, decisions are made by individuals and teams based on their situational awareness and goals derived from organisational doctrine, training, norms and values. This is underpinned by cognitive functions of perception, attention, memory and language. Decisions must be executed by enacting or communicating a plan to others and monitored using feed-forward and feedback information.

Individual and team decision-making occurs at all levels of emergency management: from the responders who attend the emergency to the incident management teams that coordinate the response, to teams of senior personnel who make decisions about resources and provide strategic oversight and the executives who consider organisational capabilities and the socio-political context of the organisation's response. Table 1 details the levels of emergency management decision-making. Each of these levels have similarities in the way they make decisions, but also have their own unique challenges and requirements.

For example, a road crash rescue officer must form an awareness of the situation (the potential hazards and the location, nature of entrapment and injuries of patients). They must develop and execute an extraction plan, which may involve relocation of the vehicle, stabilisation, space creation, freeing the patient from entrapment and extracting the patient from the vehicle. Throughout the process information needs to be obtained and decisions communicated to other road crash operators and medical personnel and police so that actions can be coordinated efficiently and effectively.

The incident controller in an incident management team managing a large bushfire must build situation awareness based on potential influences of weather, terrain and vegetation on the fire, the location of critical infrastructure, fire prediction modelling and reports from operators attending the incident. Decisions need to be made about the fire management strategy, the location of resources, road closures, the provision of information and warnings to the public, and the management of incoming resources, all in the context of the predicted fire situation several hours into the future. This requires an effective flow of information into the incident management team and clear and timely communication by the team both internally and externally (e.g. with the police, media, local community and politicians).

Table 1: Levels of emergency management decision-making.

Level	Function	Illustrative example
Executive	Considers the wider socio-political context of the organisation's response, ongoing organisational capabilities, accountability issues and likely consequences.	The organisation's executive management and senior staff from the office of the responsible government minister(s).
Strategic	Defines what to do as the organisation's response to the emergency.	Senior staff from both the organisation and participating agencies at a regional, territory or state incident management centre.
Tactical	Specifies how the response effort is to be carried out.	On-scene or near-scene Incident Controller and multi-person incident management teams, representatives from other participating organisations and agencies.
Operational	Implements the response effort at the scene(s).	On-scene Incident Controller and operational staff in key roles (e.g. safety officer).

Source: Penny (2024b)

Decision-making is a critical part of emergency management and is one of the 7 non-technical skills identified by Hayes et al. (2021). The other non-technical skills are communication, coordination, cooperation, leadership, situation awareness and coping with stress and fatigue. Decision-making has a very close relationship with situation awareness and many authors consider situation awareness to be the 'front end' of the decision-making process (Alison and Shortland 2021; Mosier and Fischer 2010; Tolcott 1992). Communication is closely related to decision-making since others need to be informed of the decisions that have been made and where appropriate involved in the decision process (Hayes et al. 2021). Other non-technical skills, such as leadership, coordination, cooperation and coping with stress and fatigue are also related to decision-making (Paton 2003; Thomason et al. 2024). Effective decision-making requires sound and timely decisions based on an adequate understanding of the situation, a suitable decision-making approach and the appropriate involvement of others in the decision-making process (Hayes et al. 2021).

This edition of the *Australian Journal of Emergency Management* includes 3 papers examining different aspects of decision-making. These papers are designed to assist people working in the emergency management sector. While the papers are all written by members of our research team, each lead author adopted their own approach, method and style as appropriate to address the topic. Each of the papers consider key issues of current concern for emergency managers.

Butler et al. (2024) explores the literature on 3 key challenges for emergency management: stress and fatigue, interoperability and ethical dilemmas. Each area is discussed to explore the nature of these challenges, how these challenges are likely to evolve and what helpful advice can be found to mitigate them. The paper concludes that, to better meet these challenges, organisations need to develop appropriate doctrine and training, develop supportive organisational cultures and learn the lessons of previous critical incidents.

Penny et al. (2024a) describes the types of cognitive aids that have been developed to assist emergency management decision-makers. These aids vary according to their intent and the context in which they are applied. Strengths and limitations of the cognitive aids are discussed. The paper concludes that, while cognitive aids can be useful, they are not a silver bullet for emergency management decision-making. The correct tool (correctly designed) must be correctly applied in the correct context by trained and competent end users.

McLennan et al. (2024) examines emergency management decision-making training and discusses current practice and issues. This review showed that decision-making competence is a depreciating asset that needs to be maintained and that a range of options for training emergency management decision-making exist. The paper argues that it cannot be assumed that participation in emergency management decision-making training will result in improved performance. That can only be determined by appropriate training outcomes evaluation programs. Organisations need to deliver training that is appropriate, accessible, matched to the skills of the tasks, appropriately resourced and methodically evaluated.

The scope of these literature reviews was restricted to research in emergency management or in closely related industries (medicine, military, aviation) that could be applied to emergency management. As with most literature reviews, the decision about what to include and what to leave out was difficult, particularly as we were compiling useable research findings for practitioners. The information that we ended up including in the papers was considered to be the most relevant to people in decision-making roles (career and volunteers) working in emergency management in Australia. There is more literature that

could have been included and each paper could have been considerably longer. The papers try to strike a balance between covering important issues in each of the topics while being succinct enough for emergency managers to read and use.

Collectively, the 3 papers represent a coherent body of knowledge on emergency management decision-making. This provides a concise summary of research findings so emergency managers are better equipped to respond effectively to current and emerging challenges they are likely to face.

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