HAZARD NOTE

IMPROVING EMERGENCY MANAGEMENT TEAMWORK USING NON-TECHNICAL SKILLS

▲ **Above:** THIS RESEARCH DESCRIBES THE EMERGENCY MANAGEMENT NON-TECHNICAL SKILLS TOOL THAT CAN BE USED TO ENHANCE THE NON-TECHNICAL CAPABILITIES OF EMERGENCY MANAGEMENT INDIVIDUALS AND TEAMS. PHOTO: SOUTH AUSTRALIA COUNTRY FIRE SERVICE.

ABOUT THIS PROJECT

This research was conducted by CQUniversity as part of the Bushfire and Natural Hazards CRC's *Improving decision making in multi-team environments* project. Researchers identified the non-technical skills required by incident and emergency management team personnel. This *Hazard Note* outlines the non-technical skills framework, which is operationalised as the Emergency Management Non-Technical Skills (EMNoTS) tool, one of six tools developed by this project.

Hazard Note 33 discusses two team management tools developed earlier by A/Prof Chris Bearman and colleagues – the Emergency Management Breakdown Aide Memoire and the Team Process Checklist.

Hazard Note 73 discusses two strategic decision-making tools developed by A/Prof Benjamin Brooks and Dr Steven Curnin – the Psychological Safety Checklist and the Cognitive Bias Aide Memoire.

Hazard Note 93 presents the recently developed Key Tasks Cognitive Aid, designed to support emergency management team operations during crisis.

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SUMMARY

Incident management and emergency management teams (IMT/EMTs) are regularly required to operate under difficult and demanding circumstances, coordinating the response to large scale emergencies such as storms, floods, bushfires, earthquakes, oil spills, pandemics and industrial incidents. Non-technical skills play a central role in the performance of these teams. Based on a literature review, researchers developed a non-technical skills framework for emergency management. The core non-technical skills included in this framework are: communication, coordination, cooperation, decision-making, situation awareness, leadership, and managing stress/fatigue. This non-technical skills framework is operationalised as the Emergency Management Non-Technical Skills (EMNoTS) tool. This tool can be used to help emergency management individuals and teams enhance these non-technical skills to develop more effective teamwork capabilities.

You can access all tools developed by this project, including the Emergency Management Non-Technical Skills tool, at www.bnhcrc.com.au/driving-change/tools, under the 'Teamwork tools' heading.

Emergency Management Non-Technical Skills

bushfire&natural HAZARDS CRC

CQUniversity AUSTRALIA

PURPOSE

This tool helps emergency and incident management teams enhance non-technical skills (such as communication or leadership skills) to develop more effective teamwork capabilities.

There are seven core non-technical skill categories, divided into elements and behavioural markers.

To help ensure that both positive (helpful) and negative (unhelpful) behaviours are considered, there are negative behavioural markers included in the checklist – these are marked *in italics.*

The EMNoTS can be used in several ways:

- as a **simple checklist**, by completing the unshaded columns to quickly capture which non-technical skills are in play for a team
- to facilitate an **after-action review** at the end of a shift or training exercise
- to collect **more detailed data** to ascertain how well non-technical skills are being used, by completing the shaded columns.

COORDINATION	NOT APPLICABLE	NOT OBSERVED	OBSERVED	SOMETIMES	MOSTLY	CONSISTENTLY
Clear roles, responsibilities and expectations				OBSERVED		
Actions are always carried out as expected	☐	☐	☐			
There is a clear and common purpose	☐	☐	☐			
Everyone has a common understanding relating to the operation	☐	☐	☐			
The roles and responsibilities of team members are unclear	☐	☐	☐			
Adjusting to demands						
Everyone is adjusting to meet the demands of the situation	☐	☐	☐			
Team members are not correcting any mistakes made by others	☐	☐	☐			

LEADERSHIP	NOT APPLICABLE	NOT OBSERVED	OBSERVED	SOMETIMES	MOSTLY	CONSISTENTLY
Creates a suitable team environment				OBSERVED		
Good behaviour is consistently modelled	☐	☐	☐			
Inclusive behaviours are modelled that enables others to speak up and offer suggestions and constructive comment	☐	☐	☐			
Others are not treated with respect	☐	☐	☐			
Provides focus, direction and coordination						
There is a focus on the important tasks at hand	☐	☐	☐			
Appropriate direction and guidance are provided	☐	☐	☐			
Activities are not well-coordinated within the team	☐	☐	☐			

▲ **Above:** A SAMPLE OF THE EMERGENCY MANAGEMENT NON-TECHNICAL SKILLS (EMNoTS), SHOWING CORE SKILLS, ELEMENTS OF EACH SKILL AND BEHAVIOURAL MARKERS. YOU CAN ACCESS THE FULL EMNoTS ON THE CRC'S ONLINE TOOLS PAGE, UNDER THE 'TEAMWORK TOOLS' HEADING.

BACKGROUND

The effectiveness of an IMT/EMT is dependent on the ability of team members to successfully interact, maintain appropriate awareness of what is going on and make sound decisions. These types of capabilities, called non-technical skills, are especially important in IMT/EMTs, as these teams are often operating in dynamic, high-consequence and uncertain contexts.

Non-technical skills are defined as the "cognitive, social and personal resource skills that complement technical skills, and contribute to safe and efficient task performance" (Flin et al., 2008, p.1). For example, a firefighter is required to use technical skills to operate the pump on the fire truck and put water on a burning object. The coordination of the crew by the crew leader, how the crew communicates, their decision making and situation awareness are all non-technical skills.

Previous research examining the performance of IMT/EMTs highlights various problems with non-technical skills (Bearman et al., 2015; Brooks et al., 2018). At the individual level, commonly identified issues include inadequate situation awareness, poor decision-making skills and the adverse effects of stress and fatigue. At the team level, common issues are breakdowns in communication, disconnects in the understanding between team members, and uncoordinated decision making/decision errors. Despite evidence that well-developed non-technical skills are central to effective management of large-scale incidents, there has not been much research that focuses on how to improve these skills in IMT/EMTs. This research addresses the basic questions: 'What are the non-technical skills that are required for emergency management and how can we improve their use?'

BUSHFIRE AND NATURAL HAZARDS CRC RESEARCH

Since 2015, the research team has been developing tools that support and enhance performance of individuals and teams in emergency management. The Emergency Management Non-Technical Skills tool featured in this *Hazard Note* is the fifth tool developed by this research team (see the breakout box on page 1 for how to access all six tools).

To identify the non-technical skills required for emergency management, researchers analysed the peer-reviewed published literature in emergency management and other safety-critical sectors. This comprised:

1. research in domains where there is a strong history of research and practice of non-technical skills (such as aviation, maritime, military and healthcare)
2. non-technical skills frameworks developed for fire and emergency response teams (including offshore oil and gas emergency response, nuclear energy emergency response, fire and rescue, and paramedicine)
3. the non-technical skills capabilities and competencies required for emergency incident management, such as the United Kingdom fire and rescue service incident commanders' non-technical skills (Butler et al., 2020), Australian incident management team competency and capability frameworks (Hayes & Omodei, 2011; Owen et al., 2016), and the Team Process Checklist (as featured in *Hazard Note 33*).

As part of the review process, researchers identified aspects of IMT/EMTs that are different to other domains where research on non-technical skills has been conducted, and the issues this raises for the development and application of non-technical skills in emergency management.

Working with existing frameworks

The identification of non-technical skills for a domain typically follows a two-step process: first, identifying the skills and related behaviours for safe and efficient performance, and second, refining and sorting these skills and behaviours into a framework that comprises a list or hierarchical taxonomy (Flin et al., 2008).

Rather than starting from scratch and identifying a set of skills and behaviours to develop a non-technical skills framework, researchers collated and carefully sorted the behavioural indicators from four frameworks identified in the literature review as being most relevant to incident management teams: the Emergency Management Professionalisation Scheme incident management capabilities

(Owen et al., 2016), the Team Process Checklist (see *Hazard Note 33*), incident management team key competencies (Hayes & Omodei, 2011), and a set of incident command skills (Crichton et al., 2005).

Identifying behavioural markers

Each of the four frameworks has a different structure and were developed in a different way, however each framework has in common the provision of a set of behavioural markers. Behavioural markers are statements that identify an aspect of a non-technical skill in a practical and observable way. Researchers used the sets of behavioural markers in each framework as building blocks to identify the core non-technical skills and their sub-components in the new non-technical skills framework. In essence, this list of behavioural markers forms the first part of the Flin et al. (2008) method for identifying non-technical skills.

The second task was to refine and organise this list into a taxonomy. An initial list of 123 behavioural markers for non-technical skills was compiled from the four frameworks. These markers were carefully reviewed and items that were considered unclear or ambiguous were excluded. The remaining 87 items were used to extract an initial set of core non-technical skills and sub-components, called elements. Seven core non-technical skills and 16 elements were identified. This set of non-technical skills, elements and behavioural markers forms the non-technical skills framework for emergency management.

Developing the Emergency Management Non-Technical Skills tool

The non-technical skills framework was developed into the Emergency Management Non-Technical Skills (EMNoTS) tool – that can be used in IMT/EMTs. EMNoTS was developed, evaluated and further refined with end-users using a human-centred design method.

Researchers worked with an iterative cycle of two IMT exercises conducted by the Country Fire Service. In this exercise, people being trained for IMT roles managed a simulated incident with actors playing the role of fireground personnel and other stakeholders (for example, media and police). A prototype EMNoTS was used by the trainer/assessors to supplement their assessment of the candidates. After each exercise, the trainer/assessors provided feedback on the prototype EMNoTS, which was then further revised.

Finally, EMNoTS was evaluated in a separate study with a group of nine experienced incident managers (average experience = 18.4 years). The incident managers watched a video of a response team performing a task and rated their performance using EMNoTS. In this study, EMNoTS was rated (out of 5) as 4.4 for usefulness, 4.3 for clarity and 4.2 for comprehensiveness across the seven different core non-technical skills.

RESEARCH FINDINGS

The EMNoTS tool comprises seven core non-technical skills:

- **Communication** – who says what to whom and the mechanism they use to communicate
- **Coordination** – the synchronisation of individual behaviours and the activities of team members
- **Cooperation** – the willingness of people to work in a team and to support one another
- **Leadership** – the way in which the person in charge of the team provides focus and guidance for the team's activities and models inclusive behaviours
- **Situation awareness** – the team's understanding of the current and possible future situations
- **Decision making** – the making of clear, timely and appropriate decisions
- **Coping with stress/fatigue** – effective management of stress and fatigue within the team

Each of these core non-technical skills can be further divided into sub-components (or elements) and behavioural markers. Communication, for example, has two elements: effective communication and proactive communication. Observable behaviours (behaviour markers) that can be used to determine whether effective communication is occurring are the degree to which: information is passed on in a timely manner, information is passed on accurately, the team members ensure that information has been received and understood by others, and whether inappropriate communication procedures are being used.

To help ensure that the users consider both positive (helpful) and negative (unhelpful) behaviours, each element was described with at least one negative behavioural marker, such as 'Inappropriate communication procedures are being used' within the communication

FURTHER READING

Bearman C, Grunwald JA, 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, pp.16-25.

Bearman C, Rainbird S, Owen C & Brooks B (2017) Tools to enhance emergency management team performance, *Hazard Note 33*, Bushfire and Natural Hazards CRC.

Brooks B & Curnin S (2020) Creating psychologically safe teams and managing cognitive bias in strategic decisión making, *Hazard Note 73*, Bushfire and Natural Hazards CRC.

Brooks B, Curnin S, Bearman C & Owen C (2018) Human error during the multilevel response to three Australian bushfire disasters, *Journal of Contingencies and Crisis Management, 26*(4), pp.440-452.

Butler PC, Honey RC & Cohen-Hatton SR (2020) Development of a behavioural marker system for incident command in the UK fire and rescue service: THINCS, *Cognition, Technology & Work, 22*(1), pp.1-12.

Flin R, O'Connor P & Crichton M (2008) *Safety at the sharp end: a guide to non-technical skills*, Aldershot, Ashgate.

Hayes P, Bearman C, Bremner P & Thomason M (2021) Supporting emergency management team performance during emergencies, *Hazard Note 93*, Bushfire and Natural Hazards CRC.

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*.

Hayes P & Omodei MM (2011) Managing emergencies: key competencies for incident management teams, *The Australian and New Zealand Journal of Organisational Psychology, 4*, pp.1-10.

Owen C, Hayes P, Brooks B, Scott C & Conway G (2016) *Supporting evidence for the Emergency Management Professionalisation Scheme: core incident management team capabilities*, Australasian Fire and Emergency Service Authorities Council (AFAC).

Thomas MJW (2018) *Training and assessing non-technical skills: a practical guide*, CRC Press, Boca Raton.

sub-component. These negative behaviours are marked in italics on the EMNoTS.

The EMNoTS, which you can on the CRC's Online Tools page, includes core non-technical skills, elements of those core non-technical skills and sets of behavioural markers for each.

HOW SHOULD THIS RESEARCH BE USED?

The EMNoTS provides guidance on the types of non-technical skills that are important in an IMT/EMT. This tool can be used by emergency management organisations in several ways:

- as a simple checklist
- to facilitate an after-action review
- to collect more detailed data to ascertain how well non-technical skills are being used.

The use of a common non-technical skills framework and tool such as EMNoTS provides the opportunity for emergency management organisations to:

- create clear expectations regarding the required non-technical skills
- provide clear guidance for non-technical skills training content
- develop a common vocabulary for discussing and providing constructive feedback on non-technical skills
- provide assistance on how to address common non-technical skills problems
- provide an objective framework to collect data and monitor trends in non-technical skills at the team and organisational level, to support continuous improvement.

Non-technical skills training
Successful training programs usually embed the development of non-technical skills through three distinct phases: 1) awareness, 2) practice and feedback, and 3) continual reinforcement loop. The *awareness* phase builds understanding of the key concepts and helps participants to develop a common language for non-technical skills.

The *practice and feedback* phase uses practical exercises and usually some form of simulation to enable participants to practice and refine their non-technical skills in various situations. The *continual reinforcement loop* phase uses ongoing refresher training in combination with organisational practices, such as workplace auditing, standard operating procedures, and learning and development systems.

In addition, recent work by Thomas (2018) outlines some important principles for the training of non-technical skills, including the need for organisations to carefully coordinate and integrate their efforts with other training programs to upskill their personnel in non-technical skills. Thomas highlights that attitudinal change is an important outcome of non-technical skills training, and that training can take place in various settings, not just during formal training. Thomas emphasises that briefing and debriefing are essential elements for non-technical skills training sessions.

Discussion with several emergency management agencies has indicated the need to ensure that non-technical skills training is part of early training programs and ensure that there are further development opportunities as personnel progress through key transition points to take on more senior roles.

FUTURE DIRECTIONS
The non-technical skills framework provides a valuable start point for developing the types of non-technical skills required by IMT/EMTs. Some suggestions on how to integrate non-technical skills into training programs are suggested in the EMNoTS. To support this process, further work is required to develop support and training materials that agencies can tailor for their own use. These materials will be available in mid-2021.

It is also important that core non-technical skills are well represented in public safety training units and the Emergency Management Professionalisation Scheme. Beyond that, one of the key ways to implement non-technical skills is to embed it in day-to-day activities and management practice so that it simply becomes part of how the organisation conducts its business. Practitioners training emergency management personnel have observed that, to successfully embed non-technical skills, those skills need to become part of all organisational activities, not just used in the emergency management operations. In this way, emergency management agencies can improve their non-technical skills and make their use a core part of everyday operations and activities.