



Embedding  
Non-Technical  
Skills into  
Emergency  
Management  
Training



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Sources for the development of this material are listed in the References section.

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# Preface

This guide provides advice on how to embed non-technical skills into emergency management training. The guide is divided into three main sections. An introductory section (Chapters 1 and 2) describes: a) non-technical skills, b) the three-phase approach to developing non-technical skills (i.e., awareness; practice and feedback; and continual reinforcement) and c) the use of non-technical skills to enhance the training environment.

The main section of the guide (Chapters 3-6) shows how non-technical skills content can be enhanced in ongoing emergency management training. As examples, three clusters of PUA Public Safety Training Package (PTSP) units are discussed:

1. *PUATEA001 Work in a team*
2. *PUAOPE020 Lead a crew and PUAOPE012 Control a Level 1 incident*
3. *PUAFIR005 Observe fire from an aircraft and PUAFIR006 Observe a non-fire emergency from an aircraft.*

For each unit, additional information and activities are recommended to help instructors better integrate non-technical skills into the training.

The content builds progressively from introductory level material in *PUATEA001 Work in a team* to more advanced material in *PUAOPE012 Control a Level 1 incident*. Air Observer units (*PUAFIR005/PUAFIR006*) were selected to show how non-technical skills can be integrated into more technically oriented role-based training.

The final concluding section of the guide (Chapter 7) provides some further guidance on how to integrate non-technical skills into emergency management training and emphasises the importance of incorporating non-technical skills into the everyday business of the organisation.

Throughout the guide a wide range of useful references, training materials and links to online resources are included to help instructors and learning product developers learn more about non-technical skills.

## Chapter 1: Introduction

Robust and consistent emergency management team performance relies on training and developing personnel who can work together effectively. This is especially the case when these teams are working under difficult and high-pressure conditions. Effective personnel have developed the 'technical skills' to successfully use key equipment and systems, and the corresponding 'non-technical skills' required to effectively work with others, make sound decisions, and manage stress and fatigue. These two

types of skills are interdependent and are also referred to as 'taskwork' and 'teamwork', or 'hard' and 'soft' skills (MacLeod, 2021).

There is clearly a close relationship between technical and non-technical skills. For example, in the case of a road crash rescue the use of cutting and spreading equipment needs to be carefully coordinated by the team, using clear communication between team members. The crew leader needs to have good situation awareness and make quick effective decisions that are well communicated in order to extract the casualty quickly and safely. The close relationship between technical and non-technical skills is also borne out by research which suggests that there is a significant positive correlation ( $r = .45$ ) between technical and non-technical skills (Riem *et al.*, 2012). Team members therefore require both skill types to perform consistently well (Odell, 2011).

In addition to technical and non-technical skills there is also a third category, known as 'personal skills'. These personal skills – such as safety consciousness, adaptability, flexibility, dependability, and showing initiative – complement technical and non-technical skills (Hayes, 2021; Hayes *et al.*, 2021). This guide focuses on the training of non-technical skills in the context of emergency management; we will leave further discussion of personal skills for another publication.

Whilst emergency management teams have had many notable successes, both research and public inquiries show that emergency management teams can often have problems with non-technical skills, such as communication, coordination, decision making, and managing the adverse effects of stress and fatigue (e.g., Bearman *et al.*, 2015; Pollock, 2013; Teague *et al.*, 2010). This guide helps improve non-technical skill performance by showing how technical skills delivery can be supplemented with non-technical skills training to better integrate the two. In this way, the use of non-technical skills becomes routinised and part of normal business.

In order for non-technical skills to become broadly adopted by an organisation, these skills need to become business as usual practice for all operations, not just when a team is managing the acute phases of an emergency (Okray and Lubnau, 2004). Developing non-technical skills for emergency management personnel requires sound analysis, careful planning, and strong organisational support. Organisations following traditional human resource approaches to develop non-technical skills tend to utilise a three-step process of training needs analysis, building training resources, and developing assessment and evaluation tools (Goldstein and Ford, 2002; Winterton, 2007). However, if organisations really want to embed non-technical skills into everyday work practices, they need to ensure personnel receive ongoing encouragement and opportunities to use and develop these skills so that they become the default way of working.

# Chapter 2: Background

There has now been much research that highlights the critical role non-technical skills play in enabling emergency management team effectiveness (Bearman *et al.*, 2015; Brooks *et al.*, 2018; Grunwald and Bearman, 2017). Research has found these skills play a critical role for teams working in a wide range of emergency domains such as nuclear emergency response (Crichton and Flin, 2004); offshore oil and gas emergency response (Crichton *et al.*, 2005; Reader and O'Connor, 2014); surgery, anaesthesia, and emergency medicine (Carne *et al.*, 2012; Fletcher *et al.*, 2002; Kohn *et al.*, 2000); military operations (Wilson *et al.*, 2007); paramedicine (Shields and Flin, 2013); and fire and rescue incident command (Butler *et al.*, 2020).

To help promote the effective use of non-technical skills in emergency management, a number of resources have recently been developed. Examples include:

- Checklists<sup>1</sup>
  - Team Process Checklist (TPC)
  - Emergency Management Breakdown Aide Memoire (EMBAM)
  - Key Tasks Cognitive Aid (KTCA)
  - Emergency Management Non-Technical Skills (EMNoTS)
  - Cognitive Bias Aide Memoire (CBAM)<sup>2</sup>
  - Psychological Safety Checklist (PSC)<sup>2</sup>
- Publications<sup>1</sup>
  - A guide to non-technical skills in emergency management
- Training materials<sup>3</sup>
  - Emergency Management Non-Technical Skills: Key Concepts Workshop
  - Emergency Management Non-Technical Skills: Advanced Workshop

The primary resource used to shape this work is the Emergency Management Non-Technical Skills (EMNoTS)<sup>4</sup> framework (Hayes *et al.*, 2021). EMNoTS is based on a comprehensive literature review of best practice in both emergency management and other related domains. EMNoTS identifies seven core non-technical skills required by emergency management teams:

1. Communication
2. Cooperation
3. Coordination
4. Leadership
5. Situation awareness
6. Decision making
7. Stress and fatigue management

The guide uses concepts and resources from EMNoTS and considers how they can be applied to enhance the non-technical skills content of five PUA Public Safety Training Package (PTSP) units. Instructors and learners will not only find these resources helpful for learning important concepts, but also useful tools to aid their ongoing performance as instructors and practitioners.

## 2.1 A brief introduction to non-technical skills

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). This definition highlights that in addition to thinking and perceptual skills, team performance relies on a range of social and personal skills. Non-technical skills help teams to more effectively use their collective resources and increase the opportunity to capture errors or omissions, which are part and parcel of emergency management. Although 'non-technical skills' is a more recent term, the concept itself has been part of professional practice for centuries. For example, not only do mariners need to be able to navigate and handle the vessel, interpret weather and sea conditions, and use propulsion efficiently, but they also need to manage the crew, respond appropriately to changing conditions, and ensure the vessel makes a safe and efficient passage (Thomas, 2018).

Over the last 40 years, non-technical skills training programs have gradually become adopted by industries that have a safety critical component to their operations. Beginning with the introduction of crew resource management (CRM) in aviation, sectors such as medicine, maritime, military, rail, nuclear energy, and oil and gas, have all introduced non-technical skills training (Hayes *et al.*, 2021). Emergency management organisations initially showed interest in non-technical skills during the early 1990s following the tragic Storm King, Hackensack, and Cherry Road fires (IAFC, 2003). Since then, some European fire and ambulance services have developed programs for their frontline personnel such as the THINCS framework for UK fire and rescue incident command (Butler *et al.*, 2020); non-technical skills training of Norwegian helicopter emergency medicine service crews (Rasmussen *et al.*, 2019); and Team Resource Management training in a German fire brigade (Hagemann and Kluge, 2013).

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1. The checklists and A guide to non-technical skills in emergency management are available under teamwork tools - see <https://www.bnhcrc.com.au/driving-change/tools>

2. The CBAM and PSC were developed by Brooks and Curnin (2020a; 2020b).

3. These two non-technical skills training resources are available online. To request access to the workshop resources, please fill out this form: <https://forms.gle/SbtoHXo8xJU5MHzdA>

4. Further discussion of non-technical skills and EMNoTS can be found in A guide to non-technical skills for emergency management – see <https://www.bnhcrc.com.au/non-technical-skills-guide>



The key non-technical skills for emergency management have been articulated in the EMNoTS framework (Hayes *et al.*, 2021). EMNoTS is structured using the three-tier hierarchical taxonomy of categories, elements, and behavioural markers developed by Flin *et al.* (2008). EMNoTS comprises 7 non-technical skills categories, 16 elements (skill sub-components) and 44 behavioural markers. The non-technical skill categories (i.e., communication, cooperation, coordination, leadership, situation awareness, decision making, and stress and fatigue management) are the highest level units. Elements cluster closely related behavioural markers and provide more detail about the sub-components

that make up each skill. Behavioural markers provide operational level descriptions for each of the elements so it's clear how they apply in practice.

EMNoTS uses positive (favourable) and negative (unfavourable) markers to make more explicit the types of behaviours that are helpful or unhelpful for teams. The EMNoTS framework attempts to strike a balance between identifying important behaviours for emergency management while ensuring that it is concise enough to be used in real time operations (Hayes *et al.*, 2021). The EMNoTS framework is outlined in Table 1.

Table 1. Emergency Management Non-Technical Skills (EMNoTS)

Non-technical skill category	Element	Behavioural marker
Communication	Effective communication	<ul style="list-style-type: none"> <li>- Information is passed on in a timely manner</li> <li>- Information is passed on accurately</li> <li>- Team members ensure that information has been received and understood by others</li> <li>- <i>Inappropriate communication procedures are used*</i></li> </ul>
	Pro-active communication	<ul style="list-style-type: none"> <li>- Situation updates are provided</li> <li>- <i>Team members are not providing constructive comments to one another*</i></li> </ul>
Coordination	Clear roles, responsibilities and expectations	<ul style="list-style-type: none"> <li>- Actions are always carried out as expected</li> <li>- There is a clear and common purpose</li> <li>- Everyone has a common understanding relating to the operation</li> <li>- <i>The roles and responsibilities of team members are unclear*</i></li> </ul>
	Adjusting to demands	<ul style="list-style-type: none"> <li>- Everyone is adjusting to meet the demands of the situation</li> <li>- <i>Team members are not correcting mistakes made by others*</i></li> </ul>
Cooperation	Contributes to a positive team environment	<ul style="list-style-type: none"> <li>- Everyone shows willingness to work as a team</li> <li>- Team members are open and approachable</li> <li>- <i>Team members do not exhibit confidence and trust in each other*</i></li> </ul>
	Alignment of efforts and management of conflict	<ul style="list-style-type: none"> <li>- Everyone is following team objectives without opting for independence</li> <li>- Differences in opinions are resolved effectively</li> <li>- <i>Individuals are creating unnecessary conflicts*</i></li> </ul>
Situation awareness	Gathering and analysing information	<ul style="list-style-type: none"> <li>- Patterns and trends are identified in a timely manner</li> <li>- Team members ask others about the situation to improve their situational awareness</li> <li>- <i>The consequences of the options available are not identified*</i></li> </ul>
	Identifies contingencies, problems and expectations	<ul style="list-style-type: none"> <li>- Contingencies are discussed and future potential problems identified</li> <li>- <i>Expectations are not articulated (i.e., goals and potential event evolution)*</i></li> </ul>
	Sharing information and insights	<ul style="list-style-type: none"> <li>- Views are shared of the current situation with others</li> <li>- <i>Team members do not effectively participate in team briefing to build and shared situation awareness*</i></li> </ul>
Decision making	Sound, timely decision	<ul style="list-style-type: none"> <li>- Decisions are being appropriately prioritised</li> <li>- <i>Decisions are not being made on a timely basis*</i></li> </ul>
	Appropriate decision making approach	<ul style="list-style-type: none"> <li>- Appropriate decision making approaches are applied to the situation at hand (e.g., speed vs thoroughness)</li> <li>- <i>Plans are not readily adjusted as the situation changes*</i></li> </ul>
	Engaging others in decision making	<ul style="list-style-type: none"> <li>- Others' ideas and inputs are incorporated into decisions when practicable</li> <li>- There is flexible matching of communication style to the audience</li> <li>- <i>Decisions (and intent) are not clearly communicated*</i></li> </ul>

3 Cs of teamwork

The front and back end of decision making

Leadership	Creates a suitable team environment	<ul style="list-style-type: none"> <li>- Good behaviour is consistently modelled</li> <li>- <i>Others are not treated with respect*</i></li> <li>- Inclusive behaviours are modelled that enable others to speak up and offer suggestions and constructive comment</li> </ul>	Leadership
	Provides focus, direction and coordination	<ul style="list-style-type: none"> <li>- There is a focus on the important tasks at hand</li> <li>- Appropriate direction and guidance is provided</li> <li>- <i>Activities are not well-coordinated within the team*</i></li> </ul>	
Coping, stress and fatigue management	Manages pressure	<ul style="list-style-type: none"> <li>- A suitable level of focus is maintained when under pressure</li> <li>- <i>Team members do not remain composed when under pressure*</i></li> <li>- Team members remain flexible when faced with sub-optimal or novel conditions</li> </ul>	Stress and fatigue management
	Employs effective coping strategies	<ul style="list-style-type: none"> <li>- The effects of fatigue on oneself and others are recognised and appropriate actions are taken to manage this</li> <li>- Coping strategies are used to manage sub-optimal conditions (e.g., takes notes, prioritises tasks, delegates)</li> <li>- <i>Team members do not request (and offer) assistance from (to) others, when necessary*</i></li> </ul>	

Note: items italicised and marked with an \* are negative behavioural markers. Source: Adapted from Hayes *et al.* (2021) pp. 197-198

In addition to improving team effectiveness, sound non-technical skills contribute to a positive team climate that supports learning and helps reduce some of the friction of working under high levels of pressure. Supporting a team environment that is more conducive to employee and volunteer wellbeing is clearly desirable. Creating more favourable team conditions can assist organisations to recruit, train, and retain personnel. Furthermore, sound non-technical skills help to foster a team climate that enables team members to speak up, offer suggestions, raise concerns or report errors. This type of team environment is described as psychologically safe and supports individual, team, and organisational learning because members are more willing to share insights, raise concerns, and ask for clarification (Edmondson, 1999).

## 2.2 Non-technical skills and PUA Public Safety Training Package units

To show how non-technical skills training can be enhanced in ongoing operational training, a number of PUA PSTP units were reviewed, as well as the way they are delivered by agencies. Based on this review, recommendations are provided about additional non-technical skills content that could be included in these units.

The candidate PUA PSTP units discussed in this guide were selected by initially identifying 32 units which could benefit from enhanced non-technical skills content (Hayes and Bearman, 2021). Further examination identified that 14 of these units already have core content directly related to non-technical skills. The five units selected (from the 14) were chosen on the basis that these were principal training units for most emergency management organisations or provided good examples of how non-technical skills could be integrated into technically oriented units. Furthermore, recent research undertaken by the National Aerial

Firefighting Centre (NAFC) found that non-technical skills were rated as some of the most important skills by highly experienced air observers, air-attack supervisors and air operations managers (Hayes, 2021).

For convenience, the seven non-technical skills have been distilled into four clusters of skills, namely 1) teamwork (communication, coordination, and cooperation), 2) decision making (situation awareness and decision making), 3) leadership, and 4) stress and fatigue management. These are discussed in relation to the PUA PSTP units in the following sections.

### 2.2.1 The three Cs of teamwork:

#### Communication, coordination and cooperation

The first three skills of communication, coordination, and cooperation highlight the 'three Cs' of teamwork. These closely interrelated skills are fundamental to team members exchanging information, adjusting their actions and activities in conjunction with other team members, and putting team goals before individual ones. These skills serve social (relational) and cognitive (sharing task relevant information) purposes central to team functioning. For emergency management activities involving teamwork or meaningful interaction with others, the three Cs are critical skills, and are outlined as the non-technical skills that should be emphasised in training for the *PUATEA001 Work in a team* unit. However, these skills are important in all of the PUA PSTP units discussed in this guide: *PUAOPE020 Lead a crew*, *PUAOPE012 Control a Level 1 incident*, and *Air Observer* units (*PUAFIRO05/PUAFIRO06*).

### 2.2.2 Decision making and situation awareness

The second cluster captures decision making, with situation awareness being the front end of the process and decision making the back end. Situation awareness focuses on



building a sound understanding of what's going on and how the situation is likely to unfold (Hayes *et al.*, 2022c). Situation awareness is sometimes referred to as the front end of decision making as it focuses on the identification and diagnosis of the situation (Mosier and Fischer, 2010). Decision making is described as the back end as it focuses on aspects such as: solution generation, option formulation, evaluation, plan development, and execution. Effective decision making relies on good performance of other non-technical skills, such as the three Cs of teamwork. If a team member does not pass on crucial information in a timely or accurate manner, or has poor cooperation with others that undermine the sharing of information, a team may develop a faulty understanding of the situation. This can undermine the coordination of activities between team members and with other teams and lead to poor decision making.

Given that Crew Leaders and Level 1 Incident Controllers need to soundly assess the situation and make suitable decisions to enable their crew to complete tasks or resolve an incident, the two closely related skills of situation awareness and decision making are critical. The discussion of the Crew Leader and Level 1 Incident Controller training units will emphasise development of these skills. Air Observers play a crucial role in developing and maintaining situation awareness on behalf of the wider incident management (or prescribed burn) team. This means that it is important that they appreciate what the observed conditions and phenomena may mean for the development of the hazard and the potential impact on nearby communities. Air Observers are teamed with pilots and need to maintain good situation awareness of the various factors that can put their aircraft and mission at risk. The discussion of Air Observer training will emphasise the development of situation awareness skills, its link to sound decision making, and the three Cs.

### 2.2.3 Leadership

The third skill cluster is leadership. Leadership training plays an important role in shaping the effectiveness of a person leading a team or controlling an incident. The two elements of leadership that are particularly important for emergency management settings are 1) creating a suitable team environment and 2) providing focus, direction, and coordination (see Table 1). There can be a tendency for Crew Leaders and Incident Controllers to focus on the second more 'doing' focused element (focus, direction and coordination). Building teams that members are keen to continue working in and that enable members to contribute their best work requires leaders to model a range of appropriate behaviours to create a suitable team environment. The discussion of Crew Leader and Level 1 Incident Controller training units will emphasise development of these elements of leadership.

### 2.2.4 Management of stress and fatigue

The final skill type is the management of stress and fatigue. Unfortunately, this is a common issue for all emergency management teams and can be a particular issue for volunteer members. Stress and fatigue blunt team members' non-technical skills and this reduces cooperation, undermines communication, disrupts coordination, and compromises both situation awareness and decision making. The discussion of Crew Leader, Level 1 Incident Controller, and Air Observer training units will emphasise the importance of managing stress and fatigue in teams.

## 2.3 Developing non-technical skills: A three-phase approach

Flin *et al.* (2008) draws on the CRM training literature to outline a three-phase approach to developing non-technical skills comprising: (i) awareness, (ii) practice and feedback, and (iii) continual reinforcement. The first phase focuses on developing trainees' knowledge of the key concepts and theory of non-technical skills. This phase develops a common understanding and language for non-technical skills and is delivered via classroom-based activities such as lectures, role play, case studies, and videos of relevant incidents. The second phase focuses on enabling trainees to practice and receive feedback to help improve their use of these non-technical skills in various situations. This second phase typically uses simulation such as role play and can also be field based. The third phase provides ongoing refresher training in conjunction with organisational practices such as workplace auditing and learning and development activities to ensure that candidates continue to practice the use of these skills and maintain a positive attitude towards the use of these skills. This third phase addresses the concern that without regular reinforcement, practices and attitudes tend to decay (Helmreich *et al.*, 2009; Woodman *et al.*, 2021).

This guide will largely focus on the first two phases of developing awareness and providing opportunities for practice and feedback. However, in the last section, some suggestions are provided to help organisations provide opportunities for continual reinforcement.

## 2.4 Non-technical skills in the classroom

Non-technical skills are not only useful when considering how people manage emergencies, they are also critical in the actual training and learning environment. Thus, instructors can model and use key non-technical skills to create an environment conducive to learning. A training workshop or instructional session has many of the same features as workplace teams. The instructor is leading and facilitating the achievement of learning outcomes for the workshop participants (the team). The workshop participants' role is to

cooperatively engage in the activities to enable their individual and collective learning. The instructor's communication skills are central to explaining key concepts, providing clear instructions for skill building and enabling feedback so that participants and the instructor can identify what they are doing well and what adjustments they need to make.

There are two breakout boxes at the end of this section with some additional material on instructional feedback and coaching micro-skills. Micro-skills are simple behaviours that instructors can be used to create more effective relationships with learners and improve the quality of these conversations.

From an instructor's perspective, the two main elements of their leadership within the workshop are to create a suitable environment and to provide focus, direction, and coordination (see Table 1, Leadership).

The first element can be supported by the instructor using inclusive and appropriate behaviours to create a suitable environment that encourages full learner participation. Course participants also learn from each other. So, enabling a positive environment is important to help encourage and foster the development of the skills under instruction. For example, in role play trainees can benefit from participating, observing or providing feedback to peers. This creates a psychologically safe environment that enables participants to freely ask questions, clarify points, and contribute fully to the training session. Creating this type of environment also has the advantage of supporting adult learning principles, such as capitalising on learners' broader experiences (Knowles *et al.*, 2015).

Utilising the second leadership element, instructors can model and use behaviours that focus learners' efforts on the important aspects of the topic being delivered, and when needed, direct or re-direct learners' attention, and coordinate the delivery (sequence) of the instructional activities to help maximise learning opportunities.

A second non-technical skill relevant to instruction is developing situation awareness of the overall workshop and participants' circumstances and how they are progressing in their learning of the new skills and knowledge. Understanding the amount of relevant experience, the type of emergency management work activities undertaken by learners, and any specific learning needs can assist an instructor to reference more suitable examples and to make any required instructional adjustments. Careful observation, use of some simple questions, and encouraging learners to discuss the aspects they need help on can enable instructors to tailor their teaching.

Instructors ensuring that their own working knowledge of non-technical skills is sound will enable them to inject relevant examples and anecdotes into their training delivery. *A guide to non-technical skills in emergency management*<sup>5</sup> provides helpful guidance on this.

5. Hayes *et al.* (2022) – see <https://www.bnhcrc.com.au/non-technical-skills-guide>.

### Breakout Box 1: Feedback in instructional settings

Educational researcher John Hattie (2009) has identified that feedback is one of the most powerful influences on learner achievement. Although feedback is often thought about in terms of instructors providing feedback to learners, Hattie observes that feedback is most powerful when it is from the learner to the instructor. When instructors seek or are at least show they are receptive to feedback, they can gain insights as to what learners know, what learners understand, the errors learners are making, the misperceptions learners have, and whether learners are engaged. These insights enable instruction and learning to be synchronised and more effective.

A helpful feedback model for instructors is provided by Hattie (2009). This model suggests that effective feedback answers three important questions central to learning: (i) where am I going? (learning intentions/goals/success criteria), (ii) how am I going? (self-assessment and self-evaluation), and (iii) where to next? (progression, new goals). These three questions can be asked at four levels covering task, process, self-regulatory and the self. An ideal learning environment enables an instructor and learner to seek answers to these questions. Figure 1 below shows Hattie's model which helps explain how feedback works.

Hattie's model highlights that effective feedback not only helps the learner understand how they are doing, but also to gain additional insights on the processes and self-regulation required to perform a task more effectively.

### Breakout Box 2: Use of coaching micro-skills

The AFAC Coaching and Mentoring: Research Insights into Good Practice (Hayes, 2018) provides helpful guidance on the use of micro-skills. Micro-skills such as active listening, asking good questions and providing feedback are behaviours that help facilitate more effective conversations, something that is central to teaching, mentoring or coaching others (Ridley *et al.*, 2011). Moreover, these skills can help instructors to develop stronger rapport with their learners.

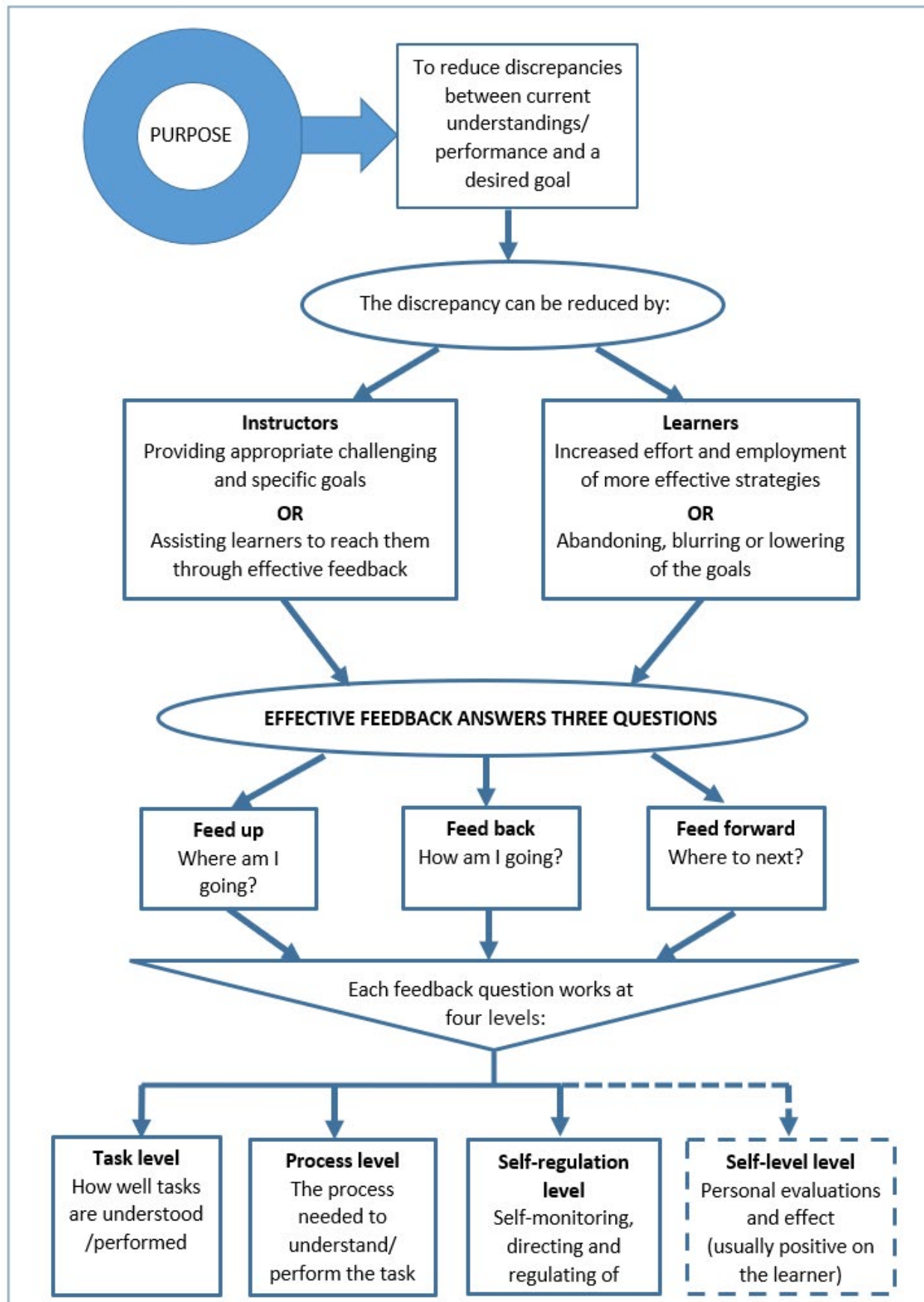


Figure 1. A model of feedback (Adapted from Hattie, 2009, p. 176)

## 2.5 Additional resources

Butler P C, Honey R C and Cohen-Hatton S R. 2020. *Development of a behavioural marker system for incident command in the UK fire and rescue service: THINCS. Cognition, Technology and Work*, 22(1), 1-12. <https://doi.org/10.1007/s10111-019-00539-6>

Cardiff University CPD Unit. 2022. *THINCS behavioural marker system: A tool to support safe fire and rescue service incident command [Video]*. YouTube. [https://www.youtube.com/watch?v=3mq\\_Xm4NmPk](https://www.youtube.com/watch?v=3mq_Xm4NmPk)

Hayes P. 2018. *Coaching and mentoring - Research insights into good practice*. AFAC.

## Chapter 3: Embedding non-technical skills in the PUA Public Safety Training Package

Australian emergency management organisations base much of their training on the PUA Public Safety Training Package. This suite of vocational training offers a suite of circa 255 units of competency spanning from Certificate 2 to Graduate Diploma level.<sup>6</sup> Emergency management organisations select the units of competency most relevant to the hazards they are responsible for or otherwise manage. These units cover the broad range of competencies required by their personnel from initial training through to specialist and senior incident management roles. It is important to note that even though many of the PUA PTSP units have titles that suggest their content is focused on technical skills, some of these units require learners to develop complementary non-technical skills to become proficient. For example, proficiency in navigation requires skills in developing and maintaining situation awareness. As might be expected, there are a number of common core units adopted by all organisations (e.g., work in a team, lead a crew, incident management).

For each of the selected PUA PSTP units, the authors have worked with an emergency management organisation to develop the case studies. This practitioner input has helped refine the suggested approach and ensured that the materials developed are practical. The case studies provided in this guide are the products of this collaboration. To help identify the most relevant non-technical skills for each training resource, the corresponding unit of competency was reviewed and analysed. As outlined in Section 2.2, the non-technical skills selected for each training unit were selected from EMNoTS.

This guide focuses on activities and resources that instructors can use to help build learners' awareness of non-

technical skills, and practice and obtain feedback on their own use of these skills. Additional material for instructors, short vignettes, practical activities, and BNHCRC tools will be used to develop awareness and provide examples and guidance on the non-technical skills relevant to each unit.

As noted in the Introduction, an important principle to emphasise for learners is the interdependent relationship between technical and non-technical skills. It is recommended that early in the workshop instructors provide an overview of the concept of non-technical skills to help learners recognise and appreciate their value for enabling effective emergency management team performance. Instructors play a key role in modelling non-technical skills and highlighting how these skills should be used in operational settings. Section 8 outlines some resources that will be helpful for instructors to learn more about non-technical skills and how they can incorporate these in their own workshop instruction and interaction with learners.

## Chapter 4: Case study 1 – PUATEA001 Work in a team

The first case study focuses on *PUATEA001 Work in a team*, and considers how Queensland Fire and Emergency Services (QFES) can strengthen and better integrate the non-technical skills content of this unit.

This introductory unit is used to on-board and integrate new personnel into emergency management organisations (AFAC, 2020). Some Australian emergency management organisations (such as QFES) combine this training with other foundational units such as *PUACOM001 Communicate in the workplace*, *PUAOPE013 Operate communications systems and equipment*, *PUAWHS001 Follow defined work, health and safety policies and procedures*, *PUACOM002 Provide services to clients*, and *PUATEA004 Work effectively in a public safety organisation*.<sup>7</sup>

This cluster of units forms the foundational training for volunteer firefighters. QFES have enabled rural fire service brigades to play a central role in the training, development and assessment of their members. Creating flexibility for local brigades to be able to deliver this training has become an important principle. Depending on how frequently brigades meet, completion of this training by learners can take up to six months.

The QFES Training and Assessment Guide (VESC005) segments the curriculum into four sections, each containing

6. Training package details – see <https://training.gov.au/Training/Details/PUA>

7. Further guidance and examples of clustering training units is provided in the AFAC Learning Strategies Guide for Fire and Emergency Services Organisations – see <https://www.aidr.org.au/media/7085/learning-strategies-guide.pdf>.

between two and four topics (see Table 2). QFES notes that the amount of time allocated for each topic is based on the needs of the brigade and learners. QFES provide a suggested schedule packaging the content and assessment requirements into 11 topic areas.

**Table 2. Summary of the Working in the Rural Fire Service training package**

Section	Topics
1	1: Volunteering in the Rural Fire Service 2: Introduction to foundation skills 3: Queensland Fire and Emergency Services 4: Roles, responsibilities and functions
2	5: Work health and safety 6: Health and wellbeing
3	7: Communicating with others 8: Interacting with others 9: Workplace behaviour
4	10: Stakeholder engagement 11: Operate communication systems and equipment

Of the training content shown in Table 2, most of the *PUATEA001 Work in a team* material is covered in Section 3. However, some of the other topic areas provide an opportunity to incorporate discussion of non-technical skills.

## 4.1 Unit of competency for PUATEA001 Work in a team

The *PUATEA001 Work in a team* unit of competency outlines the scope of this training. It highlights that the focus is on

how to: 1) contribute to team activities, 2) share knowledge and information, and 3) give and receive support to or from team members. Table 3 sets out selected performance criteria, performance evidence, and knowledge evidence for this unit standard. Most of the selected elements, criteria, and evidence relate directly to the non-technical skills of communication, coordination, and cooperation (i.e., the three Cs of teamwork).

## 4.2 Description of the additional non-technical skills content

This section outlines proposed content and activities to further integrate non-technical skills into this training unit. A summary of these activities and suggested location in the *QFES Learner Guide* is provided at the end of this section in Table 4.

### 4.2.1 The concept of non-technical skills

A good starting point to introduce the concept of non-technical skills is following the workshop's initial ice-breaker activity. During the debriefing for this activity instructors can make the link between non-technical skills and team effectiveness. One way of doing this is to ask workshop participants to consider why ice breakers are used in training and other workplace activities. The importance of building rapport highlights how work teams are influenced by the same social factors that shape human interaction and relationships outside of work (Hayes *et al.*, 2022c). For example, people tend to be more reluctant to ask questions to clarify a task from someone that they do not know or have a poor relationship with. As noted earlier, there is

**Table 3. Selected criteria from PUATEA001 Work in a team relevant to non-technical skills**

Elements and performance criteria	Performance evidence	Knowledge evidence
1. Contribute to team activities 1.4 Assistance in the completion of tasks is requested from other team members 1.5 Team members are assisted to ensure efficient and safe completion of tasks, in accordance with organisational policies and procedures 1.6 Participation by team members is encouraged and acknowledged 1.8 Team meetings are attended regularly, punctually and are contributed to, in accordance with organisational procedures 2. Share knowledge and information 2.1 Information related to work is communicated with team members to enable efficient completion of tasks, in accordance with the organisational policies and procedures 2.2 Knowledge and skills are shared between team members 3. Give and receive support to or from team members 3.1 Feedback or assistance is given to other team members in an appropriate and timely manner 3.3 Feedback from other team members is acted upon, in accordance with organisational procedures	<ul style="list-style-type: none"> <li>- displaying interpersonal skills and encouraging team members</li> <li>- giving and receiving support to and from team members</li> <li>- listening and using a variety of communication skills</li> <li>- providing appropriate suggestions, feedback and information to team members</li> <li>- reporting information</li> <li>- requesting assistance from appropriate personnel</li> <li>- sharing knowledge and information</li> </ul>	<ul style="list-style-type: none"> <li>- composition of teams including roles and responsibilities of members</li> <li>- non-operational and operational communication processes</li> <li>- techniques for assisting and supporting others</li> <li>- techniques for giving and receiving feedback in a constructive manner</li> </ul>



considerable evidence from public inquiries and research that non-technical skills are critical to effective team performance. Non-technical skills such as communication, coordination, decision making, and the adverse effects of stress and fatigue have all been identified as problematic in both research and public inquiries (e.g., Bearman *et al.*, 2015; Johnstone, 2002; Schapel, 2007; Teague *et al.*, 2010). Teams working at all levels, spanning from the incident ground to state coordination, have experienced these problems.

## 4.2.2 Overview of non-technical skills

Early in the QFES *Learner Guide* for this unit (p. 26) the topic of technical and non-technical (soft) skills is discussed in a section titled 'Your contribution and our expectations' (see Figure 2). This provides a suitable point to introduce the three skill types (technical, non-technical, and personal) highlighted in the introduction. The QFES *Learner Guide* outlines the role of the three types of skills, and an example of each skill type is highlighted in Figure 2. This is a suitable point to reinforce the interdependency between these skill types and to ask for examples from learners of situations where they have observed poor non-technical skills undermining team performance. During this discussion the instructor could explain the differences between the types of skills and highlight that even though the emphasis in PUA PSTP units tends to be on technical skills, non-technical and personal skills are important. It is useful to highlight how personal skills such as being flexible and adaptable, safety consciousness, and persisting when things become difficult are clearly valuable and to some degree can be learnt.

## 4.2.3 The three Cs of teamwork: Cooperation, coordination, and communication

The close alignment of this unit to the three Cs suggests that the Team Process Checklist<sup>8</sup> (TPC) would be a valuable tool to help introduce trainees to these non-technical skills in a simple operational way. In terms of building awareness of these skills, the TPC can be used early in the workshop to introduce the general concept of non-technical skills and to outline the team member behaviours conducive to communication, coordination, and cooperation. Appendix A provides a copy of the TPC. An important point to emphasise during the introduction of the three Cs is that these are interdependent skills and that poor performance in one can compromise the others. For example, if a team member fails to inform others of important information, the team will not be able to adjust their actions based on this new information. The metaphor of a three-legged stool can be used to explain this relationship. If a stool is missing a leg it will be unstable and fall over. The 3Cs are important within and between teams. A simple example could be a search and rescue team failing to communicate effectively which areas they have covered; which can result in duplication of effort and delays in finding the missing person. This occurred during the early phases of the response to Hurricane Katrina (Cooper and Block, 2006; Garnett and Kouzmin, 2007).

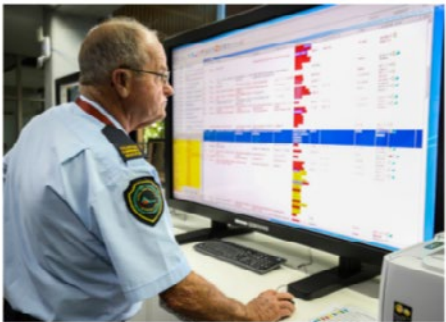
To bring this material to life, the instructor could ask trainees to watch a short video such as the following example from the *Guardians of the Galaxy* (2014) film (see <https://www.youtube.com/watch?v=82ycrfGAv-A>). This video clip shows the Guardians team struggling with the three Cs of

8. Team Process Checklist – see <https://www.bnhcrc.com.au/teamprocesschecklist>

### Your contribution and our expectations

As an RFS volunteer, you will learn many new skills, such as the use of communications equipment and different firefighting techniques. You will also have an opportunity to bring skills you *already* have to the role, as well as improve these skills over time.

Many skills required as an RFS volunteer are just as important as knowing how to operate a piece of equipment; these skills are sometimes referred to as *soft skills*. Soft skills can include:



Technical skill

- effective communication
- conflict resolution
- flexibility
- the ability to listen and to follow instructions
- the ability to work independently and with others
- being supportive and offering constructive feedback, and
- the ability to work safely and under pressure within stated timeframes.

Non-technical skill

Personal skill

Non-technical skill

Figure 2. QFES *Learner Guide*: Discussion of non-technical skills (p. 26).

(Source: QFES, 2020)



teamwork during planning of their prison break. Workshop participants could use a copy of the TPC to help diagnose the issues at play in the Guardians team and discuss their answers. This activity could be undertaken after the *Learner Guide* Learning Activity 4.4 which asks workshop participants to list three characteristics a good team player would have (p. 58). There is the opportunity to ask workshop participants to reflect on the characteristics they selected and which of these are non-technical skills before commencing the Guardians team prison break activity.

#### 4.2.4 Examining what good communication looks like

The *Learners Guide* provides a good overview of communication. The discussion highlights various functional aspects of communication, such as: timing, audience, communication channels (methods), non-verbal communication, active listening, and types of questions. This creates an opportunity for workshop participants to practice their use of active listening and providing information to others.


The first simple exercise that could be used is called the *Stop listening exercise* (Norman, 2018). In this activity, the workshop participants are split into two groups. One group remains inside the training room and is asked to think about a topic they are very interested in to discuss (e.g., their favourite sport, film or pastime). The group who move outside the training room are briefed to act as active listeners, albeit with a slight twist that after about 45 seconds they stop listening (this may need to be demonstrated). Bring the participants back into the room and pair them to listen actively with a participant from inside the room who will talk about a topic they are interested in. Typically, the speakers become quite frustrated once the listeners disengage, creating the opportunity for a useful debrief on the importance of listening and engaging in discussions. This activity can be discussed collectively to highlight the importance of active listening and how it supports better understanding, builds rapport and trust, and makes it more likely that the other person will reciprocate.

An alternative activity that could be used is the *Listener and talker exercise* (Norman, 2018). In this exercise, workshop participants are paired up. The 'talker' is asked to spend about three minutes describing what they want from a holiday, but without naming the destination. The 'listener' is asked to listen attentively and, once the talker has finished their description, make a tentative pitch of what they think might be a suitable holiday destination. The pair can then review how well the listener has demonstrated active listening and how well they pitched (communicated) their understanding of the talker's requirements. The pair swap roles and repeat.

These activities could be run after Learning Activity 7.1 *What does good communication mean to you?* (p.98), following the discussion of *Active listening* (p. 109-110), or after *The importance of active listening* (p. 119).

#### 4.2.5 The interplay between communication and cooperation

Learning Activity 8.1 (p. 121) asks workshop participants to consider how their attitudes and feelings (negative and positive) shape their verbal and non-verbal communication behaviour (see Figure 3). This *Learner Guide* activity highlights how communication behaviours can affect others. A workshop activity that can be used to consolidate these insights is to pair participants and ask them to compare and discuss the verbal and non-verbal cues they exhibit depending on how they are feeling. Then, ask participants to discuss how these cues are likely to shape interaction with others, cooperation (or conflict), and team functioning. Lastly, the pairs are asked to report back to the workshop. During the debriefing of this activity, the instructor can draw on examples from learners (and their own) of the types of positive and negative cues that might be seen in teams. It is particularly useful to explore how negative cues can be problematic for sharing information, cooperation, and team functioning, and how stress and fatigue generally make us more irritable and less socially attuned to how we interact with others. These can be useful markers for how well team members may be faring (refer back to *Stress and fatigue* (p.85-88) in the *Learner Guide*).



### Learning activity 8.1

It is sometimes tough for us to recognise our own behaviour, especially when we are feeling negative emotions, as our own state of mind overrides any thought for its effect on others.

Thinking back over what you learnt about verbal and non-verbal communication, make a brief list of cues (just 3 things) that you recognise about your own behaviour. These cues will not be the same for everyone; however, it is important to recognise how your behaviour can affect others.

Verbal cues I give when I am feeling:		Non-verbal cues I give when I am feeling:	
Negative	Positive	Negative	Positive

Figure 3. Learning activity 8.1: Impact of positive and negative emotions on communication.

(Source: QFES, 2020)

#### 4.2.6 Summary of the suggested additional activities

Table 4 shows a summary of the additional activities suggested for *PUATEA001 Work in a team unit*.

Table 4. Summary of the proposed additional non-technical skill activities for *Work in a team*

Learner Guide section and page number	Non-technical skill(s)	Learner Guide learning activity	Brief description of the additional activity or material
Following icebreaker activity	Introducing the concept of non-technical skills	N/A	Identify how work teams are influenced by the same social factors that govern human interaction and relationships outside of work.
Topic 1: Volunteering with the Rural Fire Service, p. 26	Overview of non-technical skills	N/A	Introduction to non-technical skills. Provide overview of how to be effective, teams require members with technical, non-technical, and personal skills.
Topic 4: Roles, responsibilities and functions, p. 58	Three Cs of teamwork: - Cooperation - Coordination - Communication	Learning Activity 4.4 List 3 characteristics of a good team player	Introduce the Team Process Checklist (TPC) to diagnose teamwork issues at play in the Guardians of the Galaxy team.
Topic 7: Communicating with others, p. 96 or p. 109-110 Topic 8: Interacting with others, p. 119	- Communication	Learning Activity 7.1 What does good communication mean to you? Or following Active listening (p. 109-110) Or following The importance of active listening (p. 119)	Examining what good communication looks like. Use the Stop listening or Listener and talker exercise to highlight the importance of active listening.
Topic 8: Interacting with others, p. 121	- Cooperation - Communication - Managing stress and fatigue	Learning Activity 8.1 Verbal and non-verbal cues I give when feeling negative or positive	The interplay between communication and cooperation. Use Learner Guide Activity 8.1 to emphasise the link between positive and negative emotions and communication. There is also the opportunity to highlight how stress and fatigue tends to undermine team members' ability to communicate.

## 4.3 Additional resources

B. Norman. 208. *Trainers' Tips: active listening exercises*. TrainingZONE. <https://www.trainingzone.co.uk/develop/cpd/trainers-tips-active-listening-exercises>

Tedx Talks. 2015. *The power of listening | William Ury | TEDxSanDiego* [Video]. Youtube. <https://www.youtube.com/watch?v=saXfavo1OQo>

AFAC. 2019. *Learning strategies guide for fire and emergency services organisations*. Australasian Fire and Emergency Service Authorities Council. <https://www.aidr.org.au/media/7085/learning-strategies-guide.pdf>

McLennan J, Strickland R, Omodei M and Suss J. 2014. *Stress and wildland firefighter safety-related decisions and actions*. In C Owen (Ed.), *Human factors challenges in emergency management: Enhancing individual and team performance in fire and emergency management* (pp. 19-33). Ashgate.

## Chapter 5: Case study 2 – PUAOPE020 Lead a crew and PUAOPE012 Control a Level 1 incident

These two units focus on developing the core skills to effectively lead crews and control Level 1 incidents. Personnel undertaking these units have typically been working or volunteering in the sector for a few years. The NSW National Parks and Wildlife Service (NPWS) combine the training of these two units to help prepare their crew leaders to perform both roles. Three additional units included in this training package are: *PUATEA002 Work Autonomously*, *PUAFIR003 Suppress Fire*, and *PUAOPE015 Conduct briefings and debriefings*. This case study considers how NPWS can strengthen and better integrate the non-technical skills content of these units in their combined training program. Compared with *PUATEA001 Work in a team*, the *PUAOPE020 Lead a crew* and *PUAOPE012 Control*

a *Level 1 incident* units require a broader range of non-technical skills to enable people to undertake the operational leadership of a crew, size up an incident, make decisions and control an incident.

The NPWS training is based on a five-day course that integrates classroom learning with practical and field-based activities. This enables learners to practice and develop core

skills in on-the-job settings. Examples of these activities include leading and participating in briefings and debriefings, providing situation reports via radio, predicting and mapping fire behaviour, and deciding and implementing fire suppression strategies and tactics. Most of the knowledge content is delivered during the first half of the course. Table 5 provides an overview of this program.

Table 5. Summary of the NPWS Crew Leader and *Control a Level 1 incident* training

Crew Leader 5 Day Program				
Day 1: 0830 - 1700	Day 2: 0800 – 1700	Day 3: 0800 - 1700	Day 4: 0800 - 1700	Day 5: 0800 - 1700
Session 1 -Introduction - Preparation, welcome - Housekeeping - Tech introduction (RTO member) - Course overview Session 2 - Crew Leader role and responsibilities	Changeover briefing CL1 to CL2 Daily briefing – <b>part of Assessment 1</b> IMT to CL2>CL2 to CMs Session 6 – Suppress Wildfire - Fire behaviour Theory	Changeover briefing CL2 to CL3 Daily briefing – <b>part of Assessment 1</b> IMT to CL3>CL3 to CMs Session 10 – Fire Suppression - Strategies and tactics <b>Assessment 6: Scenario Lead a crew (First response)</b>	Changeover briefing CL3 to CL4 Daily briefing – <b>part of Assessment 1</b> IMT to CL4>CL4 to CMs Session 11 – Control line construction <b>Assessment 7: Control line construction rates</b>	Changeover briefing CL4 to CL1 Daily briefing – <b>part of Assessment 1</b> IMT to CL4>CL1 to CMs <b>Assessment 11: Major field exercise (ALL)</b>
Morning tea: 1000 - 1020	Morning tea: 1000 - 1020	Morning tea: 1000 - 1020	Morning tea: 1000 - 1020	Morning tea: 1000 - 1020
Session 3 – Leadership Session 4 – Incident Action Plans (IAPs)	Session 7 - Fire Behaviour Prediction <b>Assessment 2: OFH (use OFH Guide 3rd Ed)</b> <b>Assessment 3: Fire Behaviour Prediction (Use Macarthur Meter/ App)</b>	<b>Practice Field Assessment – ALL Suppress wildfire</b>	Session 12 – Lighting a back burn <b>Assessment 8: Lighting a back burn</b>	<b>Assessment 11: Major field exercise (ALL) cont.</b>
Lunch: 1230 – 1300	Lunch: 1230 – 1300	Lunch: 1230 – 1300	Lunch: 1230 – 1300	Lunch: 1230 – 1300
Session 5 – Fireground Communication - Briefings (SMEACS) - Daily briefing (IMT to CL1 >CL2 to CMs) Debriefs (end of shift)	Session 8 – Fire Behaviour Prediction (Mapping) <b>Assessment 4: Fire Behaviour Prediction Mapping (Cooperabung Range Rd)</b> <b>Assessment 5: Select a route (Tinebank Mountain)</b>	<b>Practice Field Assessment cont.</b>	Session 13 – ALL <b>Assessment 9: Theory test</b> Session 14 – Lessons learnt <b>Assessment 10: Plantation fire</b>	Course wrap up and review Post-course requirements <b>(Assessment 12: WRB and additional evidence)</b>
Afternoon tea: 1500 - 1515	Afternoon tea: 1500 - 1515	Afternoon tea: 1500 - 1515	Afternoon tea: 1500 - 1515	Afternoon tea: 1500 - 1515
Session 5 cont. - Situation Reports (SitReps) - Practice SITREP (using a radio) Debrief – <b>part of Assessment 1</b> CL1 with CMs>CL1 to IMT Review of the day Q+A	Session 9 – OFH and Debrief review. Field exercise – ALL Debrief – <b>part of Assessment 1</b> CL2 with CMs>CL2 to IMT Review of the day Q+A	Debrief – <b>part of Assessment 1</b> CL3 with CMs>CL3 to IMT Review of the day Q+A	Session 15 – Mop-up and patrol Session 16 – Post-incident actions Debrief – <b>part of Assessment 1</b> CL4 with CMs>CL4 to IMT Review of the day Q+A	

Discussions with the instructors identified they provide learners with a significant amount of additional narrative and contextualisation that the NPWS training resources do not capture. The need to ensure that training resources accurately reflect what instructors actually deliver is an ongoing challenge for many organisations in the emergency management sector. Without this documentation, it is difficult to assess how much time is spent on non-technical skills. Including non-technical skills in training needs to be a planned and deliberate activity and training resources should reflect this.

## 5.1 Unit of competency for Lead a crew and Control a Level 1 incident

The *Lead a crew* unit of competency is focused on how to: 1) prepare a crew for tasks, 2) lead crew to perform tasks, and 3) conclude tasks. Table 6 sets out selected performance criteria, performance evidence, and knowledge evidence for this unit standard. A number of the selected elements, criteria, and evidence relate directly to the non-technical skills of communication, coordination, and cooperation (i.e., the three Cs of teamwork). In addition, the other non-technical skills of leadership, situation awareness, decision making, and managing stress and fatigue are all relevant here.

The *Control a Level 1 Incident* unit is focused on how to: 1) receive incident response request, 2) proceed to an incident, 3) establish control, 4) assess the incident, and 5) develop and implement an incident action plan (IAP). Table 7 sets out selected performance criteria, performance evidence, and knowledge evidence for this unit standard. Like the unit *PUAOPE020 Lead a crew*, a number of the selected elements, criteria, and evidence for *PUAOPE012 Control a Level 1 incident* relate directly to the non-technical skills of teamwork (communication, coordination, and cooperation), with the other non-technical skills (leadership, situation awareness, decision making, and managing stress and fatigue) also relevant.

As may be expected, the *Lead a crew* unit focuses on operational crew management activities whereas the *Control a Level 1 incident* unit focuses more on the higher incident level. Both of these units require the full suite of non-technical skills identified in EMNoTS. However, the greater complexity and scope of the *Control a Level 1 incident* unit indicates that it requires more developed leadership, situation awareness, decision making, and stress and fatigue management skills than the *Lead a crew* unit.

Table 6. Selected criteria from *PUAOPE020 Lead a crew* relevant to non-technical skills

Elements and performance criteria	Performance evidence	Knowledge evidence
1. Prepare crew for tasks 1.2 Additional information, equipment and resources are obtained, as required 1.3 Crews are briefed and tasks are allocated 2. Lead crew to perform tasks 2.2 Progress towards completion of tasks is monitored and adjustments are made, as required 2.4 Communication is maintained with supervisor, crew members and other personnel in the work/incident area 2.5 Safety, health and wellbeing of crew members is monitored and appropriate action is taken 3. Conclude tasks 3.2 Crew and equipment are made ready for further tasks 3.3 Crew is debriefed, in accordance with organisational procedures	<ul style="list-style-type: none"> <li>- briefing and debriefing crew members</li> <li>- leading crew to perform tasks</li> <li>- maintaining shared situational awareness</li> <li>- monitoring and reporting on progress</li> <li>- obtaining briefing from designated officer</li> <li>- preparing crew for tasks</li> </ul>	<ul style="list-style-type: none"> <li>- progress monitoring (plan, do, check and adjust)</li> </ul>

Table 7. Selected criteria from *PUAOPE012 Control a Level 1 incident* relevant to non-technical skills

Elements and performance criteria	Performance evidence	Knowledge evidence
<p>1. Receive incident response request</p> <p>1.2 Incident information is obtained and assessed to inform decision making processes</p> <p>1.3 Location of incident and most appropriate route are ascertained</p> <p>2. Proceed to incident</p> <p>2.1 Personnel, equipment and transport resources are dispatched promptly, consistent with the nature of the incident and information available</p> <p>2.2 Communications are established and maintained, in accordance with organisational procedures</p> <p>2.3 Appropriate route to the incident is followed to minimise response time</p> <p>2.4 Hazards en route are recognised and negotiated to minimise risk</p> <p>2.5 Observations are made en route to assist with incident assessments</p> <p>3. Establish control</p> <p>3.1 Control is assumed and communicated, in accordance with designated responsibility and authority</p> <p>3.2 Communications are established, in accordance with organisational policies and procedures, to provide for exchange between the incident controller and involved parties</p> <p>4. Assess incident</p> <p>4.1 Initial assessment of the incident is carried out promptly</p> <p>4.2 Hazards and risks are assessed, monitored and minimised or controlled</p> <p>4.4 Need for additional resources is identified and requested, in accordance with organisational policies and procedures</p> <p>4.6 Incident potential is assessed and transition to a higher level incident is considered</p> <p>5. Develop and implement Incident Action Plan (IAP)</p> <p>5.1 IAP appropriate to the incident is developed based on available information, in</p> <p>5.2 Objectives, strategies and tactics are determined, and tasks are allocated to personnel</p> <p>5.3 Incident personnel are briefed clearly, accurately and in a timely manner</p> <p>5.4 Incident information is communicated to key stakeholders</p> <p>5.5 IAP is implemented, continually monitored, reported on and reviewed in the light of additional information and is communicated to participating and pertinent personnel and participating organisations</p> <p>5.7 Response is adjusted in a timely manner</p> <p>5.8 Leadership, supervision and team welfare are provided to ensure performance</p> <p>5.9 Changes to the IAP are communicated to participating personnel and organisations</p>	<ul style="list-style-type: none"> <li>- assessing incident including management of risks</li> <li>- communicating with personnel and stakeholders</li> <li>- conducting briefings and debriefings</li> <li>- developing and maintaining shared situational awareness</li> <li>- developing, implementing and monitoring a written incident action plan</li> <li>- directing and supervising incident activities</li> <li>- establishing control</li> <li>- proceeding to the incident</li> <li>- supervising post response operations</li> </ul>	<ul style="list-style-type: none"> <li>- decision making processes in time critical and dynamic situations</li> <li>- processes for briefings and debriefings</li> </ul>

## 5.2 Description of the additional non-technical skills content

This section outlines proposed content and activities to further integrate non-technical skills into training for these units. A summary of the activities and suggested sessions they occur in during the Crew Leader five-day program (i.e., combined *Lead a crew and Control a Level 1 incident* training) is provided at the end of this section in Table 9.

### 5.2.1 Introduction to non-technical skills

The first training session discussing relevant content is Session 2 and this is titled *Crew leader role and responsibilities* (see Figure 3). This session discusses effective teams, crew leader and controller responsibilities, situation awareness, allocating tasks, and managing and improving performance of work. In addition to the material that is currently being used, coverage of non-technical skills could be strengthened by providing an overview of the technical and non-technical skills that emergency management team members require (see Introduction) and the interdependent nature of these different skills. It would also be helpful to introduce the seven non-technical skills identified in EMNoTS and provide a brief explanation of this framework. This overview of EMNoTS can help set up subsequent discussions in the following sessions and field-based activities. EMNoTS can be used to help instructors provide more consistent language in their feedback and assist learners to better understand the types of non-technical skills (and behaviours) that contribute to more effective teams.

### 5.2.2 Situation awareness

The second part of Session 2 discusses situation awareness. The current Session 2 workshop slides use some photographs of planned or back-burning operations to highlight some of the situation awareness issues. However, the focus is on largely on the risks and hazards present in the environment and to the crew<sup>9</sup>. This discussion provides a somewhat limited perspective on situation awareness and could be strengthened by prompting learners to consider a broader set of concerns, such as: crew (and crew leader) stress and fatigue, crew experience and skill levels, adequacy of resourcing, forecast weather, and influence of topography, slope and vegetation on fire behaviour. It is also important to highlight how better situation awareness enables crew leaders and incident controllers to more effectively comprehend what is going on and how the incident is likely to develop (Endsley, 1995), which are critical points for a new crew leader. Developing faulty situation awareness can mean that a crew leader or incident controller may continue to monitor the wrong or incorrect sources of information. This will undermine their understanding of the true situation. Clearly, sound situation awareness enables better decision making whereas poor quality situation awareness

undermines it. This is why situation awareness is sometimes described as the front end of decision making (see Section 2.2). An instructor describing their own experience of poor or faulty situation awareness, or asking workshop participants' for their experiences, would help reinforce this important point.

A further step that could be used to help provide a deeper understanding of situation awareness is Klein's (2003) idea of a pre-mortem. A pre-mortem can be used as a group exercise to identify the fatal elements of a plan prior to implementation, in a similar way to how a post-mortem identifies the cause of death. Claire Johnson (2011) has helpfully unpacked how to conduct a pre-mortem in the Bushfire CRC *Fire Note 77* (p.4) (see 5.4 Additional resources). This approach has been used by prescribed burn instructors to help their learners think more critically about how proposed operations could go awry and what trigger points indicate that a change in tactics is required.

### 5.2.3 Effective teams

The discussion of effective teams in Session 2 could be further strengthened by highlighting the three Cs of teamwork (see also Section 4.2.3). EMNoTS and TPC describe communication, coordination, and cooperation as non-technical skills central to enabling effective teamwork. The learner resources include two scenes from the film *Sister Act*, highlighting poor teamwork (Act 1) and good teamwork (Act 3)<sup>10</sup>. These two video clips in conjunction with the EMNoTS or EMBAM could be used as the basis of a brief workshop discussion of how communication, coordination, and cooperation are central to teamwork. For the *Sister Act* choir to perform well (Act 3) the team had to: communicate a clear plan and desired set of outcomes; work cooperatively and constructively with one another; and coordinate their work to produce a robust performance.

From a leadership perspective an important role played by a crew leader or incident controller is modelling sound behaviour. For crew members to adopt sound behaviours, those in leadership roles need to consistently demonstrate these same behaviours.

### 5.2.4 Stress and fatigue management

The issues of stress and fatigue are briefly outlined in the last part of Session 2. The Session 2 workshop slides highlight some principles for managing fatigue and the *Learner Guide* (p.5) equates the effects of being awake for extended periods in terms of blood alcohol levels. The main opportunity here is to outline some key signs that may

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9. Discussion with a NPWS senior instructor highlighted that trainers typically take a broader perspective, but the current materials do not reflect this. This led to a discussion probably pertinent to many organisations; that the training materials do not capture some of the valuable and richer content taught by experienced instructors.

10. The film *Apollo 13* also provides some nice examples of effective teamwork and leadership.



indicate a person is suffering from stress or fatigue and note that these can be quite subtle. A number of the signs of stress and fatigue are very similar and include behaviours such as crew members limiting or withdrawing from communication with others, increased irritability, impaired memory and psycho-motor performance, and relatively simple tasks becoming very effortful (Hayes *et al.*, 2022c). A further point to make is that stress and fatigue undermine performance in all of the other non-technical skills.

## 5.2.5 Leadership

Session 3 of the workshop focuses largely on leadership but includes content on situation awareness and decision making, which is discussed further in Section 5.2.6. This session provides some good materials highlighting various aspects of leadership. The opening definition of leadership helpfully incorporates the two main elements identified in EMNoTS by highlighting the importance of creating a suitable team environment and providing focus, direction and coordination (See Table 1).

The leadership perspective taken in this session draws from situational leadership, an approach commonly used in the sector (e.g., Adair, 2009). This approach emphasises matching the degree of direction exercised by the leader with the experience and capability of the team members and outlines directing, participating and delegating leadership styles (e.g., Flin, 1996).

Additional information about leadership that can be included is the appropriate use of inclusive behaviour, an aspect of leadership important for creating a team climate conducive to members raising concerns, reporting errors, and offering helpful suggestions. The role of leadership in enabling psychological safety was briefly discussed in Section 2.3. Crew members' reluctance to speak up is a significant issue in bushfire response (Lewis *et al.*, 2011). Two primary themes emerge as to why firefighters are reluctant to speak up. The first is firefighters' individual limits to their environmental perception (and thus level of situation awareness), and the second is social influence. These two factors vary considerably depending on a firefighter's career stage. Firefighters newer to the job tend to be reluctant to speak up because they often lack the ability to discern and interpret the fire environment and therefore are reliant on others to ensure their safety. Newer firefighters can also be concerned about being stigmatised if they voice concerns, and may believe that they won't be listened to.

Experienced firefighters are better able than newer firefighters to discern and interpret environmental cues and identify risky situations and tend to feel more confident to raise these concerns. However, Lewis *et al.* (2011) found that the more experienced firefighters still faced social pressures that meant that they may remain silent. The expert veteran firefighters in their study faced fewer social pressures but tended to be in roles that meant they may be either complacent or distracted. These observations from Lewis

*et al.* suggest that at both the crew member and leadership levels, training and modelling of suitable behaviour to support and ensure a psychologically safe climate is a valuable addition.

The concept of psychological safety is helpfully unpacked by Amy Edmondson in a short Ted Talk (see 5.3 Additional resources). This video highlights how enabling team members to speak up not only helps capture errors, oversights or problems, but helps the team to learn from these problems so that these are less likely to happen again. The Psychological Safety Checklist<sup>11</sup> (Brooks and Curnin, 2020b) provides some simple strategies to help establish a team climate that enables members to speak up. The Psychological Safety Checklist can be used by participants during several of the field exercise briefings they provide to others to help embed these simple steps into their leadership repertoire.

## 5.2.6 Role of situation awareness and decision making

Session 3 further briefly discusses situation awareness and introduces decision making. This discussion of situation awareness is used to link the style of leadership to the context (i.e., situational leadership). This provides the opportunity to broaden the explanation of situation awareness to that offered in Session 2 focused on the incident ground to a somewhat more holistic approach that considers the team, task and incident (e.g., Three Circles model; Adair, 2009).

From the training materials provided, there appears to be the opportunity to strengthen the treatment of situation awareness and decision making. Perhaps a more robust approach would be to undertake the discussion of situation awareness and decision making skills in a new standalone workshop session that follows a Session 3 focused on leadership.

In addition to the content discussed in Section 5.2.2, a further concept important to developing sound situation awareness (and decision making) skills is the challenge posed by cognitive biases. A cognitive bias can be defined as 'cases in which human cognition reliably produces representations that are systematically distorted compared to some aspect of objective reality' (Haselton *et al.*, 2016, p. 968). The suggested approach is to focus on cognitive biases that are most relevant to the learners. A common example to start this discussion is that of confirmation bias. This is the tendency to search for, interpret, favour, and recall information in a way that confirms or supports a person's beliefs, expectations or current hypothesis (Nickerson, 1998). A simple demonstration of confirmation bias can be provided by using an example of backward masking. This is where a song is played backwards. There are various 'stories'

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11. Psychological Safety Checklist – see <https://www.bnhcrc.com.au/sites/default/files/managed/psychsafety/>

about how particular songs played backwards contain certain messages. The Jeff Milner back masking website (see 5.3 Additional resources) has 15 well known song samples which can be played forward (with the lyrics shown) and backwards. Usually when played backwards people struggle to hear any coherent words or phrases. However, if listeners are prompted with suggested alternate (reversed) lyrics provided by the website, most people can now 'hear' these words (e.g., playing Queen's *Another One Bites the Dust* backwards; prompted listeners can hear 'It's fun to smoke marijuana'). The simple concept demonstrated here is that we tend to see or hear what are looking or listening for—this is confirmation bias.

Omodei's (2012) Bushfire CRC research has provided a helpful framework that clusters cognitive biases into three types: biases in thinking about the external situation; biases in thinking about oneself and others; and biases in managing uncertainty and complexity. This framework helps to operationalise these biases for emergency management in a

way that is more accessible than the traditional psychological literature on biases and heuristics. A simple workshop activity to help learners consider the influence of these biases is to ask them to work in groups to identify examples from their own experiences. Each group could tackle one of the three main types of biases by providing examples alongside the biases and description shown in Table 8. This table provides some suggested examples for instructors. The activity handout for learners would leave the example column blank for the groups to complete. This activity can be concluded with a workshop discussion of the examples provided by the groups. Instructors may provide their own examples to further enrich and help highlight the key ideas during this discussion. Some further prompts that could be used to help facilitate this discussion are:

1. Has this happened to you?
2. Does this happen often?
3. Thinking more broadly, does this happen in other aspects of life?

Table 8. Summary of some of the biases that may affect incident management

Biases in our thinking about the external environment		
Bias	Description	Example (Note: these are only for instructors)
Misinterpreting the current situation	<ul style="list-style-type: none"> <li>- Captured by the obvious/dramatic/present.</li> <li>- Distort or ignore new information about incident and control strategies to justify current understanding of the situation and/or current plans.</li> <li>- Underestimate how much things can change.</li> </ul>	After turning out to a fire call on a hot windy day, first responders see a small fire and begin to attack it, not realising it is merely a spotfire from the rapidly approaching larger main fire, hidden from their view by terrain and smoke.
Underestimating future developments in the situation	<ul style="list-style-type: none"> <li>- Underestimate how quickly things can change.</li> <li>- Underestimate how often things can change.</li> </ul>	Fire crews are relaxed conducting control operations as they watch low flames creeping very slowly downhill some distance from them, but they have almost no time to escape after the same fire crosses a drainage and races uphill towards them with 6 m flames.
Overestimate control strategies	<ul style="list-style-type: none"> <li>- Overestimate the likely efficacy of incident management strategies/plans.</li> </ul>	Expect line construction to be completed without any problems or delays.
Biases in thinking about oneself versus others		
Bias	Description	Example (Note: these are only for instructors)
Over-estimate memory capacity	<ul style="list-style-type: none"> <li>- Overestimate the amount of information one can keep in mind or will remember later.</li> <li>- Underestimate the amount of information others can keep in mind or will remember later.</li> </ul>	<p>An incident controller at a developing fire makes requests for a dozer and an air observer. He gets busy communicating with crews and the aircraft but forgets to confirm the availability of the dozer until hours later.</p> <p>A road rescue crew are paged to respond to an emergency callout. After assembling the crew and driving off to the call they realise 500 m out from their base that they do not details for the location for the callout.</p>
Over-confidence in decisions	<ul style="list-style-type: none"> <li>- Overconfident in one's own decisions.</li> </ul> <p>AND</p> <ul style="list-style-type: none"> <li>- Underconfident in others' decisions.</li> </ul>	An experienced planned burn team decides to ignite a burn with unburnt fuel that is slightly too damp to burn properly, believing it 'won't be a problem' ('how could it be if it's too damp?'). Days later, the humidity drops markedly with rising temperature and wind, fire flares in the rapidly drying unburnt fuel and the burn escapes to burn a number of homes.

Reluctance to delegate	<p>A general tendency to take more personal responsibility than is optimal for:</p> <ul style="list-style-type: none"> <li>- gathering information,</li> <li>- assessing situations,</li> <li>- making decisions and plans, and</li> <li>- implementing decisions and plans.</li> </ul>	<p>An incident controller on-scene in initial attack with two tankers continues to try to manage a further nine individual tankers as they arrive, plus demands from the District Coordination Centre and the public for information. The crews have great difficulty communicating with the distracted incident controller.</p> <p>A rescue team respond to a call with a farmer trapped under an overturned tractor. The crew leader realises the person trapped is one of his friends and is struggling to remain focused. The crew leader does not delegate leadership of the response to another crew member.</p>
Biases in managing uncertainty and complexity		
Bias	Description	Example (Note: these are only for instructors)
Mental overloading	<ul style="list-style-type: none"> <li>- Attempting to deal with more than one can mentally manage.</li> <li>- Found at all levels.</li> <li>- Arises from taking on more responsibility than one can manage/micro-manage.</li> <li>- Often overlaps with high communications workload.</li> <li>- Often goes unrecognised, especially the impact on decision quality.</li> <li>- Leads to an overestimation of one's ability to remember important things later.</li> <li>- Leads to insufficient attention to anticipating future developments.</li> </ul>	<p>Trying to attend to three separate communications channels at the one time.</p> <p>Not finding time to review progress/adequacy of previous instructions to crews.</p>
Reluctance to change plans	<ul style="list-style-type: none"> <li>- A general reluctance to change a current plan even when one becomes aware that the plan is not working as expected.</li> <li>- Pressure to complete what we start.</li> <li>- Pressure to avoid the workload involved in changing direction.</li> <li>- False belief that to change would 'waste' past effort (Sunk Costs Bias).</li> <li>- Ego protection – to not draw attention to the fact that there are errors in the plan.</li> </ul>	<p>Wanting to complete one's plans for dealing with an earlier threat before reallocating resources to deal with newer more serious threats.</p>
Preference for our own kind	<ul style="list-style-type: none"> <li>- A systematic tendency to evaluate members of one's own group (the in-group) more favourably than members of other groups (the out-group).</li> </ul>	<p>Expecting crews from one's own agency (e.g., public land protection) to do a better job than crews from a different agency (e.g., private land protection).</p> <p>A SES crew responds to a flood event on the boundary of their unit's area. As the incident develops they maintain radio silence so that they can join back up with other units from their base rather than being required to work with other crews they do not know.</p>

(Source: adapted from Omodei, 2012)

### 5.2.7 Incident Action Plans (IAPs): Artifacts that both contain and shape situation awareness and decision making

Session 4 discusses Incident Action Plans (IAPs). IAPs are considered a more technical part of the skill set new leaders and incident controllers need to be proficient in using or developing. Like any human-generated product, IAPs may vary in their quality and accuracy. During this

session there is the opportunity to flag that the author's situation awareness and decision making will influence the quality of the IAP. Given that crews use the IAP to guide their own understanding of the current and predicted situation, objectives, execution arrangements, logistics and communications, a poor quality or inaccurate IAP can create real problems for crews. This may undermine the ability of a crew to properly understand the situation and may cause poor decisions based on this faulty understanding.

## 5.2.8 Communications, situation reports, briefings, and debriefings

Session 5 focuses on fireground communications, briefings (daily and other briefings)<sup>12</sup>, situation reports, and debriefings. This classroom-based session includes the opportunity for learners to practice providing situation reports, an important communication skill. The workshop's subsequent field-based activities and exercises provide realistic conditions to practice receiving and providing situation reports, daily briefings, and debriefings.

The workshop assessment schedule highlights criteria that capture the non-technical skills of leadership (e.g., enable others to speak up), communication (e.g., appropriate communication procedures are used), and coordination (e.g., actions are always carried out as expected; there is a clear and common purpose; and everyone has a common

understanding relating to the operation). What is unclear from the training materials that we reviewed is whether the rationale for using these non-technical skills for the delivery (and receipt) of daily briefings, situation reports, and debriefings is provided. This would help learners recognise the value of developing and applying these skills.

## 5.2.9 Summary of the suggested additional activities

Shown below in Table 9 is a summary of the additional activities suggested for the PUA PSTP *Lead a crew* and *Control a Level 1 incident* units.

12. AIIMS specifies use of the acronym SMEACS to structure briefings but some Australasian agencies such as NPWS add 'Q' to remind briefing facilitators to ask for any Questions. SMEACS+Q = Situation, Mission, Execution, Administration, Command and communications, Safety, and Questions.

Table 9. Summary of the proposed additional non-technical skill activities for Lead a crew and Control a Level 1 incident

5-day program session	Non-technical skill(s)	Brief description of the additional activity or material
Day 1, Session 2: Role, responsibilities, and situational awareness	<p>Introduce the concept of technical, non-technical and personal skills</p> <p>Provide an overview of non-technical skills using EMNoTS</p> <p>Expand discussion of situation awareness*</p> <p>Use the pre-mortem activity to help learners' refine their situation awareness skills</p> <p>Outline the three Cs of teamwork</p> <p>Model the three Cs of teamwork</p> <p>Manage stress and fatigue</p>	<p>Provide overview of how to be effective, teams require members with technical, non-technical, and personal skills.</p> <p>Outline the seven non-technical skills outlined in EMNoTS.</p> <p>Explain how non-technical skills help operationalise skills important for emergency management teams.</p> <p>Broaden discussion of situation awareness to include a broader set of factors and how sound situation awareness can enable better decision making*.</p> <p>Use the pre-mortem activity to help learners think more critically about the situation.</p> <p>Use the Team Process Checklist to diagnose the poor and good teamwork (3Cs) issues in Sister Act video clips (Acts 1 and 3).</p> <p>Highlight the key role leadership roles play in consistently demonstrating the three Cs to help create a suitable team climate.</p> <p>Identify some signs of crew member stress and fatigue.</p>
Day 1 Session 3: Leadership This session also briefly covers: situation awareness and decision making	<p>Introduce concept of inclusive leadership behaviour to create a sound team climate that enables members to speak up</p> <p>Suggest creating a new workshop session that covers situation awareness and decision making (and follows Session 3: Leadership)</p>	<p>Use the Amy Edmondson Ted Talk to introduce this concept.</p> <p>Ask participants to use the Psychological Safety Checklist (PSC) in their briefings to practice using the simple steps that help support psychological safety.</p> <p>Highlight how decision making is closely linked with situation awareness.</p> <p>Explain how cognitive biases can interfere with acquiring sound situation awareness – confirmation bias activity using back masking.</p> <p>Use Omodei's (2012) cognitive bias on the incident ground exercise.</p>
Day 1 Session 4: Incident Action Plans (IAPs)	Situation awareness and decision making	Make explicit how IAPs are both the product of situation awareness and decision making, and how they inform the subsequent situation awareness and decision making of crew leaders.
Day 1 and early Day 2 Session 5: Fireground communications	Leadership, communication and coordination	Explain the rationale for using these non-technical skills for the delivery (and receipt) of daily and SMEACS briefings, situation reports, and debriefings

\*Note: the content on situation awareness may be best included in the proposed new session covering situation awareness and decision making following leadership.

## 5.3 Additional resources

Bearman C. 2018. *Team Process Checklist*. BNHCRC. <https://www.bnhcrc.com.au/teamprocesschecklist>

Brooks B and Curnin S. 2020a. *Cognitive Biases Aide memoire*. BNHCRC. <https://www.bnhcrc.com.au/sites/default/files/managed/cbam/>

Brooks B and Curnin S. 2020b. *Psychological Safety Checklist*. BNHCRC. <https://www.bnhcrc.com.au/psychsafety>

Edmondson A C. 2019. *The fearless organisation*. Wiley. (See Chapter 7: Making it happen (pp. 153-186)).

Grant A. 2021. *Think again*. WH Allen. (See Chapter 10: That's not the way we've always done it (pp. 205-222)).

Johnson C. 2011. *How bushfire fighters think about worst case scenarios*. In *Fire Note 77*. Bushfire CRC. [https://www.bushfirecrc.com/sites/default/files/managed/resource/worst\\_case\\_scenarios.pdf](https://www.bushfirecrc.com/sites/default/files/managed/resource/worst_case_scenarios.pdf)

McLennan J, Strickland R, Omodei M and Suss J. 2014. *Stress and wildland firefighter safety-related decisions and actions*. In C Owen (Ed.), *Human factors challenges in emergency management: Enhancing individual and team performance in fire and emergency management* (pp. 19-33). Ashgate.

Milner, J. n.d, *Jeff Milner's Backmasking Collection*. Jeff Milner. <https://jeffmilner.com/backmasking/>

Tedx Talks. 2014. *Building a psychologically safe workplace | Amy Edmondson | TEDxHGSE [Video]*. YouTube. <https://www.youtube.com/watch?v=LhoLuui9gX8>

As its name suggests, an air observer's role is to collect and record intelligence information on hazards such as fire, floods, oil spills, and biosecurity threats. This requires observers to work closely with their pilot to develop sound situation awareness and to make judgements about how the incident may be evolving. From time-to-time, air observers may need to make mission-related decisions in conjunction with the pilot. Air observers work in what may be physically and mentally demanding conditions and require well-developed planning, interpersonal and communication skills. Recent analysis of these observer roles by Hayes (2021) found that strong non-technical skills were an important requirement.

The NSW National Parks and Wildlife Service (NPWS) and Rural Fire Service (RFS) training for air observer roles is based on a five-day intensive workshop incorporating classroom, field, simulation, and aircraft-based activities. This training was updated and refreshed in early 2022. The workshop gradually builds the core knowledge and skills required to become an air observer. Four of the workshop days use simulation and flight time to provide the opportunity for learners to apply, practice, and be assessed on these skills. A schedule of learning activities for the training workshop is provided in Figure 4.

On the morning of the first day, a one-hour session focuses specifically on non-technical skills in a session titled Crew Resource Management (CRM). CRM is the aviation version of non-technical skills for aircrew. The CRM session includes non-technical skills content relevant to other crew such as airbase manager, aircraft refuellers, remote access firefighting team (RAFT), and ground observers (i.e., team resource management (TRM)).

## Chapter 6: Case study 3 – PUAFIR005 Observe fire from an aircraft and PUAFIR006 Observe a non-fire emergency from an aircraft


These units prepare personnel to *PUAFIR005 Observe fire from an aircraft* and *PUAFIR006 Observe a non-fire emergency from an aircraft*. The unit prerequisites cover PUAFIR017 Working around aircraft, PUAOPE013 Operating communications systems and equipment, and PUAOPE014 Navigating to an incident. In the case of *PUAFIR005 Observe fire from an aircraft*, there is the additional prerequisite unit of PUAFIR303 Suppress wildfire.

### 6.1 Unit of competency for Observe fire from an aircraft and Observe a non-fire emergency from an aircraft

These two units of competency outline the scope of this training. They focus on how to: 1) work safely as an air observation team member, 2) prepare for air observation mission, 3) plan a flight route, 4) prepare for flight, 5) validate a flight path en-route to a mission area, 6) collect and record intelligence, 7) react and respond to changed conditions and emergencies, and 8) conclude air observation missions. Table 10 sets out selected performance criteria, performance evidence, and knowledge evidence for this unit standard. A number of the selected elements, criteria, and evidence relate directly to the non-technical skills of communication, coordination, and cooperation (i.e., the three Cs of teamwork). In addition the non-technical skills of situation awareness, decision making, and managing stress and fatigue are also relevant.



Figure 4. Schedule of learning activities for the NSW NPWS and RFS air observer training workshop.

<div></div> <div>AOB TRAINING RUNSHEET</div>										
TEAMS: ALPHA, BRAVO, CHARLIE, DELTA, ECHO, FOXTROT, GOLF, HOTEL (2 PARTICIPANTS PER TEAM)										
DAY 1	TIME	LENGTH	SESSION	METHOD	<div>Daily Objective</div> <div>By the end of the day the student will be able to: work safely as a team member, including developing skills in CRM/TRM, receiving and performing briefings, establishing SAR, and being able to plan AOB mission.</div>					
	8:00	30 MIN	Welcome + SMEACS-Q Briefing	PP						
	8:30	15 MIN	Ipads + Axe + Assessments + Mentors	CLASS						
	8:45	75 MIN	Introduction to the aviation world	PP						
	10:00	15 MIN	Flight Bag - example	CLASS						
	Morning Tea - 10:15 (15 minutes)									
	10:30	60 MIN	CRM	PP						
	11:30	60 MIN	Aviation Weather	PP						
	Lunch 12:30 (30 minutes)									
	13:00	60 MIN	Prepare for an AOB Mission	PP						
	14:00	60 MIN	Pilot Briefings, patter and SAR	PP						
	15:00	10 MIN	SMEACS-Q ARVO PRAC BRIEFING	CLASS	EVERYONE TOGETHER					
	15:10	60 MIN	Flight Safety Briefings x 4 aircraft	FIELD						
	16:05	40 MIN	Show me flight	FLY						
	16:45	30 MIN	Knowledge Assessment 1 - Prepare + Safety	IPAD						
	17:15	15 MIN	Debrief	CLASS						
17:30 FINISH										
DAY 2	TIME	LENGTH	SESSION	METHOD	<div>Daily Objective</div> <div>By the end of the day the student will be able to: plan AOB navigation and associated flight details as well as navigate from an aircraft.</div>					
	8:30	30 MIN	SMEACS-Q Briefing + Recap	CLASS						
	9:00	75 MIN	TECH REFRESH	PP						
	Morning Tea - 10:15 (15 minutes)									
	10:30	90 MIN	Plan Route and Navigate from Aircraft	PP						
	12:00	45 MIN	Navigate activity	FIELD						
	Lunch 12:45 (30 minutes)									
	13:15	45 MIN	Prepare flight - Brief/Nav x 1	CLASS						
	14:00	15 MIN	SMEACS-Q ARVO PRAC BRIEFING	CLASS						
	14:15	3 HOURS	Flight - Brief/Nav	FLY	DAY 2 FLY 90 MIN   SIM 45 MIN   ASS 45 MIN Round 1   A, B, C, D   E, F,   G, H Round 1B   G, H   E, F Round 2   E, F, G, H   A, B   C, D Round 2B   C, D   A, B					
			RPAS PRESENTATION	FIELD						
			Knowledge Assessment 2 - Nav	IPAD						
	17:15	15 MIN	Debrief	CLASS						
	17:30 FINISH									
	DAY 3	TIME	LENGTH	SESSION	METHOD	<div>Daily Objective</div> <div>By the end of the day the student will be able to: collect and record AOB intelligence/information and communication this intel to the relevant personnel. This day will also include a intro to land management.</div>				
		8:30	30 MIN	SMEACS-Q Briefing + Recap	CLASS					
9:00		60 MIN	Collect, record and communicate	PP						
Morning Tea - 10:00 (15 minutes)										
10:15		60 MIN	Collect, record and communicate cont.	PP						
11:15		60 MIN	Land management	PP						
12:15		45 MIN	Prepare flights - Brief/Nav/Collect	CLASS						
Lunch 13:00 (30 minutes)										
13:30		15 MIN	SMEACS-Q ARVO PRAC BRIEFING	CLASS	DAY 3 FLY 90 MIN   SIMS 45 X 2   ASS 45 MIN Round 1   A-D   E, F   G, H Round 1B   G, H   E, F Round 2   E-H   A, B   C, D Round 2B   C, D   A, B					
13:45		3 HOURS	Flight - Brief/Nav/Collect	FLY						
			Bait and whale SIM	FIELD						
			Knowledge Assessment 3 - C/R/C	IPAD						
16:45		15 MIN	Debrief	CLASS						
17:00 FINISH										



DAY 4	TIME	LENGTH	SESSION	METHOD						
	8:30	30 MIN	SMEACS-Q Briefing + Recap	CLASS						
	9:00	90 MIN	Eruptive Fire Weather	PP						
	Morning Tea - 10:30 (15 minutes)									
	10:45	45 MIN	React to changing conditions, emergencies	PP						
	11:30	45 MIN	Conclude AOB Mission	PP						
	12:15	45 MIN	Prepare flight - Brief/Nav/Collect/React	CLASS						
	Lunch 13:00 (30 MIN)									
	13:30	15 MIN	SMEACS-Q ARVO PRAC BRIEFING	CLASS						
	13:45	3 HOURS	Flight - Brief/Nav/Collect/React	FLY						
			Knowledge Assessment 4 - React	IPAD						
			React SIM	SIM						
16:45	30 MIN	Final flight prep	CLASS							
17:15	15 MIN	Debrief	CLASS							
17:30 FINISH										
DAY 5	TIME	LENGTH	SESSION	METHOD						
	8:00	30 MIN	SMEACS-Q PRAC Briefing	CLASS						
	8:30	30 MIN	RECAP -	CLASS						
	Morning Tea - Lunch on table grazing									
	9:00	3 HOURS	Final Flight	FLY						
			Knowledge Assessment - FINISH	IPAD						
	12:00	30 MIN	Debrief	CLASS						
	12:30 FINISH									

Table 10. Selected criteria from *PUAFIR005 Observe fire from an aircraft* and *PUAFIR006 Observe a non-fire emergency from an aircraft relevant to non-technical skills*

Elements and performance criteria	Performance evidence	Knowledge evidence
<p>1. Work safely as air observation team member</p> <p>1.1 Team Resource Management (TRM) principles are applied during air observation mission</p> <p>1.4 Job hazards are identified and action is taken to eliminate, minimise or control them</p> <p>2. Prepare for air observation mission</p> <p>2.1 Briefing on air observation mission is obtained from task supervisor</p> <p>2.2 Mission information is collated</p> <p>3. Plan flight route</p> <p>3.1 Mission aircraft, its performance capability and fuel range are confirmed with task supervisor</p> <p>3.2 Pre-flight plan is prepared using available information including known terrain, hazards, mission requirements, weather forecast and expected time duration</p> <p>3.3 Alternative landing areas in flight area are identified in consultation with pilot</p> <p>3.4 Flight plan and communication arrangements for mission are confirmed with pilot</p> <p>3.5 Flight following and search and rescue arrangements are confirmed</p> <p>4. Prepare for flight</p> <p>4.1 Pilot is briefed on mission</p> <p>4.2 Briefing from pilot is received on aircraft safety and emergency procedures</p> <p>5. Validate flight path en-route to mission area</p> <p>5.1 Communication is maintained with pilot to ensure planned route is followed and mission objectives are achieved</p> <p>5.2 Flight following protocols are established and maintained</p> <p>6. Collect and record fire (or other) intelligence information</p> <p>6.1 Spatial data on fire location and progress of suppression efforts is recorded and communicated in accordance with organisational procedures</p> <p>6.2 Observations of current and projected fire behaviour, including factors that may affect it, are collected and recorded</p> <p>6.3 Fire intelligence information is communicated to task supervisor within agreed timeframes using approved communication arrangements</p> <p>7. React to changed conditions and emergencies</p> <p>7.1 Contact is made with task supervisor and/or fire ground commander, if present, to confirm communication arrangements</p> <p>7.2 Observed hazards that pose a risk to people, property, assets or the environment are reported to task supervisor and/or fire ground commander, if present</p> <p>7.3 Observed changes in operational conditions are communicated to task supervisor and/or fire ground commander, if present</p> <p>8. Conclude air observation mission</p> <p>8.1 After action review is conducted with air observation personnel</p>	<ul style="list-style-type: none"> <li>- applying Team Resource Management (TRM) principles</li> <li>- briefing pilot on mission requirements and receiving pilot briefing on aircraft safety and emergency procedures</li> <li>- receiving briefing on mission, aircraft safety and emergency procedures from pilot</li> <li>- communicating fire intelligence and changed conditions to task supervisor and/or fireground commanders</li> <li>- maintaining communication with pilot</li> <li>- conducting after action reviews with air observation personnel</li> <li>- determining job hazards and taking action to eliminate, minimise or control them</li> </ul>	<ul style="list-style-type: none"> <li>- Team Resource Management (TRM) principles</li> <li>- mission information including weather forecast, incident action plan, if developed, and communications plan</li> <li>- pilot briefings and debriefings</li> <li>- roles and responsibilities in aerial operations units</li> <li>- hazards and risks associated with fire and flight</li> <li>- factors that impact aircraft navigation including prevailing weather and environmental conditions and margin of error allowable per task or incident terrain</li> </ul>

# 6.2 Description of the additional non-technical skills content

This section outlines proposed content and activities to further integrate non-technical skills into this training unit. A summary of these activities and the suggested session they occur in during the air observer five-day program is provided at the end of this section in Table 11.

## 6.2.1 Introduction to the aviation world

This session provides an overview of key aspects of aviation and the air observer’s role and responsibilities. It covers:

- legislation and policy
- standard operating procedures (SOPs)
- aviation measurements
- aircraft use in land management and incident operations
- the role and responsibilities of the air observer
- aircraft types and functions
- the basics of airbase management.

This session contains three topics that could be discussed from a non-technical skills perspective. The first is the use of SOPs and checklists. These are important and useful tools that help aircrew to perform, but do have some limitations (Hayes *et al.*, 2020; MacLeod, 2005; Velazquez, 2018; Westrum and Adamski, 2009). At a later stage of the workshop trainers could return to the use of SOPs and checklists to discuss their respective strengths and limitations, particularly their influence on the coordination of activities, workload management and situation awareness.

The second topic that could be linked to non-technical skills is the discussion of measurement. Measurements such as height, altitude, elevation, distance and speed contribute to an aircrew’s understanding of their current and likely future situation, in other words, their situation awareness. These measurements by themselves may tell only part of the story and various other contextual factors could be very important (e.g., weather, visibility, landscape, fatigue levels). This is further explored in the following session on CRM/TRM.

The third topic in this section with implications for developing non-technical skills is that of air observer roles and responsibilities. Knowing what your own and others’ roles are is important to help ensure coordination within teams and with other parties (Hayes *et al.*, 2022c).

## 6.2.2 Non-technical skills for aircrew (CRM/TRM)

As noted in the introduction to this section, the air observer training incorporates a one-hour session focussed on non-technical skills during the first morning of the workshop. This session is described as a refresher and it covers situation awareness, CRM/TRM, identifying hazards, flight in wire and obstruction environments, and aviation watchouts.

The first part of this session briefly covers selected aspects of situation awareness, teamwork, and communication (i.e., speaking up). The session emphasises that people will make errors, but that CRM/TRM can be used to catch these errors before they become problematic. The trainer’s notes for this part of the session suggest that the link is made to how stress, fatigue, and illness can contribute to poor decision making and that not understanding how these factors can adversely affect people can lead to precarious situations. The second part of the session extends the discussion of situation awareness and the importance of speaking up by focusing on identifying the important hazards that an aircrew may encounter on the job.

This material has been developed specifically for the air observer training program and clearly emphasises core content and skills that are directly related to this role. However, this session could be strengthened by commencing the session with a very brief overview of how CRM (i.e., aviation non-technical skills training) came about and describing example of CRM/non-technical skills frameworks, such as NOTECHS (Flin *et al.*, 2003; see Figure 5) and EMNoTS<sup>13</sup>. This highlights the cluster of non-technical skills required by aircrew so that the inter-relationship between non-technical skills can be understood. This also provides an opportunity to introduce the idea of behavioural markers that operationalise good and poor practice. The use of behavioural markers could be embedded in selected workshop activities and practical exercises so that participants are provided ongoing feedback on their use of relevant non-technical skills. During the post-workshop development phase, mentors could use selected elements from EMNoTS to provide feedback as part of flight portfolio for trainee air observers.

Figure 5. NOTECHS classification for crew resource management.

NOTECHS	Identifiers
Decision Making	Problem solving
Situational Awareness	Situational awareness, situational assessment
Co-operation	Communication, teamwork, collaboration, feedback, influencing, conflict resolution, exchange of objections, challenge and response
Leadership and Managerial	Authority, assertiveness, leadership/ following, obedience, maintaining standards, planning, briefings, coordination
Personal resources	Stress (coping, management), fatigue, crisis psychiatry
Other	Any non-introduction module that did not fit into the other categories

(Source: Havinga *et al.*, 2017, p. 4)

The discussion of situation awareness in this session is reasonably good, but there are some opportunities to strengthen this. In the previous section (Section 6.2.1), the

13. See <https://www.bnhcrc.com.au/sites/default/files/managed/emnots/> and <https://www.bnhcrc.com.au/non-technical-skills-guide>

importance of considering the broader context for building sound situation awareness was highlighted.

This discussion should begin by highlighting that it takes time for air observers to develop the skills to discern and interpret the various contextual factors important in the flight and operational environment (Klein, 1999; Martinussen and Hunter, 2018). This undermines the ability of newer air observers to more quickly develop and maintain robust situation awareness. However, the workshop's practical exercises and flight portfolio requirements can be used to provide opportunities to address these skills. One technique that is used to help build these observational skills in advanced vehicle driving instruction for the UK Police is to ask trainees to provide commentary<sup>14</sup> on key aspects of what is going on as they drive (e.g., Crundall *et al.*, 2010; Walker *et al.*, 2009). This type of approach could potentially be used with trainee air observers and scheduled a couple of times for a few minutes during each training flight. However, instructors would need to make sure that the timing of this requirement does not create an unreasonable workload on a trainee if they are undertaking other skills such as mapping, radio communication or navigation.

A second topic that could be briefly discussed is the use of visual search patterns that pilots and other aircrew tend to use (Wickens, 2023; Yu *et al.*, 2014). Discussing visual search patterns, their link to situation awareness, and suggesting a suitable search pattern for trainee air observers to adopt and practice may be a useful addition.

A third aspect that would enrich this situation awareness content is emphasising the role the air observer plays on behalf of a wider team. Air observers support the situation awareness of the planned burn controller or the incident management team responsible for the oversight of the fire or incident. Sharing pertinent information on a timely basis with others is an important non-technical skill.

The session highlights the importance of air observers being assertive in their communications. An additional activity that could be included in the learners' workbook and discussed in this session is an interaction style questionnaire. This simple, 42 item questionnaire developed by MacLeod (2005) can be used to encourage workshop participants' to reflect on their preferred interaction style – aggressive, assertive or non-assertive (See Appendix B). These results could be used as the basis for a brief discussion of what assertiveness in the cockpit looks like and provision of some simple techniques that trainees could practice and be assessed on in their subsequent flight-based exercises and portfolio activities.

The discussion of TRM briefly touches on a wider range of relevant material. One of the topics covered is how pressure can sometimes entice people to cut corners or operate without the usual precautions to complete work. The instructor's notes highlight that a series of events – such as delays, frustrations, and hassles – can lead to a narrowing of

attention and an individual losing touch with the hazardous conditions developing around them. The role of stress, fatigue, and illness is also highlighted in undermining sound decision making. The session could make more explicit some of the sources of pressure that can lead to an aircrew taking greater risks. A useful addition would be highlighting how these pressures may come from various personal, social or organisational factors (Bearman and Bremner, 2016; Michalski and Bearman, 2014; NASA, 2022). There are some good examples identified in studies of Australian outback and Alaskan aviation and also some helpful commentary on the mitigating factors (e.g., Bearman, Paletz and Orasanu, 2009; Bearman, Paletz, Orasanu, *et al.*, 2009; Michalski and Bearman, 2014).

Two concepts that can help explain this tendency for aircrew to get caught up in pursuit or avoidance of an outcome without adequate consideration of the risks are described as 'goal seduction' and 'situation aversion' (Bearman and Bremner, 2016; Bearman, Paletz and Orasanu, 2009). Strong situations such as rescuing others, meeting a significant other, time-related constraints, and financial pressures can lead to goal seduction. Avoiding physical discomfort, not having maintenance or facilities for the aircraft, and a lack of aircrew lodgings can lead to situation aversion. It is thought that goal seduction and situation aversion can contribute to the phenomena of 'plan continuation', the tendency to continue with a course of action despite evidence suggesting that it may no longer be prudent (Bearman, Paletz and Orasanu, 2009).

Two brief examples from Australian aviation highlighting the issues of goal seduction and engaging all aircrew in high-stakes operations are provided in Breakout Box 3.

### Breakout Box 3 Goal seduction in action

In busy metropolitan settings, police helicopter aircrew need to comply with air traffic control requirements as they execute tasking from their operational command. From time to time, the aircrew of a police helicopter can inadvertently get caught up in the pursuit of a suspect or other tasking. This can lead to an erosion of the safety margins with respect to air traffic control requirements.

#### Aircrew strategies to reduce the risk of goal seduction

Recognising the importance of all aircrew having input into decision making, an Australian helicopter ambulance rescue service involves the whole crew when considering undertaking a rescue mission with elevated risk. The whole crew (pilot(s), aircrew, and paramedics/doctors) all need to agree to undertake the operation before proceeding.

Additional research that could be used by instructors to discuss the potential adverse consequences (behavioural traps) of poor aircrew decision making is provided by Velazquez (2018). This study of 34 commercial airline

14. Commentary driving is a technique in which a learner verbally describes what they are seeing, thinking and planning to do – see Crundall *et al.* (2010).

accidents in the United States identified the contribution of factors such as the neglect of flight planning, pre-flight inspections, and checklists; peer pressure; 'get-there-itis'; loss of situation awareness; flying outside the envelope; airline management; breakdown of CRM; and fatigue. The Velazquez study provides various examples that can be used to highlight these types of situations. Section 6.4 provides some additional relevant resources that can be used to illustrate these issues.

### 6.2.3 Aviation weather

This session covers the aspects of weather that aircrew will need to be familiar with for planning and executing their missions. The first part of the session discusses weather forecasts and how weather and atmospheric conditions can affect flight and visibility when conducting observation activities. The second part of the session requires learners to obtain weather forecasts for four different types of missions and asks them to determine whether it is safe to proceed with each mission. The instructional materials highlight how weather information is an important element of mission planning and emphasise how terrain, clouds, fog, dust, rain and smoke can combine to create areas of reduced visibility and obscure hazards.

In terms of non-technical skills, the importance of analysing and monitoring weather could be linked to the three elements (and corresponding behavioural markers) of situation awareness outlined in EMNoTS, namely:

- gathering and analysing information
- identifying contingencies, problems and expectations
- sharing information and insights.

A second non-technical skill related to using weather information is making sound decisions during planning of missions and in response to changing conditions once airborne. The three EMNoTS elements of decision making are:

- sound, timely decisions
- use of appropriate decision making approaches
- engaging others in decision making.

To explicate the elements that are important for situation awareness and decision making, the workshop instructors could provide some examples of behaviours that would be helpful or problematic for air observation operations. Instructors could highlight some of their own weather-related experiences of good and poor situation awareness and decision making to help learners recognise the importance of these skills.

### 6.2.4 Prepare an air observation mission

This session covers the various planning activities important for preparing for a mission. The session covers the aircraft request process, engaging in IMT and aviation briefings,

determining flight details, assessing and obtaining personal protective equipment, technology and communications checks, and completing a flight manifest. The instructional materials emphasise the important role the briefings play in supporting aircrew situation awareness and that careful consideration of the flight details helps ensure pilots and aircrew work within their duty and flight hour limits. The flight details also cover various logistical requirements such as flight path, helipads, refuelling, ground transport and support resources. An important principle highlighted in the materials is that 'a few extra minutes on the ground may save many in the air, or may prevent an accident'.

Similar to the weather session (see Section 6.2.3), instructors could highlight the value of preparation and engaging in briefings to ensure sound situation awareness by using some pertinent examples based on their own experiences. One further non-technical skill that could be highlighted is coping, stress and fatigue management. The training materials use the IMSAFE checklist (Illness, Medication, Stress, Alcohol, Fatigue, and Eating) to identify key factors that can undermine aircrew performance. As discussed earlier for *Lead a Crew* and *Control a Level 1 Incident* training units (Section 5.2.4), there is an opportunity here to outline some key signs that may indicate a person is suffering from stress or fatigue. It may be useful to ask learners about their own experiences before following up with some of the more visible indicators of stress and fatigue.

One last point that could be highlighted is that understanding what shape you and fellow crew are in is an important aspect of situation awareness. Moreover, if aircrew are experiencing the adverse effects of stress or fatigue, then recognising this and taking suitable steps to compensate is important. Identification of such concerns and suitable adjustments are facilitated by cooperative behaviours (see Table 1). Instructors could enrich this session by outlining how they have recognised and managed these occurrences based on their own experiences.

### 6.2.5 Pilot briefings and SAR

This session covers the use of the SMEACS+Q<sup>15</sup> framework to conduct briefings, flight following procedures, and the correct language to declare an emergency. The instructional materials highlight how the briefings perform the important role of helping develop shared situation awareness. The practical activity for this session requires learners to perform a SMEACS+Q briefing for a pilot based on their own briefing received from the Planning Unit. This activity requires the learners to assess and identify the key information and appropriately communicate this using the SMEACS+Q framework. The three relevant EMNoTS skills that could be emphasised here are communication, coordination and

15. AIIMS specifies the use of the acronym SMEACS to structure briefings but some Australasian agencies such as NPWS add 'Q' to remind briefing facilitators to ask for any Questions. SMEACS+Q = Situation, Mission, Execution, Administration, Command and communications, Safety, and Questions



cooperation. Behavioural markers could be used here to highlight (and assess) these skills for learners:

- the provision of accurate information
- information has been received and understood by others
- appropriate communication procedures are followed (i.e., SMEACS+Q)
- actions are always carried out as expected
- team members are open and approachable
- differences in opinions are resolved effectively.

A strength of the workshop's design is that there are multiple opportunities for learners to practice core skills such as the SMEACS+Q briefing and to receive feedback on these skills (see Figure 4). The EMNoTS framework can be used to help facilitate feedback, especially in the practical flight and simulation settings.

## 6.2.6 Technology refresh

This session focuses on the technology used by air observers. The session covers the devices and applications typically used, provides a refresh on the standard mapping symbols, provides tuition on the Fire Mapper and Avenza applications, and discusses technology backup plans. Two non-technical skills that could be emphasised in this session are communication and coordination. The use of standardised map symbols aligns with the EMNoTS behavioural markers of: (i) use of appropriate communication procedures, and (ii) carrying out actions as expected.

## 6.2.7 Flight route planning

This session focuses on the core navigational skills required to plan and calculate an appropriate route, select a suitable altitude, navigate to a destination, undertake tasking at the destination, maintain situation awareness, and perform appropriate procedures if diverted or lost en-route. The session provides four practical activities that require learners to correctly identify map symbols, locate a landscape feature from an aerial photograph on a topographical map, plan a route for a specified mission, and replan en-route for a new tasking. These skills are further assessed during the flight practicals conducted as part of this workshop (see Figure 4). This links directly to situation awareness. The seven behavioural markers of situation awareness shown in Table 1 could be used to prompt learners on the types of behaviours helpful for developing and maintaining situation awareness and can be used by instructors as part of their assessment and feedback for learners.

## 6.2.8 Collect, record and communicate intelligence

This session focuses on identifying, collecting and communicating intelligence to assist with the management

of the incident or emergency. The instructional materials introduce the detection and reconnaissance purposes for air observation missions and highlight the importance of identifying valuable information. There is a brief overview of the tools and technology that can be used to capture this information.

The second part of this session discusses the non-technical skills of situation awareness and communication that are important for collecting and sharing intelligence. The Endsley (1995) model of situation awareness is used to help explain differing degrees of situation awareness (i.e., perception, comprehension and projection) and underline the importance of timely communication of this intelligence to the IMT or divisional commander. The effective communication of intelligence is explained using three types of situation reports (SITREPS): (i) windscreen SITREP, (ii) first information SITREP (ITASC<sup>16</sup>), and (iii) scheduled/change SITREP (LCANS<sup>17</sup>). Some key aspects of effective communication are outlined such as the importance of being precise, using breaks in communication to allow the other party to note details, ensuring both parties are using the same map, and confirming that information is correctly understood by the other party. The session emphasises the role the air observer plays in providing intelligence to facilitate improved shared situation awareness for the IMT and ground crews for planning and operational purposes.

The practical activities included in this session require learners to provide a detailed windscreen SITREP and ITASC format SITREP based on a set of basic information and images. These skills are further assessed during the flight practicals conducted as part of this workshop (see Figure 4). To enhance these activities, the EMNoTS behavioural markers for situation awareness and communication could be used to help learners understand both desirable and problematic behaviours. These behavioural markers can also be used by instructors as part of their assessment and feedback for learners.

## 6.2.9 Reacting to changing conditions and emergencies

This session focuses on reacting appropriately to changing conditions and emergencies. The session discusses the need to be flexible in order to respond to diversions or changing priorities, eruptive fire behaviour, deteriorating weather conditions, aviation emergencies, and the value of listening to one's intuition. This session highlights the responsibilities of the pilot versus the air observer, and how remaining attuned to hazards and using sound non-technical skills (CRM) can reduce errors and mistakes. The instructional materials emphasise the role of continual monitoring to help ensure that situation awareness of changing conditions is maintained.

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16. ITASC/FTASC SITREP = Incident/Fire, Threats, Actions, Support, Command and communications

17. LCANS SITREP = Location, Conditions, Actions, Needs, and Safety



The instructional materials discussing intuition provide a very brief description of this concept. These materials emphasise appropriately responding to feelings and language that may indicate danger by following the steps of 'divert, analyse and react'. It may be useful to further explain how intuition can sometimes assist aircrew to recognise when there may be a problem or an issue. People may quickly develop a sense that something is not quite right, or just seems wrong. Intuition occurs largely subconsciously and comes from inconsistencies between our prior experiences and what is occurring (or may be planned). In essence, this sense of unease is the result of a mismatch between the observed versus the expected pattern of a situation. One implication of this is that it may be harder for novices or personnel unfamiliar with a particular set of circumstances to perceive the inconsistencies that lead to unease. So, whilst intuition can be valuable, it does to some extent depend on the relevant experience of the aircrew.

## 6.2.10 Concluding air observation missions

The final session focuses on wrapping up an air observation mission and shift. The session covers cancelling flight

following, logbook completion, handing over shift information, conducting debriefs, participation in after-action reviews and self-care. The instructional material steps through the various procedural requirements and outlines the particular stress and fatigue challenges that air observers may be subject to. The first opportunity to strengthen this session would be to ensure that instructors model and discuss the behaviours suitable for creating a psychologically safe environment. Instructors could also explain how psychological safety is important for enabling effective debriefs and after-action reviews (see Section 5.2.5 for further discussion of psychological safety). This section could be further strengthened by emphasising the cumulative effects of stress and fatigue. Stress and fatigue pose a particular challenge to air observers and pilots during longer running incidents and campaign fires, or when multiple operations are conducted in a short space of time.

## 6.2.11 Summary of the suggested additional activities

Shown below in Table 11 is a summary of the additional activities suggested for the PUA PSTP Air Observer units.

Table 11. Summary of the proposed additional non-technical skill activities for air observer training

Workshop session	Non-technical skills content	Additional content
<b>Day 1</b>		
Introduction to the aviation world (6.2.1)	<ul style="list-style-type: none"> <li>- SOPs and use of checklists</li> <li>- Situation awareness</li> <li>- Coordination (role and responsibilities of the air observer) (measurement)</li> </ul>	<p>Highlight how SOPs and checklists are important tools to help aircrew, but do have some limitations.</p> <p>Link discussion of measurements to situation awareness. Measurements by themselves may only tell part of the story and other contextual factors may be important (e.g., weather, visibility, landscape, fatigue levels).</p> <p>Explain how knowing your own role and the role of others is important to help ensure coordination.</p>
CRM/TRM (6.2.2)	<ul style="list-style-type: none"> <li>- Situation awareness</li> <li>- being aware of what is happening around you</li> <li>- Coordination</li> <li>- understanding each other's role</li> <li>- Communication</li> <li>- speak up and be assertive</li> <li>- Stress and fatigue</li> <li>- pressure can entice people to cut corners</li> <li>- delays, frustrations or hassles can narrow attention (reduce situation awareness)</li> <li>- Decision making – adversely affected by stress, fatigue, and illness</li> </ul>	<p>Use a CRM (e.g., NOTECHS) or non-technical skills (e.g., EMNoTS) model to anchor the discussion.</p> <p>Outline the need to consider the broader context.</p> <p>Share insights with other parties such as ground crew, planned burn controller or incident management team</p> <p>Questionnaire on communication assertiveness</p> <p>Outline the concepts of plan continuation, goal seduction and situation aversion</p> <p>Explain behavioural traps (Velazquez, 2018)</p>
Aviation weather (6.2.3)	<ul style="list-style-type: none"> <li>- Important element for situation awareness</li> </ul>	<p>Link to EMNoTS behavioural markers for situation awareness and decision making</p>
Prepare for an air observation mission (6.2.4)	<ul style="list-style-type: none"> <li>- Aviation briefings</li> <li>- PPE - Stress and fatigue</li> <li>- Technology and comms check – communicating with the pilot</li> </ul>	<p>Link to EMNoTS behavioural markers for situation awareness and stress and fatigue</p> <p>Emphasise that understanding what shape you and fellow crew are in is an important aspect of situation awareness and there is a strong need for cooperative behaviour</p>

Workshop session	Non-technical skills content	Additional content
Pilot briefings, pattern and SAR (6.2.5) Various SMEACS-Q PRAC briefings	<ul style="list-style-type: none"> <li>- Perform pilot briefing</li> <li>- Pilot briefing activity</li> <li>- Flight following – link to situation awareness</li> </ul>	Link to EMNoTS behavioural markers for communication, coordination and cooperation
<b>Day 2</b>		
Technology refresh (6.2.6)	<ul style="list-style-type: none"> <li>- Communication</li> <li>- Coordination</li> </ul>	Link to EMNoTS behavioural markers for communication and coordination
Flight route planning (6.2.7)	<ul style="list-style-type: none"> <li>- Situation awareness</li> </ul>	Link to EMNoTS behavioural markers for situation awareness
<b>Day 3</b>		
Collect, record and communicate intelligence (6.2.8)	<ul style="list-style-type: none"> <li>- Situation awareness</li> <li>- Communication</li> </ul>	Link to EMNoTS behavioural markers for situation awareness and communication
<b>Day 4</b>		
Reacting to changing conditions and emergencies (6.2.9)	<ul style="list-style-type: none"> <li>- Situation awareness</li> <li>- Decision making</li> </ul>	Conduct an additional brief discussion on the role of intuition in situation awareness and decision making
Concluding air observation missions (6.2.10)	<ul style="list-style-type: none"> <li>- Leadership</li> <li>- Communication</li> <li>- Stress and fatigue</li> </ul>	Highlight how psychological safety influences the ability of crew members to speak up  Describe the cumulative effect of stress and fatigue

## 6.3 Additional resources

Aerosurance. n.d. *Accidents and Incidents: Investigations and Reports*. <http://aerossurance.com/category/air-accidents-incidents/>

Aerosurance. n.d. *Wildlife Netting Accidents*. <http://aerossurance.com/helicopters/wildlife-netting-accidents/>

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## Chapter 7: Embedding non-technical skills in other organisational training, exercising, and development activities

The guide has demonstrated how non-technical skills content can be enhanced in ongoing emergency management training. As examples, three clusters of PUA Public Safety Training Package (PTSP) units were discussed and additional information and activities were recommended to help instructors better integrate non-technical skills into the training. To show the range of units that can benefit from more inclusion of non-technical skills two technically oriented role-based training units were considered (PUAFIRO05 *Observe fire from an aircraft* and PUAFIRO06 *Observe a non-fire emergency from an aircraft*).

The three sets of examples of PTSP units were used in this guide to help readers understand how non-technical skills content can be readily incorporated into existing training packages. There are plenty of opportunities to do this, but there is also a need to consider how to gradually build non-technical skills into training so that learners progressively acquire, practice and refine their use of these skills. This guide shows how this is a reasonably straightforward thing to do once a skilled instructor or instructional designer has become familiar with non-technical skills, and has reflected on how these skills underpin team effectiveness in emergency management settings.

Section 2.3 highlighted the value of adopting a three-phase approach to developing non-technical skills: i) awareness, ii) practice and feedback, and iii) continual reinforcement (Flin *et al.*, 2008). This guide emphasised awareness, and to some extent, the practice and feedback. Extending training beyond the classroom by providing further opportunities for practice and feedback and continual reinforcement of these skills is also important.

If organisations want to make non-technical skills a core part of their workforce's behavioural repertoire, they need to ensure personnel receive ongoing encouragement and opportunities to use and develop these skills. This will require an ongoing and concerted effort to embed non-technical skills more widely in organisations. There are plenty of potential opportunities to do this by wider inclusion of non-technical skills in training, exercising, professional development, promotion criteria, and coaching and mentoring. Given that non-technical skills support a wide range of desirable organisational behaviours, embedding these skills more broadly throughout the organisation appears an eminently sensible thing to do.

## Chapter 8: Resources to support non-technical skills development

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# Appendices

## Appendix A: 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?



## Appendix B: Interaction Style Questionnaire

(Source: MacLeod, 2005, pp. 104-105)

### Interaction Style

Read each of the following statements and ask yourself if you tend to agree or to disagree with each one. Mark each of the statements accordingly. So, if you reckon that, generally speaking, you would tend to agree with a statement, then circle the number of the question. Work quickly through the statements. Remember, there are no right or wrong answers and your immediate reaction to each statement is probably the most accurate reflection of your true feeling.

1. The best way to handle conflicts is to avoid them.
2. I never assume that I will get what I want in life.
3. I find that it's best not to give people a choice.
4. I do value the contribution of others.
5. I usually check my assumptions.
6. I do not like to offend people.
7. Conflict can be a creative force.
8. In this world there are winners and losers.
9. I usually go along with what people want.
10. I always tell people exactly what I think of things.
11. I rarely give praise because it's often not deserved.
12. I am happy to take responsibility for things.
13. You do not need to offend people in order to get the job done.
14. I do have a tendency to jump to conclusions.
15. I like to get the views of others.
16. If people take offence then it is not my problem.
17. I usually yell people exactly what I think of things.
18. In groups, I usually keep my views to myself.
19. I like to discuss ideas.
20. I usually let others take responsibility for things.
21. I am happy to just do what I am asked.
22. I often get angry or upset when I have a conflict with others.
23. I try to get the point of view of those with whom I am having a conflict.
24. It is important not to upset people.
25. I always try to get others to agree with me when we have a decision to make.
26. I like a quiet life.
27. I consult others before deciding on matters that affect them.
28. I know I am not as constructive as I could be when I disagree with someone.
29. I try to make sure that everyone gains something from a dispute.
30. I find compromise is usually the best solution.
31. I play to win.
32. I accommodate myself to the other person's view.
33. We openly integrate ideas of both persons.
34. I often find ways to accept the other person's solution.
35. I don't like to give in until I get what I'm after.
36. I fully express my ideas and feelings and urge the other person to do the same.
37. I push to have my approach or ideas prevail.
38. We find solutions that take both our views fully into account.
39. I am happy to try solutions proposed by the other person.
40. I like to get every-one's concerns out in the open and we problem solve together.
41. I don't usually resist the views expressed by the other person.
42. I usually get my ideas accepted.

Marking frame for this questionnaire is on the next page

## Marking Frame

Circle the number of the questions you tended to agree with, i.e. those you circled on the question sheet. Then, add up the number of questions in each of the three columns you agreed with. You should end up with a score against the aggressive (ag), assertive (as) and non-assertive (na) interaction styles. The highest number indicates your prevalent style.

	1		4		3
	2		5		8
	6		7		10
	9		12		11
	18		13		14
	20		15		16
	21		19		17
	24		23		22
	26		27		25
	30		29		28
	32		33		31
	34		36		35
	39		38		37
	41		40		42
na =		as =		ag =	

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