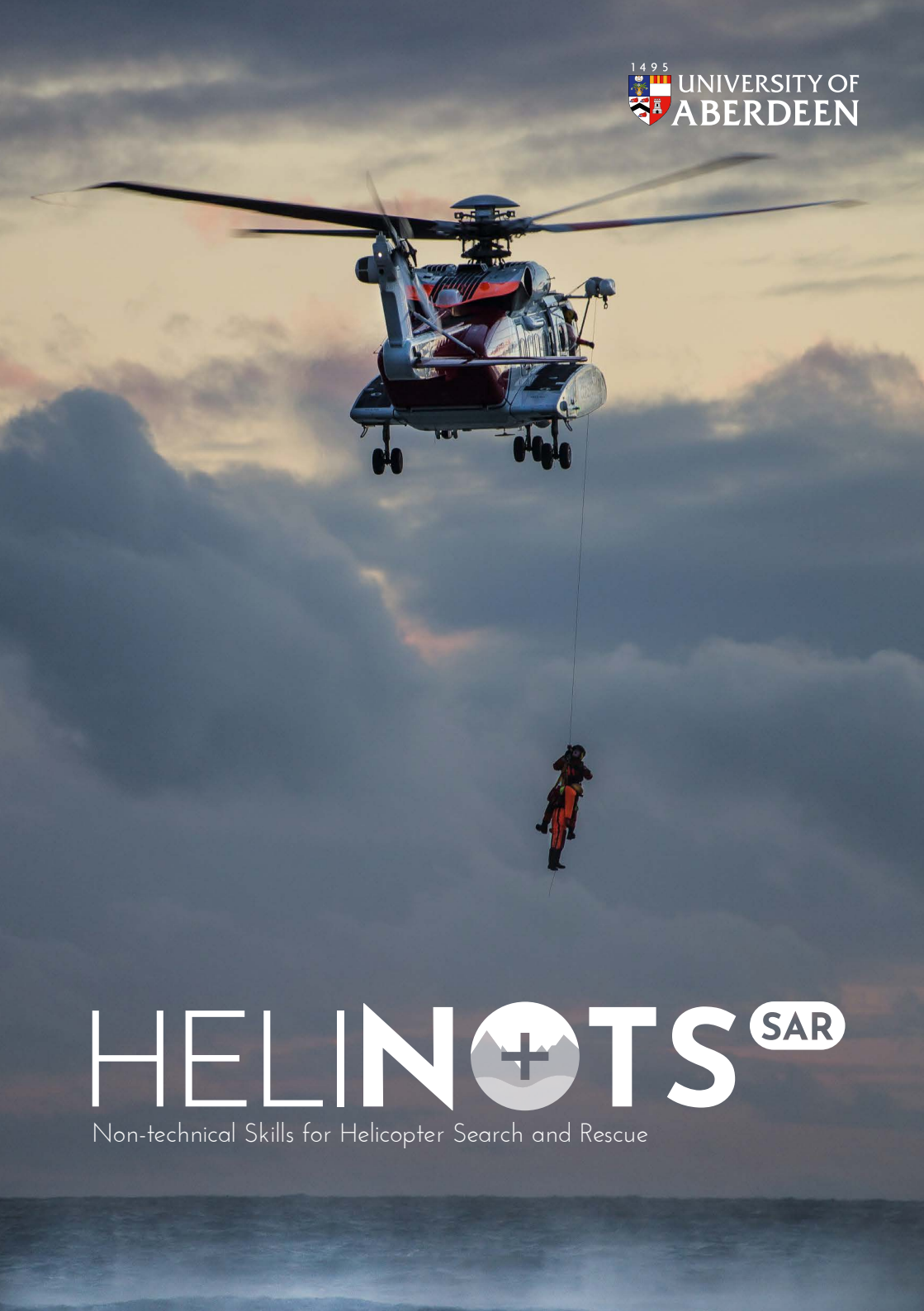
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Non-technical Skills for Helicopter Search and Rescue

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The Helicopter Non-technical Skills for Search and Rescue (HeliNOTS (SAR)) system is a behavioural marker system developed by psychologists from the Applied Psychology and Human Factors Group of the University of Aberdeen, in association with CRM trainers and search and rescue pilots and technical crew from international helicopter operators.

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Note from the authors

HeliNOTS (SAR) is the result of the HeliNOTS (S) system, designed for search and rescue pilots, and a recent body of research that has investigated the non-technical skills and associated behavioural markers of search and rescue technical crew personnel.

Under the recommendation of the pilots, technical crew, CRM trainers, and independent consultants, HeliNOTS (SAR) has been constructed to represent the non-technical skills of all SAR crew members within one system. The research underpinning the development of the system is equally based upon data from studies with pilots, winch-operators and winch-paramedics, and should therefore be seen as relevant to the entire crew.
To that end, HeliNOTS (SAR) elements have been designed to include example behavioural markers that are shared across all crew members, and role-specific markers reflecting nuanced aspects of the outlined element. These role-specific markers, while phrased toward either the technical crew or the pilots, are still to be taken as examples of positive and negative behaviours and may still be of relevance to crew members in other roles.

Introduction

Alongside the technical aspects of search and rescue training, the enhancement and evaluation of crews' non-technical skills have been a long-standing component of crew training and licence maintenance. Due to the varied and unique circumstances associated with search and rescue operations, the applicability and validity of existing standardised training and evaluation methods have been questioned. Fundamental variances have, for example, been recognised between pilots who fly different aircraft types across a range of flight roles, and increasing attention is being focused on the input of technical crew personnel.

Differences between helicopter and fixed-wing aircraft operation are a significant point of consideration for rotor-wing operators seeking to tailor their Crew Resource Management training, and any associated assessment methods (e.g. behavioural marker systems), to their operational needs. Rotorcraft have a range of unique features; they possess the ability to hover, decrease airspeed without loss of altitude, and have a reduced need for ground infrastructure. This makes the helicopter an ideal aircraft for search and rescue operations, a role it is utilised for by both civilian and military operators globally. In respect to the unique functionality of this aircraft, and its distinct operational roles, helicopter crews have been shown to exhibit non-technical skills differently from their fixed-wing counterparts, adapting these skills in accordance to their specific mission parameters.

In addition to the pilots, search and rescue operations involve the input of a winch operator and a winch paramedic. These technical crew personnel are an integral component of helicopter-based search and rescue, playing a critical role regarding searches, winching operations, casualty extraction and care, and overall mission planning. Research has recognised that high level non-technical skill utilisation is similarly crucial to their respective roles, and non-technical skills training should encompass the technical crew personnel to enhance search and rescue crew performance.

Search and rescue missions are characterised by unpredictable and dynamic operating environments. Risk factors associated with low altitude, hazardous terrain, weather conditions and extraction method must be considered alongside variables such as a casualty's condition or missing person's status. Crews must, while maintaining prescribed air readiness posture, react to taskings with what information is provided while continuing to gather information on transit to a location. As such, crews may find themselves under heightened exposure to the effects of fatigue and stress and must effectively utilise their non-technical skills to ensure the safety and performance of themselves and their fellow crew members.

It is essential, therefore, that operators continue to enrich their non-technical skills training, specific to the domain in which the search and rescue crews operate. To that end, the HeliNOTS (SAR) system is the result of a range of studies exploring in detail the non-technical skills utilised by crews during search and rescue missions. HeliNOTS (SAR) has been developed to provide a structured, empirical framework by which to address these skills. The system provides a common language for crews and Crew Resource Management trainers to discuss and train non-technical skills and lays a foundation on which debriefing sessions may be structured. It is expected that such a nuanced system will be ideally placed to address the unique elements of the search and rescue operations and further enhance Crew Resource Management training.

What this handbook contains

This handbook contains a guide to the HeliNOTS (SAR) system. Part 1: Information for users outlines guidance for the use of the behavioural marker system. Part 2: The HeliNOTS (SAR) system provides the full contents of the system across categorical and elemental levels, in addition to providing shared and role-specific behavioural markers for each element. Part 3: Use of the HeliNOTS rating scale includes a description of the rating scale, and the observation/rating form associated with HeliNOTS (SAR). For more information on the HeliNOTS (SAR) system, underpinning research, and supplementary materials, please visit the website at: **https://research.abdn.ac.uk/applied-psych-hf/helinots**

Part 1: Information for users

What are non-technical skills?

It is accepted that whilst technical knowledge is a core component of high-level performance, non-technical skills (NTS), encompassing interpersonal (e.g. communication) and cognitive (e.g. situation awareness) skills, are a necessity for safe and efficient practitioner outcomes (Flin, O'Connor, & Crichton, 2008). Within the aviation industry, NTS have been the focus of significant attention due to a series of fatal human-error related incidents in the 1970s. One such incident in 1977, where two airline jets collided on a runway resulting in the greatest accidental loss of human life in aviation history, is still used as a case study to highlight the catastrophic impact of lapses in NTS, such as loss of situation awareness, inappropriate decision-making, and poor leadership behaviours (Weick, 1990). Subsequently, over the following decades, distinct generations of Crew Resource Management (CRM) training have evolved in the industry, aimed at addressing NTS and ultimately mitigating human error (Helmreich, Merritt, & Wilhelm, 1999).

CRM courses involve the modular, classroom-based training of NTS by certified CRM trainers. These programmes have been adopted globally as the training of knowledge and skills relating to human performance has become a mandated component of flight training by all major air operators worldwide (ICAO, 2010). In the UK, both fixed-wing and helicopter operators are subject to CRM training regulations from the Civil Aviation Authority (CAA) which stipulate that crews should receive training and assessment on NTS (see Flin, 2019). Indeed, it is indicated that a degree of role-specificity within CRM courses is a marker of effective training (CAA, 2017).

What are behavioural marker systems?

Behavioural marker systems are rating scales based on skill taxonomies and are used to identify observable non-technical behaviours that contribute to superior or substandard performance. They consist of two parts: a skills taxonomy with examples of positive and negative behavioural markers allied to each skill, and a rating system. Behavioural marker systems are context-specific and are developed in the domain in which they are to be used and can be utilised to structure observations, ratings and feedback, as well as to identify practitioners' training needs. They can also form the basis for NTS training. One of the earlier behavioural marker systems in the European aviation industry is NOTECHS (Flin et al., 2003), comprising four NTS categories and a five-point rating scale. Since its inception in the early 2000s, NOTECHS has been used and adapted by a number of operators (fixed and rotor- wing) for assessing the NTS of aviators and is the only method named by the European Union Aviation Safety Agency (EASA). Other operators have moved towards a competency-based approach to training and assessment through EBT (evidence-based training). In cases where a European operator has

approval for an ATQP (Alternative Training and Qualification Programme) they are permitted to construct their training programmes and assessments based upon their own evidence (EASA, 2016).

Recently, a series of studies with search and rescue (SAR) and offshore transport helicopter pilots identified differences in how helicopter pilots utilise their NTS based upon mission parameters and the factors which influence these NTS (Hamlet, 2021; Hamlet, Irwin, Flin, & Thomson, 2019; Hamlet, Irwin, & McGregor, 2020). The research proposed the inclusion of a new skill category for SAR pilots (cognitive readiness) which encompasses the overall adaptability, preparedness, resilience, and problem solving required for dynamic and unpredictable rescue environments.

The addition of this skill category was further reinforced in later studies with technical crew personnel (Hamlet, 2021), demonstrating the high-level utilisation and facilitation of NTS and the fundamental importance of cognitive readiness to winch-operators and winch-paramedics, alongside the flight crew. Based on these findings, the HeliNOTS (SAR) behavioural marker system, specific to SAR crews, has been developed.

What is the HeliNOTS (SAR) system?

Helicopter Non-technical Skills for Search and Rescue (HeliNOTS (SAR)) is a behavioural marker system developed by psychologists from the Applied Psychology and Human Factors Group of the University of Aberdeen, in association with CRM trainers and SAR crews from international helicopter operators. The system allows for the observation, rating, and feedback of SAR crews' NTS performance.

HeliNOTS (SAR) describes the core NTS categories specific to SAR pilots, winch-operators and winch-paramedics operating in unpredictable and dynamic rescue environments. It has been designed for use by qualified CRM trainers, in accordance with established technical knowledge related to SAR crew members' roles, in order to allow for the observation and subsequent rating of NTS against a structured framework. The system is recommended for use within a simulator or simulated exercise but may also be used as a debriefing tool post-flight.

HeliNOTS (SAR) has been developed on the basis that all system behaviours are directly observable or may be identified though communications between crew members. The system applies a rule of parsimony, where a broad range of NTS behaviours are described in as few distinct elements as possible, and has been designed using terminology recognisable and applicable to SAR crews and trainers.

HeliNOTS (SAR) comprises three levels, including skill categories, elements, and associated behavioural markers. The system is made up of five core NTS categories and 15 associated elements (see Table 1). Definitions of the categories and their associated elements are provided in this handbook, alongside examples of positive and negative behavioural markers

for each element. These behavioural markers were developed in consultation with experienced crews from international SAR operators and are intended to give examples of typical behaviours rather than provide an exhaustive summary of behaviours. For the purposes of the HeliNOTS (SAR) system, the behavioural marker examples included have been divided between shared markers, pilot specific markers, and technical crew specific markers.

Table 1. HeliNOTS (SAR) taxonomy v1.0

Category	Elements
Communication	- Exchanging information - Giving instructions - Providing feedback
Leadership and Teamwork	- Guiding task behaviours - Sharing task activities - Monitoring other crew members - Setting and maintaining crew atmosphere
Cognitive Readiness	- Utilising preparedness - Applying problem-solving - Maintaining resilience
Situation Awareness	- Gathering information - Comprehending informational elements - Anticipating future states
Decision-making	- Identifying and selecting options - Reviewing course of action

Using the HeliNOTS (SAR) system

The HeliNOTS (SAR) behavioural marker system is intended to be used as a rating tool to assess SAR helicopter crews' NTS performance and give feedback in a structured manner immediately after a flight or training exercise. In this regard, HeliNOTS (SAR) may also be utilised as a debriefing tool post flight or simulator session. It is recommended that users first observe performance while taking note of any specific behaviours or omissions. Assessments should be based solely on behaviours that are observed or directly communicated. Using these observations, a rating may first be made at an elemental level, then at a more general categorical level. The associated five-point rating scale should be used to determine the level of performance achieved, with a non-applicable option for skills that could not be observed within the current situation. The HeliNOTS (SAR) rating form can be viewed on page 22. It is essential that users of HeliNOTS (SAR) receive proper instruction on observation, assessment/rating, and the application of the system prior to use.

As with other behavioural marker systems, it may require repeated use of the system for assessors to become familiar and competent with the HeliNOTS (SAR) system. Training and practice should help facilitate this process.

- HeliNOTS (SAR) assessment should not interfere with flight performance; use of the system should cease immediately if circumstances dictate.

- Formative assessment and feedback on HeliNOTS (SAR) should occur routinely in both in-flight and simulated environments.
- HeliNOTS (SAR) should be utilised primarily to structure beneficial feedback to crews on the state of their NTS. It is therefore essential that the system is used in a non-threatening and educational manner.

User selection and training

- Training is required to learn how to rate behaviours using HeliNOTS (SAR). This should include an understanding of:
  - Non-technical skills, human performance and error management so that constructive, directive feedback can be given to crews
  - Principles of using psychometric tools for rating performance
  - The contents of the HeliNOTS (SAR) system and how it relates to flight performance
  - Observing NTS and rating behaviours with the system
  - Providing constructive feedback.

- If HeliNOTS (SAR) is to be used for assessment, users should be appropriately trained and calibrated to ensure all assessors provide consistent ratings for the same behaviours.
- Regular updates may be required, so recurrent training and calibration programmes should be developed.
- It is recommended that a group of experienced CRM trainers, whose collective experience represents both the flight crew and technical crew, be selected from an operator to become HeliNOTS (SAR) trainers/assessors.

Pilot selection and training

- Crews should receive training on human performance and error management to support development of their NTS.
- Crews should receive their own copy of this HeliNOTS (SAR) booklet.
- HeliNOTS (SAR) should be used appropriately for the level of experience of the technical crew member or pilot:
  - For junior/trainee crew members, HeliNOTS (SAR) can be used as a tool for discussions on NTS and their importance for safe and effective flight/operational performance
  - For experienced crews, HeliNOTS (SAR) can be used to observe, rate, and provide feedback on NTS behaviours
  - Experienced crews/crew members may also be trained to use HeliNOTS (SAR) to assess NTS in others.
- CRM trainers should explain to crews why the structured rating of NTS are important, and why HeliNOTS (SAR) has been developed for this purpose.

Suggested functions for HeliNOTS (SAR)

- To assess crew members' NTS in accordance with operators' CRM assessment regulations.
- To guide discussions of HeliNOTS (SAR) and the role of NTS in flight.
- To provide a basis for debriefing discussions and to encourage less experienced crew members to participate in debriefs.
- To allow for trainers and crew members to discuss NTS in relation to case studies and CRM issues.

Practical tips and recommendations

- Use HeliNOTS (SAR) in a variety of simulated flight settings as appropriate for CRM assessment.
- It is recommended new users work at an elemental level, as behaviours may be more directly observable.
- If HeliNOT S (SAR) is being used for assessment purposes, it is recommended that:
  - Users take notes about observations during the assessment if possible (e.g. observed or omitted expected behaviours), then make assessments based on these notes post-observation
  - Users take notes about specific circumstances of the observed scenario and the crew member's experience (e.g. type of simulated flight, simulated hazards/emergency scenarios, casualty condition, crew member new on aircraft type)
  - Crews receive feedback and a debriefing session directly after the observation session, with element level observations/ratings, to give feedback on specific skills and the categorical rating to describe general performance.
- The HeliNOTS (SAR) system has been designed for use during CRM sessions and assessments, but focus should be applied to areas of weakness identified by the operator/CRM trainers.

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Part 2: The HeliNOTS (SAR) System

Communication: Exchanging task relevant information with others and ensuring information has been received and understood.

 Behavioural markers = pilot-based example  Behavioural markers = technical crew-based example

Exchanging information – Providing appropriate information to others and being receptive to information provided.

Positive behavioural markers	Negative behavioural markers
• Communicates clearly and in a standardised and efficient format • Shares information when relevant/at an appropriate time to avoid unnecessary communication • Addresses or requests relevant information from the appropriate source/crew members (e.g. those engaged in task) • Promptly warns others of cues suggesting potential hazards	• Withholds full information or reports incomplete information to other crew members (intentionally or un-intentionally) • Communicates in an unstructured, inconsistent or non-standardised manner with other crew members • Fails to identify correct crew member/external agency for communication • Requests irrelevant, or fails to ask for, information from appropriate source/s
Uses hand signals to convey information where necessary (e.g. point out positions of interest, potential landing/winching locations, share comms failure)	Ignores, or appears unaware of, other technical crew member's hand signals
Considers and shares intent prior to undertaking decision or action (e.g. change to flight path or approach)	Continues with verbal communication where unsuitable (e.g. interrupts busy crew member/s with inappropriate request, violates sterile cockpit rule)

Giving instructions – Being clear and concise when requesting action from another crew member.

Positive behavioural markers	Negative behavioural markers
• Provides instructions in a standardised manner, outlining what is required or expected in sufficient detail • Updates instructions as task/situation progresses	• Provides unclear or inconsistent information about requirements or task information • Provides instruction but does not update as task/situation progresses
Gives achievable and timely instruction relevant to other pilot (e.g. aircraft handling/monitoring)	Proceeds with following new flight instructions without informing other crew members of action
Seeks to ensure all relevant parties (e.g. other crew members) are aware of new instruction/s relevant to casualty management	Provides instruction that is beyond the capability of the instructed individual/aircraft due to focus on rescue-related task (e.g. winching, treating casualty)

Providing feedback – Providing an opportunity to raise questions and seeking to address any misunderstandings in communication.

Positive behavioural markers	Negative behavioural markers
• Acknowledges reception of others' communications in a clear manner • Uses hand signals to demonstrate recognition of communication (e.g. thumbs up) • Regularly raises opportunity for questions and takes the time to respond to the questions asked • Focuses on relevant information when reading back	• Fails to respond or acknowledge understanding of brief or instructions • Continues without recognising that another crew member has failed to confirm receipt of a communication • Proceeds without allowing for questions • Responds negatively to questions and discourages other crew members from speaking up
 Allows space to address questions/concerns of casualty/bystanders/non-crew members	 Disregards concerns of non-crew members

Leadership and Teamwork: Taking charge of a task when needed, coordinating with other crew members, and making sure that others are managing with their tasks.

 Behavioural markers = pilot-based example

 Behavioural markers = technical crew-based example

Guiding task behaviours – Taking oversight of a mission, action/series of actions, and ensuring teamwork effectiveness.

Positive behavioural markers	Negative behavioural markers
• Oversees crew activities and decision-making processes • Facilitates crew coordination • Encourages input and information from all team members • Demonstrates an awareness of other crew members' abilities and incorporates this into the task guidance	• Provides minimal or no justification for actions/ decisions chosen • Struggles, or shows unwillingness, to oversee crew tasks/mission and is easily dictated to • Responds dismissively to suggestions and input from others • Overloads/overburdens other crew members with tasks
 Ensures tasks have been shared appropriately between flight crew	 Undertakes dictatorial behaviours, or becomes overly commanding, and stops seeking consultation from other pilot or technical crew member
 Shows assertiveness and is not coerced into an inappropriate position by another crew member (e.g. open to calling for casualty priority)	 Acts submissively to other crew members and is easily dictated to (e.g. concerns about casualty dismissed)

Monitoring other crew members – Ensuring others in crew are coping and performing appropriately.

Positive behavioural markers	Negative behavioural markers
• Keeps an eye on other crew members' tasks in order to spot possible errors or signs of overloading • Engages with other crew members to gain awareness of their physical and emotional states/preparedness • Steps in to correct actions/understanding where required	• Focuses solely on own actions and is unaware of other crew members' missed cues and errors • Ignores indications of reduced performance/ adverse state in other crew members (e.g. lack of communication/yawning) • Assumes everyone has shared understanding of task without checking or fails to correct actions/misunderstanding when inconsistency is identified
 Acts to support other crew members when adverse emotional or physical state identified (e.g. winch operator checking in with paramedic after high-intensity task)	 Demonstrates a lack of support towards other crew members (e.g. winch-paramedic shying away from checking in with overloaded winch-operator during search)
 Adapts monitoring to suit other pilot's experience level	 Pays too much attention to other crew members' actions/tasks (e.g. assisting in search for target) to the detriment of other attentional factors (e.g. focus is lost on aircraft instrumentation)

Sharing task activities – Maintaining input into team tasks and providing support to others under pressure.

Positive behavioural markers

- Follows instructions from other crew members accurately and promptly
- Effectively synchronises task/s with other crew members (e.g. all crew members conducting their role during winching operation)
- Volunteers to take on other crew members' tasks when they are overloaded (e.g. handling radios, assisting in casualty care)
- Coordinates with external agencies and updates other teams on task (e.g. mountain rescue, hospital, tasking agency)

Passes task responsibilities to other crew members when personally overloaded (e.g. hands over radio responsibility to technical crew)

Seeks to aid flight crew in pre-empting situation and providing information (e.g. provides flying information from books for pilots)

Negative behavioural markers

- Fails to follow instruction correctly, or in a timely manner
- Acts in isolation to the detriment of coordination with other crew members
- Does not offer assistance to other crew members despite recognition of overloaded state
- Overwhelms activity and leaves other crew members without input (e.g. takes over all radios, all decision-making)

Shows reluctance to share flight relevant tasks/ responsibilities with technical crew members

Refuses to take on tasks not deemed to be part of their role (e.g. reluctant to assist other technical crew member with treating casualty/ handling communications)

Setting and maintaining crew atmosphere – Setting the tone for an effective crew environment.

Positive behavioural markers

- Seeks to identify and resolve conflict within the crew
- Modifies behaviours and actions to take into account current emotions and state of team (e.g. uses humour to diffuse tense situations)
- Treats all crew members with respect and to the same standard
- Uses reasoning and diplomacy when interacting with other crew members and external agencies
- Interjects in disagreement if experienced in domain of conflict (e.g. if tasks centres upon winching approach/casualty care)
- Demonstrates a tone for other crew members to follow (e.g. facilitates flat cockpit gradient, ensures rapport)

Negative behavioural markers

- Fails to identify and address factors underlying conflict
- Behaves in a manner that invites conflict such as using sarcasm, being abrupt or overly dismissive of others
- Sets inappropriate tone (e.g. shuts down other crew members, becomes overbearing/ commanding, creates hostile atmosphere)
- Shows signs of distress (e.g. raises voice) when interacting with crew or external agencies
- Avoids getting involved or helping to resolve conflict even when aware of correct course of action (e.g. fails to emphasise priority of task when necessary)
- Acts as a source of conflict within the team (e.g. argumentative, encourages separation between flight crew and technical crew)

Cognitive Readiness: Employing mental preparation and adaptability to cope with dynamic, hazardous, and taxing rescue conditions.

 Behavioural markers = pilot-based example

 Behavioural markers = technical crew-based example

Utilising preparedness – Exhibiting the mental preparation to enable action in an appropriate and effective manner.

Positive behavioural markers

- Shows readiness for alternative actions if new information comes in during tasking (e.g. establishes contingency plans en route)
- Makes sure all task-relevant information and equipment is up to date
- Shows an awareness of regulations associated with potential rescue-related task or action
- Is open to and ready for potential obstacles and negative outcomes during rescue

 Demonstrates knowledge via prompt and appropriate use of flight checklists or emergency procedures

 Reacts to new information by preparing themselves and their equipment for the new task (e.g. changes into an immersion suit, configures the back of the aircraft for the type of emergency)

Negative behavioural markers

- Shows reluctance to engage in contingency planning
- Proceeds with task despite out of date information
- Demonstrates an erroneous understanding of regulations related to potential rescue-related task or action
- Shows signs of anxiety and seeks a large amount of information from other crew members to satisfy uncertainty

 Continues with action without reviewing flight checklists or emergency procedures /uses incorrect checklists

 Spends too long preparing one aspect (e.g. aircraft preparation) so that other aspects receive less attention (e.g. PPE are not ready)

Applying problem solving – Generating adaptive approaches to dynamic and challenging rescue situations.

Positive behavioural markers

- Shows ability to innovate and consider new pathways to achieving mission goal
- Recognises uncertainties, consistently generates new potential solutions in response to changing conditions (e.g. casualty status becomes more severe), and justifies solution to the rest of the crew
- Demonstrates an understanding of mission complexities and defines issues (e.g. potential influence of hazards, difficulties with landing locations)
- Adheres to SOPs but makes minor and safe adjustments/adaptations to meet scenario

 Correctly diagnoses problems using appropriate checks and acts accordingly (e.g. applies correct checklist)

Negative behavioural markers

- Follows defined responses to problems, even when ineffective
- Fails to recognise change in, or suggest potential solutions to, mission-based challenges
- Acts without fully understanding, or defining, mission complexities
- Breaks critical rules in order to meet task requirements

 Misdiagnoses problem or applies incorrect checklist

Maintaining resilience – Effectively managing reactions to unforeseen or stressful circumstances.

Positive behavioural markers

- Is able to continue to follow procedure and maintain focus whilst under high levels of stress, distress, fatigue, or within adverse conditions
- Employs stressor coping strategies (e.g. humour, rest time, caffeine, 'Breathe reAnalyse Decision', takes off PPE when not needed)
- Shows ability to quickly adapt, switch tasks/ priorities, and remain flexible to unforeseen circumstances and new information

Produces measured and effective responses to sudden changes in flight/aircraft requirements

Displays empathy and care for casualty and those involved (e.g. keep a calm tone, monitors bystanders for shock)

Negative behavioural markers

- Begins to perform outside of the standard procedures as a result of stress/distress/fatigue (e.g. makes basic errors during task)
- Shuts off from task, reacts negatively and/or is quick to give up in adverse rescue conditions (e.g. goes quiet, physically freezes, lowers communications, dejected behaviour)
- Continues with established task focus despite new information, failing to adapt to new circumstances

Engages in rushed, disjointed, or inappropriate actions in unfamiliar or taxing flight conditions

Shows a lack of care towards the casualty, bystanders, or external agencies

Situation Awareness: Perceiving and monitoring one's surroundings, establishing an understanding of the environment, and projecting a picture of future events based on this understanding.

 Behavioural markers = pilot-based example

 Behavioural markers = technical crew-based example

Gathering information – Establishing awareness of cues from the environment internally and externally to the helicopter.

Positive behavioural markers	Negative behavioural markers
• Frequently scans the environment both internal and external to aircraft • Seeks information update promptly when task changes • Uses information from multiple sources (e.g. other crew members, tasking agencies) to gain overall picture of mission objective	• Shows signs of attentional tunnelling and strongly focuses on a specific element within the environment (e.g. weather), whilst missing other critical factors. • Does not request information in a timely manner, or at all • Does not appear to acknowledge critical information (e.g. warning indicators)
 Monitors aircraft instrumentation/systems regularly to get relevant information on position and ensure awareness of warning indicators	 Sporadically scans instrumentation, is subject to distraction (e.g. failing to notice warning indicators), or underutilises systems when gaining awareness
 Identifies potential escape points	 Fails to recognise or consider escape points
 Regularly checks medical equipment readings and condition of casualty	 Disregards information regarding casualty condition (e.g. ignores output from medical equipment)
 Utilises all resources (NOTAMS, Google Earth etc.) to facilitate information gathering related to rescue landscape/conditions	 Dismisses relevant information (e.g. turns radio off, does not read information given)

Comprehending informational elements – Recognising the significance and meaning behind cues perceived in order to form a mental picture.

Positive behavioural markers	Negative behavioural markers
• Exhibits a clear account of current situation and relevant task information • Reappraises, suspends, or cancels action based on new information or threats • Recognises erroneous information from other crew members or external sources	• Fails to identify hazard when informational elements are available • Continues with the task even when significant threat has been identified • Fails to recognise, or ignores, cues that information gathered is incorrect
 Prioritises actions in response to receiving information regarding rescue situation and casualty condition	 Does not appreciate seriousness of casualty condition and fails to take action to stabilise/ maintain patient status
 Highlights identification of potential flight hazards in environment and notifies the other pilot	 Demonstrates an incomplete or inappropriate awareness of risk (e.g. proposing action that would put helicopter at risk)

Anticipating future states – Projecting understanding of situation in order to predict future events.

Positive behavioural markers

- Constructs an effective plan of action (e.g. takes into account information gathered and comprehended)
- Makes a note of time in order to manage actions (e.g. considers fuel burn, high-power hover, casualty care)
- Reacts to, and acknowledges, information suggesting future hazard
- Takes immediate/emergency actions before normal operating actions

Predicts need for corrective flight action

Monitors status of casualty to predict need for immediate action (e.g. suggestion of appropriate trauma centre/hospital)

Negative behavioural markers

- Fails to plan effectively despite recognition of cue/s
- Shows a lack of awareness of time and time-related mission factors
- Misunderstands or fails to recognise information that puts aircraft, crew, or casualty at risk
- Does not implement contingency planning prior to action

Does not foresee need to make corrective action despite information suggesting otherwise

Fails to prioritise casualty condition and recommend appropriate treatment centre

Decision-making: Weighing up alternatives and selecting approach to task in consideration of relative risk and confirming input of, and acceptance by, other crew members.

 Behavioural markers = pilot-based example

 Behavioural markers = technical crew-based example

Identifying and selecting options – Weighing up multiple options and settling on appropriate option.

Positive behavioural markers	Negative behavioural markers
• Seeks to actively participate in group decision-making process (e.g. puts forward reasoning, open to the input of others), and gain input from all relevant parties (e.g. tasking agency, other rescue teams) • Considers alternative task strategies (e.g. extraction approach/method, dealing with change to casualty status) in order to choose best course of action • Engages in timely decision-making in response to recognised cues  Suggests prioritisation change to the tasking authority when necessary (e.g. if casualty condition is unequivocally associated with death then priority lowered)  Estimates risk to crew and aircraft when considering options for rescue and casualty	• Shies away from group decision-making and leaves other crew members to make task related decisions • Does not consider alternative approaches/ courses of action before proceeding with task • Makes decisions in isolation from others  Shows an uneasiness with suggesting prioritisation/task changes to authority  Selects or advocates for inappropriate or hazardous option for rescue that puts the crew and aircraft at significantly increased risk

Reviewing course of action – Revisiting and assessing the outcomes of the decision made

Positive behavioural markers	Negative behavioural markers
• Reads back decisions to demonstrate comprehension • Regularly reviews decisions made as task progresses and assesses whether decision has met objective • Discusses any additional planned actions with other crew members and shows willingness to revisit any decisions made • Reviews decisions in an open manner rather than seeking confirmation	• Proceeds with actions without reviewing decisions as task progresses • Does not investigate whether decisions' goals have been achieved • Indicates reluctance to revisit decisions  Focuses on rescue/casualty needs to exclusion of aircraft safety considerations

Part 3: Use of the HeliNOTS rating scale

The HeliNOTS rating scale may be used at both the elemental and categorical levels, though it is recommended the user starts by grading elements before proceeding to assign a category score. Before making ratings, it is suggested that notes be taken on observed behaviours and on any omissions of behaviours that should have been observed, thereby reducing the possibility of missing key behaviours. All skill elements and categories should be scored using the same five-point rating scale described in Table 2. This five-point scale design was chosen in consultation with subject matter experts (CRM trainers/examiners).

The HeliNOTS (SAR) rating form is provided in the rear of this handbook.

Table 2. HeliNOTS System Rating Scale

Rating	Description
5 – Very good	Behaviour optimally enhances flight/operational safety; no areas of improvement can be identified
4 - Good	Behaviour is of high standard and enhances flight/operational safety
3 - Acceptable	Behaviour does not endanger flight/operational safety but could be improved
2 – Marginal	Behaviour indicates cause for concern and could, in other conditions, endanger flight/operational safety
1 – Poor / sub-standard	Behaviour was unacceptable and directly endangered flight/ operational safety; remedial action is required
N/A – Not Applicable	Skill/element was not required in this case

Ratings should only be made on observed behaviours to achieve a grade of 2 (marginal) – 5 (very good). A grade of 1 (poor/sub-standard) can be given based upon the observation of unacceptable behaviours, or the absence of behaviours that were required.

It is important to note that not all skill elements are required or appropriate in any given scenario, therefore the rating of N/A should be made in such circumstances - this judgement is to be made by the HeliNOTS user.

HeliNOTS (SAR) v1.0 Rating Form

Location..... Trainer name..... Date.....

Crew member's name..... Crew member's role..... Aircraft type .....

Category	Category rating	Element	Element rating	Feedback on performance / debriefing notes
Communication		Exchanging information		
		Giving instructions		
		Providing feedback		
Leadership and Teamwork		Guiding task behaviours		
		Monitoring other crew members		
		Sharing task activities		
		Setting and maintaining crew atmosphere		
Cognitive Readiness		Utilising preparedness		
		Maintaining resilience		
		Applying problem-solving		
Situation Awareness		Gathering information		
		Comprehending informational elements		
		Anticipating future states		
Decision-making		Identifying and selecting options		
		Reviewing course of action		

1 – Poor / sub-standard	Behaviour was unacceptable and directly endangered flight safety; remedial action is required
2 – Marginal	Behaviour indicates cause for concern and could, in other conditions, endanger flight/operational safety
3 – Acceptable	Behaviour does not endanger flight/operational safety but could be improved
4 – Good	Behaviour is of high standard and enhances flight/operational safety
5 – Very good	Behaviour optimally enhances flight/operational safety; no areas of improvements can be identified
N/A – Not applicable	Skill/element was not required in this case

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HELINOTS SAR

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