

Safety at the Sharp End

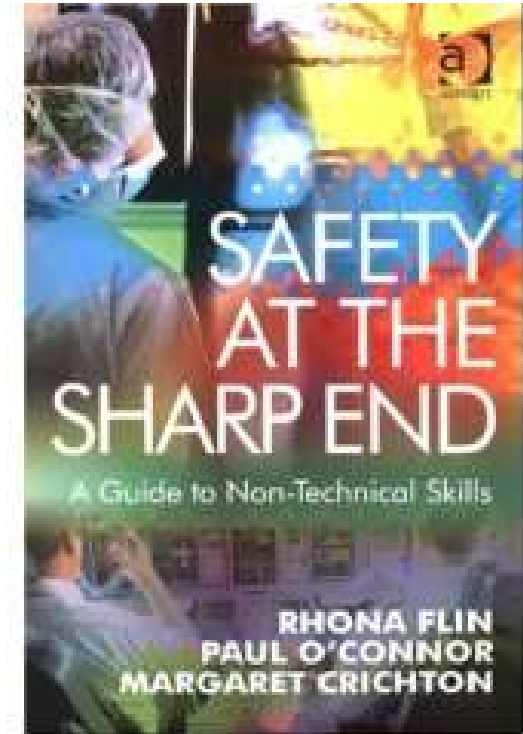
PACDEFF, Brisbane, 12 September, 2023

Rhona Flin



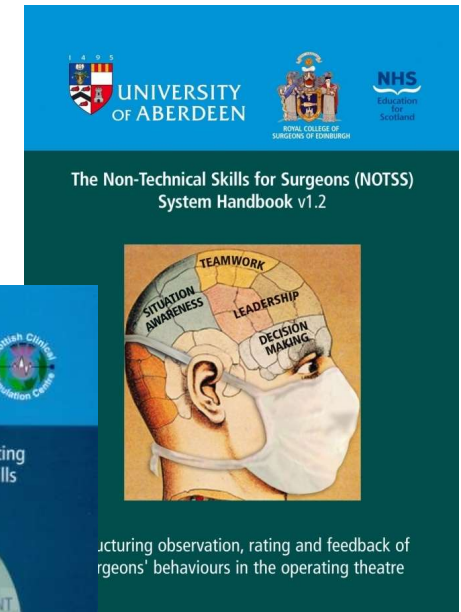
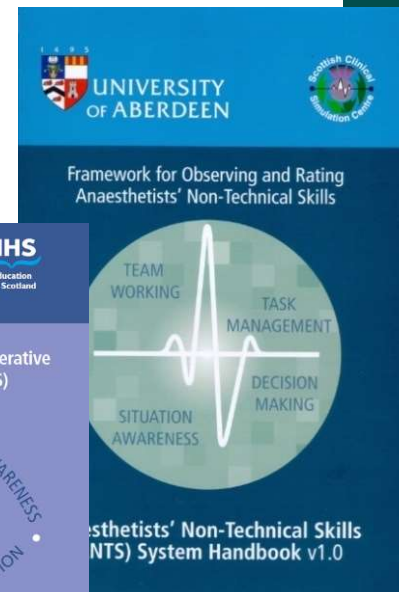
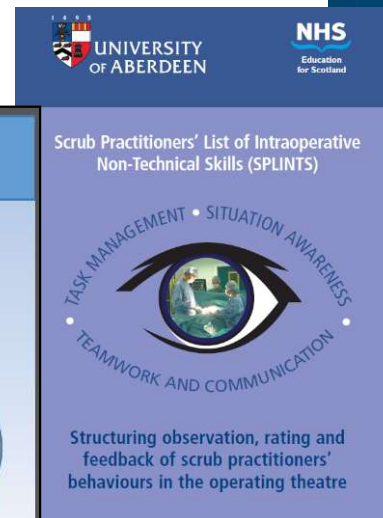
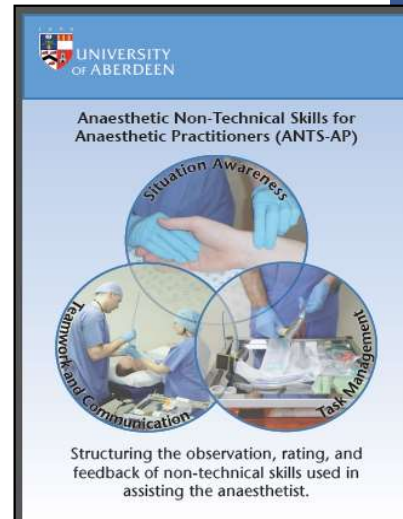
Safety at the Sharp End: *A Guide to Non-Technical Skills (2008)*

- Situation Awareness
- Decision Making
- Team Work
- Leadership
- Communication
- Managing Stress and Fatigue
- Identifying Skills/ Developing Rating Systems
- Training and Assessment of NTS



Non-Technical Skills in healthcare

- Identifying NTS for surgeons, anaesthetists, scrub nurses & ODPs, anaesthetic nurses



Flin, Glavin, Maran, Paterson-Brown, Patey, Yule, Fletcher, Mitchell, Youngson, Rowley et al

NOTSS – Variable Resource Context



NTS for Wildlife Vets in Africa



“One of the challenges of capture work is marrying boldness, quick decision making, and the necessity to take a certain amount of risk to get the job done with human and animal safety. In this we are probably very similar to other high risk domains like the military. Too little boldness doesn’t work and too much is courting disaster!” (Morkel, personal communication, 2023)

The INcident Command Skills (THINCS) system:
A users' guide for UK fire and rescue service



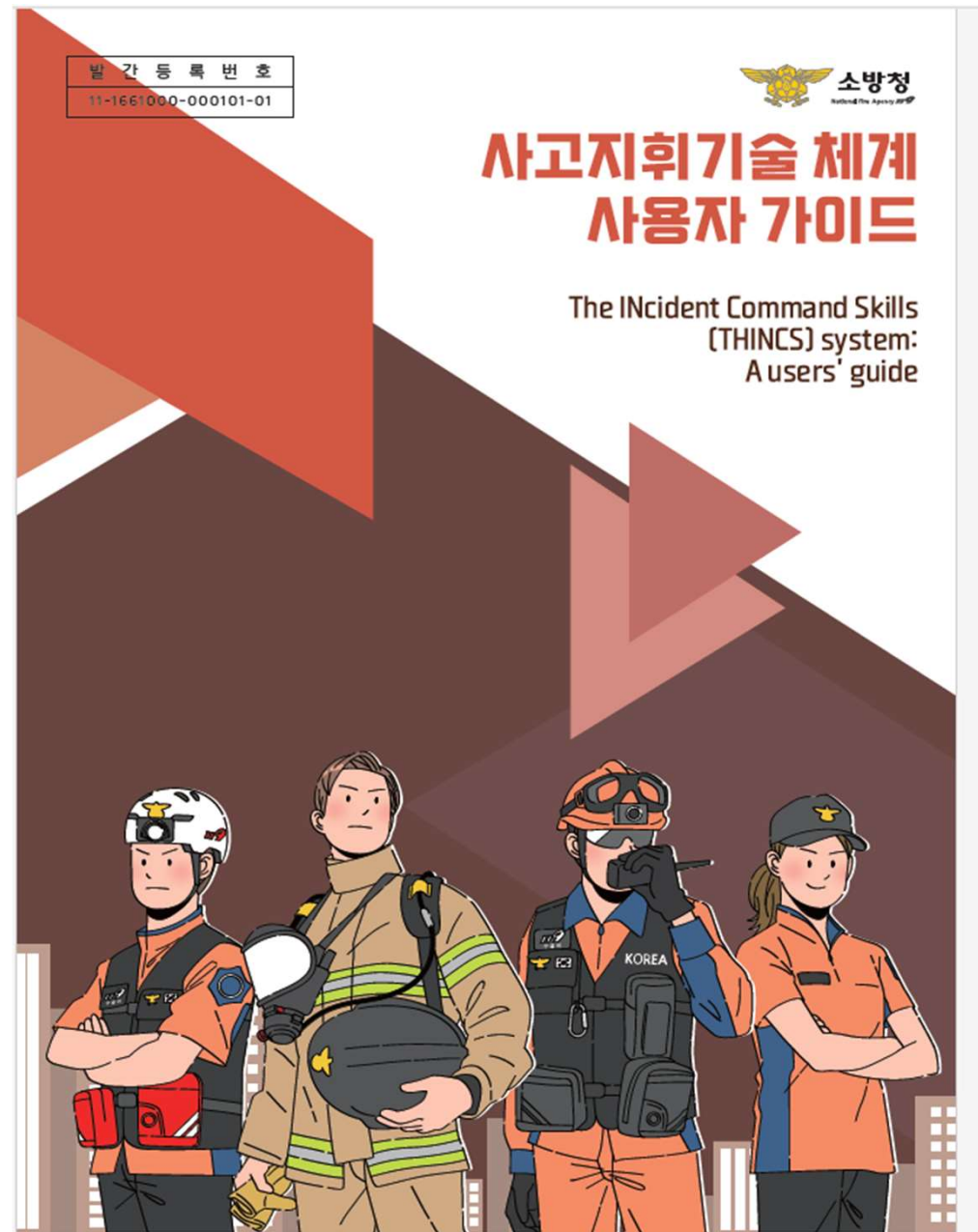
Observe Review Rate Feedback



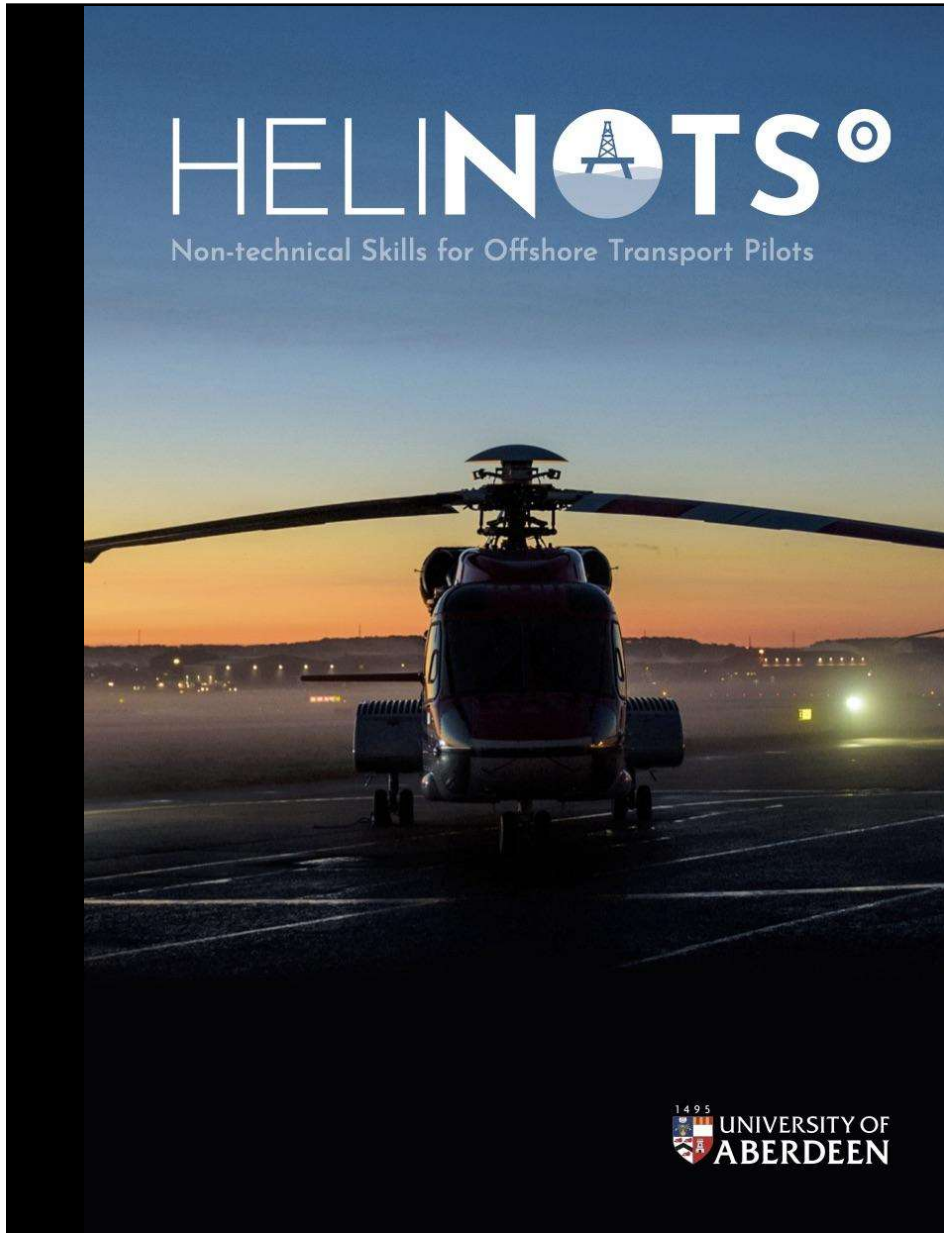
Version 1.7

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Butler, P., Cohen-Hatton & Honey (2020)
Cognition, Technology & Work



Hamlet, Irwin, Nedlar & Flin (2023) *Ergonomics*

Aviation NTS in Europe

EBT – Evidence Based Training

CBTA – Competence Based Training and Assessment

9 Competencies

Transition from checking to performance development

Implications for trainers' skill sets

Allocation of behavioural markers to categories

Observability of some markers

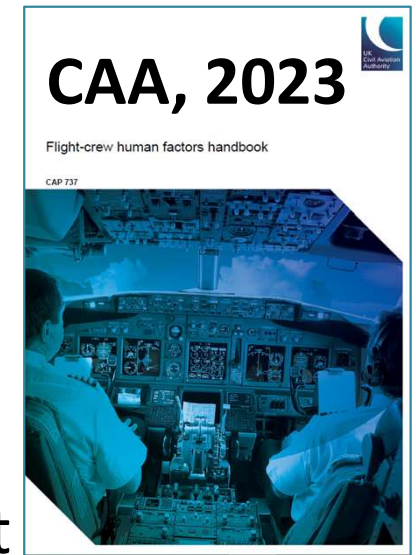
Addition of resilience, safety culture

Online NTS training instead of classroom

Self directed NTS e-learning packages

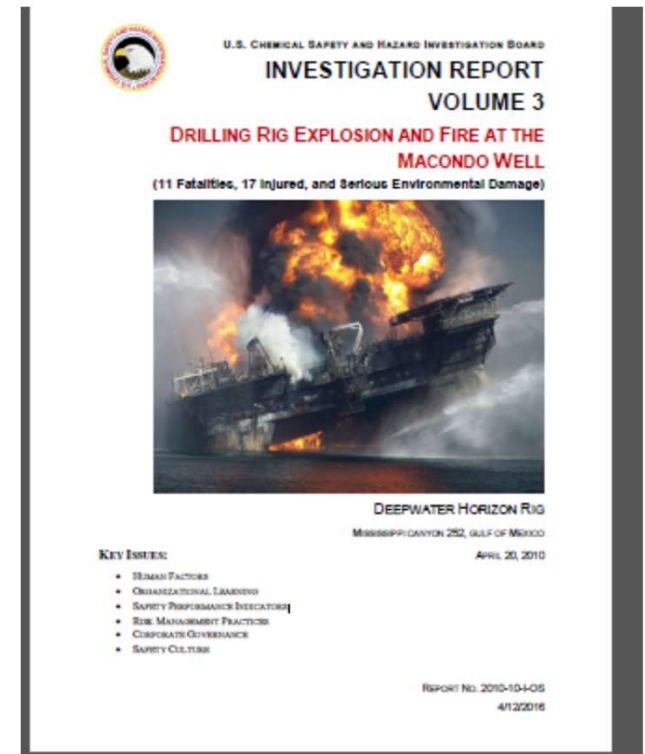
New methods: e.g. VR, AR

More linkages with safety databases



Deepwater Horizon

The need for development and use of non-technical skills, including communication, teamwork, and decision-making, by the operator, drilling contractor, and other well services providers; (p24)



Chemical Safety Board USA (2016) *Investigation Report, Macondo Well, vol. 3*

United pilots miscommunicated. The NTSB says their error caused a plane to plunge more than 1,000 feet

BY ALIZA CHASAN

AUGUST 10, 2023 / 8:05 PM / CBS NEWS



The captain asked the co-pilot to reset the wing flaps to five. The co-pilot heard "15" instead, according to the NTSB.

The Boeing 777, which had climbed to 2,100 feet, quickly plummeted down to about 748 feet above the ocean. The pilots remember hearing warnings from the ground proximity warning system.

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Two Air France pilots suspended after cockpit fistfight

🕒 29 August 2022

- 29 August 2022

- **Two Air-France pilots have been suspended after a physical altercation in the cockpit, reports say.**

- The captain and first officer exchanged blows as they flew an Airbus A320 from Geneva to Paris in June, Swiss news outlet *La Tribune* said.



Atlanta

Delta flight returns after passenger has diarrhea 'all the way through' plane

Passengers re-board flight to Spain after eight-hour delay while social media posts describe flight crew mopping up mess

**Richard
Luscombe**

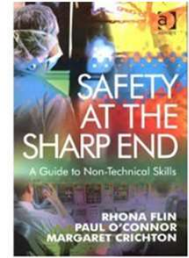
🐦 @richlusc

Wed 6 Sep 2023 15.27
BST



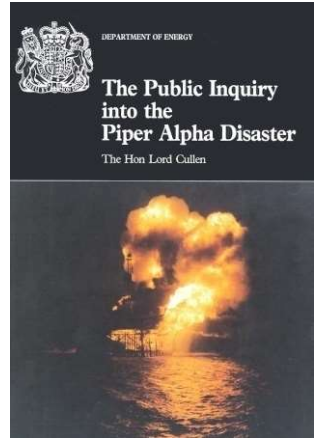
🎬 'This is a biohazard issue': footage emerges of plane forced to U-turn over diarrhoea - video

Sharp End 2



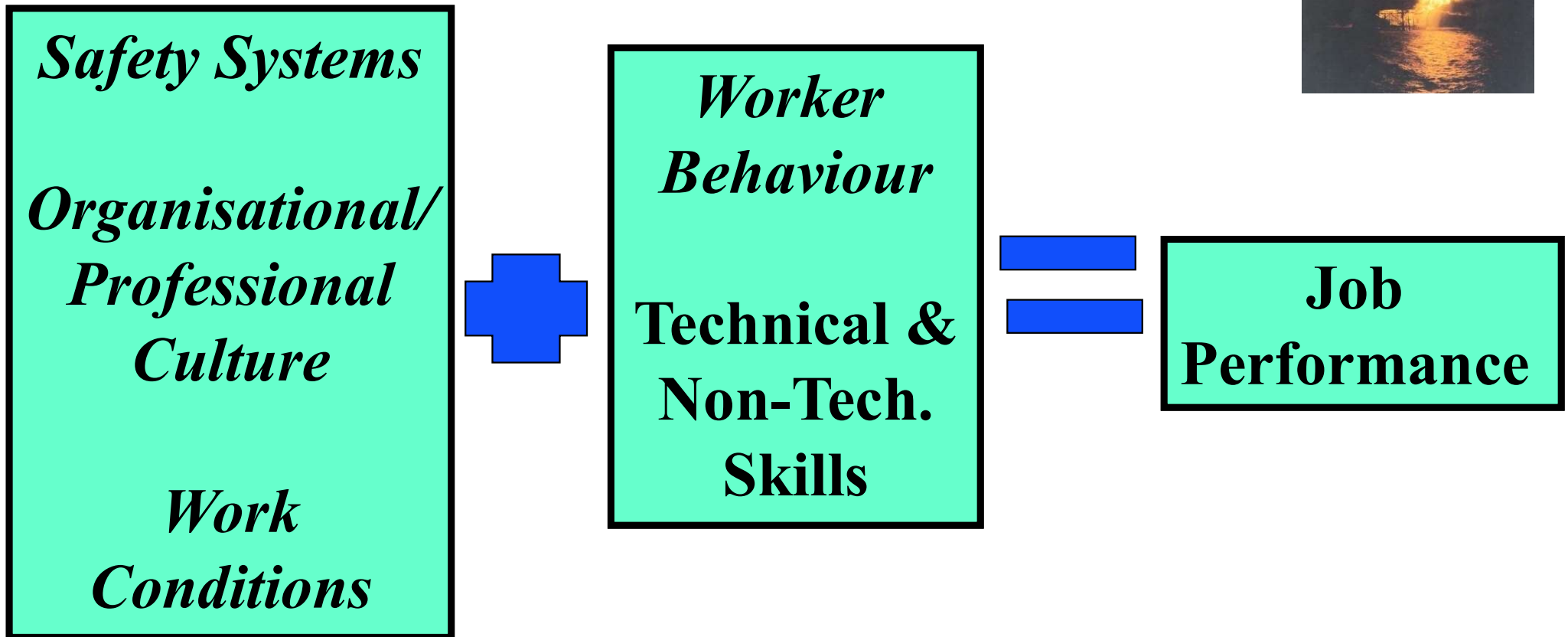
- Justify the term ‘Non-Technical Skills’
- Tone down error, major accidents
- Tone up performance, learning from what goes well / resilience
- Emphasise that NTS are not synonymous with Human Factors – only a small part of HF science
- Explain (again) NTS are not sole cause of safety events/ excuse for a ‘blame culture’

Safe and Efficient Job Performance



Latent Conditions

□ Individual actions



Factors Influencing Pilots' NTS

Environmental factors

- Equipment available
- Weather conditions
- Aircraft faults
- Aircraft type / ergonomics
- Time of day / night
- Base facilities
- PPE
- Noise
- Vibration

Mission-related factors

- Incomplete information
- Time pressure
- Safety management
- Available alternatives
- Fuelling options
- Risk vs reward
- Task complexity
- Mission length
- Unexpected changes to task

Individual / personal factors

- Stress (home based, job based)
- Fatigue
- Experience / background
- Distraction
- Health & physical fitness
- Assertiveness / confidence
- Nutrition / hydration
- Preparedness
- Mood / attitude of oneself

Crew related factors

- Experience / background of crew
- Familiarity of crew
- Ability of crew
- Compatibility with crew
- Personality of crew members
- Mood / attitude of crew
- Style of commander's leadership
- Crew gradient
- Crew conflict / disagreements

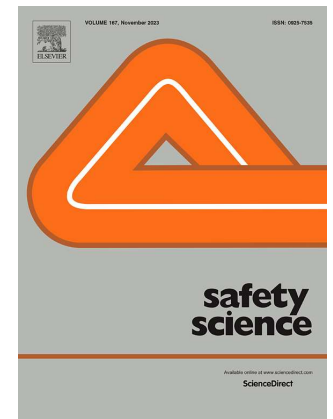
Workload

- Task saturation
- Too high a workload (long term)
- Training responsibilities
- Length of duty
- Task delegation

Organisational factors

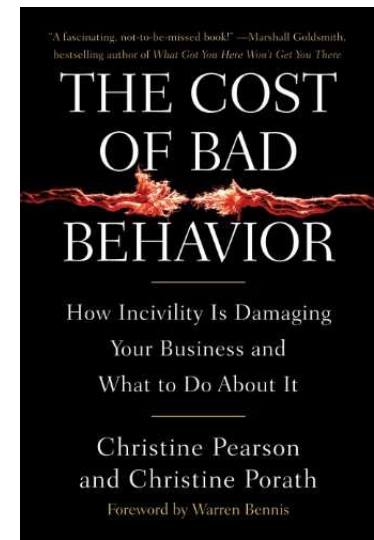
- Company culture
- Customer wishes
- Company morale
- Job insecurity
- Reliance on other departments
- Changes to regulations / SOP

Trends in Safety Research i



- Safety I and Safety II
- Resilience/ coping with unexpected
- Work as Imagined/ Work as Done/ Successful Work
- Less emphasis on negative - error/ major accidents
 - Threat Error Management?
 - Performance Enhancing Errors? (Kerray et al (2023) J Surg Educ)
- More emphasis on positive - performance, CBTA
- Evidence-based practice
 - Quality of evidence - validity? reliability? Peer reviewed?

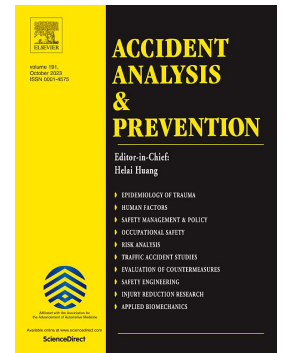
Trends in Safety Research ii



- Employee Voice and Silence
 - Different motivators for speaking up (perceived impact) and keeping quiet (psychological safety) (Sherf et al, 2021, *AMR*)
- Rudeness and cognitive costs (Porath & Erez, 2013)
- Importance of wellbeing/ mental health for safety
- Mindfulness and safety outcomes (Liu et al, 2023, *JOB*)

Trends in Safety Research iii

- Debriefing tools e.g. PEARLS
 - (Eppich & Chen, 2015, *Simulation in Healthcare*)
- Safety event analysis tools
 - e.g. TRIPOD-LITE for less severe events (free from Energy Institute)
- AI/ML for analysing large safety datasets or published safety research
 - e.g. Human Behaviour Change Project
www.humanbehaviourchange.org



Situation Awareness Updates

- Monitoring
- Cue utilisation (Wiggins, 2022 PACDEFF)
- Cognitive load management (Howie et al 2023, J. Surg Educ)
- Mindfulness and attention (Jha et al, 2015, *PLOS One*)
- Attention control/ strategy toolbox (Pak et al, 2023 *Human Factors*)
- Cognitive Readiness

Cognitive drivers of performance under pressure

- Delphi study – measuring expert consensus
- 68 international experts were recruited from four performance domains (i) Defence; (ii) Competitive Sport; (iii) Civilian High-stakes (e.g. emergency services); and (iv) Performance Neuroscience.
- (1) **Attention;**
- (2) **Cognitive Control—Performance Monitoring;**
- (3) Arousal and Regulatory Systems—Arousal;
- (4) Cognitive Control—Goal Selection, Updating, Representation, and Maintenance;
- (5) Cognitive Control—Response Selection and Inhibition/Suppression;
- (6) Working memory—Flexible Updating;
- (7) Working memory—Active Maintenance;
- (8) Perception and Understanding of Self—Self-knowledge;
- (9) Working memory—Interference Control;
- (10) Shifting.

Albertella et al (2022) *Frontiers in Psychology* (Monash University, Melbourne)

Cognitive Readiness



Morrison and Fletcher (2002)

- *“Cognitive Readiness is the mental preparation (including skills, knowledge, abilities, motivations, and personal dispositions) an individual needs to establish and sustain competent performance in the complex and unpredictable environment of modern military operations”*
- *“The concept of cognitive readiness may be of special relevance and significance for those who must adapt quickly to rapidly emerging, unforeseen challenges”*



HELINOTS

BEHAVIOURAL MARKER SYSTEMS

Search and Rescue Pilots
and Crews

Cognitive Readiness

Utilising preparedness

Maintaining resilience

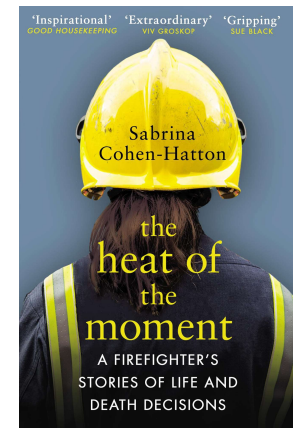
Applying problem-solving

[https://research.abdn.ac.uk/
applied-psych-hf/helinots](https://research.abdn.ac.uk/applied-psych-hf/helinots)

Hamlet et al (2023) *Ergonomics*

Decision Making Updates

- Decision inertia/ least worst decisions (Alison et al, 2015, JOOP)
- Decision controls – (Cohen-Hatton & Honey, 2015, *JEP:A*)
- Decision modes/ switching (Moulton, 2010, *JGS*)
- Low/ Mid-fidelity simulation for problem solving (Rosa, Dahlstrom et al, 2021, *TIES*)
- Startle/ surprise (Martin; Boland, PACDEFF, 2016)
- Amended decision models
 - e.g. T-FORDEC; F-DODAR



**Suggestions, comments, criticisms of
Safety at the Sharp End 1
to**

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