Human Factors and Human Behaviour in Safety Management and Accident Investigation

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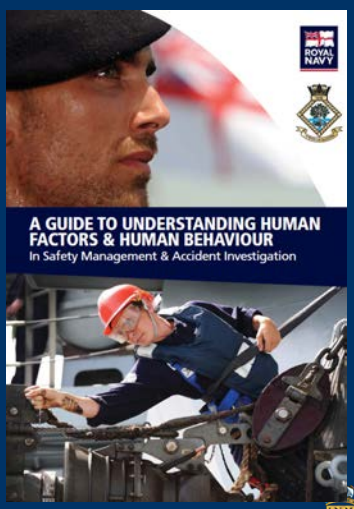
Overview

- HF in accident investigation
- Hindsight bias
- HF guide
  - Behaviour & Accident investigation
  - Behaviour & safety management
- Risk and human behaviour
- Safety culture



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Human behaviour and accident investigation

- Human error is not the sole cause of failure, it is a symptom of a deeper trouble *get bad results*
- Human error is the starting point of an investigation, not the end point.
- To do something about error we must look at the system in which people work
- Focus *must* extend past 'what occurred?' to 'why did it occur?'
- Humans make errors all the time-usually nothing happens

A note on hindsight bias

- Accidents are never investigated completely objectively – we know what happened next, they did not
- It can be easy to see where people went wrong, what they should have done / not done
- Easy to overlook a missing piece of evidence that turns out to be critical

Overcoming hindsight bias

- Assume people come to work to do a job, not to make an error
- Assume they were doing what seemed reasonable given the information they had at the time
- Report should answer why it seemed reasonable for people to do what they did

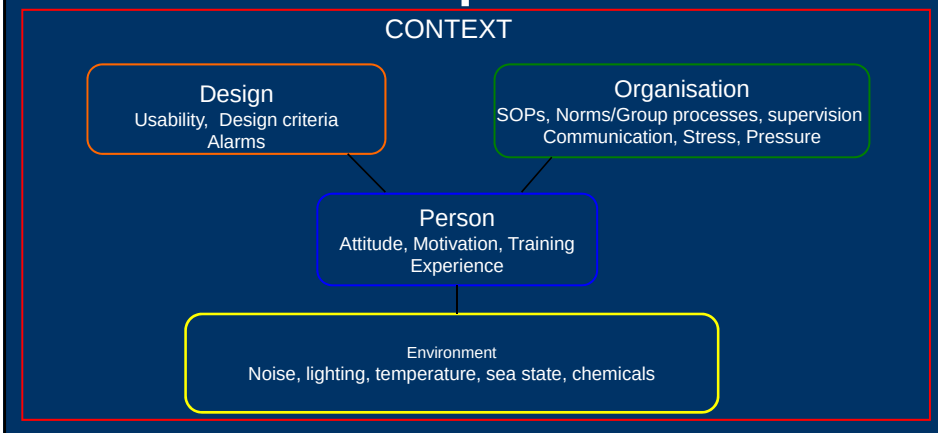
Guide to Human Factors & Human Behaviour in Safety Management and Accident Investigation

- Practical ways of applying Human Factors
- Helps you to ask the right Human Factors questions in a systematic way
- Help you to understand WHY things went wrong and how to PREVENT a recurrence
- Available to all personnel on NAVYSAFE website

Human behaviour and accident investigation

- The important end-goal of investigation of accidents/near miss events is to PREVENT RECURRENCE
- Simply blaming/removing/re-training the individual does not always reduce the likelihood of repeat occurrence
- You need to understand the context in which the accident/near miss occurred and what needs to be changed

Person-Centred Description



What was the situation that the operator found him/herself in at the time of the incidence?

Organisation-Centred Description

CONTEXT

Design
Usability
Design criteria
Alarms

Operational Environment
SOPs
Norms/Group processes
Supervision
Communication
Stress
Pressure
Physical work environment

Person
Attitude
Motivation
Training
Experience

What gave rise to this situation in the first place? Why where things they way they were?

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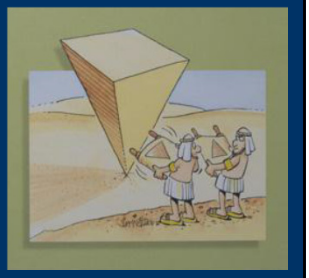
Stage 1: Identifying errors/violations, HF and root causes

Question 1 – Classification

Was there an error or violation?

The answer to this question will provide a broad categorisation of behaviour

Also it will direct strategies to prevent recurrence



Question 2 – Human Factors

What Human factors contributed to the error/violation occurring?

The answer to this question will require a micro-analysis of the event against the context of the immediate scene and sequence of events

Question 3 – Root causes

Why did these Human Factors exist in the first place?

The answer to this question will also provide numerous secondary questions and a macro-analysis of the event against the context of the wider organisation and potentially latent issues

Identifying HF and human behaviours after an event

Stage 1: Identification and Classification of Human Behaviour

1. Did an error or violation contribute to the accident?

2. Did Human Factors (Organisation / Design / Environment) increase the risk of the error/violation occurring?

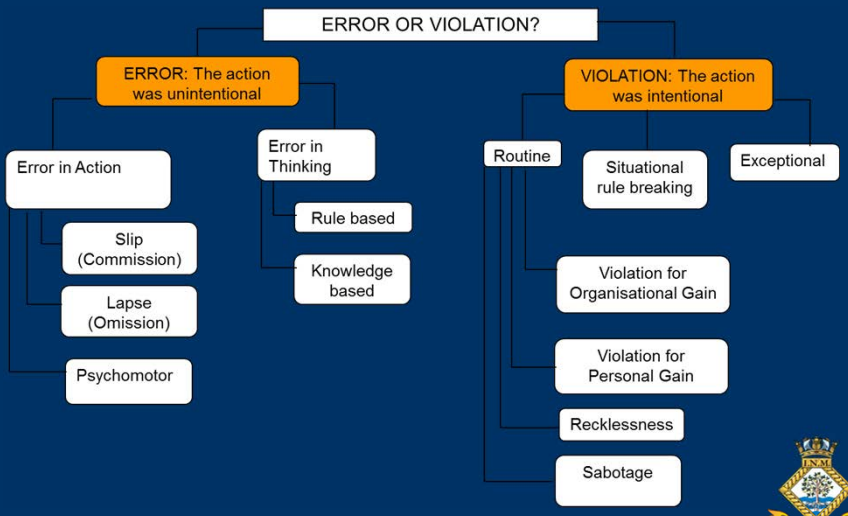
3. Why did these Human Factors exist in the first place?

Stage 2: Consideration of how to prevent recurrence.

1. If Human Factors contributed to the accident, what can we do to remove them to prevent recurrence?

2. How can we shape future Human Behaviour to prevent recurrence?

Stage 1: Identifying errors/violations, HF and root causes



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Stage 1: Identifying errors/violations, HF and root causes

Question 2 – Human Factors

What Human factors contributed to the error/violation occurring? Micro analysis of immediate causal factors.

Consider whether the following Human Factors were present:

ENVIRONMENT
- Extremes of heat/cold
- Excessive noise
- Confined space
- High sea state
- Poor lighting
- Toxic hazards
- Flammable materials
- Weather conditions
- Other

ORGANISATION
- Fatigue
- Watch systems
- High time on task
- Poor team work
- Communication problems
- Inadequate maintenance
- Poor record keeping
- Conflicting goals
- Poor instructions
- Time pressure
- Lack of supervision
- Lack of training
- Other

DESIGN
- Workstation layout
- Too many controls
- Poor displays
- Console design
- Presence/absence of warning signs
- Screen layout
- System response time
- Adequacy of feedback
- Poor sightlines
- Visibility
- Number of Warnings / Alarms
- Other

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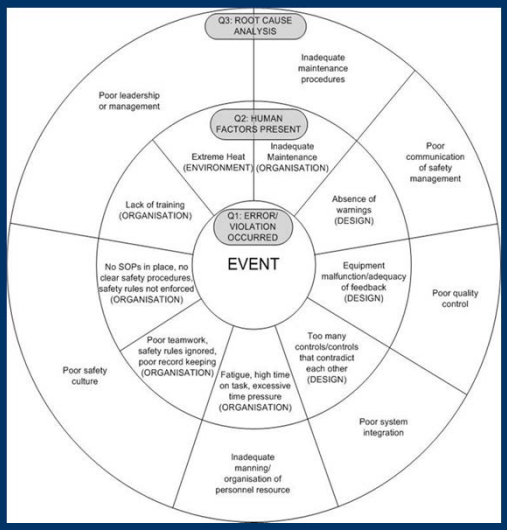
Stage 1: Identifying errors/violations, HF and root causes

Question 3 – Root causes



Stage 2: Preventing Recurrence

How can we deal with the Human Factors present at the time of the accident to prevent recurrence?

Environment

- Improving lighting, ventilation,
- Improve warning systems
- Ensure risk management is in place in cold/hot climates

Organisation

- Should supervision be reviewed?
- Are training requirements in line with the task requirements?
- Task allocation could be reviewed in light of changing manning levels
- Standard Operating Procedures could be re-written to accurately reflect the task requirements

Design

- Controls could be laid out in a manner that does not cause contradictory information
- Current inadequate maintenance and procurement procedures could be improved
- E.g. HMS Endurance example

Stage 2: Preventing Recurrence

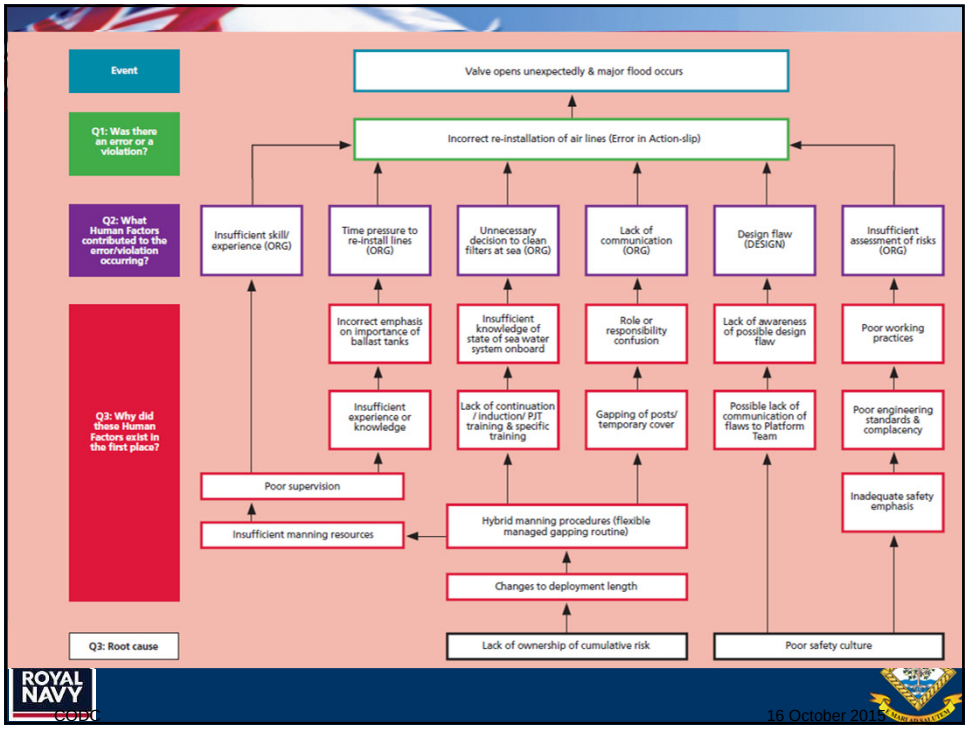
- How can we shape human behaviour to prevent recurrence?
- Understand how the context people work in may affect safety behaviour
  - Telling people to *Work safer!', 'Be more careful', 'Follow the rules'* is unlikely to change behaviour
  - Consider factors such as – safety culture, improving risk perception, removing perverse incentives
- This understanding helps to develop effective safety management strategies

HMS ENDURANCE flooding 16 Dec 2008

- Operating in the South Atlantic, Endurance suffered severe flooding in the engine room, with near loss of ship
- The Royal Navy inquiry found that the flood happened while a sea-water strainer was being cleaned, in an attempt to improve the production of fresh water. The air lines controlling a hull valve were incorrectly reconnected, resulting in the valve opening and an inability to close it. The pipe installation fell below generally accepted standards, which made reconnection of the air lines ambiguous. The inquiry also found that due to manpower constraints the ship did not have a system maintainer, and that clarity of engineering command had been lost, with no-one clearly in charge of risk-management.

HMS ENDURANCE flooding 16 Dec 2008

- Enquiry concluded: flooding due to inadvertent opening of a hull valve during inlet strainer cleaning.
- Incorrect reconnection of control airlines is likely to have caused the inadvertent opening
- Immediate cause was a SLIP (error in action)-the person who reconnected the valve was unaware their action was incorrect. The action was unintentional, and incorrect.
- Six Human Factors were identified as contributing, with two possible root causes



Why do people take risks?

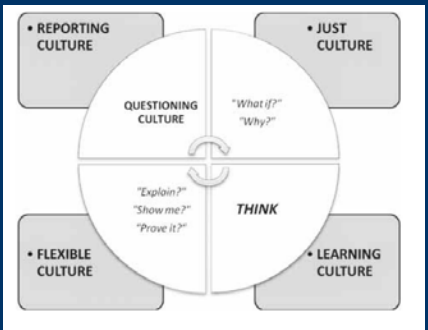
- People take risks because:-
  - Time pressure
  - Unrealistic optimism
  - Natural reinforcement - quicker / easier / less effort
  - Custom & practice *'This is how we do it here'*
  - Complacency *'I've done it loads of times'*
  - Systems of payment & reward
  - Most risky acts have 'positive' outcomes
  - Frustration
  - Interpretations of managerial priorities

Risk perception

- Important to distinguish between volitional risk taking and unintended acts
- Do people actually know the behaviour is risky (norms are not immediately obvious)?
- Factors that influence risk perception
  - Amount of control we think we have
  - Value that something has for us
  - Familiarity

Safety culture

Haddon Cave (2009)

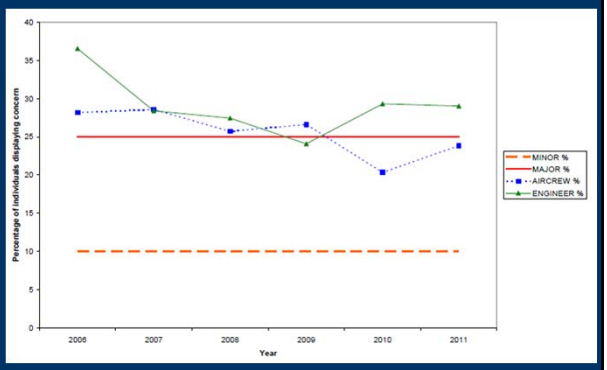


Components of safety culture
(Flin et al. 2000; Guldenmund, 2007)

- Management commitment
- Workforce involvement
- Training / communication
- Employee risk perception
- Nature of the work environment
- Policy / procedures

Measuring safety climate – example

- FAA safety survey & Q-sort
- Data used for trending
- Differences in attitudes by role
- WHY?
- Qualitative follow up
- Triangulation



Rules are not bent because of work pressure

In conclusion

- Proper accident investigation is key in the prevention of future accidents
- Use these techniques in safety management too
- Understanding context factors are key to understanding behaviour
- Management commitment to safety is most commonly identified component of safety culture (that's you!)

Questions?