Cultural Conceptions of Safety in the Royal Navy

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Introduction

- In 2010, the First Sea Lord introduced 'NAVYSAFE'
- The RN's Safety Improvement Programme
- One of the aims of the programme was to develop a good 'Safety Culture'

Background

- The Haddon-Cave Review (2009) of the NIMROD MR2 XV230 air crash in Afghanistan in 2006
- A fire broke out in an inaccessible part of the aircraft which had no fire protection (the starboard No. 7 Tank Dry Bay). The crew had no chance of controlling this fire.
- It quickly spread and led to the mid-air break-up of the airframe, tragically only minutes before the crew could make an emergency landing at Kandahar airfield
- 'A failure of leadership, culture and priorities'

Navy Safety Centre

- The RN established a 'Navy Safety Centre' (NSC)
- Audit function: conduct regular audits of safety procedures and processes
- Culture focus: 'Cultural change team'
- Today, I will review some of the work we have done with the NSC

Early Research: Accident Proneness and Stress

- A few years ago, we were doing a longitudinal study of occupational stress
- Out of curiosity, more than anything else, we decided to see whether stress was related to accidents
- It was. Accidents were just one more adverse outcome of stress in accident-prone people
- However, the exploitation pathways for this kind of knowledge, theoretically interesting although it is, are limited…..

Accidents Big and Small

- So we started to look at the accident database itself

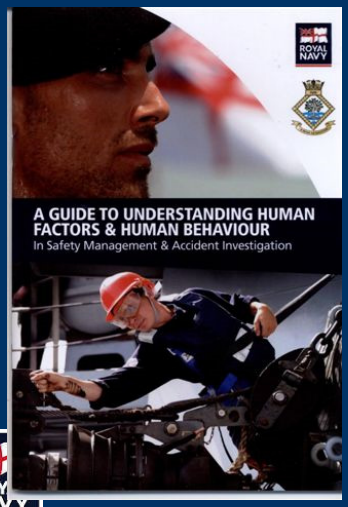
Small(ish) accidents

Injury severity category	2009	2010	2011
Minor	758 (81%) Λ	839 (85%) Λ	643 (72%)
Serious	66 (7%) V	70 (7%) ~	88 (10%) Λ
Major	110 (12%) Λ	74(8%) V	102 (11%) Λ

Big Accidents

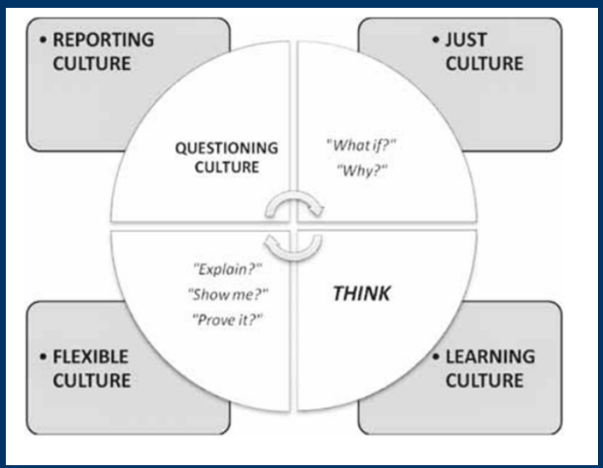
- Grounding of HMS Nottingham
- on Whale Rock
- Flooding on HMS Endurance in the Magellan Straight

Guide to Human Factors in Accident Investigation and Safety Management



- New reporting system developed
- Human Factors must be considered in all incident reports
- HF training for all COs
- HF part of the development of Safety Culture
- NSC commissioned the HF Dept to produce a guide - issued to all establishments/ships
- All investigating officers issued with the booklet

Safety Culture



Taken from Nimrod review (2009)

How Good are these Reports?

- As part of an inquiry into unsafe behaviour, three Officers independently read each of 3000 accident reports
- Their task was to classify the accident causes into:
  - *Violation* (deliberate disregard of rules and regulations)
  - *Error* (unintentional behaviour)
  - *Other* (e.g. mechanical or system failure)
  - *Unknown* (cause could not be established from the information in the report)
- Can the officers classify the reports into different categories?
- Is there sufficient information to enable them to decide?
- If they can classify the reports, do they agree ('inter-assessor reliability')?

Findings

- Tests of statistical significance showed that none of the officers classified the reports randomly – there was a pattern
- Did they agree with each other?

Kappa	Agreement
< 0	Less than chance agreement
0.01-0.20	Slight agreement
0.21-0.40	Fair agreement
0.41-0.60	Moderate agreement
0.61-0.80	Substantial agreement
0.81-0.99	Almost perfect agreement

- We used a statistic known as 'Fleiss' Kappa' to find out

Findings

- Overall, ‘moderate’ agreement
- ‘Good’ agreement for violations and errors
- ‘Fair’ agreement for ’unknown’
- Officers didn’t agree very strongly about whether the cause was ‘unknown’ or not!

	Fleiss' Kappa (s.e.)*
Overall	0.57 (0.007)
Violation category	0.62 (0.011)
Error category	0.61 (0.011)
Other category	0.56 (0.011)
Unknown category	0.37 (0.011)

Distribution of ‘Causes’

- 65.8% due to ‘Error’
- 7.8% ‘Violations’
- 5.7% ‘Other’
- Remainder ‘Unknown’
- Violations were mainly traffic offences off duty
- Over a quarter of the accident reports were written in such as way that it was difficult to classify them
- Indicating problems with the ‘Reporting Culture’?
- How does this impact the ‘Learning culture’?
  - i.e. how can we learn from accident reports if they don’t tell us what happened or we can’t agree why?

Safety Culture Survey

- In 2012, we obtained ethical approval for a Safety Culture Survey of the RN using questionniares
- What is Safety Culture?
- What is it that is being surveyed?

UK Health and Safety Commission Definition

- HSC (1993) defined ‘safety culture’ as

“the product of individual and group values, attitudes, perceptions, competencies, and patterns of behaviour, that determine commitment to, and the style and proficiency of, an organization’s health and safety management”

- The HSC seems to be suggesting that culture is an ‘emergent property’ of behaviours, abilities and perceptions…..?

Anyway…..

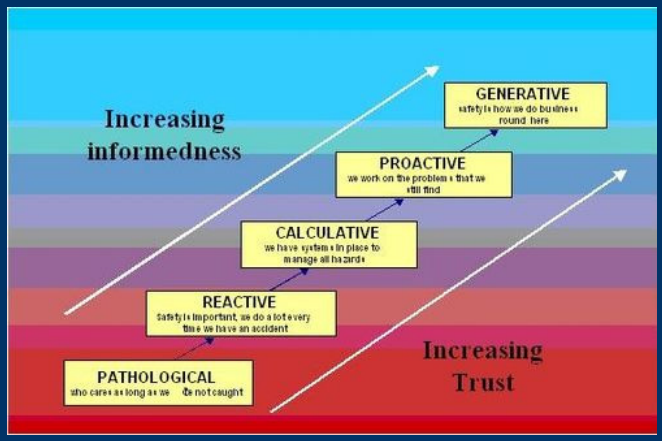
- We got on with the survey
- Developed a pilot questionnaire
- Got hundreds of replies
- Did a principal components analysis
- Identified the main components of SC
- Finalised the questionnaire
- Sent it out to 12,000 people
- And then…….

Not a Lot Happened!

- Response rate was 26% - too low
- No controls for non-response bias checking
- So, we gave up doing SC surveys - too difficult…

Safety Culture Audits

- A little later, the NSC decided to introduce a 'Safety Culture Maturity Model' into its safety audit process



Can Culture be 'Audited'?

- If safety culture is normally assessed using questionnaires / focus groups / case studies….
- Is it possible that all an audit process will do is measure compliance?
- OK - what do safety culture questionnaires measure, if not perceived compliance?
- So, we did a content analysis of existing safety culture questionnaires to get a better idea of what they measure
- Do they just measure 'perceived compliance' or do they measure something else as well?

Contents of Six Safety Culture Questionnaires

Questionnaire	No of items	No items (%) compliance
Offshore safety Questionnaire	52	7 (14%)
Irish Aviation Authority	35	7 (20%)
CAA SHoME tool	83	13 (16%)
Nordix Occupational Safety Climate Questionnaire (NOSACQ-50)	50	18 (29%)
Safety Attitudes Questionnaire (SAQ)	36	10 (29%)
Maintenance Climate Assessment Survey	43	22 (51%)

Findings

- The questionnaires vary, but they all deal with perceived compliance to some extent
- For example: "*People around here tend to follow safety procedures*"
- But they also measure other things as well
- For example: *"We who work here regard risks as unavoidable"*

A Quick Look at the NSC Audit Process

- Auditors visit an establishment for a few days
- They examine minutes of safety meetings, make observations, check record-keeping , talk to people and so on…….
- Then, they enter their findings on a template and generate an assessment of safety culture maturity
- There is far more information available for audit than can be examined in a few days. Key people may not be there. Auditors 'get what they are given on the day' to an extent, although they do have some authority and control

Audit Template

	Pathological	Reactive	Calculative	Proactive	Generative
Leadership Commitment					
Knowledge					
Communication /Involvement					
Reporting					
Learning					
Just culture					
Attitudes / behaviours					

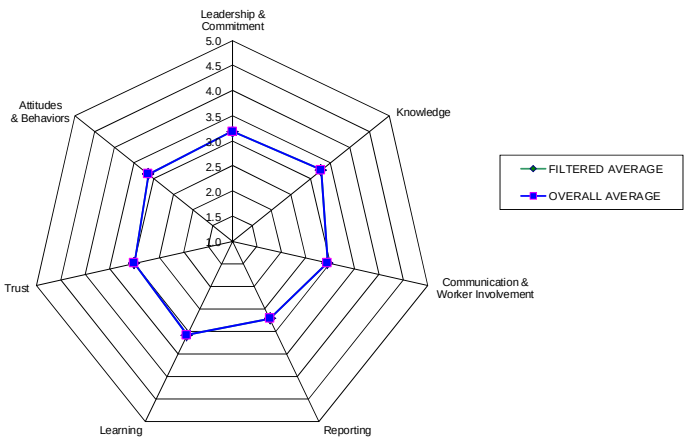
Example of Audit Criteria

Leadership and commitment:

Leadership and commitment relates to the various ways an organization demonstrates that they are committed to health and safety. In organizations where there is the highest level of commitment, health and safety is given a high priority, and the organization promotes a strong focus on continuous improvement. Management behaviour strongly reflects the organization's commitment to health and safety by acting promptly over health and safety concerns as well as ensuring that working practices are safe. Organizations that are strong on this factor devote substantial effort and invest considerable resources in health, safety and welfare. Individuals have the necessary equipment and there are always additional staff resources to complete work safely.

Pathological	Nobody within the organization takes responsibility for safety. Safety is generally regarded as an inconvenience to the operational output.

Audit Reporting



Work in Progress: Validation of a SC Maturity Model Audit Process

- One of the first questions to ask in validating such as process is whether it is reliable
- Do different auditors come up with the same assessments when they audit the same establishment independently?

Initial Findings (N=2) - Agreement by Cultural Category

	Cohen's Kappa
Overall (20 items)	0.49
Learning (2 items)	1.00
Attitudes and behaviours (3 items)	1.00
Communication and workers involvement (3 items)	0.59
Leadership and commitment (4 items)	0.58
Reporting (3 items)	0.15
Knowledge (3 items)	0.09
Just culture (2 items)	0.09

Initial Findings (N=4): Agreement by Maturity Level

	Fleiss' Kappa
Overall	0.19
Pathological	-0.02
Reactive	-0.05
Calculative	0.12
Proactive	0.48
Generative	-0.04

Discussion

- Further work is underway to look at the inter-auditor reliability in four more establishments
- It is too early to say whether the audit process is reliable
- But, there are some interesting discussion points

Operationalizing the SC Maturity Model: Interesting Research Questions

- Can the model be operationalised in an audit?
- What are mappings between the evidence 'out there' and the levels of the model?
- How do auditors 'weight' different kinds of evidence?
- Does the evidence needed to populate the audit template even exist?
- If aspects of the model have not yet been institutionalised, how can they be audited?
- Is this model completely misleading or just a bit optimistic?

Next Steps

1. Further trial audits with a short questionnaire for auditors to enable us to investigate some of these questions (reliability/ecological validity)
2. Simulated audit to be conducted under controlled conditions with de-brief (validity, mappings and weightings)
3. Implement lessons learnt in training of auditors

What is Culture?

- Shared understanding of the social significance of events and behaviours at a symbolic level

Cultural Conceptions: Is There a Safety Culture to Measure in the Royal Navy?

- There is a ‘culture’, but where safety comes in is debateable
- Delivering operational capability by taking calculated risks has cultural prestige
- Being ‘risk aware’ rather than ‘risk averse’ is a cultural norm in the RN
- Maybe that’s why nobody returns Safety Culture questionnaires……..
- Auditing is probably a better option for the RN – safety is important but it doesn’t come first

Questions?