Human Factors in accident investigation

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What we expect from investigations

• Methodical process for gathering information, analysing what went wrong (and right), and learning lessons in order to:
  – Manage risk
  – Prevent reoccurrence

• Retrospective tool, but can be powerful in promoting change
The Accident Plateau

Frequency

time

causes

unsafe conditions
unsafe acts
The Accident Plateau

Causes
- Unsafe conditions
- Unsafe acts

Frequency

time
Significance of Human Factors

- Up to 90% of accidents attributable to some degree to human failures.
- ...Texas City...Buncefield... …Texaco Milford Haven ... Southall & Ladbroke Grove crashes ...Zeebruger...
- Proportion and significance increasing as technical safety measures improve.
Human Factors in Accident Investigations

• “This accident was the result of human error”
• “…..pilot error”

Error or rule-breaking put down to
• “Lack of competence”
• “Poor supervision”
• “Not paying attention”

It’s not usually as simple as that!
Accident reports

• What happened
• Who to
• When
• How it happened
• But not why

Technical myopia

Failure to consider human factors
Accident Model

Health & safety risks from human failure

Latent Errors

Unsafe act

Unsafe plant/condition

Fail to recover situation

Incident

Accident

Performance Influencing Factors

Organisation

Person

Job
Accident Investigation Model

Health & safety risks from human failure

Unsafe act
Incident

Latent errors

Unsafe plant/condition

Fail to recover situation

Accident
Health & safety risks from human failure

Categories of Human Failure

- MISTAKES
  - Knowledge-based
  - Rule-based
- LAPSES
- SLIPS
- ROUTINE
- VIOLATIONS
- SITUATIONAL

Health & safety risks from human failure
Root Causes

Health & safety risks from human failure

- SLIPS
- LAPSES
- Rule-based MISTAKES
- Knowledge-based
- ROUTINE
- SITUATIONAL

Errors

Mistakes

Violations
**Error**

**Action not as planned** when working on a task at which skilled (‘autopilot’)

- Miss a step – omission of component on reassembly after maintenance
- Transpose – wiper instead of indicator
- Habit intrusion – driving to work instead of where intended
Mistakes

Wrong plan implemented

- **Rule-based** – if the situation is X then the cause must be Y, and the right cause of action Z – “It’s just another false alarm”

- **Knowledge-based** – working from first principles – Heathrow tunnel collapse
Violations

- Probably more important than mistakes or errors, *IS NORMAL BEHAVIOUR*

- **Routine** – everybody else ignores the rule
  - ppe, driving at 30mph, closing bow-doors

- **Situational** – perceived benefits of ignoring outweigh perceived penalties
  - Discomfort/inconvenience
  - Time/deadline pressure
  - Financial cost
  - e.g. forging documents, skimping permit procedure
Investigation process

• Gather evidence
  – Establish timeline /event sequence
  – Competence
  – Bias

• Analysis
  – Immediate & underlying causes
  – Checklists*
  – Failed controls (revisit RA)
  – Bias

• Recommendations
  – Implementation
  – Communication

* Caution
What to Remember
What to Remember

• Preventable accidents involve human failures…
  – Individual, serial or collective
  – Immediate or latent

…amongst the root causes

• Human failures are not random…
  – There are patterns
  – There are underlying job, personal and organisational performance influencing factors

…that need to be understood, investigated & managed
Sources of Guidance

• Reducing Error & Influencing Behaviour HSG 48
• Investigating Incidents & Accidents HSG 245
• Successful Health & Safety management HSG 65
• Human Factors Website pages
  http://www.hse.gov.uk/humanfactors/majorhazard/index.htm
• Energy Institute guidance