Learning from disasters:

Improving health and safety culture and competence

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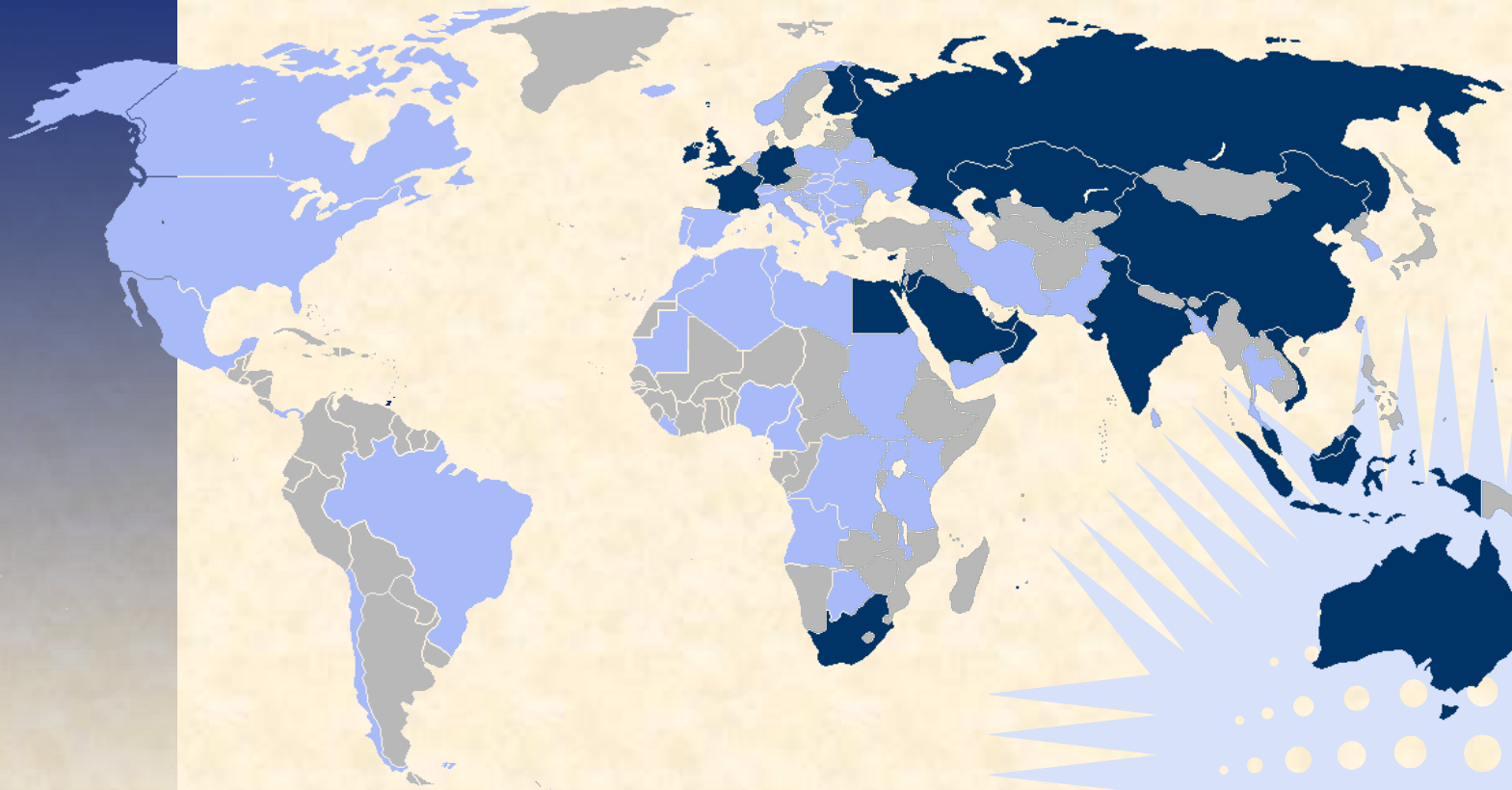
About NEBOSH

- Educational charity, established in 1979 to provide qualifications for health and safety professionals
- Now provides qualifications in health, safety and environmental issues for employees, managers and safety professionals
- Accredited by UK government as an "awarding body"

About NEBOSH

- Has a range of international qualifications based on international conventions and standards
- Currently more than 20% of NEBOSH qualifications are delivered outside the UK
- International demand is increasing rapidly

About NEBOSH



Examinations in 83 countries

International centres in 24 countries

Learning from Nimrod XV230

What happened?

- A catastrophic mid-air fire/explosion
- Total loss of the aircraft
- Death of all 14 people on board

The technical causes

- An accumulation of fuel in No 7 tank dry bay

The technical causes

- Origin of the fuel
  - Leak from fuel coupling?
  - Overflow from air-to-air refuelling?
- Probable ignition source
  - the hot surface of a duct associated with an air conditioning system

Underlying causes

- Defective design
  - juxtaposition of hot ductwork and fuel pipes and couplings
  - many modifications made to original design
- Modified operational practices
  - introduction of air-to-air refuelling increased probability of leaking fuel
- An inadequately conducted "safety case"
- A culture of complacency

Relevance to railways?

- No direct technical read across?
- Modified operational practices introducing unconsidered risks?
- Culture and competence?

- “This case starkly illustrates how dangerous … “embedded” design defects can be, and how important it is not to make blanket assumptions about safety.
- At no point was a holistic view taken of the incremental effect of … changes”

- “Safety is crucially dependent on management and management systems. One of the things that the Safety Case should demonstrate … is that the company has a suitable safety management system. However, whilst an effective safety system is necessary, it is not of itself sufficient. ….. It requires continual review and audit.”

- “Qualitative learning and numerical risk estimates from Quantified Risk Assessments (QRA) should be combined with other information from engineering and operational analyses in making an overall decision”

- “The majority of the personnel involved in the Nimrod Safety Case were incompetent ….. They were insufficiently trained and experienced in Safety Cases and the techniques they were required to employ, in particular…. how to carry out the analysis and risk classification required to produce a Safety Case.”

- “Reliance on past data cannot be considered a substitute for critical hazard analysis as to the risk of a catastrophic event in the future. ….. It should be remembered that the day before the *Piper Alpha* disaster itself in 1988, and the *Challenger* disaster in 1986, the platforms involved were ‘safe’ based on an analysis of past incidents alone.”

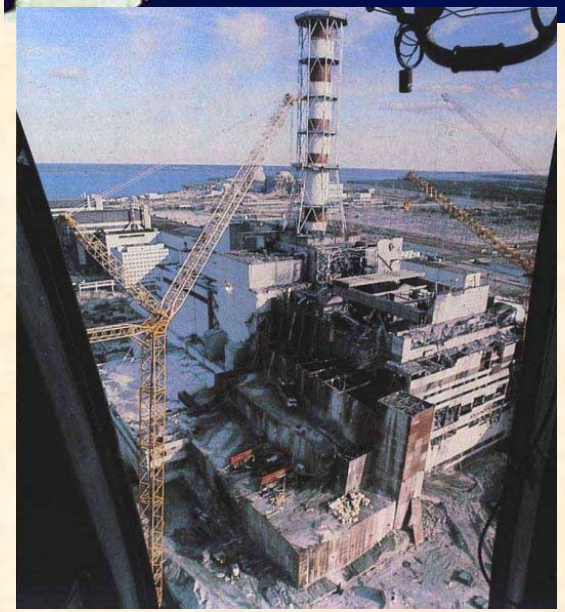
- “Having lots of processes has become more important than actually following them.”
- “Compliance with process and form-filling has taken the place of sound judgment.”

- “Reviews and inspections tend to focus on confirming whether relevant processes are in place, rather than investigating whether there is compliance and whether the processes are, in fact, having the desired effect. ….. Auditors have tended to chase ‘paper trails’ rather than check what is actually taking place on the ground.”

- Financial pressures and organisational changes distracted attention from vital functional values such as safety …, as people and organisations … became increasingly focussed on delivering the ‘change’ and the savings required

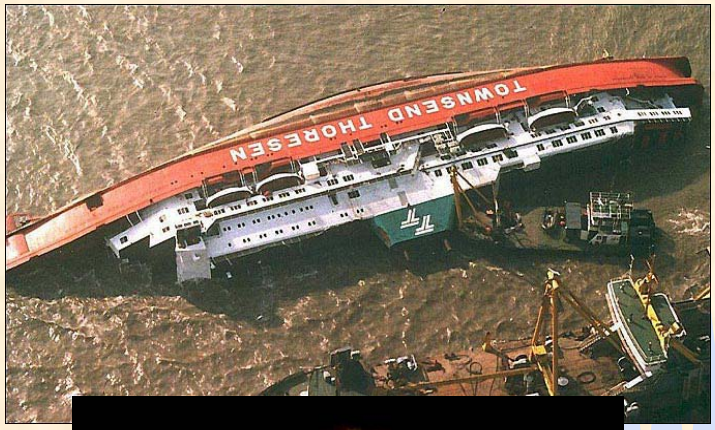
Cultural problems also contributed to…

- Challenger disaster

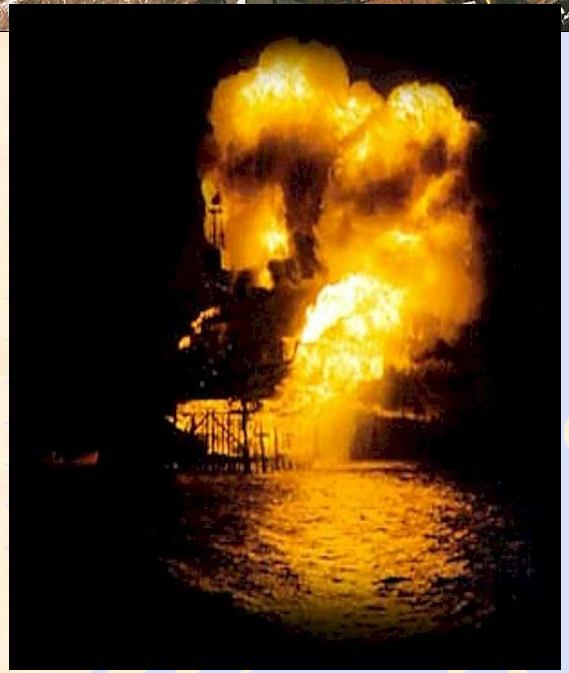


- Chernobyl

- Herald of Free Enterprise



- Piper Alpha



- Texas City explosion
- Deepwater Horizon?

Measuring culture

- "What gets measured gets managed"
- Safety culture can be measured, and findings can
  - alert organisations to weaknesses
  - motivate significant improvements
- Repeat measurements can track improvements

The four pillars of excellence in health and safety

- Safe design and construction
- Safe operation
- Safe maintenance
- Safe individual behaviour

All rely on competent staff, operating in a positive safety culture

Defining "competence"

Qualifications, skills, experience and qualities appropriate for their duties

Competence in context

- Organisational culture:
  - senior managers' expectations
  - senior manager's own competence
  - staff selection/recruitment systems
  - supervisory systems
  - staff appraisal and reward systems
  - colleague behaviours and peer group pressure

Competence and qualifications

- Qualifications
  - gauge individuals' knowledge and (if well designed) some relevant skills
  - motivate individuals to take part in education/training
  - help organisations develop a consistent approach to competence

Conclusions

- Railways can and should seek to learn from all major incident investigations
- Culture and competence are major concerns in most industries
- A positive safety culture develops competence; competence helps develop a positive safety culture
- Systematic competence management is vital
- Qualifications have a key role

Thank you for your attention

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