Producing Safety Cases - Good Practice Based on Lessons Learnt in the UK and Middle East

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Safety Case Symposium 2018 Singapore

Agenda

- A little bit of history
  - 3 mile island, Piper Alpha

- NIMROD incident

- SHAPED safety cases
  - Succinct;
  - Home Grown;
  - Accessible;
  - Proportionate;
  - Easy to understand;
  - Document-lite

- Beware of Black Swans

- Tips for a Good Safety Case

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Safety Case History – Three Mile Island

- 28th March 1979, reactor number 2 of Three Mile Island Nuclear Generating Station (TMI-2) in Dauphin County, Pennsylvania
    - Initiator – failures in the non-nuclear secondary system, followed by a stuck-open pilot-operated relief valve in the primary system.
    - Failure – plant operators did not recognize the situation as a loss-of-coolant, actually believing there to be too much coolant water in the reactor.
    - Failure – plant design meant there were ambiguous control room indicators including a hidden indicator light.
    - Accident – release of large amounts of nuclear reactor coolant.
- The logical steps followed by a safety case should have captured requirements for maintenance and inspections, plant design (including control room layout and alarm management, and training and competence requirements).

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Safety Case History – Piper Alpha

- 6th July 1988 explosion and fire destroyed the Piper Alpha platform in UK North Sea, killing 167 of 226 men onboard

- Condensate explosion spread into oil fire and escalated to failure of risers

- PTW system inadequate / bypassed and no review at shift handover

- Firewater system not operational

- Inadequate safety / evacuation training

- Management decisions delayed

- Cullen Inquiry made 106 recommendations for changes to North Sea safety procedures, including moving responsibility for enforcing safety from Department of Energy to Health & Safety Executive (leading to the introduction of offshore safety cases)

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SHAPED Safety Cases

- On 2nd September 2006, RAF Nimrod XV230 was on a routine mission over Helmand Province in Southern Afghanistan when, only minutes after completing air-to-air re-fuelling, she suffered a catastrophic mid-air fire which led to the total loss of the aircraft and the death of all 14 on board.

- A number of enquiries were conducted and concluded that the safety case for the Nimrod was fundamentally flawed and was a 'paper-exercise'.

- It was suggested that safety cases should be:

  - Succinct;
  - Home Grown;
  - Accessible;
  - Proportionate;
  - Easy to understand;
  - Document-lite

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SHAPED - Succinct

- The basic function of a safety case document is to provide sufficient information to stakeholders that safety at a facility is being managed effectively.

- In the Middle East in particular, it has become common to put as much information as possible into the safety case.

- This creates very large documents in which the important information is difficult to find.

- Leads to a concept of 'paper exercise' performed just for regulatory reasons.

- Some of the best safety cases have a relatively small amount of information and make reference to the detailed reports (which also need to be made available when required).

Too long and **bureaucratic** with unnecessary detail, often for 'invoice justification'

Obscure, inaccessible and difficult to understand language

Failing to see the **'wood for the trees'**

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SHAPED – Home Grown

- The vast majority of companies employ a consultant to write the safety case document.

- The consultant does not know the company or the facility.

- The ownership must be with the company, not with the consultant.

- Must include company personnel, at the right level, not just managers.

- Safety cases in Iraq, Dubai and UK where consultant never visited the facility.

Routine **outsourcing** to organisations who churn out voluminous quantities of paperwork in back offices

Lack of vital input from **operators** and maintainers who have the most knowledge and experience of the system

- Examples from an Iraq safety case:
  - All crane operations should be suspended during helicopter operations.
  - Final escape option was 'jump into the sea'.

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SHAPED - Accessible

- In order for a safety case to be effective, the information in the document itself AND any supporting documents/studies, need to be available to the people who need them.

- Managers need to see the overview.

- Engineers need to see the details relevant to their disciple or job role.

- Barrier management allows those responsible for managing and maintaining barriers to understand their roles and to record progress.

- New developments in barrier dashboards:
  - Use of bowtie software;
  - Integration of MMS, SAP, barrier auditing.

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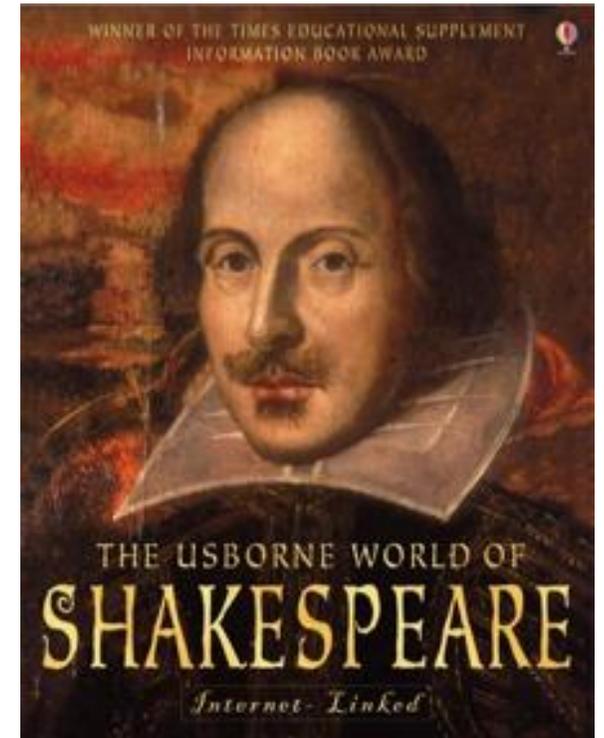Singapore
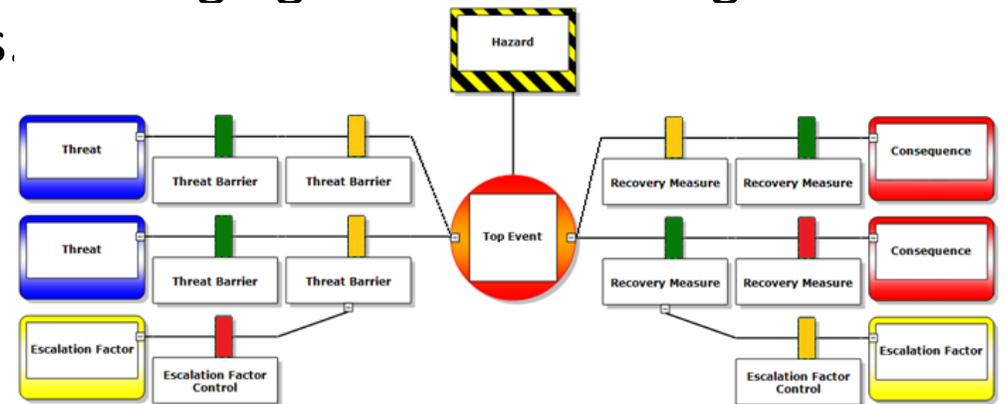
SHAPED - Proportionate

- The time and effort spent producing a safety case should be proportionate with the risks from the facility.

- A small plant with high fatality potential may need more effort than a very large facility with low fatality potential.

- Operators believe that every study needs to be completed.

- Large complex safety case documents are produced for low risk facilities.

  - Often due to misinterpretation or misunderstanding of the regulations.

  - Requires close co-operation with the regulator.

Written to **comply** with the requirements of regulations, rather than as working documents to improve safety

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SHAPED – Easy to Understand

- We all hate reading documents that are difficult to read (overly complicated, use poor English, use too much jargon, etc.).

- Should follow a logical structure.

- Only contain pertinent information (we don't want to know the problems that were seen while landscaping the carpark).

- Use language that is relevant to the site (call people by their correct job description, use correct names for plant areas).

- Use diagrams and pictures to help explain (risk contours, control room screenshots).

- Reference out to the very in-depth analysis.

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SHAPED – Document-lite

- The basic function of a safety case document is to provide sufficient information to stakeholders that safety at a facility is being managed effectively.

- The term 'Document-lite' reflects the need for a focussed, well structured safety case.

- Should clearly present the safety arguments and the information necessary to operate safely.

Languish 'on-the-shelf' rather than 'living' documents or a tool for keeping abreast of hazards

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Beware of Black Swans

Swans were assumed to be always white, until the discovery of black swans in Australia. Rare, unexpected but highly significant events are much more common than we think.

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Tips for a Good Safety Case

- Based on experience with clients, regulatory bodies and from seeing very bad safety case documents, a safety case should:
  - Focus on managing risk.
  - Clearly define the scope, and keep within it.
  - Focus on what the key users and stakeholders need to know.
  - Include 'workers' in the development – ownership.
  - Present information clearly and concisely – be easy to understand and easy to navigate.
  - Minimise repetition.
  - Use up to date, relevant references/supporting information.
  - Contain clear and implementable recommendations.
  - Either contain or reference an implementation plan.
  - Be signed by very senior company personnel to show senior management commitment.

Oh, by the way, your safety case isn't entirely useless …

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