

## Measuring and Improving Safety Culture

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## Overview



- ▶ What is safety culture?
- ▶ Why is safety culture important?
- ▶ Process versus occupational safety
- ▶ Safety culture versus safety climate
- ▶ How do we measure safety culture?
- ▶ Interventions that can improve safety culture
  - ▶ Role of leaders/managers
  - ▶ Role of supervisors
  - ▶ Role of employees
- ▶ Conclusions
- ▶ Questions

## Major Disasters!



Chernobyl (1986)  
 Challenger (1986)  
 Herald of Free Enterprise (1987)  
 King's Cross (1987)  
 Piper Alpha (1988)  
 Clapham Junction (1988)  
 USS Vincennes (1989)  
 Ladbroke Grove (1999)  
 Columbia (2002)  
 BP Texas City (2005)  
 RAF Nimrod XV 230 (2006)  
 Deepwater Horizon (2010)  
 Fukushima Daiichi (2011)



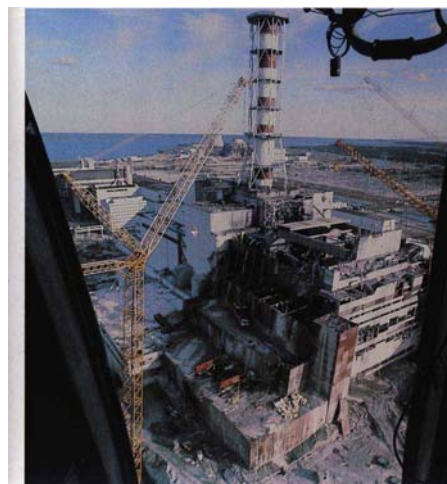
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## Chernobyl (1986)



'Safety culture is that assembly of characteristics and attitudes in organizations and individuals which establishes that, as an overriding priority, nuclear plant safety issues receive the attention warranted by their significance'.

*(IAEA, 1991)*



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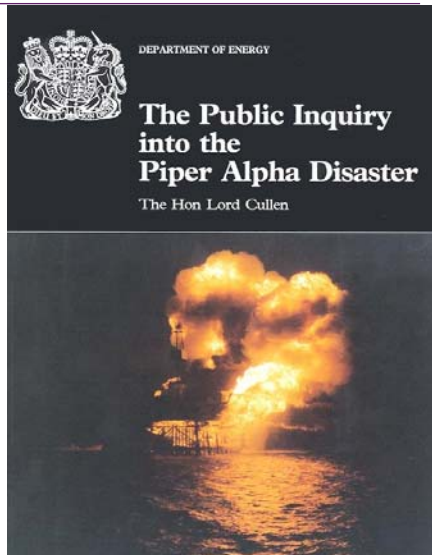
## Piper Alpha (1988)



167 people died

'It is essential to create a corporate atmosphere or culture in which safety is understood to be and is accepted as, the number one priority.'

*(Cullen, 1990)*



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## The Loss of RAF Nimrod XV 230 (2006)



*'A Failure of Leadership, Culture and Priorities'*  
*(Charles Haddon-Cave, 2009)*

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## Fukushima Daiichi (2011)



One of the key messages from the Report on the Fukushima Daiichi Nuclear Power Plant Accident: OECD/NEA Nuclear Safety Response and Lessons Learnt (2013)

‘The Fukushima Daiichi NPP accident identified significant **human, organisational and cultural challenges**, which include ensuring the independence, technical capability and transparency of the regulatory authority.’



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## BP Texas City Oil Refinery



14 people died  
100 injured

BP focusing on occupational safety and driving down lost-time injuries (LTIs) and failed to understand that this not the same as managing the risk of PROCESS incidents.

BP supposed to be implementing recommendations from the Baker report, including tackling the organisation’s safety culture when this happened.....



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## Deepwater Horizon



BP still focused on LTIs at the time of the disaster. BP Senior Managers had just 'audited' the rig for LTIs and behavioural safety. Had not identified process safety as an issue.



CEO – Tony Hayward  
 'We have begun to change the culture.'  
 'It is a thing that I talk about every time I talk internally or externally.'

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## Process Safety versus Occupational Safety



- ❑ High hazard industries, e.g. oil and gas, refer to preventing process accidents, i.e. blow-outs, fires, oil spills
- ❑ Most other industries, including high hazard, have to also consider occupational accidents, e.g. slips, trips, falls, being struck by equipment, etc.
- ❑ When measuring safety culture what are we referring to?

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## Culture versus Climate – same difference?



### Safety Climate

- Snapshot of selected aspects of organizational safety at a particular point in time (Mearns, Whittaker & Flin, 2003)
- Climate perceptions relate to 'procedures as patterns' - consistent reflection of the importance and priority of safety over competing goals (Zohar, 2000)

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## Culture versus Climate – same difference?



### Safety Culture

'The safety culture of an organisation is the product of individual and group values, attitudes, perceptions, competencies, and patterns of behaviour that determine the commitment to, and the style and proficiency of, an organisation's health and safety management' (ACSNI: HSC, 1993).

'Organisations with a positive safety culture are characterised by communications founded on mutual trust, by shared perceptions of the importance of safety and by confidence in the efficacy of preventive measures' (ACSNI: HSC, 1993).

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## Flin, Mearns, O'Connor & Bryden (2000)

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### **Thematic review of instruments measuring safety climate (18 studies)**

- ▶ Management commitment (72%)
  - ▶ Safety system (67%)
  - ▶ Risk (67%)
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## Hetherington (2007)

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### **Reviewed 'safety climate' literature from post 2001 (26 studies) to identify themes**

- ▶ Management commitment (n=22; 85%)
  - ▶ Personal involvement/responsibility/control (n=8; 31%)
  - ▶ Safety management/organizational policies and practices (n=7; 27%)
  - ▶ Safety training (n=7; 27%)
  - ▶ Communication (n=7; 27%)
  - ▶ Satisfaction with safety (n=3; 12%)
-

## Definitions of safety culture



- ▶ EUROCONTROL (Air Traffic Management)
  - ▶ 'Safety Culture is the way safety is **perceived, valued and prioritised** in an organization. It reflects the **real commitment to safety at all levels** in the organization'.
- ▶ Safety culture has also been described as 'how an organization behaves when no one is watching'.
  - ▶ This reflects how ingrained 'culture' becomes in an organization, which highlights a potential problem.....
- ▶ Culture can become 'a way of seeing that is not seeing'
  - ▶ Need a combination of outsider and insider input to understand 'safety culture'
- ▶ More than one type of 'culture' within an organization, e.g. security culture?
  - ▶ Will return to this later....

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## What is Safety Culture?



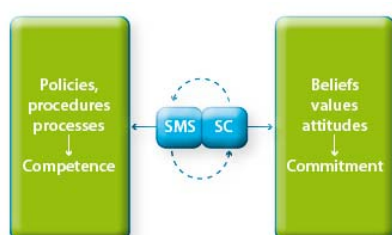
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## What safety culture is not!



- ▶ Safety Management System (SMS) represents the organization's stated competence and capability to manage safety
- ▶ Safety culture reflects the organization's commitment to manage risk and safety as stated in the SMS and to communicate and act upon safety concerns
- ▶ Safety culture gets complicated when we try to build safety into badly managed companies (quote attributed Edgar Schein)



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## Real safety culture – where the Rubber meets the Road!



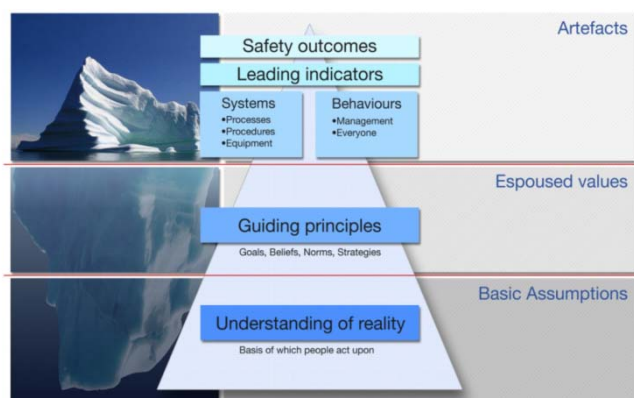
- Someone makes a mistake, but no one sees it.
- A contractor working on a safety case comes up with a negative result.
- Someone doesn't want to work with another colleague because he takes too many risks.
- Two Department heads know their departments don't work well together.
- What would **you** do for each of these examples?

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## Model of 'safety culture'



From Edgar Schein's model of Organizational Culture (IAEA TECDOC-1707).



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## The key components of safety culture (Reason, 1997)

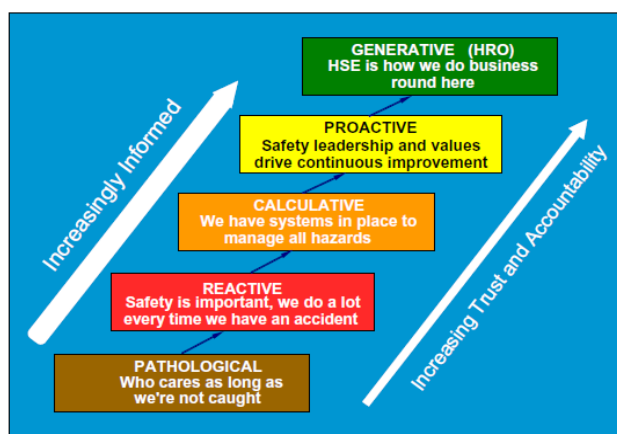


- **Informed**
  - the organisation collects and analyses data to stay informed about its safety performance.
- **Reporting**
  - people are confident they can report safety concerns without fear of blame.
- **Just**
  - people understand the boundary between acceptable and unacceptable behaviour. Unacceptable behaviour is dealt with in a consistent, just and fair manner.
- **Learning**
  - the organisation learns from its mistakes and makes changes to unsafe conditions.
- **Flexible**
  - the organisation is able to reconfigure the chain of command if faced by a dynamic and demanding environment.
- **Trust and Accountability underpin these components.**

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## Safety Culture Maturity Model (Professor Patrick Hudson, 2007)

Ladder can be used to determine an organization's level of maturity



## A 'health warning' on the Maturity Model



- Useful for categorising an organization and monitoring progress but a very rough measure
- Organizations made up of different 'sub-cultures' – this is a fact that is often overlooked in the measurement of safety culture
  - Different professional cultures, e.g. nuclear engineering, nuclear physics, project management, human factors specialists
  - Contractors versus staff
  - Senior management, middle management, supervisors, workforce
- Organizations may have pockets of safety culture excellence but may also have poorer areas (is the average a good measure?)
- Experience shows that most organizations sit on the Calculative rung of the ladder, i.e. the average!

## Categories and Traits of Nuclear Safety Culture (WANO, INPO 2013)



- ▶ Management Commitment to Safety
  - ▶ Leadership Accountability
  - ▶ Decision-Making
  - ▶ Respectful Working Environment
- ▶ Management Systems
  - ▶ Continuous Learning
  - ▶ Environment for Raising Concerns
  - ▶ Work Processes
  - ▶ Problem Identification and Resolution
- ▶ Individual Commitment to Safety
  - ▶ Personal Accountability
  - ▶ Effective Safety Communication
  - ▶ Questioning Attitude

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## EUROCONTROL Air Traffic Control Safety Culture Elements



- ▶ Management Commitment to Safety
- ▶ Resourcing
- ▶ Just culture, reporting and learning
- ▶ Risk awareness and management
- ▶ Teamwork
- ▶ Communication
- ▶ Involvement
- ▶ Responsibility

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## Offshore Oil and Gas Industry Safety Climate Factors (Mearns et al., 1997)



- ▶ Management Commitment to Safety
- ▶ Supervisor Commitment to Safety
- ▶ Incident Reporting
- ▶ Communication
- ▶ Workforce Involvement
- ▶ Work pressure

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## External influences on Safety Culture



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## How do we measure Safety Culture?



### Questionnaires

- ▶ Perceptions; attitudes

### Observations

- ▶ Individual and group behaviour

### Interviews

- ▶ Values, beliefs, knowledge, understanding

### Focus Groups

- ▶ Group interaction, challenges to behaviour, perceptions, attitudes and beliefs, identifying improvements

| SECTION B - GENERAL<br>(to be completed by all) |   | Always | Frequently | Sometimes | Rarely | Never |
|---|---|--------|------------|-----------|--------|-------|
| Q10   | Believing safety against the other requirements of my job causes me stress          | 1      | 2          | 3         | 4      | 5     |
| Q11   | When things get busy, we can get the help of others to deal with the situation      | 1      | 2          | 3         | 4      | 5     |
| Q12   | I have confidence in the people that I interact with in my normal working situation | 1      | 2          | 3         | 4      | 5     |
| Q13   | My colleagues are committed to safety   | 1      | 2          | 3         | 4      | 5     |
| Q14   | Safety is a responsibility shared throughout the organisation                       | 1      | 2          | 3         | 4      | 5     |
| Q15   | Senior management takes action on the safety issues that we raise                   | 1      | 2          | 3         | 4      | 5     |
| Q16   | My management is committed to safety  | 1      | 2          | 3         | 4      | 5     |
| Q17   | Management is interested in the safety issues that we raise                         | 1      | 2          | 3         | 4      | 5     |
| Q18   | The organisation tries to do more than just meet the minimum safety regulations     | 1      | 2          | 3         | 4      | 5     |
| Q19   | Everyone at my work/Team feels that safety is their personal responsibility         | 1      | 2          | 3         | 4      | 5     |
| Q20   | Other people in the organisation understand how my job contributes to safety        | 1      | 2          | 3         | 4      | 5     |
| Q21   | I understand how my job contributes to safety                                       | 1      | 2          | 3         | 4      | 5     |
| Q22   | The procedures inspire the way in which I do my job                                 | 1      | 2          | 3         | 4      | 5     |
| Q23   | Supervisors we have to take risks to cope with workload                             | 1      | 2          | 3         | 4      | 5     |
| Q24   | People who raise safety issues are seen as people who create problems               | 1      | 2          | 3         | 4      | 5     |

Use a combination of techniques to address:

- ▶ Artefacts
- ▶ Espoused Values
- ▶ Basic Assumptions



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## Self-Administered Questionnaire surveys



### Questionnaire design

- ▶ Developing own questionnaire?
- ▶ Using pre-developed questionnaire?
- ▶ Layout and sequence of questions?
- ▶ Mix of open questions and closed questions?
- ▶ Single versus multiple responses?
- ▶ Ranked responses?
- ▶ Rated responses, e.g. Likert scale?
- ▶ Question wording
  - ▶ Be concise and unambiguous
  - ▶ Avoid double questions
  - ▶ Avoid questions involving negatives
  - ▶ Ask for precise answers
  - ▶ Avoid leading questions
- ▶ Confidentiality and Ethics

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## Self-Administered Questionnaire surveys



- **Survey administration**
  - On-line or paper-based – advantages/disadvantages of each
- **Sampling procedure**
  - Cross-section of workforce
- **Analysing data**
  - Percentage of respondents replying to response options
- **Producing reports**
  - Format
  - Level of detail
- **Feedback to interested parties**
  - Presentations - workgroups; management
- **Next steps**
  - How to develop and implement Action Plans from the output of the survey

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## Focus Groups and Interviews



- Preparation
- Location of interview
- Timing of interview
- Interview structure including scene setting
- Questioning techniques
- Recording/note taking
- Group and Individual interviewing

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## Preparation



### How would you prepare?

- ▶ Consider location
  - ▶ Quiet, comfortable room in easily accessible location for participants
- ▶ Consider timing
  - ▶ Interviews 45 mins to 1 hr
  - ▶ Focus Groups 1 hr to 1.5 hrs
- ▶ Best done in pairs – one facilitator, one note-taker
  - ▶ Recording techniques can be used if participants amenable to this but generally not recommended
- ▶ Prepare seating/room layout
  - ▶ not intimidating, make people feel comfortable
- ▶ Prepare questions
  - ▶ Based on questionnaire survey questions or based on the results from a survey which indicate issues that need to be explored in more detail

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## Focus Group/Interview Conduct



### How would you conduct the interview/focus group?

- ▶ Put people at ease
  - ▶ Explain purpose of interview/focus groups clearly and how outcomes will be used
  - ▶ Reinforce anonymity/confidentiality as necessary
- ▶ Behave in a friendly and respectful manner
  - ▶ In focus groups explain that everyone should be encouraged to participate and people should not 'talk over' one another
  - ▶ People should be respectful of others' views
  - ▶ Also be aware of 'group think' where focus group participants conform to one way of thinking about and responding to questions
- ▶ Ask questions one at a time
  - ▶ Avoid leading questions
  - ▶ Have follow-up questions available to encourage further discussion
- ▶ Finish by thanking participants, clarifying if you still require anything more from them and allow them to ask questions

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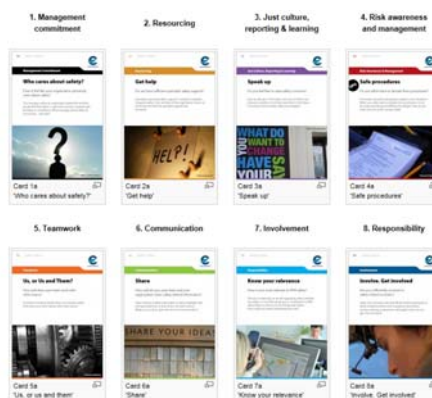


## Sort Cards (EUROCONTROL)



### Driven by EUROCONTROL Safety Culture elements

- ▶ Aimed at ownership, discussion, reflection rather than measurement
  - ▶ Engage
  - ▶ Educate
  - ▶ Flexible Use
  - ▶ Reinforce memory
  - ▶ Linked to theory
  - ▶ Improve safety culture
  
- ▶ Comparing views
- ▶ Safety moments
- ▶ Focusing on one element
- ▶ SWOT analysis
- ▶ Influences on each other



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## Safety Culture Assessments – Main Issues



- Communication
  - Too much, too little, wrong sort
- Procedures
  - Unworkable, out-of-date, work-as-imagined versus work-as-done
- Continuous Learning
  - Failure to implement lessons learned
- Visibility of management
  - Never see them
- Employee engagement
  - No one every asks us our opinion

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## Improving Safety Culture – Senior Management



- Leadership style
  - Transactional/Transformational (Bass and Alvoio, 1990)
  - Authentic (Walumba, Alvoio, Luthans, etc)
  - 'Humble' (Edgar Schein)
  - 'Flexible'?
- Legal context and accountability
  - Corporate Killing/Manslaughter
  - Regulatory attention (HSE, ONR)
- Upward appraisal of management commitment
  - Holding up a mirror to management – how others see them
- Safety Intelligence (Fruhen, Mearns, Flin and Kirwan, 2013)
  - EUROCONTROL White Paper
  - Skills, Knowledge, Understanding the 'risk picture', Decision making
- Chronic Unease (Fruhen, Flin, McLeod et al., 2014)
  - Vigilance; Propensity to worry; Requisite imagination; Flexibility of thought; Pessimism

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## Improving Safety Culture – Middle Management



- Often referred to as 'the clay layer'
- Responsible for conveying senior managers expectations to supervisors and the front-line
- Need to be committed to the organisation's safety systems
- Need to be involved in safety activities
- Participative rather than directive style (O'Dea & Flin, 2003)
  - Out on site
  - Communicating
  - Providing feedback
- Transformational leadership style also effective

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## Improving Safety Culture - Supervisors



- Focus for research on leadership and safety since Heinrich (1959)
  - *'The supervisor or foreman is the key man in industrial accident prevention. His application of the art of supervision to the control of worker performance is the factor of greatest influence in successful accident prevention' (p. 22)*
- Supervisors at the front-end of the trade off between achieving the task and maintaining the safety of the team
  - Tend to be technically competent but sometimes lack 'soft skills'
- Transactional and Transformation leadership relevant for supervisors (Zohar, 2002, 2003; Barling et al., 2002)
- Supervisor safety leadership training
  - Non-technical skills training for supervisors and their teams
    - Leadership, Teamwork, Situation Awareness, Decision-Making, Understanding personal limitations

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## Improving Safety Culture - Workforce



- Professional culture and experience of front-line workers can keep systems 'safe' even if management not focused on safety
- Empower employees to improve safety on the front-line
- Review procedures at regular intervals to ensure they are up-to-date
- Confidential Reporting System for unsafe acts, unsafe conditions, workforce concerns about safety
- Safety communications relevant to workplace (contextualised)
- Organising upward feedback sessions for safety performance of supervisors/managers
- Making employees responsible for safety
- Share lessons learned from incident investigations – ask workforce for solutions
- Encouraging wariness and mindfulness to avoid complacency!

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## Conclusions



- ▶ The lack of a 'Safety Culture' has been implicated in a number of disasters in high hazard industries since Chernobyl in 1986.
- ▶ A debate existed in the academic literature for a number of years about the difference between safety climate and safety culture
  - ▶ Generates more heat than light!
- ▶ Questionnaires are favourite tool (climate measures?) but deeper analysis, e.g. interviews, facilitated focus groups, document analysis required for safety culture.
- ▶ Each industry develops its own 'traits', 'elements' and attributes of safety culture but in reality they are very much the same.
- ▶ A healthy safety culture depends on the following components:
  - ▶ Reporting
  - ▶ Being informed
  - ▶ Just
  - ▶ Learning
  - ▶ Flexible
- ▶ 'Safety Leadership' and 'Employee Engagement' are the key components of safety culture
  - ▶ Depends on leadership style, wariness, mindfulness, chronic unease, lack of complacency, being just and fair and being able to listen to employees concerns.
- ▶ Regulators of high hazard industries realising the importance of safety culture
  - ▶ Failings of Regulators aslo implicated in disasters
  - ▶ No specific 'regulation' for safety culture amongst regulators but it is an **expectation** of duty holders, operators, etc.

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Any questions?

