

# A Learning Community Approach to Process Safety Competency



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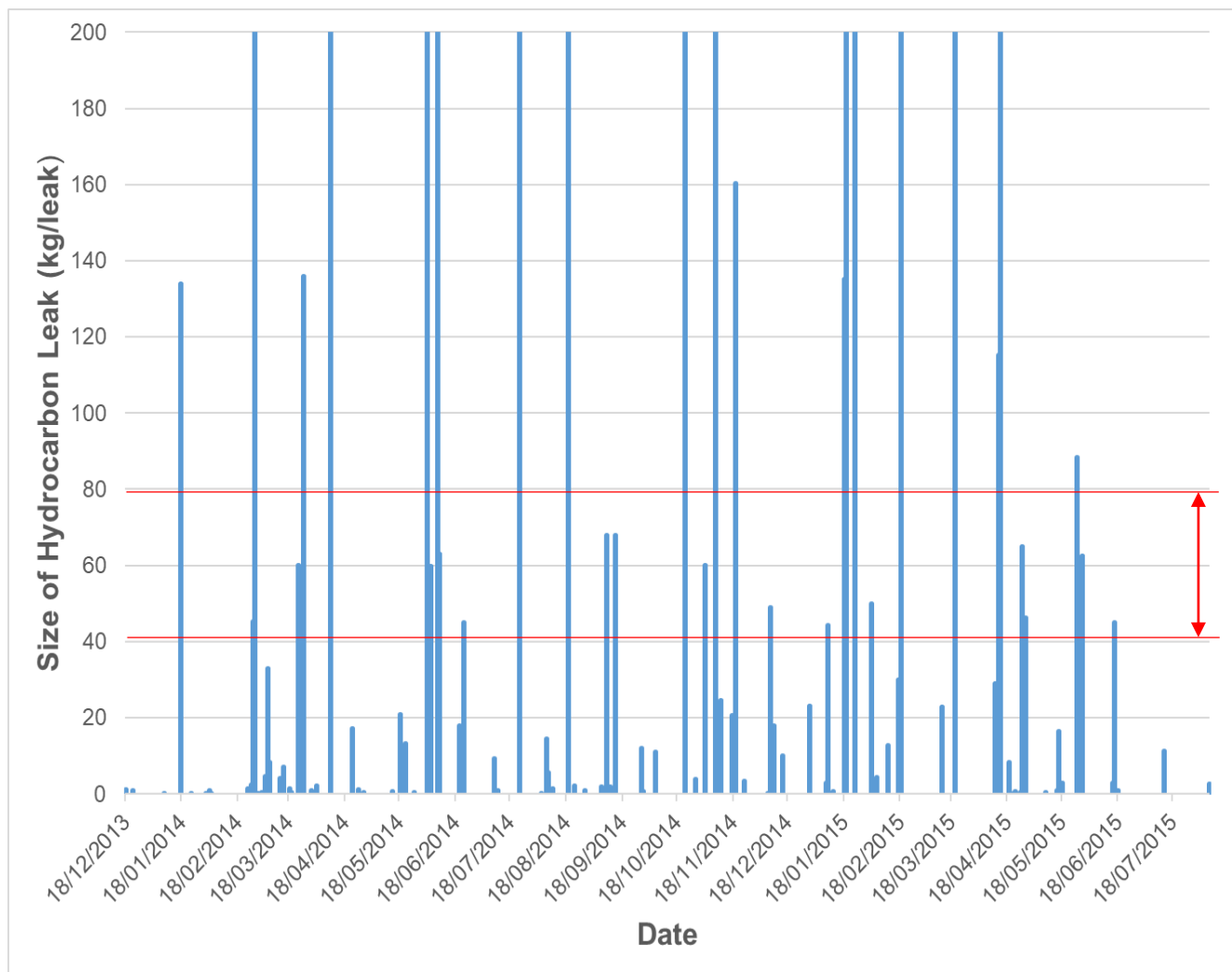
# Agenda

- Introduction
- Process Safety - The need for a new programme
- Learning Community Approach
- Structure & Content
- Learning Management System & Outcomes



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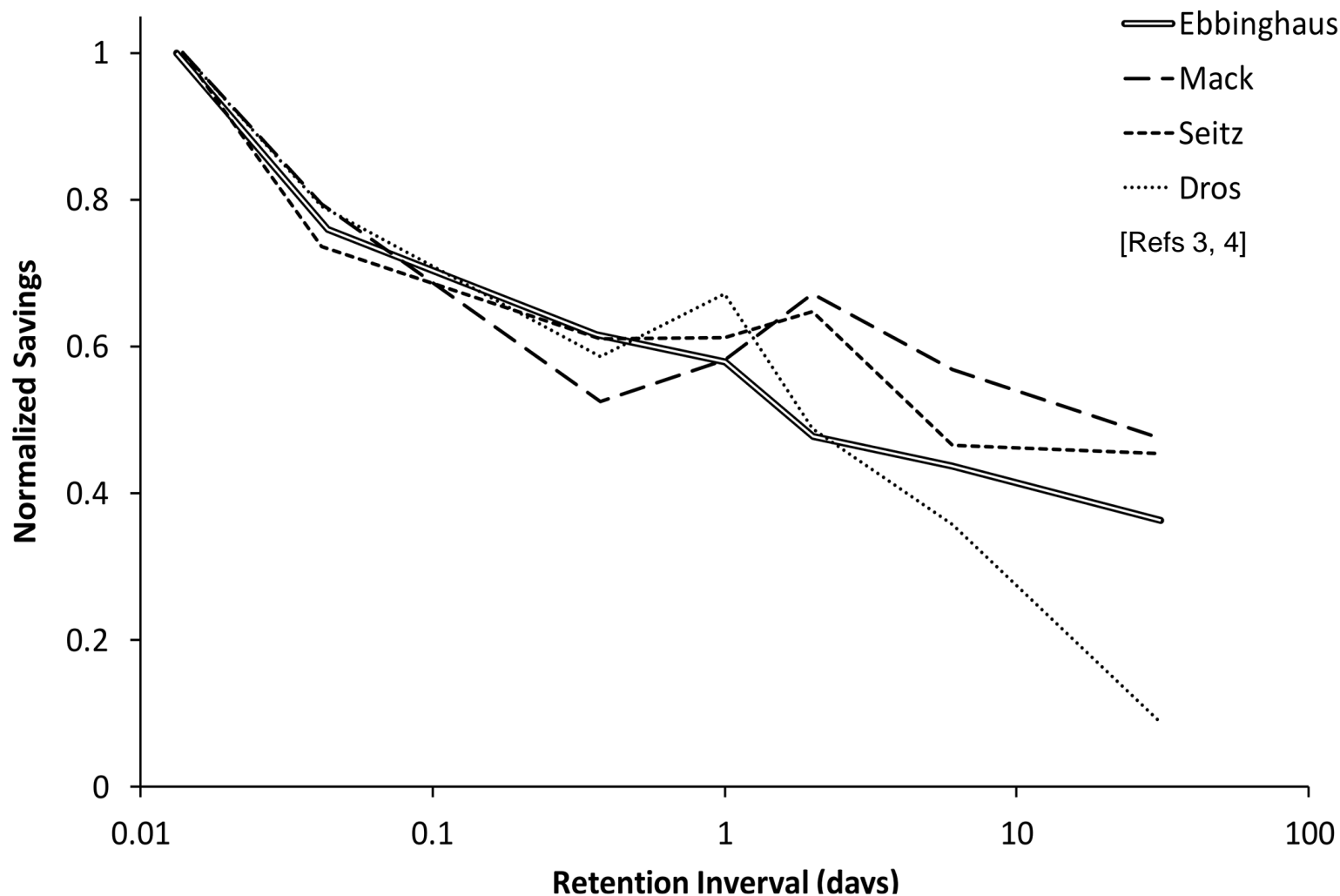
# Programme Need: Loss of Containment Events



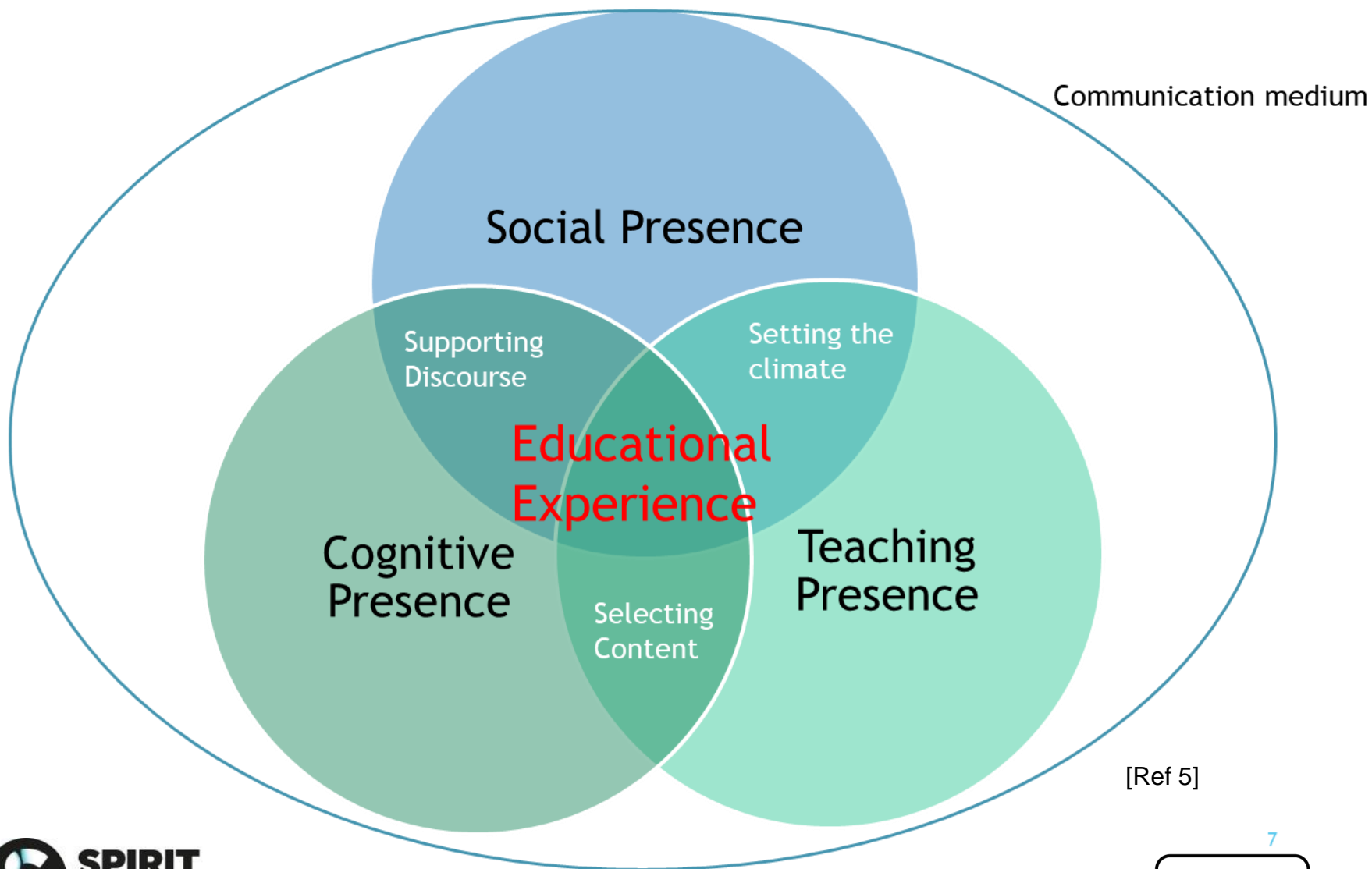
HCR Data 1992-2016 [Ref 1]

Estimate range of initial gas leak in C-Module of Piper Alpha. Section 5.103-5.109, pp68-69, [Ref. 2]

# The need for a new approach - The 'Forgetting' Curve



# Learning Community Approach



# Process Safety Programme - Structure

- Blended Learning Approach
- Development of a 'Learning Community'
- 3 Workshops spaced 1 month apart
- Workshops support by learning management system material
- Extra videos, reading, case studies.
- Learning Outcomes tested through Quiz
- Leadership Support
- Compulsory attendance



[Ref 6] <https://www.csb.gov/williams-olefins-plant-explosion-and-fire/>



# Process Safety Programme Structure

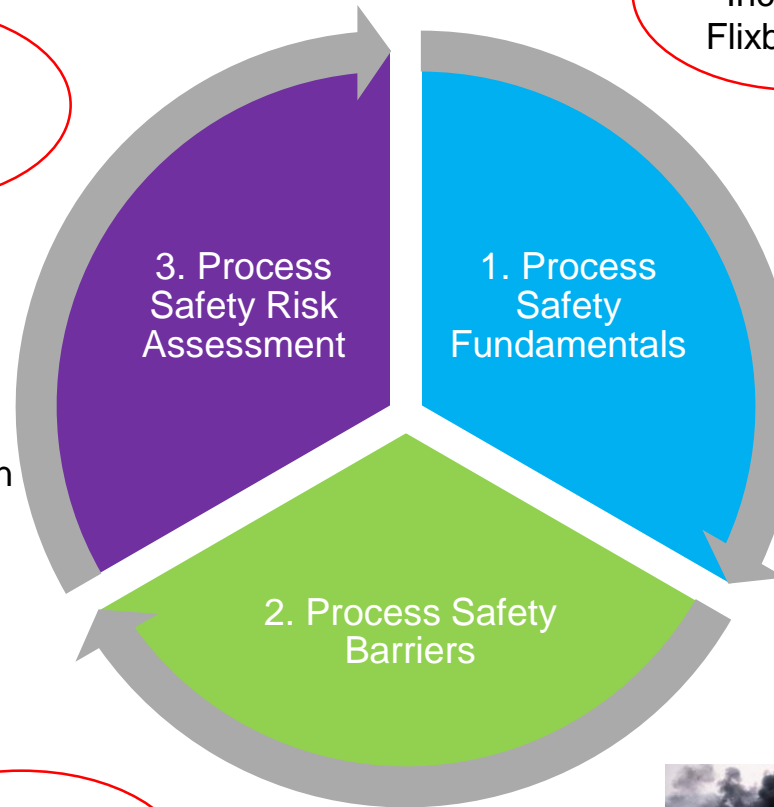


Major Incident - Buncefield



Major Incident - Flixborough

- SIS / ESD / F&G
- Layout
- Risk Assessment
- Case Study Exercises
  - ESDV Performance
  - New Fluids / Composition
- [Ref 12]



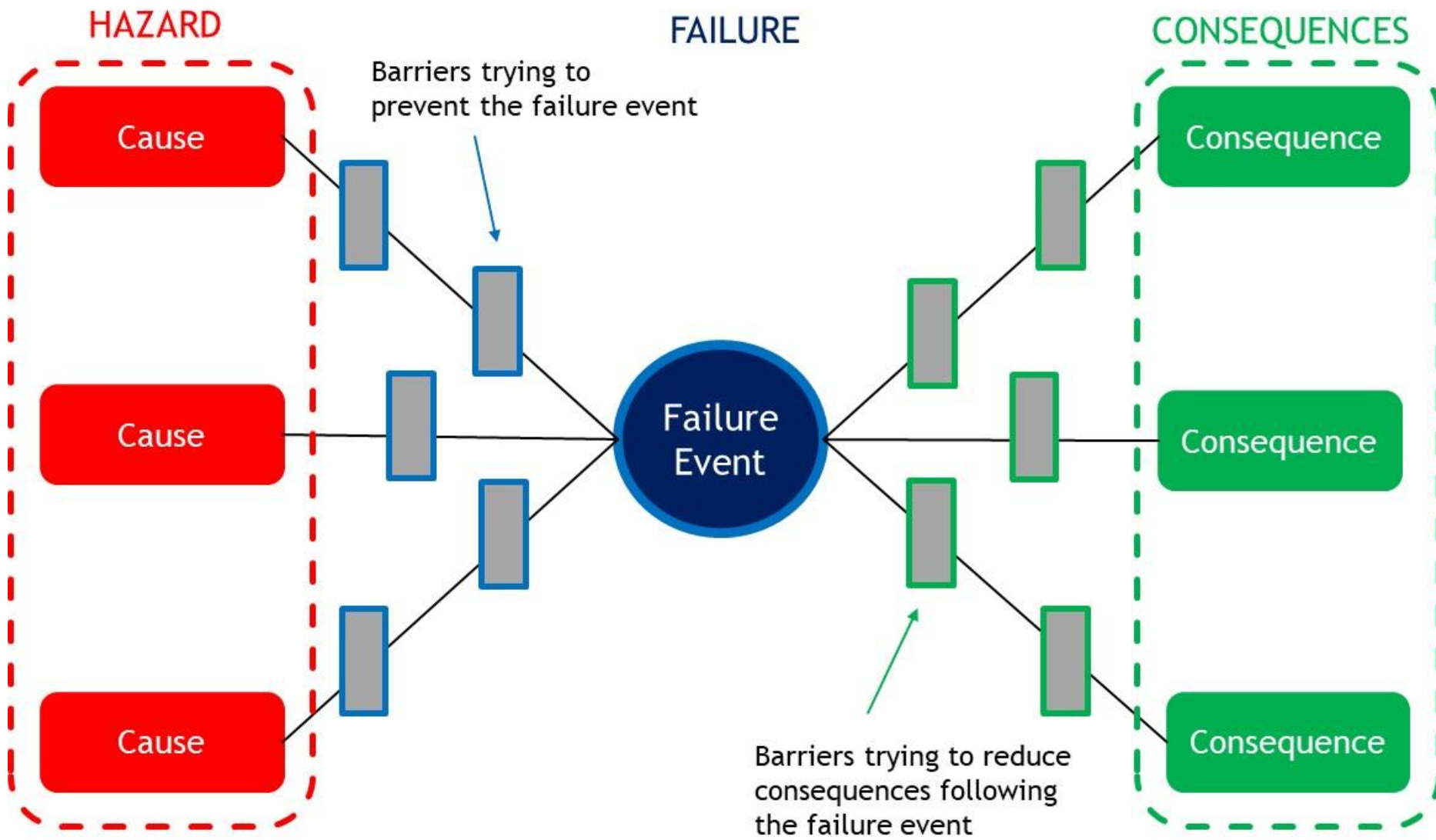
- Accident Sequence
- Hazards, Failure, Consequences
- Loss of Containment
- Legislative Framework
- ALARP Case Studies
- [Refs 7-10]

Major Incident – Piper Alpha



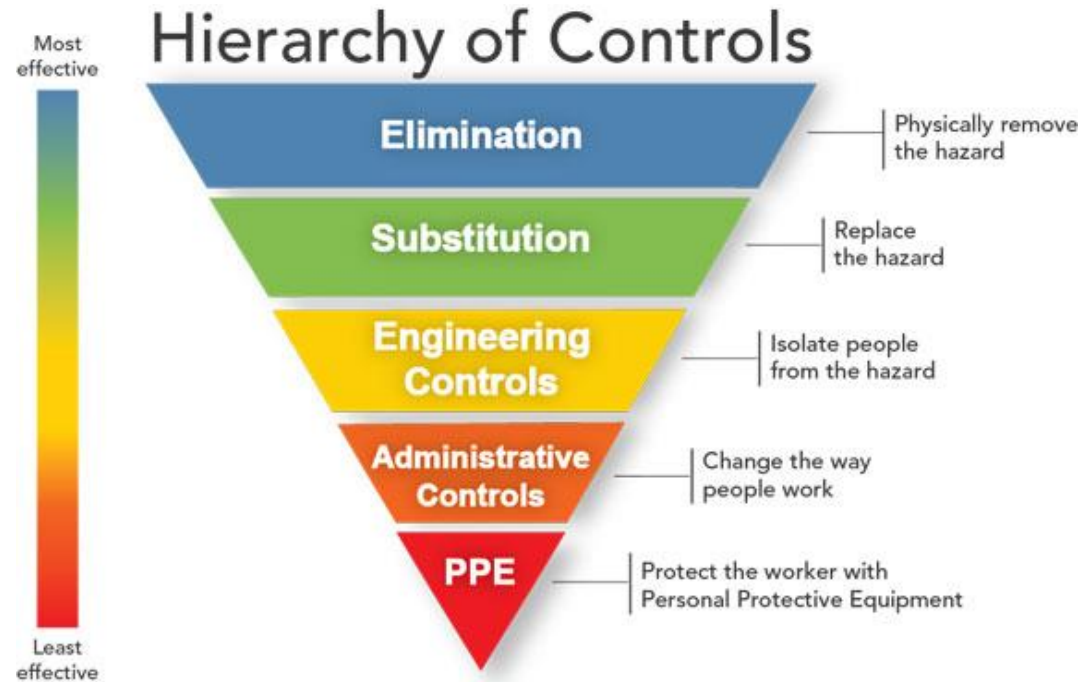
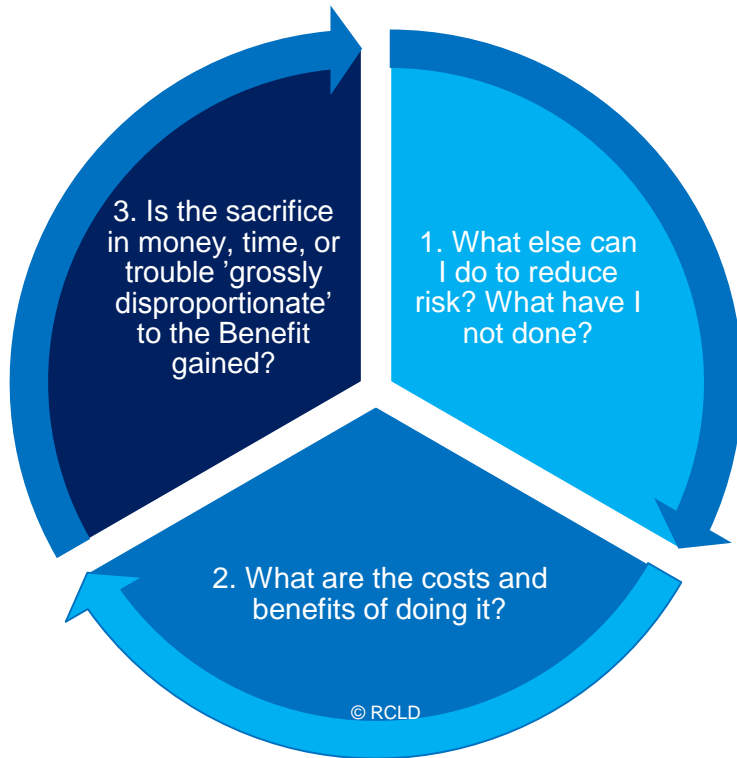
- Fire & Explosions
- Barriers
- HP/LP Interfaces
- Relief & Blowdown
- Practical ALARP
- [Refs 2, 3, 11]

# Process Safety Programme - Content





# Process Safety Programme - Content



# Learning Management System

Home / Process Safety Skills - Spirit Energy



Resume course

## Process Safety Skills - Spirit Energy

4%

### Description

Process Safety remains a critical issue for the Oil & Gas industry. Large releases, potentially resulting in multiple fatalities, are an ever-present risk on major plants with large hazardous inventories. The Piper Alpha disaster, Texas City Refinery, Macondo, Enchova South and Flixborough are all tragic examples of this. With an ageing asset base, changing competency levels, and a tough operating environment, ensuring sufficient barriers are in place to prevent major accidents is a challenge.

Key to delivering process safety performance is the competency and skills of the engineering team. All disciplines need to work together to ensure that the appropriate barriers are in place and sufficiently robust for the specific system. Without this multi-discipline input, it is difficult to ensure that risk has been reduced to a level considered 'as low as reasonably practicable' (ALARP), and that a good and efficient business outcome has been achieved.

The Spirit Energy Process Safety Skills programme covers the key issues and runs as three 1-day workshops supported by an online Learning Community between sessions. The learning community involves additional case studies and ends with a quiz on learning outcomes to help delegates develop their Process Safety Skills.

### Content

#### SECTION 1 - PROCESS SAFETY FUNDAMENTALS

- Anatomy of a Disaster - CSB Documentary on the causes of the Texas City Disaster
- The Flixborough Disaster - Report of the Court of Inquiry.pdf
- 1 - Welcome & Course Overview
- 2 - Introduction to Process Safety
- 3 - Flixborough Disaster
- 4 - Hazards, Failures, Consequences
- 5 - Group Exercise - HFC Thinking
- 6 - Loss of Containment Events
- 7 - Group Exercise - HFC Thinking 2
- 8 - Introduction to Legal Requirements
- 9 - Process Safety - Learning Community
- QUIZ Process Safety - Fundamentals



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# Learning Outcomes

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N. Renton | Instructor | Messages 2 | Search | Help |

Home / Process Safety Skills - Spirit Energy / Reports / QUIZ - Risk Reduction & Protection

Overview | Analysis | Timeline

First attempt | Last attempt

Answers distribution

0%

97%

8%

0%

Questions

What new hazard was introduced onto the Piper Alpha platform post construction? (One correct answer) (31 times answered · 30 times answered correctly)

Fire walls

☒ Gas processing with gas import/export risers

Additional oil production

Link between Piper & Tartn & Claymore

8%

8%

94%

0%

How big was the initial gas release in Module C of Piper A that led to the explosion that did the initial damage to the ... (31 times answered · 29 times answered correctly)

5-10 kg

110-230 kg

☒ 30-80 kg

2.2-3.1 Tonnes

68%

35%

87%

26%

81%

Describe some of the root causes of the Piper Alpha disaster. (More than one correct answer) (31 times answered · 16 times answered correctly)

☒ Control room location.

Gas leak from missing PSV flange.

☒ Organisational, management and competency issues within Occidental.

Platform still in production during major brownfield modifications.

☒ Temporary promotion system to manage manpower shortages.

0%

0%

How long did the escalation take between the initial explosion in Module C to the Tartan gas riser failing releasing tho... (31 times answered · 31 times answered correctly)

1 hr

5 minutes

# Programme Outcomes

## Outcomes

- Initial silo-thinking within the TA Group – basis for a common understanding by the end;
- Pressures of production and limited resources influences perceptions of the TA Community;
- Multi-site differences highlighted and begin to align (Barrow, Aberdeen, Hoofddorp);
- Understanding of Legal Requirements improved with a focus on identifying options and use of the Hierarchy of Controls;
- Comparison between company events and major accidents was powerful;
- Behaviour post workshop different – new interventions and decision making e.g. relief-valve lifting.

## Going Forward in 2018

- Expanding the programme to the Asset Leadership team;
- Technical and Asset leadership team reinforcing the key concepts of the Process Safety Framework + Hierarchy of Controls + ALARP.



# References

- [1] HSE, Offshore Hydrocarbon Releases 1992-2016.
- [2] The Hon Lord Cullen, *The Public Enquiry into the Piper Alpha Disaster*, Volume 1, Nov 1990, HMSO, ISBN 0 10 113102.
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- [3] Ebbinghaus, H., Urmanuskript "Ueber das Gedächtniß". Passau: Passavia Universitätsverlag, 1880
- [4] Murre, J. M. J., Dros, J., Replication and Analysis of Ebbinghaus Forgetting Curve, . PLoS ONE 10(7):e0120644. doi:10.1371/journal.pone.0120644
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- [11] Pate-Cornell, E., Learning from the Piper Alpha Accident: A Post-mortem Analysis of Technical and Organizational Factors, *Risk Analysis*, Vol. 13, Issue 2, pp215-232, Wiley 1993.
- [12] The Competent Authority, *Buncefield: Why did it happen?*, HMSO, 2011.

# Thank-you

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