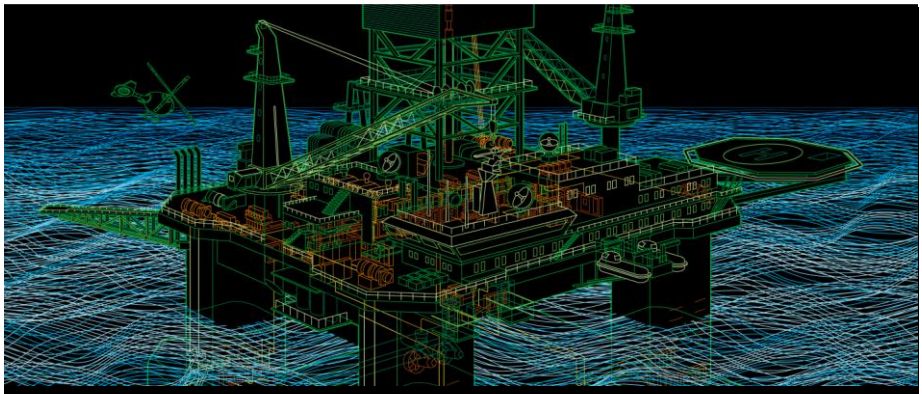


Karl Watson

HF in Operational Risk Management
Mobile Technology to reduce Human Error in Procedures

Power and productivity for a better world™

Introduction – Karl Watson

- Process Safety Product Manager, ABB OGC
- Chartered Instrument Engineer (MInstMC)
- 29 years experience in Process Industry
- ICI Chemical and Polymers, ICI Engineering, ABB Consulting (UK, US), ABB Enterprise Software
- Specialist in Functional Safety

Content

- Introduction to procedures
- Use of Technology
- Procedures and Barrier Management
- Wrap-up / Questions

Introduction into Procedures

Why do we need Operating Procedures

- To comply with regulatory requirements - **Compliance**
- Ensure reliable and repeatable operations – **Consistency**
- Tool for operational learning and feedback - **Communication**

Do humans follow procedures?

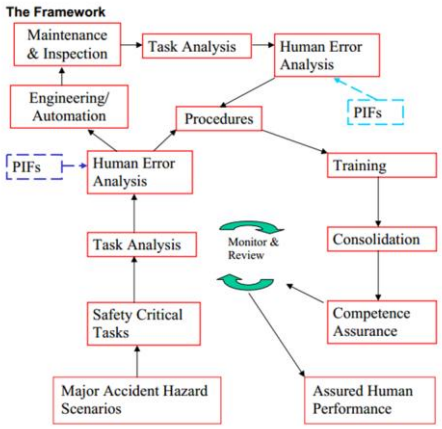
Task Type	Percentage of users who state they use procedures (percentage of users having procedures open in front of them at time of task)
Quality Critical	80 (46)
Safety Critical	75 (43)
Problem Diagnosis	30 (17)
Routine (Including maintenance)	10 (6)

Source: D. Embrey, Creating a procedures culture to minimise risk (1998)

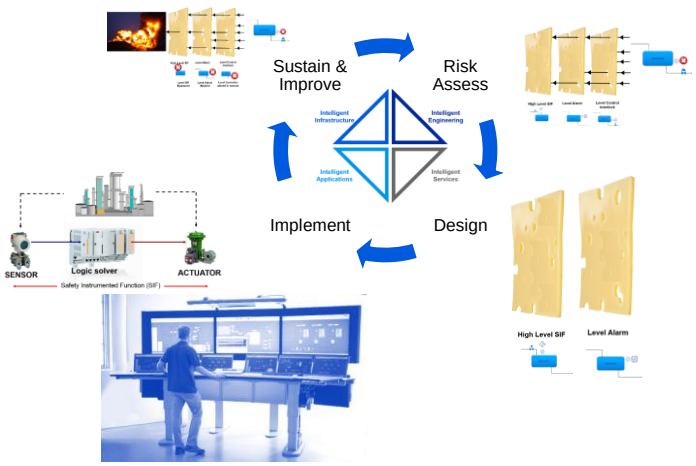
Why are we concerned with HF in Procedures?

- A 2012 study of 1632 hazardous chemical incidents showed 65% were related to human error
- 56% of forced outages occurred less than a week after a planned or maintenance shutdown
  - Yes – toss a coin to see if you are going to have a plant trip after a maintenance shutdown
- 55% - 65% of all problems associated with maintenance are related to human performance.

A Human Factors Roadmap for the Management of Major Accident Hazards



Identifying Critical Procedures



Content

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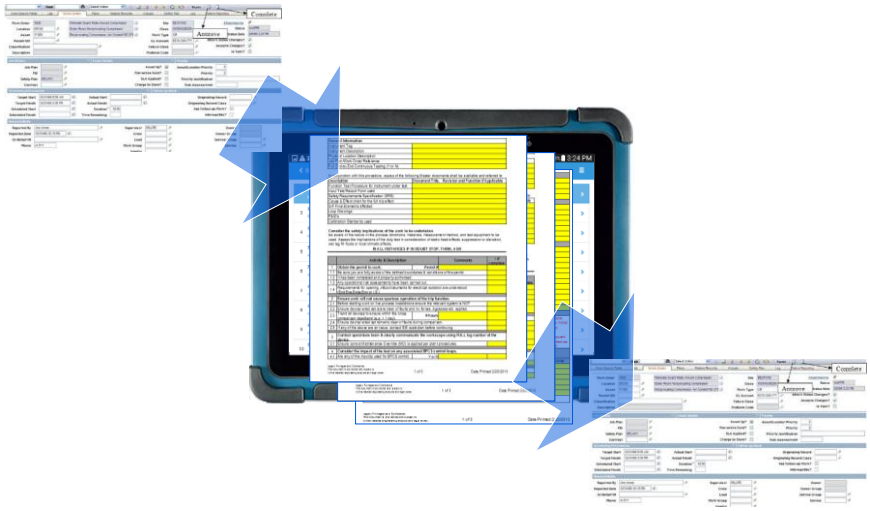
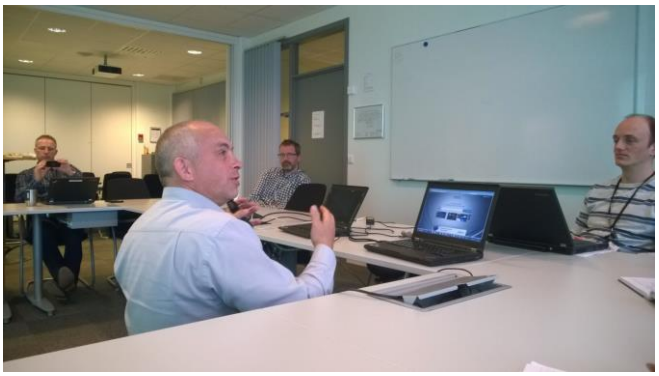
- **Use of Technology**
- Procedures and Barrier Management
- Wrap-up / Questions

Technology

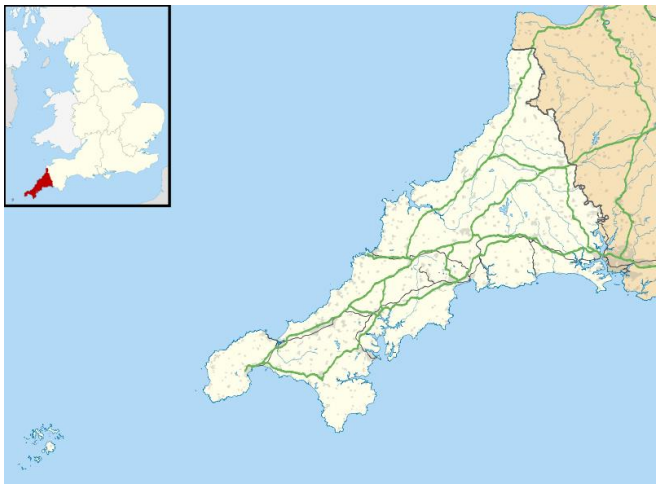


Device image from Bartec

Right Task, Wrong Object
Stavanger, Monday



Right Task, Wrong Object
Camelford 1988



Right Task, Wrong Object
Technology

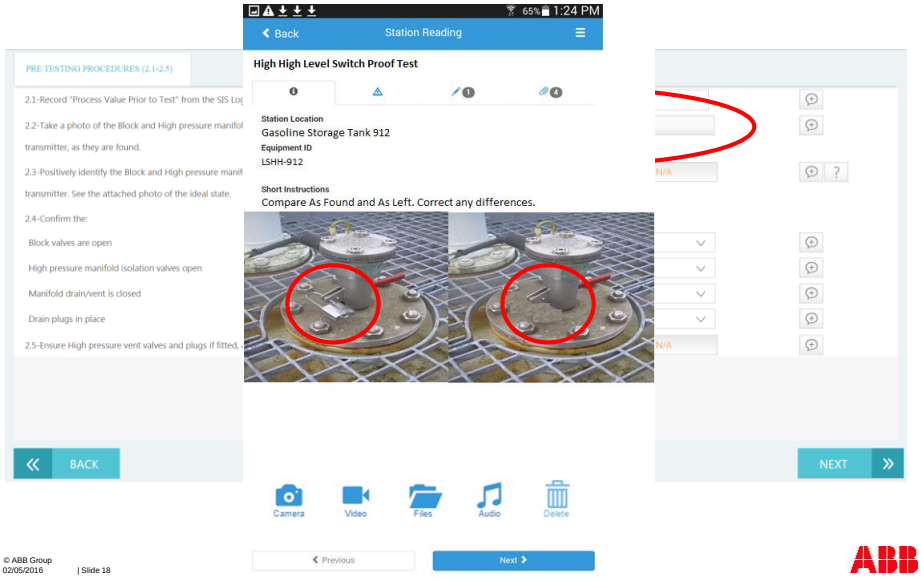
Device image from Bartec

Completion Errors

Completion Errors

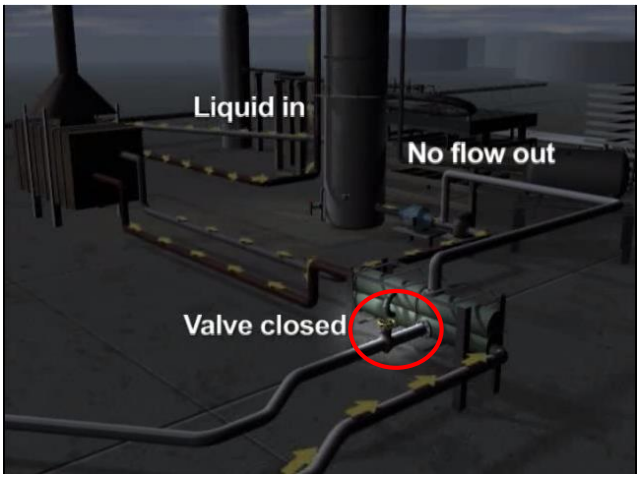
Photo from HSE Presentation

Completion Errors



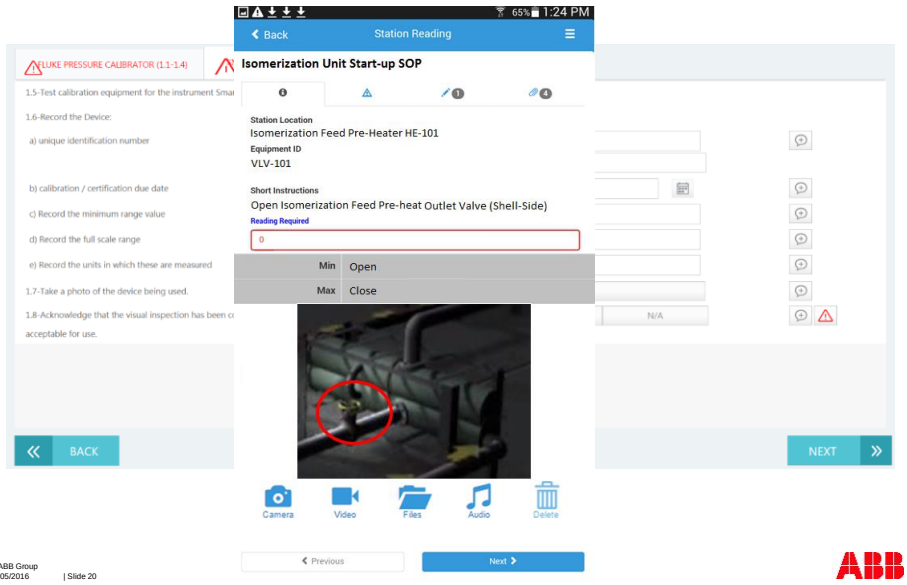
Screens developed from ABB Operations Management and Mobideo Software

Sequence/Omission Errors



Picture taken from CSB Animation of Texas City Incident

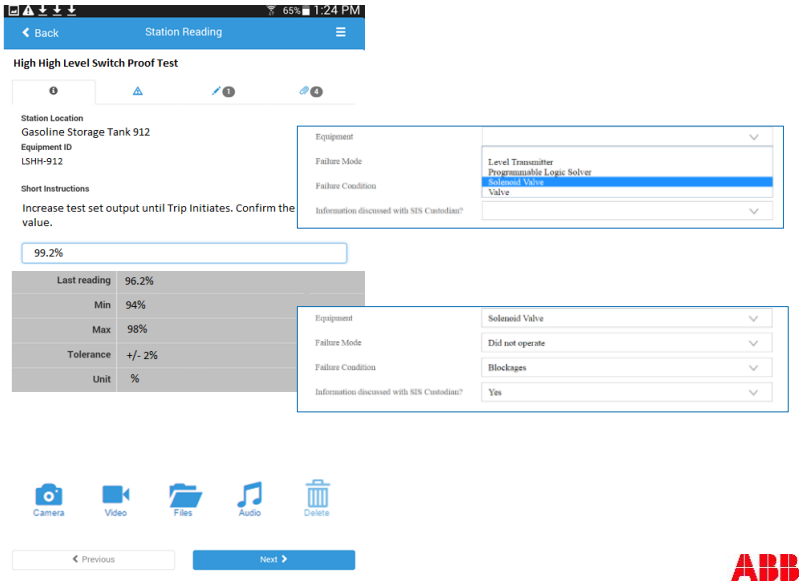
Sequence/Omission Errors



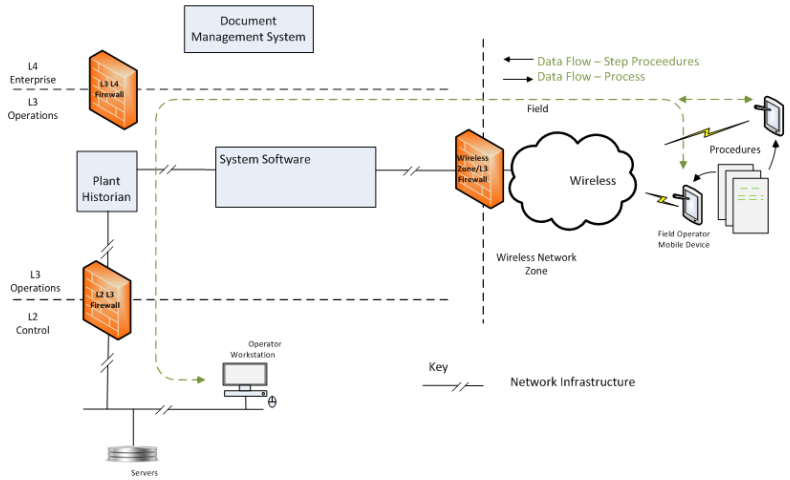
Screens developed from ABB Operations Management and Mobideo Software,

Integration with Lifecycle Information

Judgment Errors



Integration with Level 2 (via Level 3)



Other Considerations

- Ensures latest version of the procedure
- Implement competency checks
- Makes documents available in the field
  - Avoiding return to workshop / guessing
- All steps recorded automatically electronically
- Branching makes procedures easy to follow
- Tailored procedure based on experience/profile

Content

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- **Procedures and Barrier Management**
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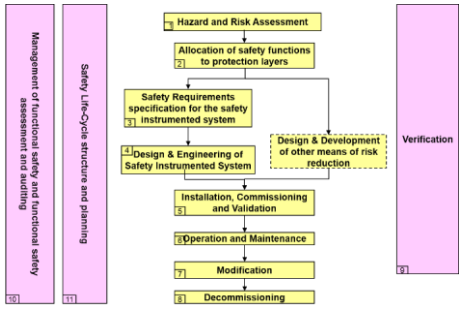
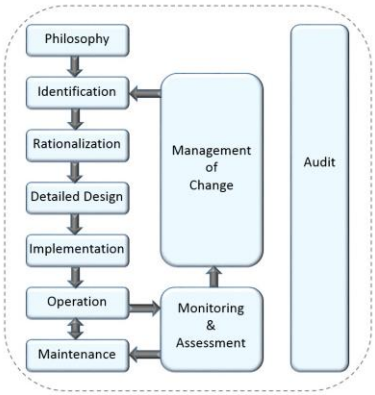
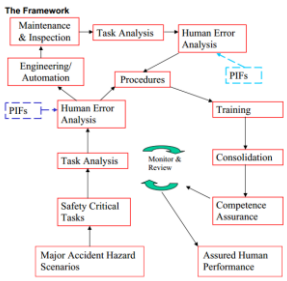
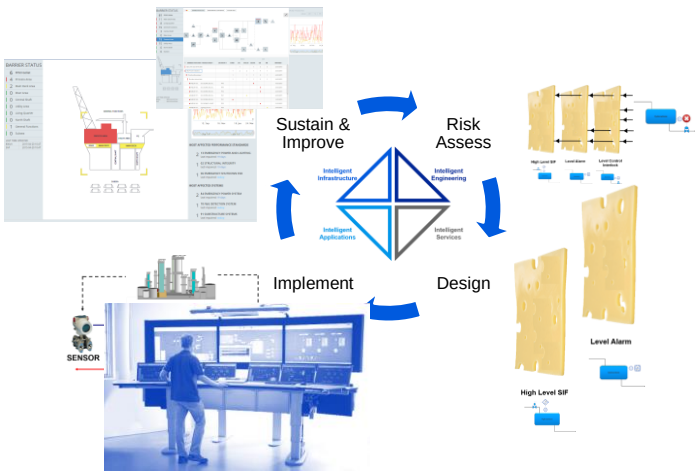
Barrier Lifecycles



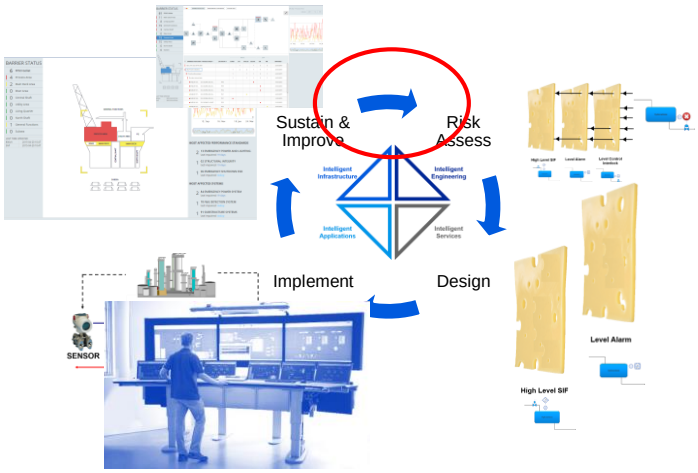




Barrier Lifecycle
Barrier Status

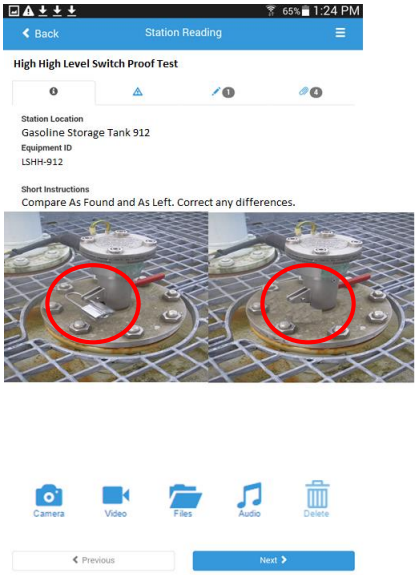


Barrier Lifecycle
Closing the loop



 | Slide 28

Knowledge and learning capture
Closing the loop



 | Slide 29

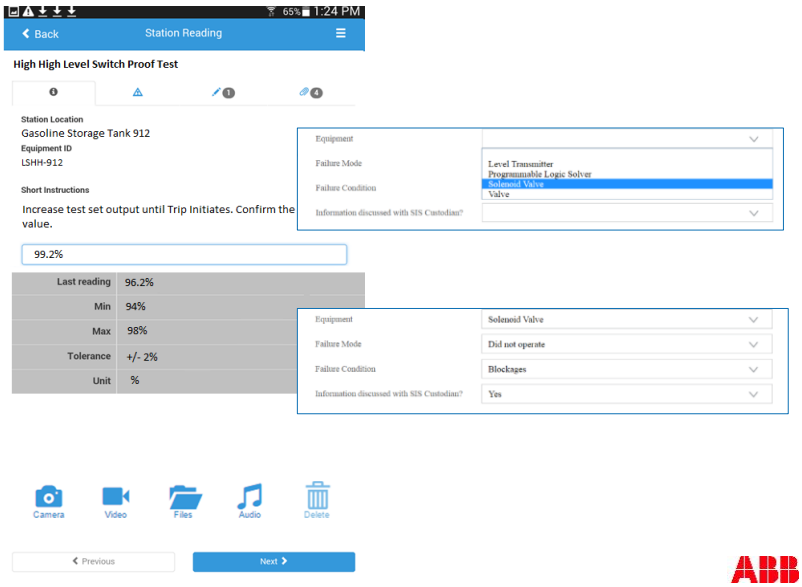
IEC61511 Standard (Ed. 1 & Ed. 2)
Closing the loop

16.2.9 Discrepancies between expected behaviour and actual behaviour of the SIS shall be analysed and, where necessary, modifications made such that the required safety is maintained. This shall include monitoring the following:

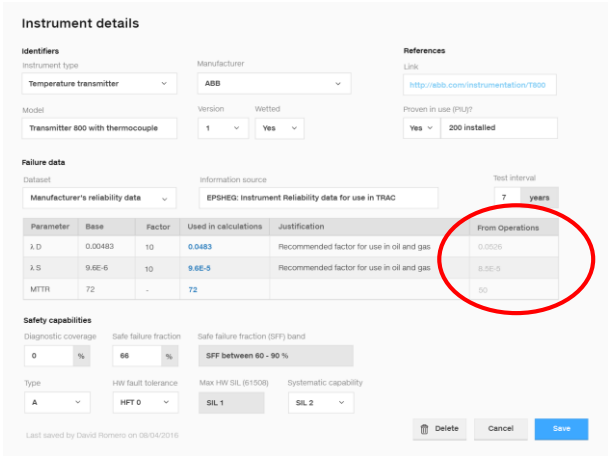
- the demand rate on each SIF (see 5.2.5.3);
- the actions taken following a demand on the system;
- the failures and failure modes of equipment forming part of the SIS, including those identified during normal operation, inspection, testing or demand on a SIF;
- the cause of the demands;
- the cause and frequency of spurious trips;
- the failure of equipment forming part of any compensating measures.

16.3.1.5 At some periodic interval (determined by the user), the frequency of testing shall be re-evaluated based on various factors including historical test data, plant experience and hardware degradation

Information Gathering
Closing the loop



Barrier Lifecycle
Closing the loop



Wrap-up

- Human Error attributed to 65% of hazardous chemical incidents
- Procedures more likely to be used for Quality than Safety
- More time and effort being spent on procedures
  - Not equating to increase up take in use.
- Mobile technology can help:-
  - Improve usability
  - Techniques to reduce Human Error
  - Improves efficiency in procedures
  - Can identify areas for procedure improvements
- Information can be used in barrier management and ‘Closing the Loop’

Thank you
Any questions?

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for a better world™