



Power and productivity
for a better world™ **ABB**

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

© ABB Group
02/05/2016 | Slide 3

ABB

Introduction into Procedures



"What makes you think no-one understands you?"

© ABB Group
02/05/2016 | Slide 4

ABB

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**

© ABB Group
02/05/2016 | Slide 5



Do humans follow procedures?

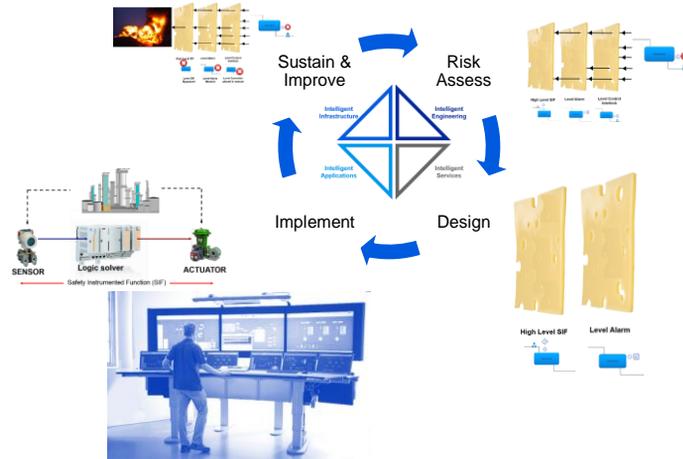
Task Type	Percentage of users who state they use procedures (percentage of users having procedures open in front of them at time of task)
Quality Critical	80 (46)
Safety Critical	75 (43)
Problem Diagnosis	30 (17)
Routine (Including maintenance)	10 (6)

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

© ABB Group
02/05/2016 | Slide 6



Identifying Critical Procedures



© ABB Group
02/05/2016 | Slide 10

ABB

Content

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

© ABB Group
02/05/2016 | Slide 11

ABB

Technology

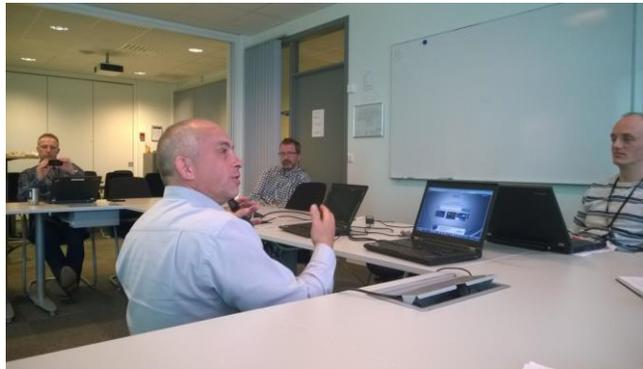


© ABB Group
02/05/2016 | Slide 12

Device image from Bartec



Right Task, Wrong Object Stavanger, Monday



© ABB Group
02/05/2016 | Slide 13



Right Task, Wrong Object Camelford 1988



© ABB Group
02/05/2016 | Slide 14



Right Task, Wrong Object Technology



© ABB Group
02/05/2016 | Slide 15

Device image from Bartec



Completion Errors



© ABB Group
02/05/2016 | Slide 16



Completion Errors

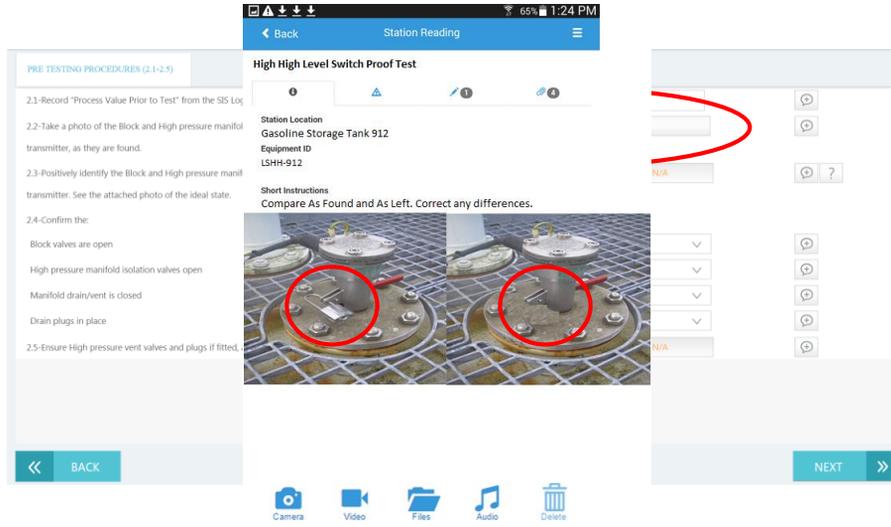


Photo from HSE Presentation

© ABB Group
02/05/2016 | Slide 17



Completion Errors

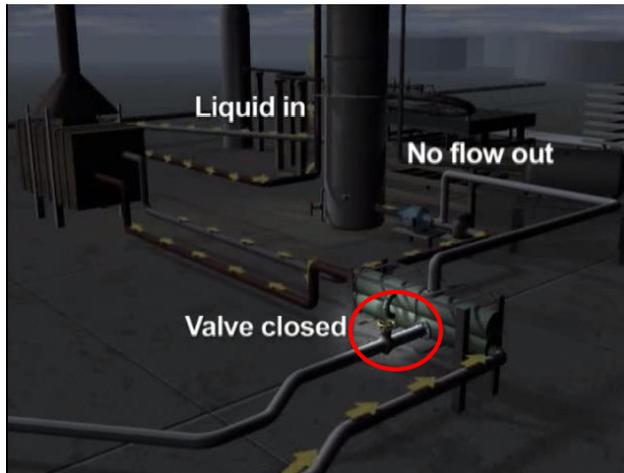


© ABB Group
02/05/2016 | Slide 18

Screens developed from ABB Operations Management and Mobideo Software



Sequence/Omission Errors

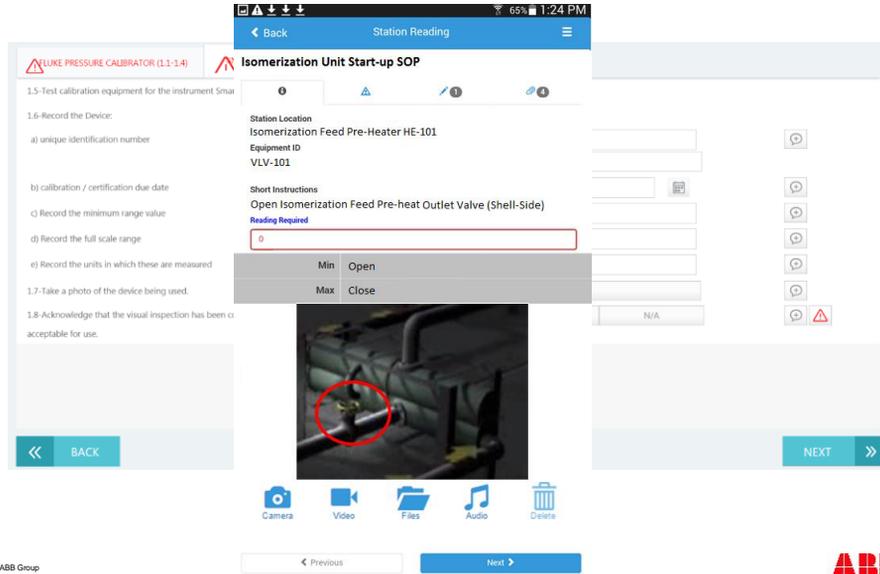


© ABB Group
02/05/2016 | Slide 19

Picture taken from CSB Animation of Texas City Incident



Sequence/Omission Errors



© ABB Group
02/05/2016 | Slide 20

Screens developed from ABB Operations Management and Mobideo Software,



Integration with Lifecycle Information



© ABB Group
02/05/2016 | Slide 21



Judgment Errors

Station Location
Gasoline Storage Tank 912
Equipment ID
LSHH-912

Short Instructions
Increase test set output until Trip Initiates. Confirm the value.

99.2%

Last reading	96.2%
Min	94%
Max	98%
Tolerance	+/- 2%
Unit	%

Equipment: Level Transmitter, Programmable Logic Solver, Solenoid Valve, Valve

Equipment: Solenoid Valve

Failure Mode: Did not operate

Failure Condition: Blockages

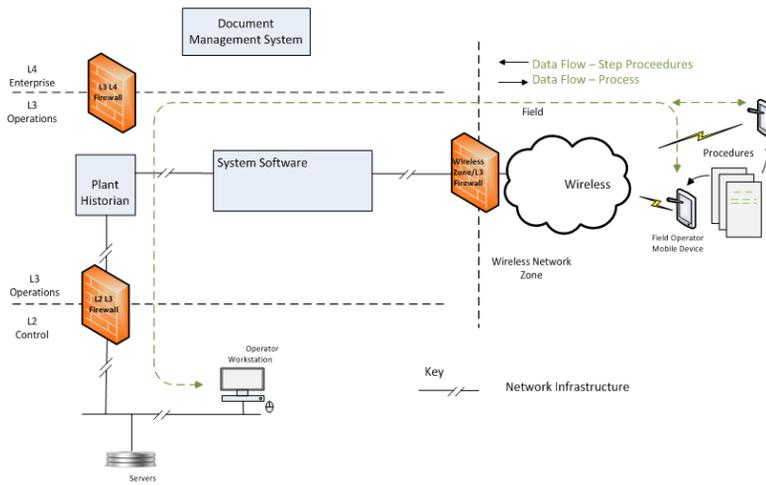
Information discussed with SIS Custodian?: Yes

Camera, Video, Files, Audio, Delete

© ABB Group 02/05/2016 | Slide 22



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

© ABB Group
02/05/2016 | Slide 24



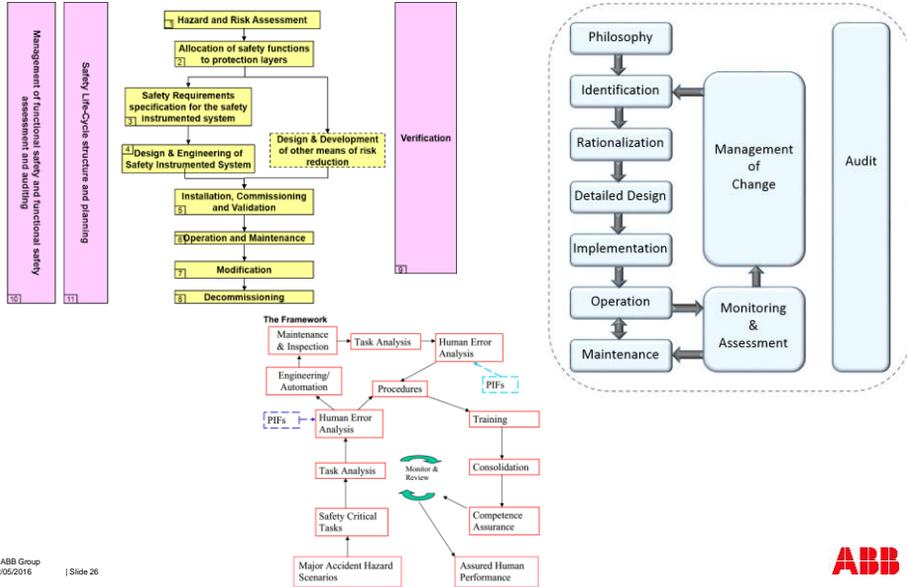
Content

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

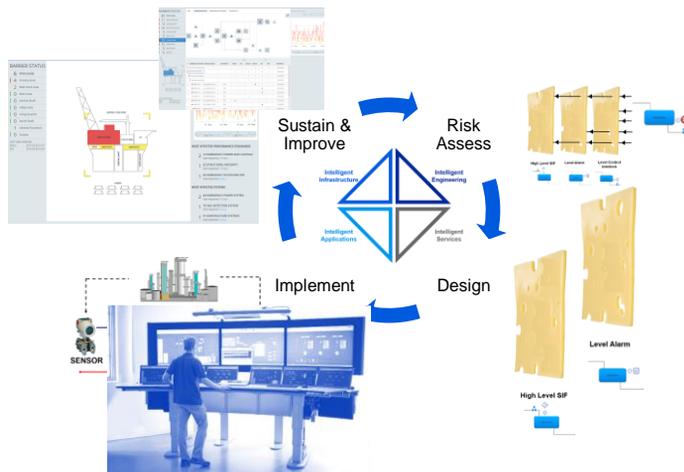
© ABB Group
02/05/2016 | Slide 25



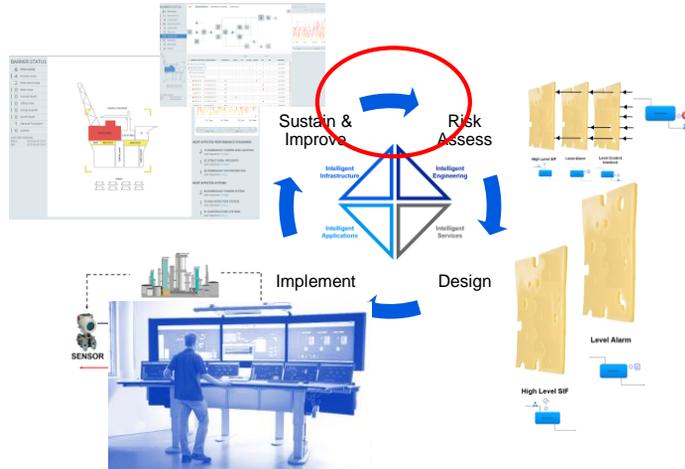
Barrier Lifecycles



Barrier Lifecycle Barrier Status



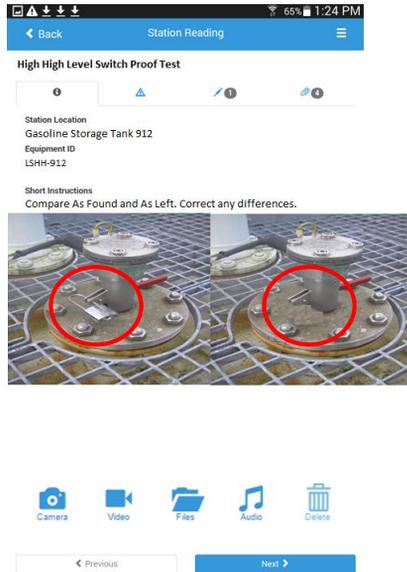
Barrier Lifecycle Closing the loop



© ABB Group
02/05/2016 | Slide 28



Knowledge and learning capture Closing the loop



© ABB Group
02/05/2016 | 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

© ABB Group
02/05/2016 | Slide 30



Information Gathering Closing the loop

The screenshot shows a mobile application interface for 'Station Reading'. The title bar includes a back arrow, 'Station Reading', and a menu icon. Below the title bar, there are icons for home, back, forward, and search. The main content area is titled 'High High Level Switch Proof Test' and contains the following information:

Station Location
Gasoline Storage Tank 912
Equipment ID
LSHH-912

Short Instructions
Increase test set output until Trip initiates. Confirm the value.

99.2%

Last reading	96.2%
Min	94%
Max	98%
Tolerance	+/- 2%
Unit	%

There are two configuration panels on the right side of the screen:

Panel 1:

Equipment	Level Transmitter
Failure Mode	Programmable Logic Solver
Failure Condition	Solenoid Valve
Information discussed with SIS Custodian?	Valve

Panel 2:

Equipment	Solenoid Valve
Failure Mode	Did not operate
Failure Condition	Blockages
Information discussed with SIS Custodian?	Yes

At the bottom of the screen, there are icons for Camera, Video, Files, Audio, and Delete. Below these icons are 'Previous' and 'Next' navigation buttons.

© ABB Group
02/05/2016 | Slide 31



Barrier Lifecycle Closing the loop

Instrument details

Identifiers

Instrument type: **Temperature transmitter**

Manufacturer: **ABB**

Model: **Transmitter 800 with thermocouple**

Version: **1** Witted: **Yes**

References

Link: <http://abb.com/instrumentation/7000>

Proven in use (PLI)? **Yes** 200 installed

Failure data

Dataset: **Manufacturer's reliability data** Information source: **EPSTEK: Instrument Reliability data for use in TRAC** Test interval: **7** years

Parameter	Base	Factor	Used in calculations	Justification	From Operations
λ D	0.00483	10	0.0483	Recommended factor for use in oil and gas	0.0029
λ S	9.6E-6	10	9.6E-5	Recommended factor for use in oil and gas	8.5E-6
MTTR	72	-	72		50

Safety capabilities

Diagnostic coverage: **0** % Safe failure fraction: **66** % Safe failure fraction (SFF) band: **SFF between 60 - 90 %**

Type: **A** HW fault tolerance: **HFT 0** Max HW SIL (S-1508): **SIL 1** Systematic capability: **SIL 2**

Last saved by David Romero on 08/04/2016

Delete **Cancel** **Save**

© ABB Group
02/05/2016 | Slide 32



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'

© ABB Group
02/05/2016 | Slide 33



Thank you
Any questions?



© ABB Group
02/05/2016 | Slide 34



Power and productivity
for a better world™

