HIPPS, the challenges faced ad the benefits of a Solution

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Emerson Valve Automation

Agenda

- Increased demand for HIPPS, why?
- Short about HIPPS and the benefits
- The Challenges faced
- Challenges on a product level
- A Solution addressing all challenges/ phases
- Questions

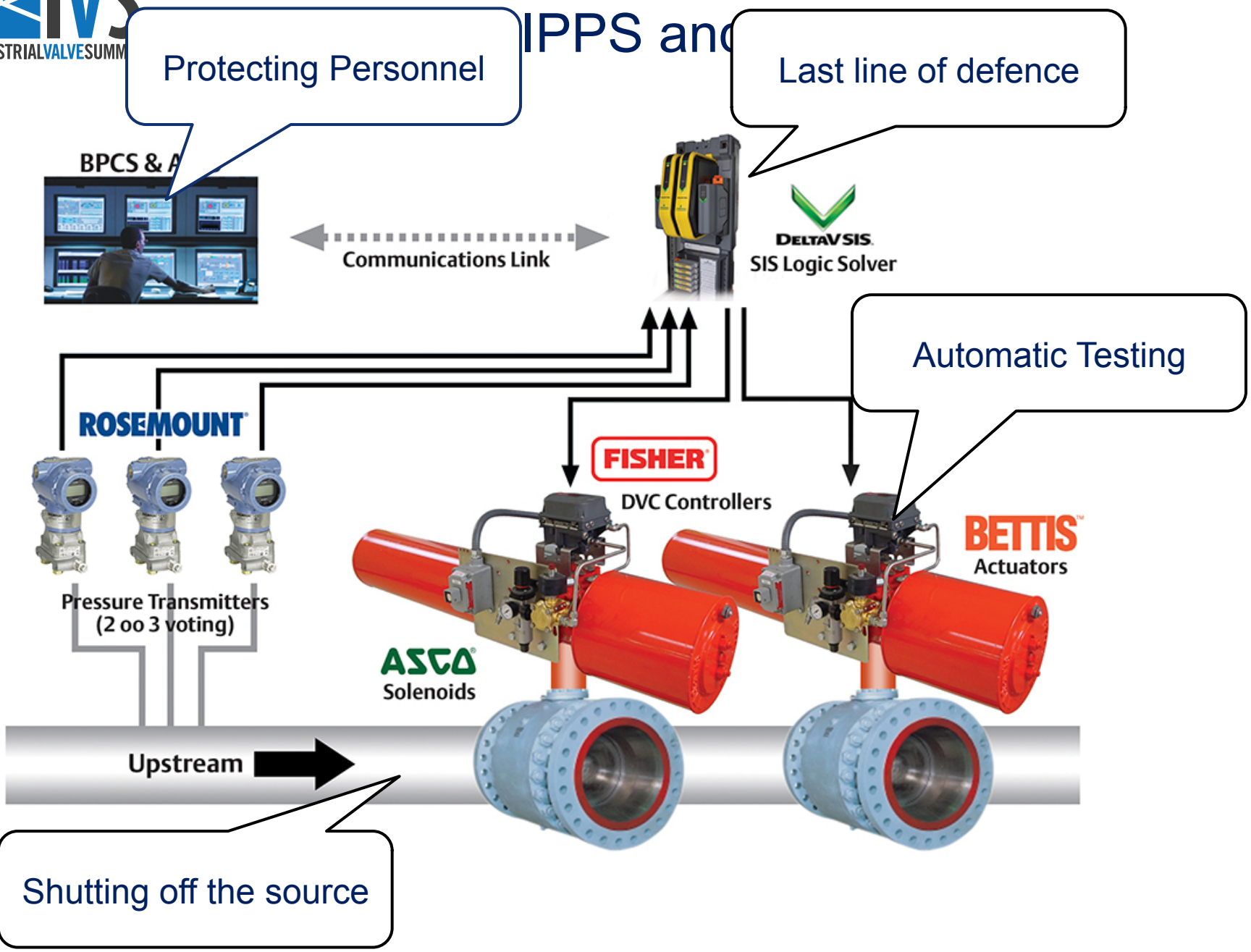
Increased demand for HIPPS, Why?

The increased demand for HIPPS is driven by different factors.

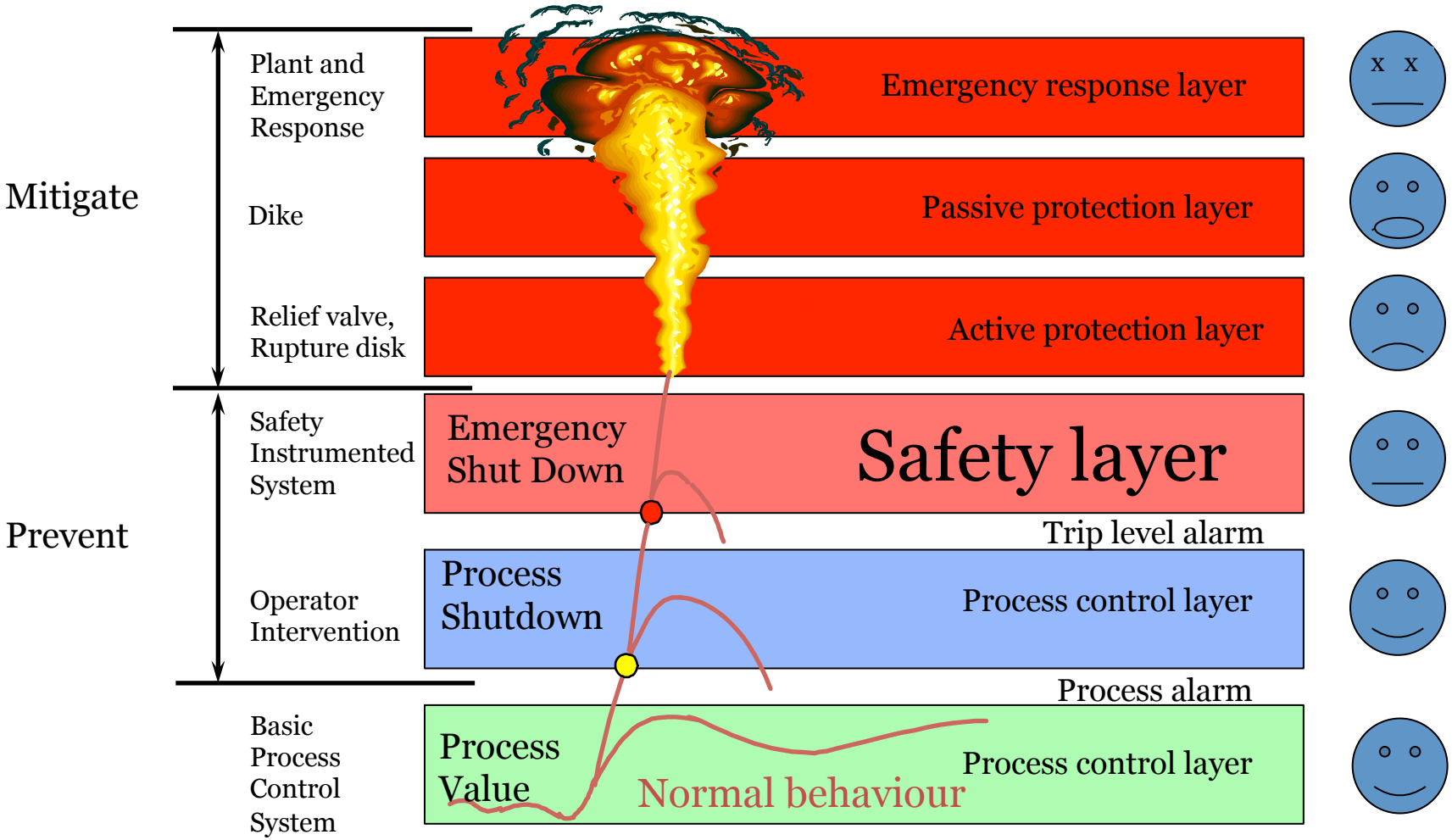
- Environmental issues

- Regulatory Directives – Reduce Flare
- Reduce OPEX (test of relief valves)

IPPS and


Protecting Personnel
Last line of defence
BPCS & A
Communications Link
DELTAV SIS
SIS Logic Solver
Automatic Testing
ROSEMOUNT
FISHER
DVC Controllers
BETTIS
Actuators
Pressure Transmitters
(2 oo 3 voting)
ASCO
Solenoids
Upstream
Shutting off the source

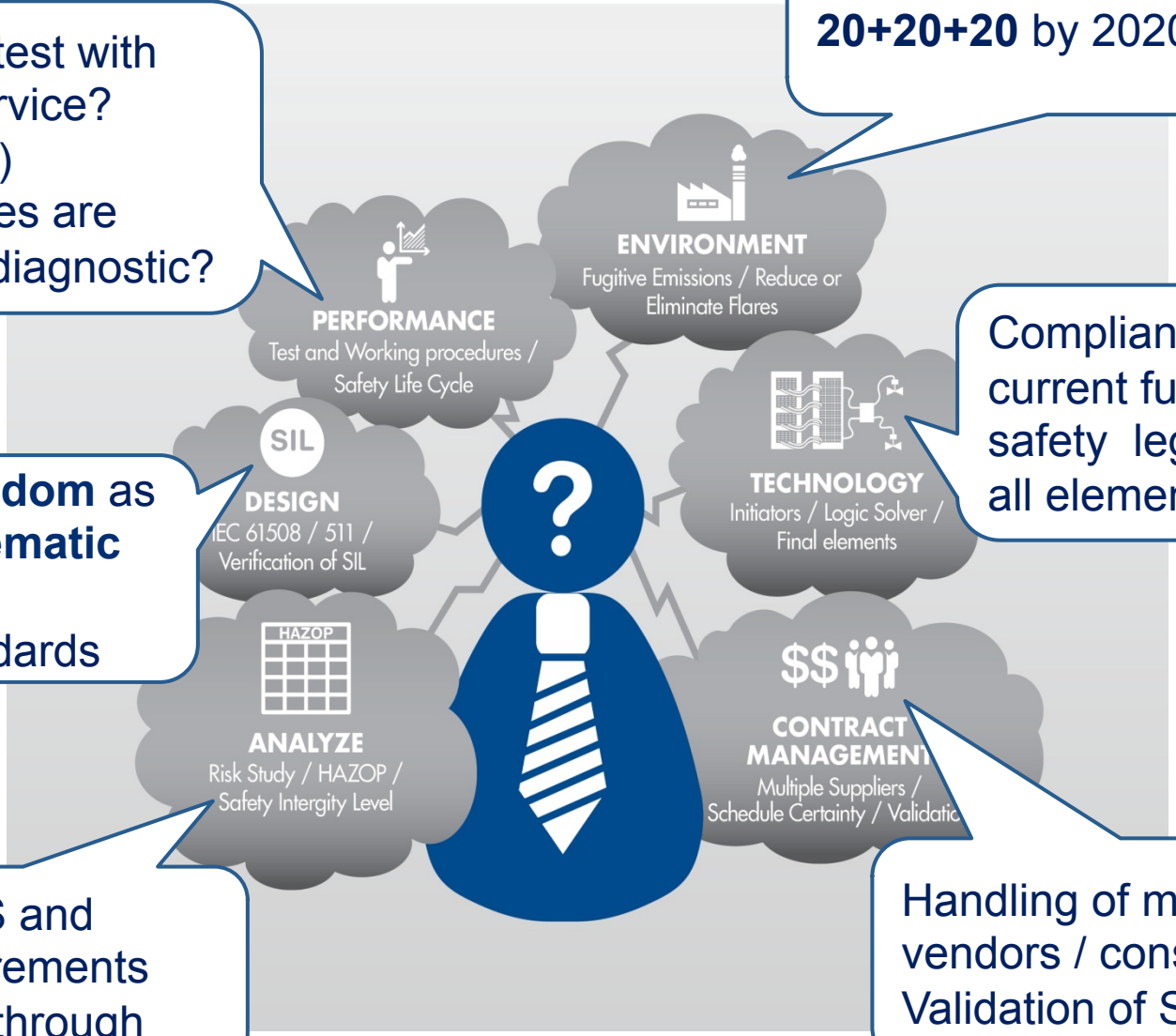
Layers of Protection



The Challenges faced

Regulations a moving target
IPPC Directives 2008/1/EC
20+20+20 by 2020

Monitor and test with system in service?
(Fast closing)
What if failures are detected by diagnostic?



Compliance with current functional safety legislation for all elements of the SIF

Consider **random** as well as **systematic** integrity
Lack of Standards

Defining SRS and ensure requirements are followed through

Handling of multiple vendors / consultants
Validation of SRS

Challenges Engineering a HIPPS - The causes of failure and the answers

All components of any solution can fail dangerously

Systematic failures

- Occur due to:
  - Designed in
  - Engineered in
  - Procedural
- Reduced by:
  - Better processes
  - Regular Verification
  - Consistent behaviour
- *People make mistakes*

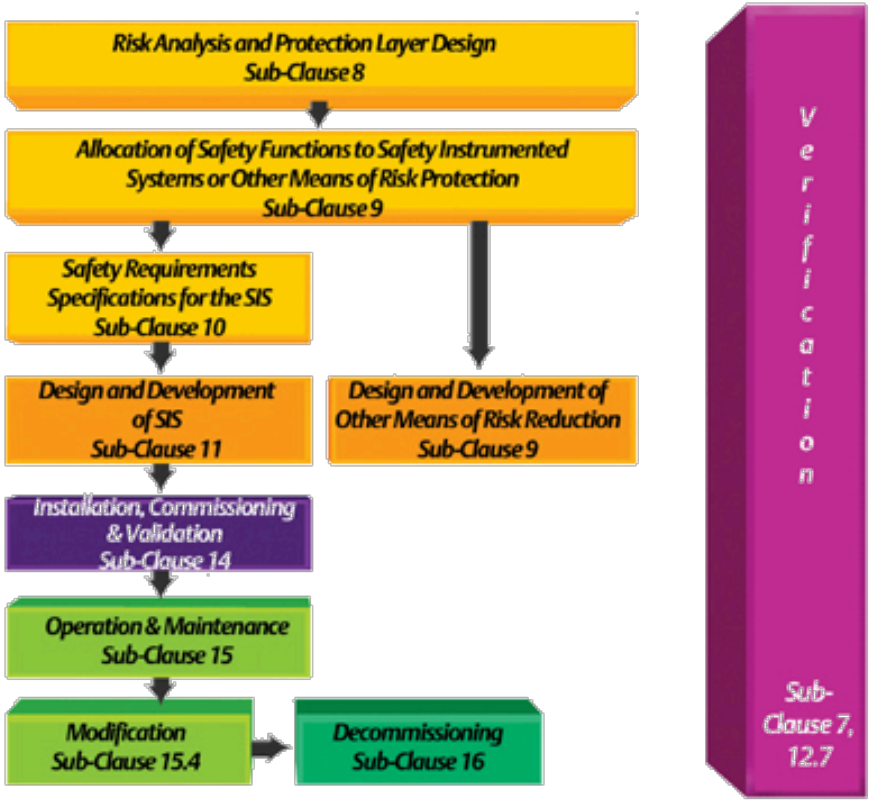
Random failures

- Occur due to:
  - Inappropriate application
  - Bad design
  - Fatigue
- Reduced by
  - Material quality
  - Consistent appropriate design
  - Performance monitoring
- *Everything breaks eventually*

The causes of failure and the answers

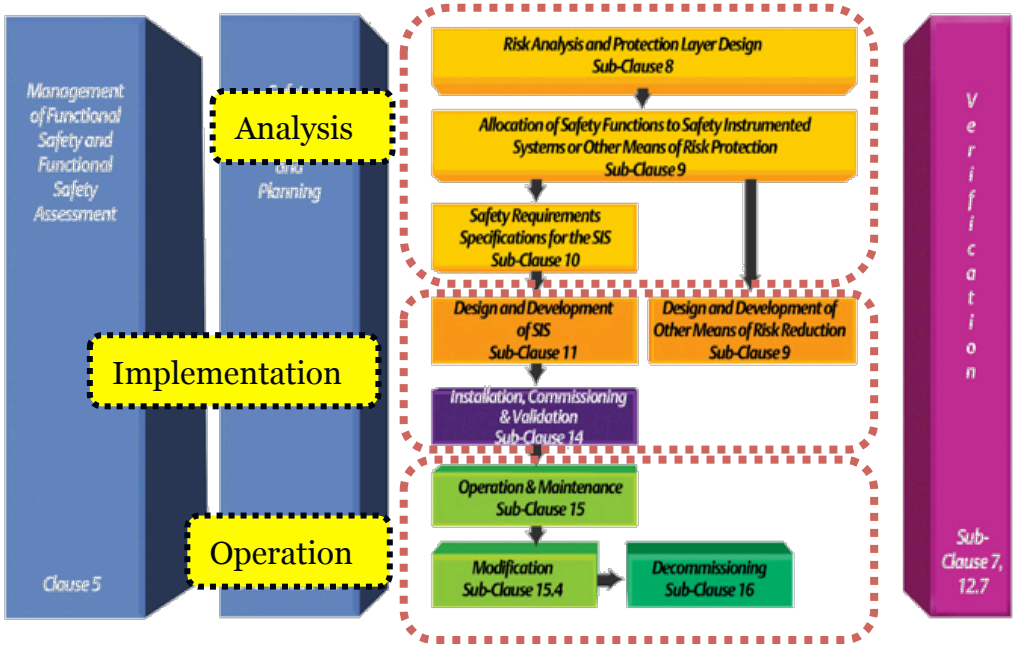
Systematic failures
Answer - The safety lifecycle

Random Failures
Answer – Safety Integrity Levels



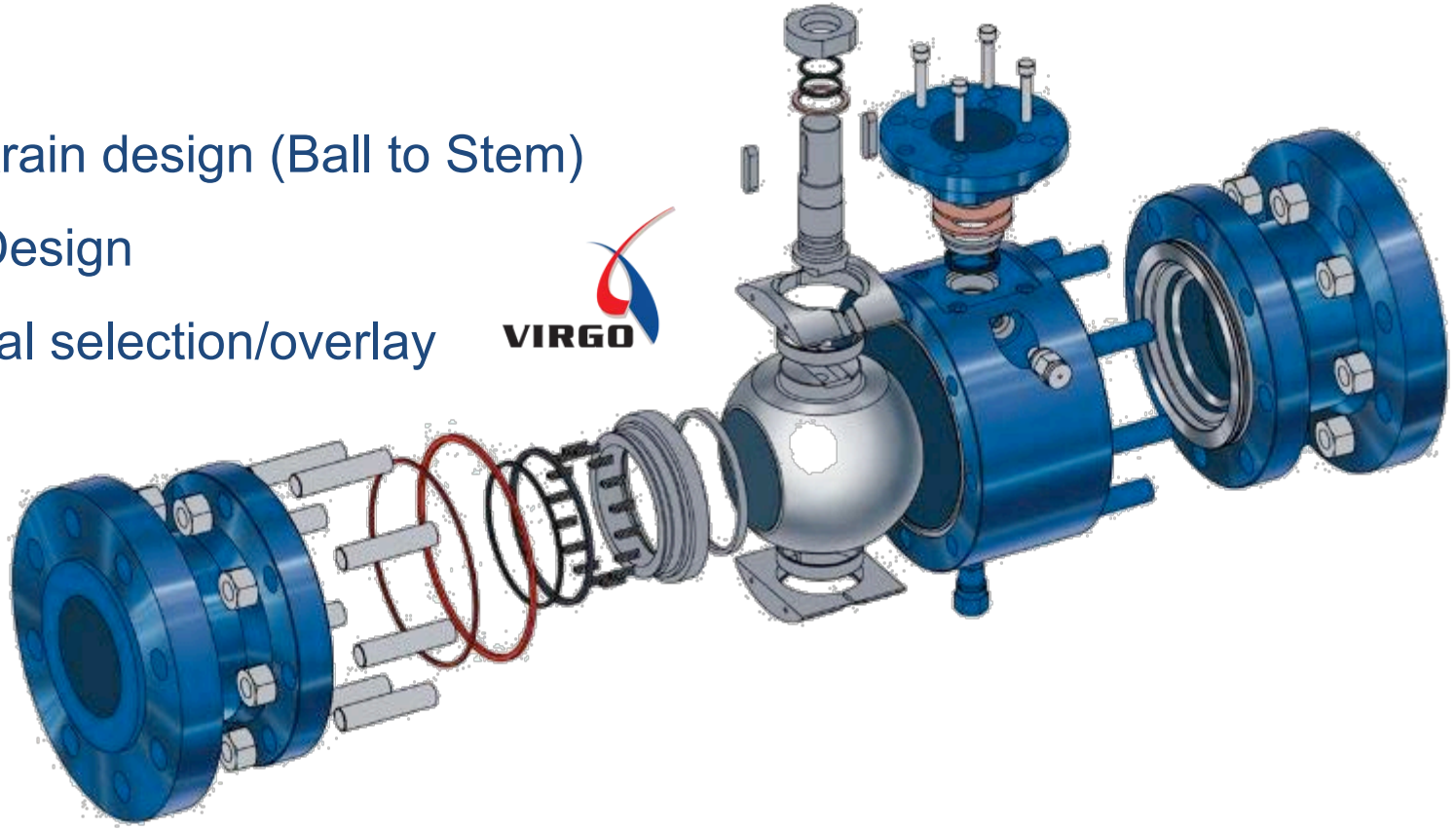
Certified SIS Products and Processes

- IEC 61508 Certified Products:
  - DeltaV SIS, Rosemount, Bettis, Fisher, ASCO and Virgo are IEC 61508 Certified
- IEC 61511 Certified Processes:
  - Global Investment in the development of “SIS Processes”
  - All Integration Centers are fully certified to IEC 61511
  - Provide a single, worldwide framework for consistent designs



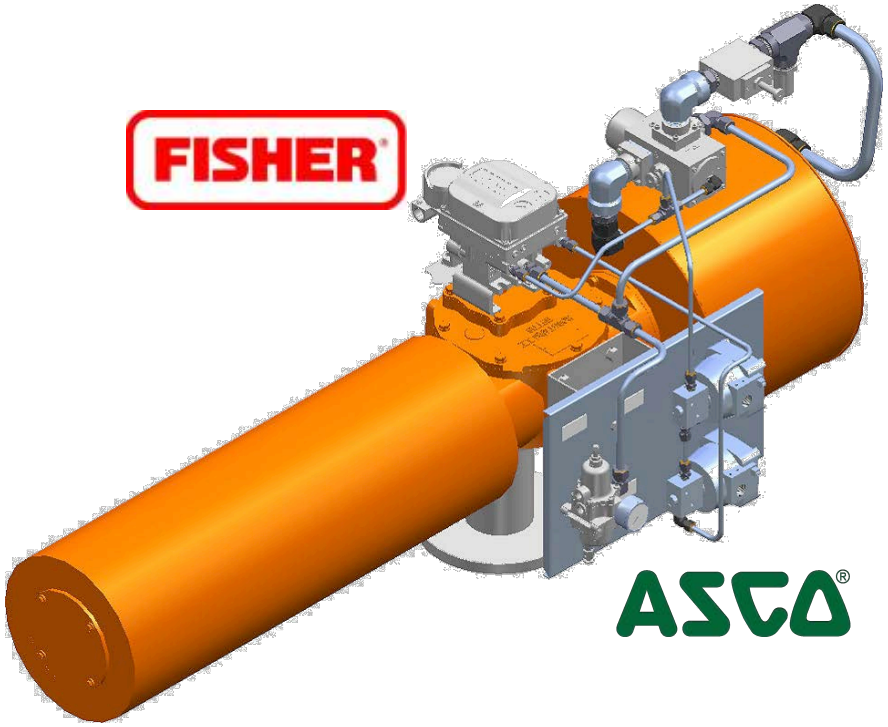
Challenges on a product level - Valves

- Closing Speed < 2-3 seconds
- Linear Speed (mid position)
- Full stroke damping vs End of Stroke Damping
- Inertia
- Drive train design (Ball to Stem)
- Seat Design
- Material selection/overlay



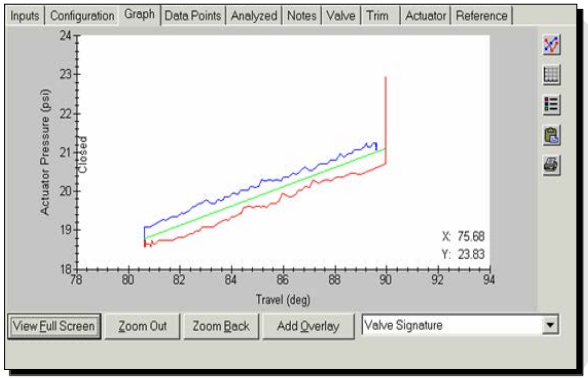
Challenges on a product level

BETTIS™ **VOS - Valve Operating System**

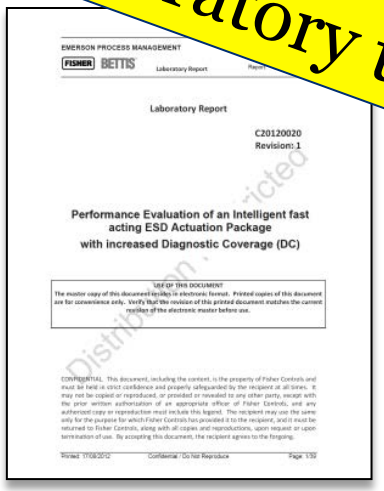


- Size actuator to consider the mechanical impact
  - Special end stops
  - Oversize actuator with “weak” spring design
- Control the entire stroke – Full stroke vs End of Stroke Damping
- High Diagnostic coverage on Fast Acting ESDV applications with the system in Service
- Test of all critical control elements in the shut down circuit with the system in Service

Increased Diagnostic Coverage



Laboratory test



EMERSON PROCESS MANAGEMENT
FISHER BETTIS
Laboratory Report

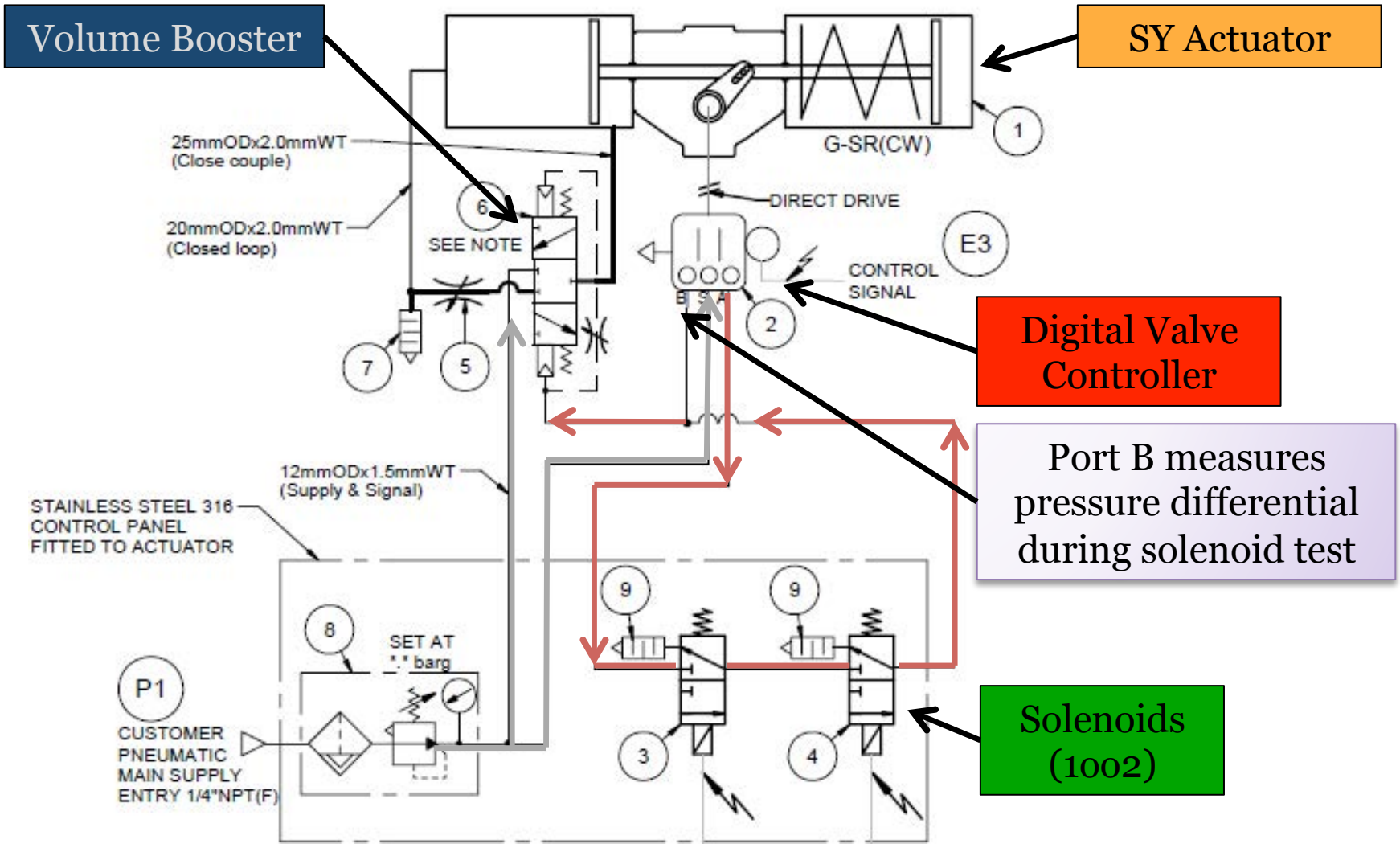
Laboratory Report

C20120020
Revision: 1

Performance Evaluation of an Intelligent fast acting ESD Actuation Package with increased Diagnostic Coverage (DC)

- Diagnose mechanical failures before they happen
- AMS ValveLink uploads PST results for analysis
- Additional diagnostics
  - Volume Booster tested as part of PST
  - Solenoids testing (50-100mSec)
  - Friction build-up
  - Valve shaft shear

Increase Diagnostic Coverage using Volume Booster for PST



Challenges on a product level

Certified with SC3 (SIL3)
Partial Stroke Capability
Comms interface with DCS
HART Pass-through
Smart SIS™ Diagnostics

“HMI”
Lamps
e Keyswitches

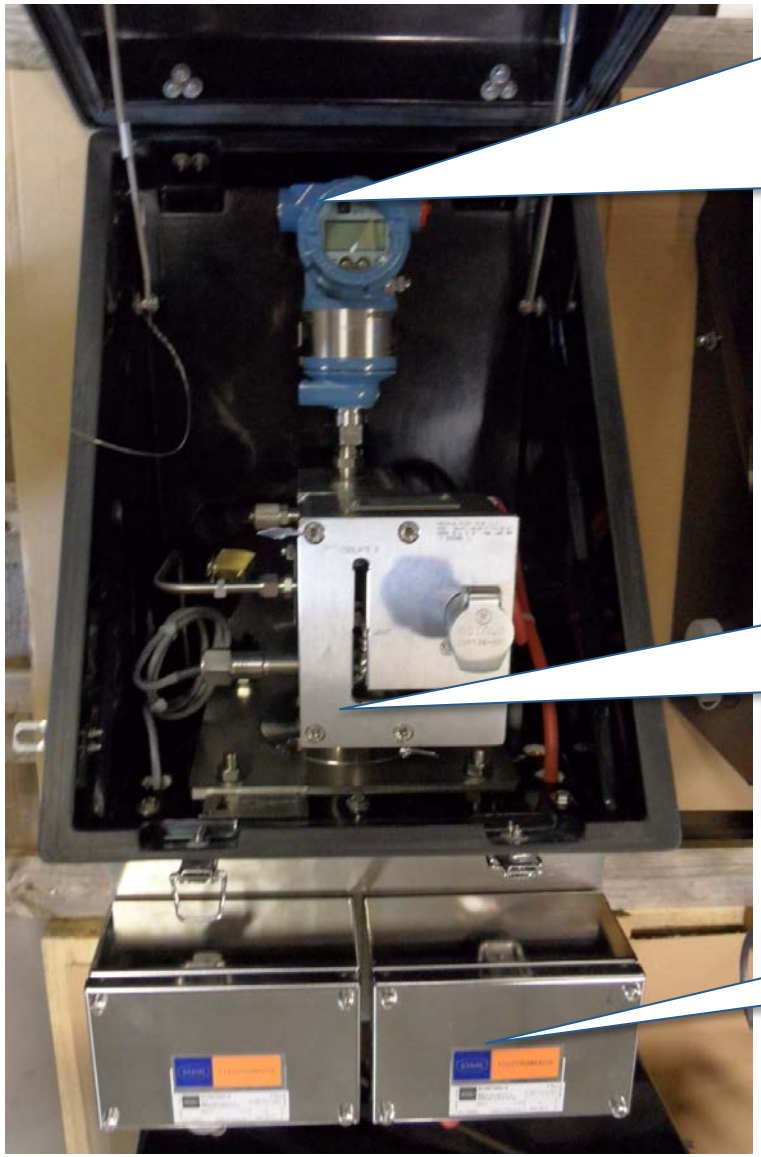
Challenges on a product level

Logic Solvers can also be mounted “Locally” on the HIPPS or

As part of a skid.
Pre-wired, pre-tested, Validated and with a fiber-Optic connection back to a Central SCADA system

Zone 2 in a IP54/65 enclosure or
Zone 1 in a EEx d enclosure

Challenges on a product level



Plugged Impulse line (SPM)
Systematic Capability: SC3
Advanced Diagnostics (DA2)
Rosemount 3051S

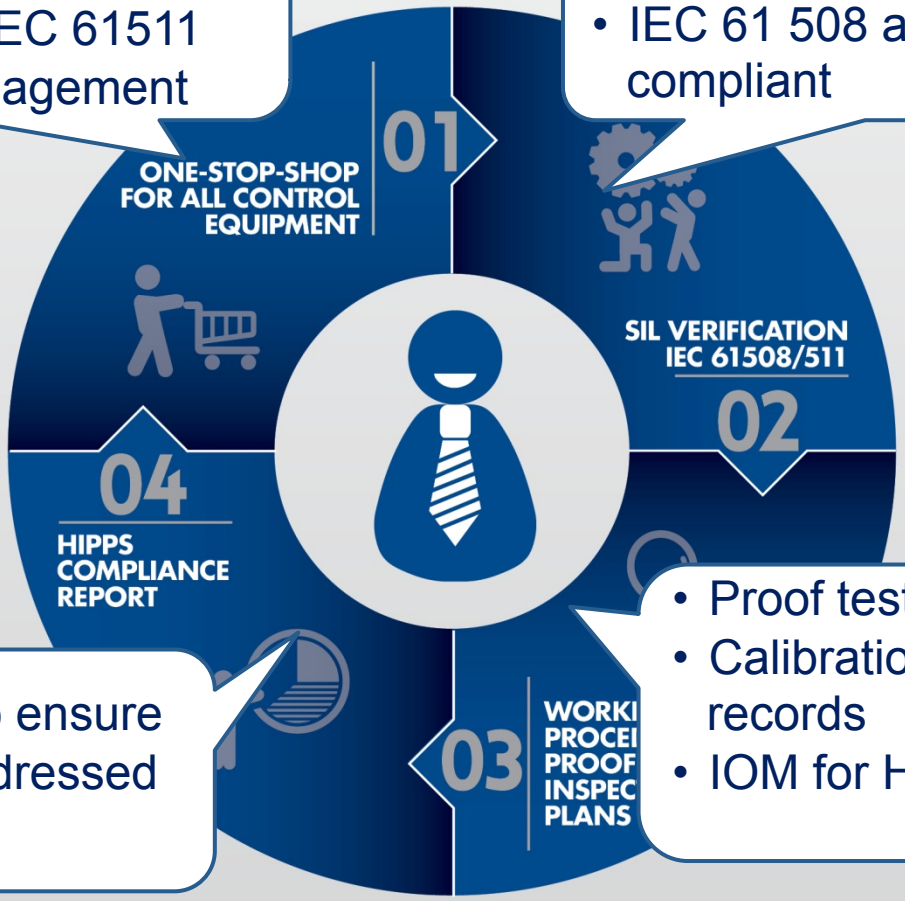
High Integrity Manifold – 3 tapings
Block-Bleed-Block for test
Single Isolation Key for 3 sensors

ATEX Junction Boxes

A Solution addressing all challenges

- Certified Systematic Capability3
- The HIPPS Design use Certified procedures acc. to IEC 61511
- Single Supplier Management

- Verification of SIL
- IEC 61 508 and 511 compliant



- Compliance report to ensure Safety Lifetime is addressed
- Validation if required

- Proof test and Inspection plan
- Calibration and Operation records
- IOM for HIPPS

Products photo

Products photo

Products photo

Products photo

Products photo