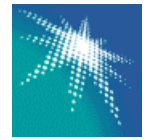

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Saudi Aramco

FF-SIS Rollout Status
FFEUCME 2006

December 12, 2006

Patrick Flanders, P.E.

Saudi Aramco

FF-SIS Rollout Status

- The FF-SIS Story
- End User Evaluation Sites
- Partial Stroke Test Transducer Block

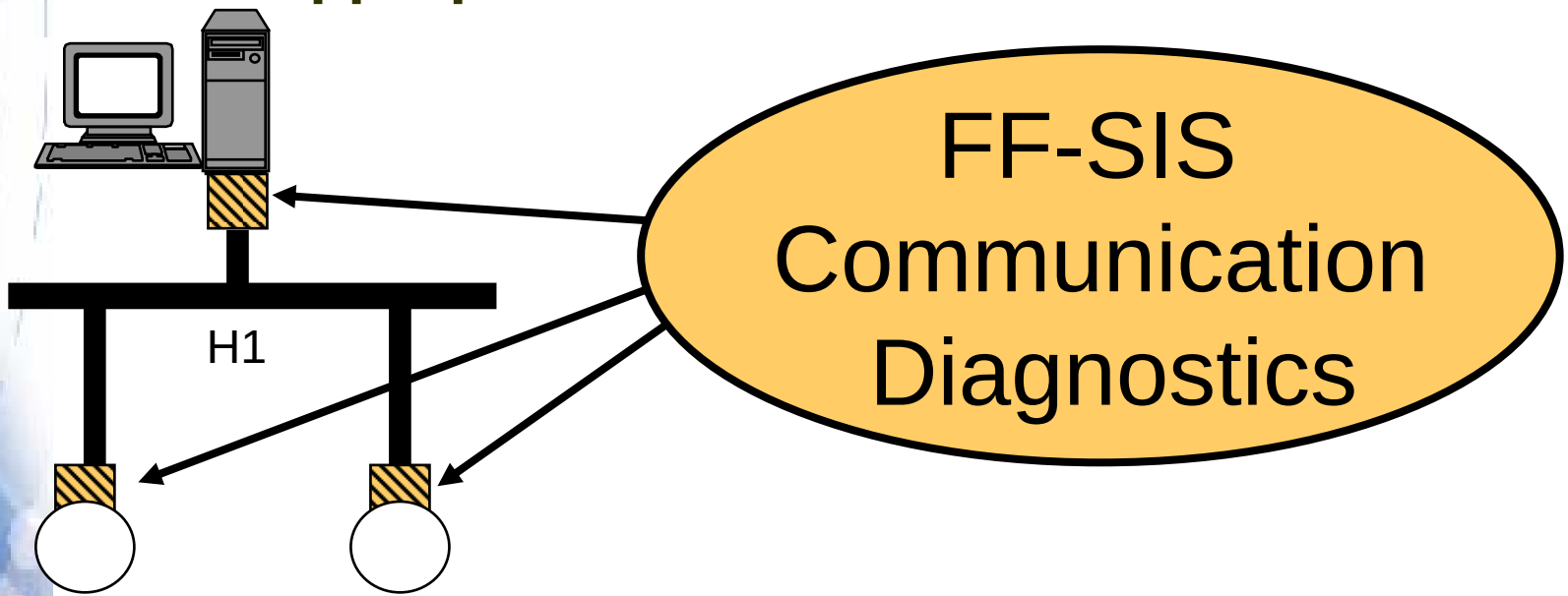
FF-SIS Background

- Uses existing FF-H1 “Black Channel”
- Protocol developed 2003-2005 with Saudi Aramco and other end-user participation
- Provides additional communications fault detection and device diagnostics
- Reduced block set for safety function (AI, DO, DI, Write Lock)
- TUV Certified for SIL 3 safety applications

Communication Extensions

H1 Communication (Black Channel) is unchanged.

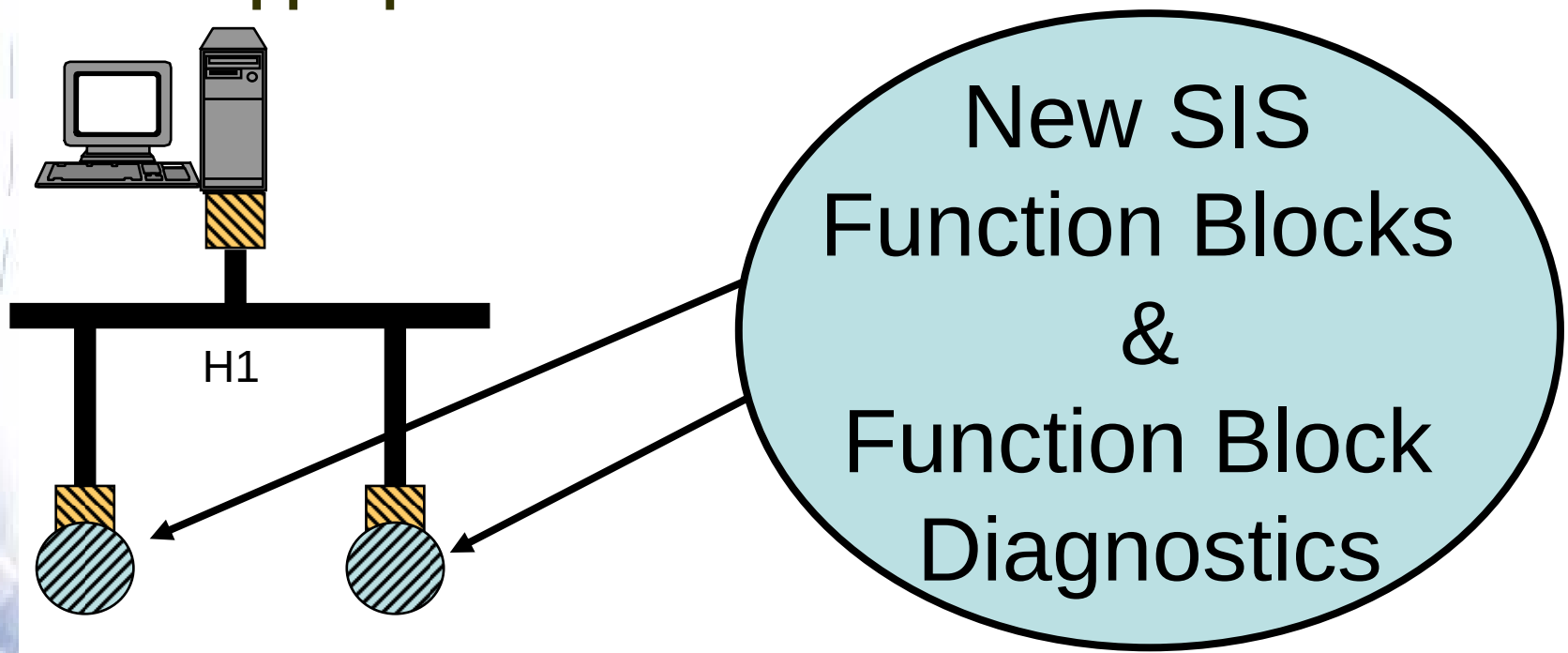
FF-SIS protocol detects network faults and appropriate action is taken.



Application Extensions

New SIS Function Blocks (AI, DO, DI, Write Lock).

Function Block diagnostics detect application faults and appropriate action is taken.



FF-SIS Rollout Team Members

ABB
BIFFI
BP
Chevron
Cooper Crouse-Hinds
Dresser-Masoneilan
Emerson-Fisher-Rosemount
Endress + Hauser
ExxonMobil
Fieldbus Diagnostics
Fieldbus Foundation
HIMA
Honeywell
Invensys/Triconex
Metso Automation
MooreHawke
MTL
Pepperl + Fuchs
Saudi Aramco
Shell Global Solutions
Siemens
Smar
Softing
TopWorx
TÜV
Yokogawa

Rollout term 2006 - 2008

Why FF-SIS Rollout Team?

- Ensure products fit operational requirements of end users.
- Evaluate prototypes first by end users, make any required modifications, then release commercial products.
- Overcome resistance to change…catalyze acceptance.

FF-SIS End User Evaluation Sites

- Saudi Aramco (Saudi Arabia)
- Shell Global Solutions (Netherlands)
- BP (Germany)
- Chevron (USA)

FF-SIS Rollout Team Suppliers

HIMA
Honeywell
Invensys - Triconex
Yokogawa
Emerson

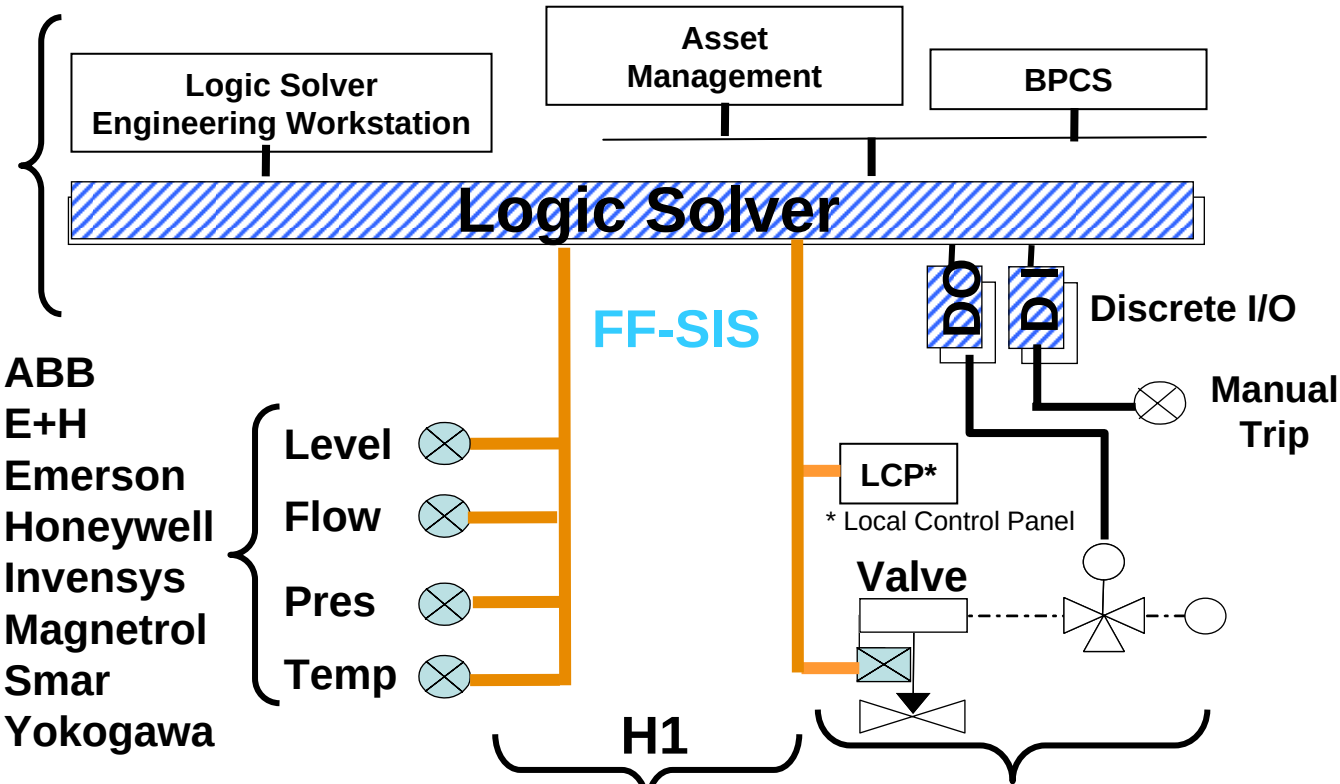


ABB
E+H
Emerson
Honeywell
Invensys
Magnetrol
Smar
Yokogawa

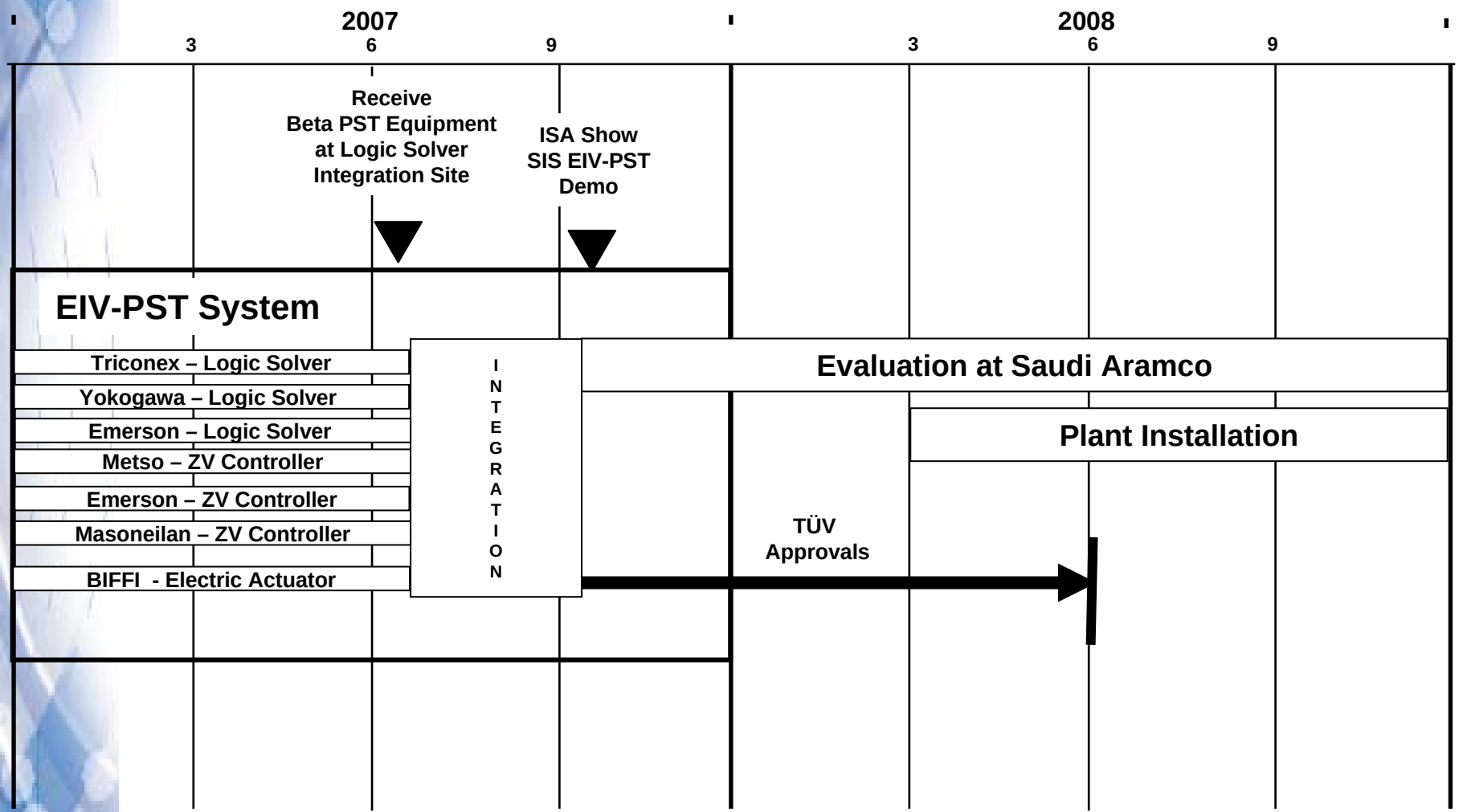
Others
Fieldbus Diagnostics
Softing
TÜV

Cooper Crouse-Hinds
Moore Industries
MTL
P+F

BIFFI
Emerson
Metso
TopWorx
Westlock/Tyco

Demonstration Sites
Shell Global Solutions – Amsterdam
Saudi Aramco - Dhahran
Chevron – Richmond, CA
BP – Gelsenkirchen, Germany

Device Evaluation Schedule at Saudi Aramco



FF-SIS PST Working Group

Focused group to define a common Partial Stroke Test function within the ZV controller transducer block.

- Use Cases
- Broadbrush Requirements
- Detailed Requirements
- Parameters
- Action Items

PST Team

Team Members

Patrick Flanders – (leader) Saudi Aramco
Jan Wiegerinck (co-leader) – Shell Global Solutions
Robin McCrea-Steele – PCS
Erich Janoschek – TUV
Heiko Rind – BP
Robert Lewis - BP
Carlo Doglio – Biffi Italia
Janne Laaksonen – Metso Automation
Sandro Esposito – Masoneilan
Bruce Grumstrup – Emerson
Riyaz Ali – Emerson
Nicolas Grein – Siemens
Davide Brambilla – Dresser Masoneilan

Use Cases

Define requirements for an EIV PST controller with FF-SIS communications to the Safety Logic Solver/Host.

- Applicable to broad range of actuator and valve combinations (Pneumatic, Hydraulic, and Electric)
- PST control resides on the valve controller and may be initiated remotely, locally, and via timer
- ESD overrides PST
- Valve signature collected during on-line PST and when full stroke initiated via a safety demand (plant trip)
- Valve Self-diagnostic fault reported to safety logic solver

Broadbrush Requirements

1. Configure PST
2. Initiate PST and FST
3. Retrieval of PST data
4. Alert on failed PST and FST via ff-sis
5. Retrieval of other diagnostic data
6. ESD overrides PST (non interfering…safety critical)
7. Retrieval of FST data (safety demand initiated)
8. Report “test in progress”
9. Auto/manually initiated abort PST

Parameters

Define the set of FF visible parameters required to configure the PST and valve diagnostics…The Transducer block decouples function blocks from the local output functions required to command output hardware. The transducer block typically contains setup and calibration information.

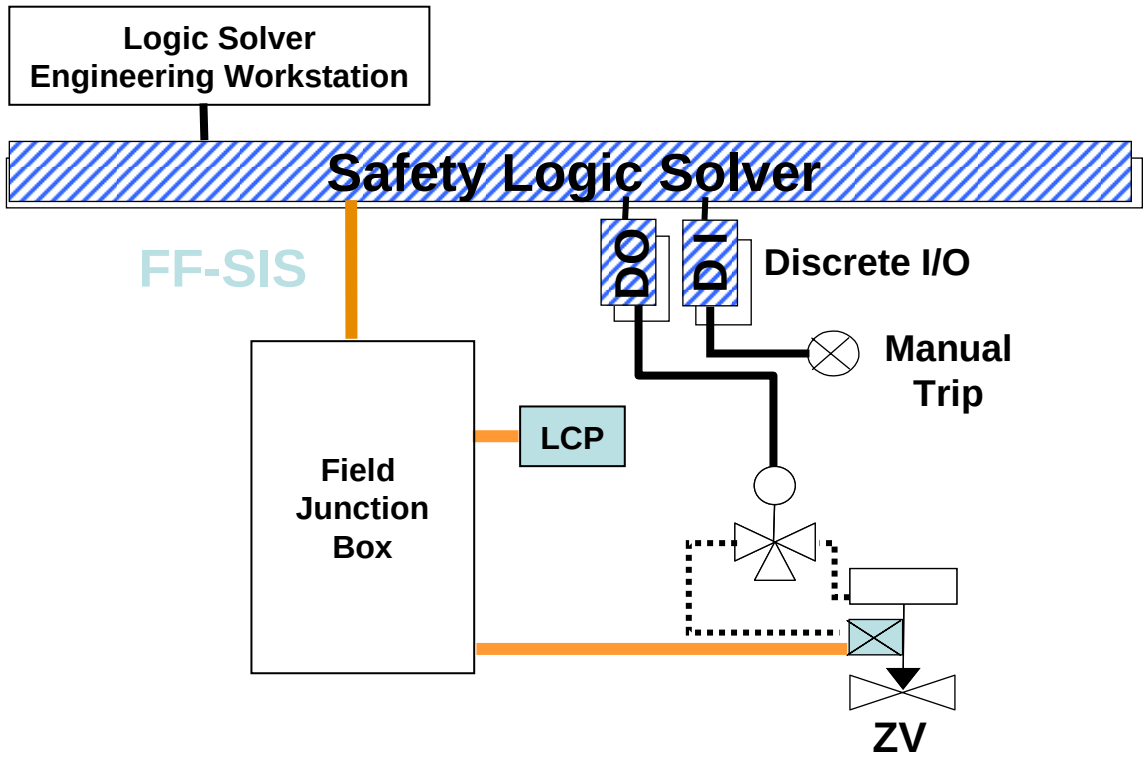
Common to all FF-SIS valve controllers

- Valve travel limit
- Time limitation (without travel, to reach PST target, etc.)
- Valve error – common fault

Action Items

- Suppliers provide PST parameters
- Define common set of PST parameters
- Draft PST TB specification
- Harmonize with other technical committees
  (FF Transducer Block team and ISA-TR96.05.01 PST TR)

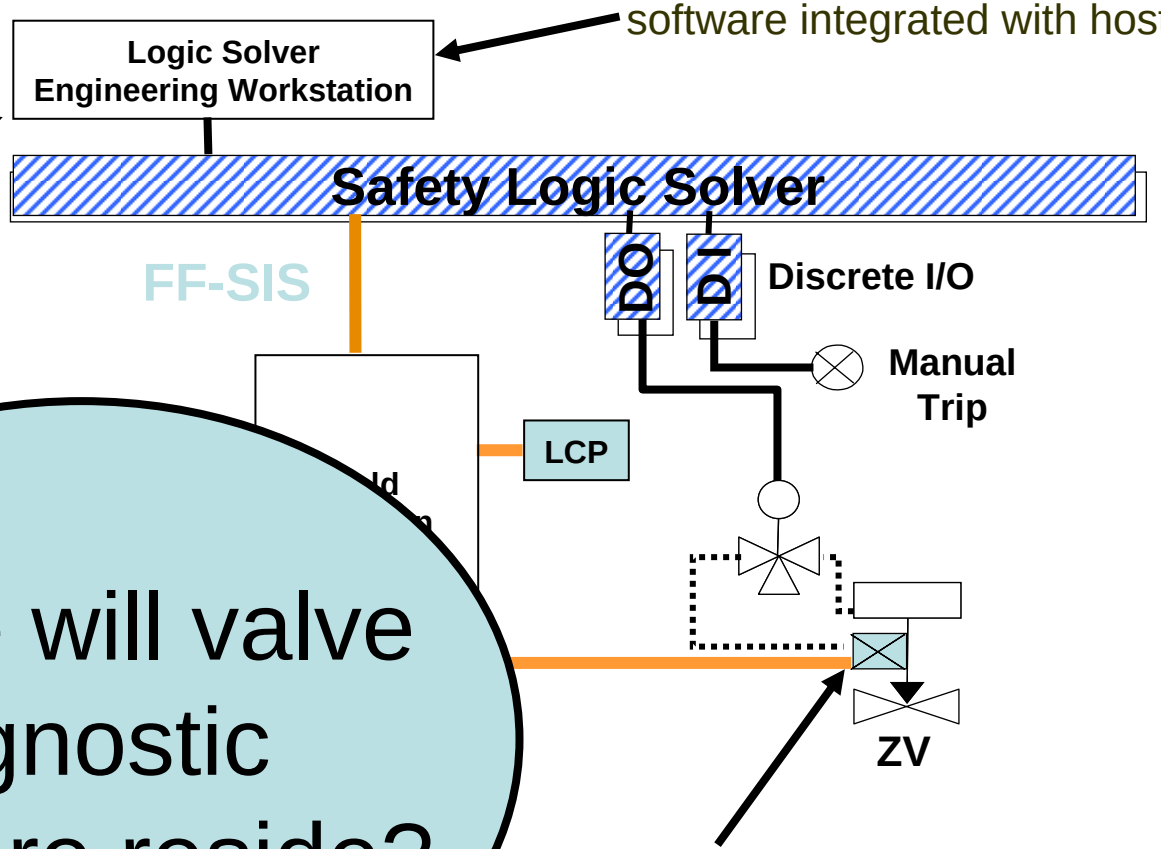
Emergency Isolation Valve (ZV)
Saudi Aramco Target Application



Emergency Isolation Valve (ZV)
Saudi Aramco Target Application

Host work station with EDDL or DTM compatible “all-purpose-Fieldbus-device-management-software”?

Host work station with device-specific software integrated with host or asset tool?



Where will valve diagnostic software reside?

Field Device Intelligence – i.e. the information is simply published over the FF network and the device management software picks it up?

FF-SIS Rollout Update

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Collaborative Design Effort to…

Improve SIS Diagnostics
Reduce Installed Smart ZV Cost

First FF-SIS products expected
for end user evaluation
in 4th Quarter 2007