



It is **EASY** with  
**DeltaV**

Neo Chow Yang  
Director  
Emerson Process Management



# What is the next BIG thing? What problems will it Solve?



Capability



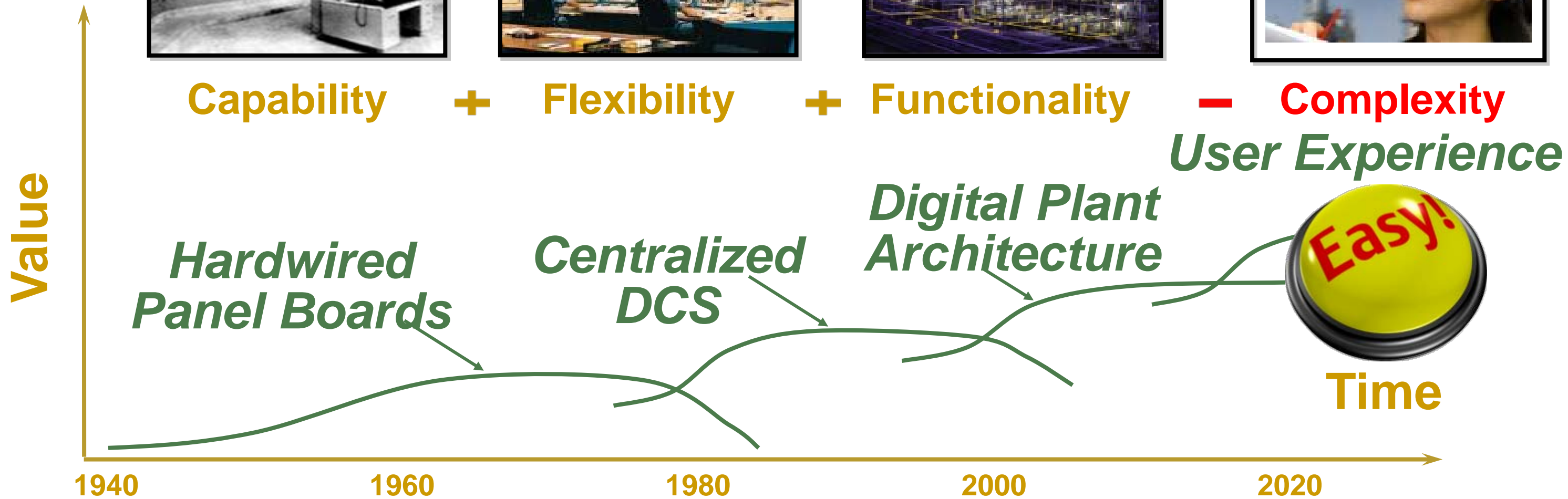
Flexibility



Functionality



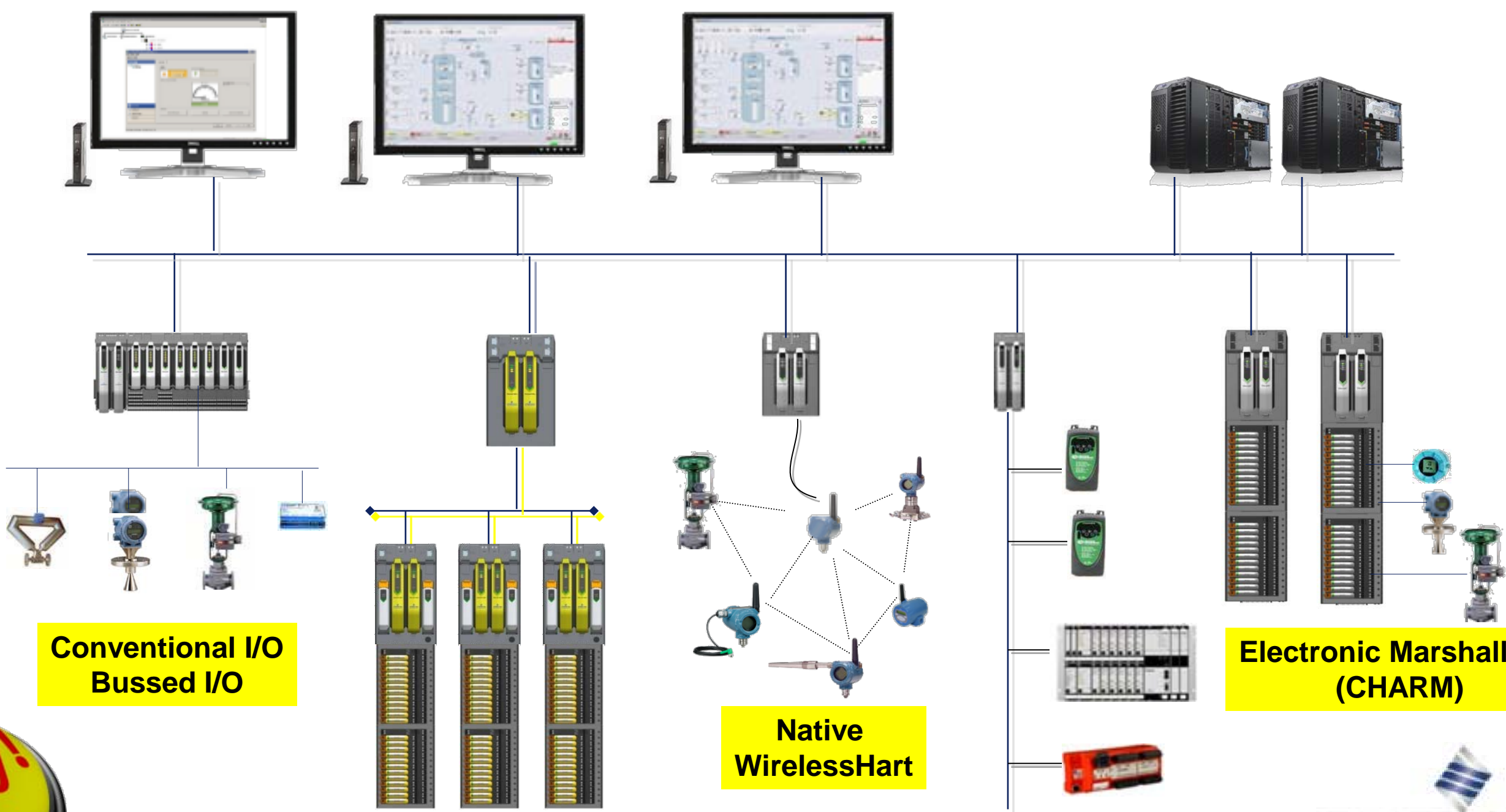
Complexity



**Control System is a small part of your plant investment  
But it will touch and impact many aspects of your business**

# Delta V

- All Native Hardware
- All Native Configuration
- Single Global Database



Conventional I/O  
Bussed I/O

Integrated yet Separated  
SIS

Native  
WirelessHart

Comprehensive  
Integration

Electronic Marshalling  
(CHARM)



# *It is EASY with DeltaV*

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**Expand without Constraint**

**Improve and Optimize  
with Ease**



**Operate  
with Confidence**

**Manage Safety  
without Compromise**

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# Leverage your investment across any system size

Ultimate Scalability

Add, Remove, Partial Download Anything Online

Small

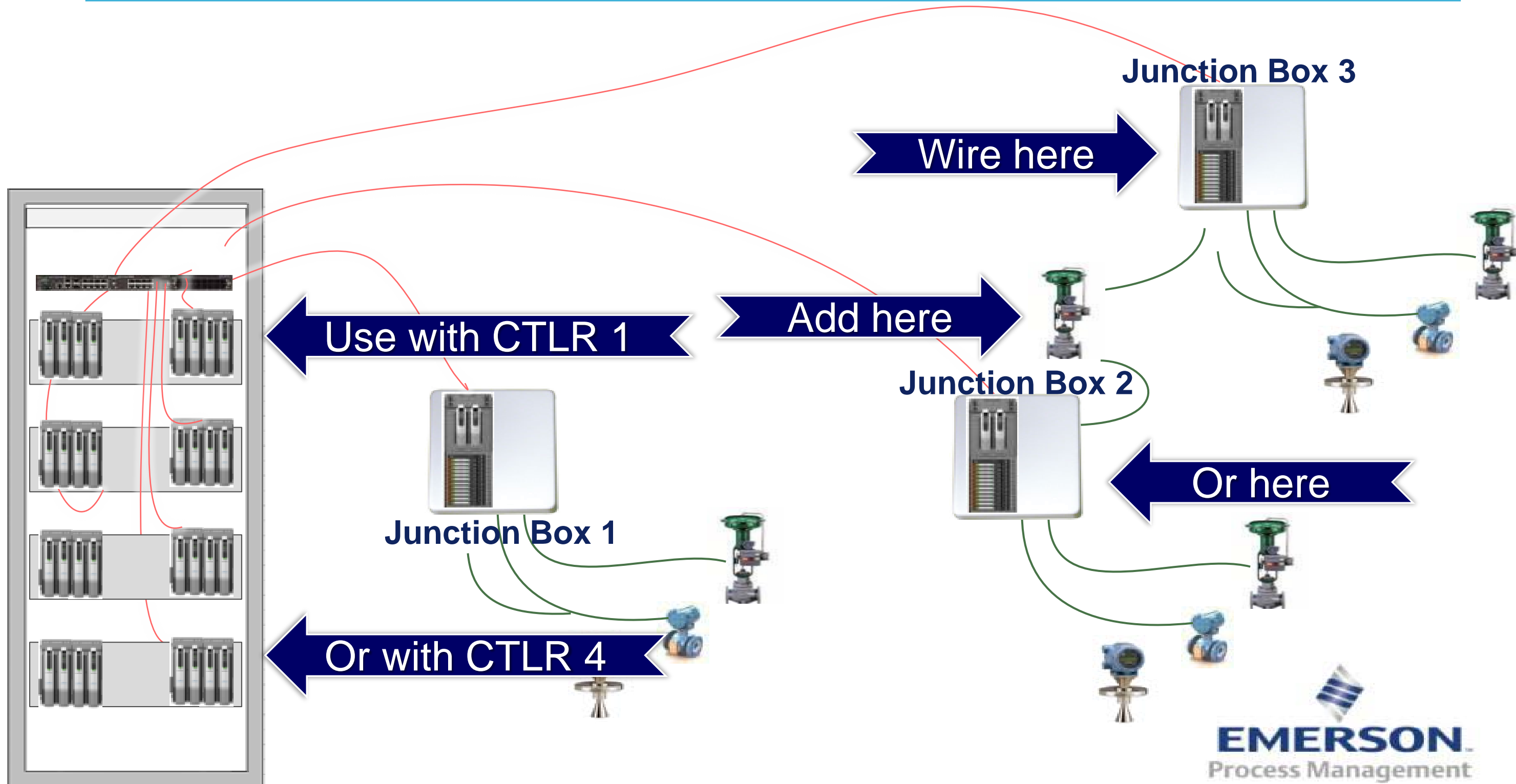
Very Large

Module Name	Type	Parameter	Value
PIC205	Control Module	Compressor Discharge Pressure Control	No
RX_1_COMPR_TRIP	Control Module	Compressor Trip Alarm	No
SIC101	Control Module	Motor Speed Control	No
TI101-R	Control Module	Product Discharge Temperature-1	Yes
TI102A	Control Module	Compressor Bearing Temp-A	Yes
TI102B	Control Module	Compressor Bearing Temp-B	Yes
TI102C	Control Module	Compressor Bearing Temp-C	Yes
XV101D	Control Module	Compressor Downstream Block Valve	No
XV101U	Control Module	Compressor Upstream Block Valve	No
XX101A	Control Module	Compressor Common Alarm	No
XX101B	Control Module	Compressor On Delay Check Alarm	No

Inherent functionality regardless of size  
Same Hardware, Same Applications, Same Database

**What if I am using Electronic Marshalling  
(aka CHARM)?**

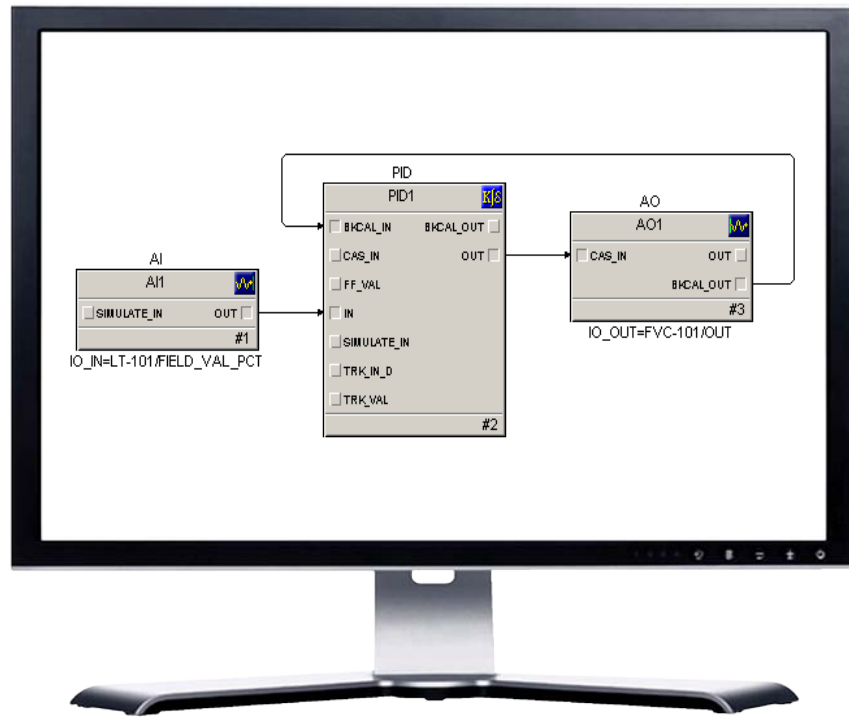
# Ultimate Scalability and Flexibility



# Commissioning Today – Need to check where the device is connected

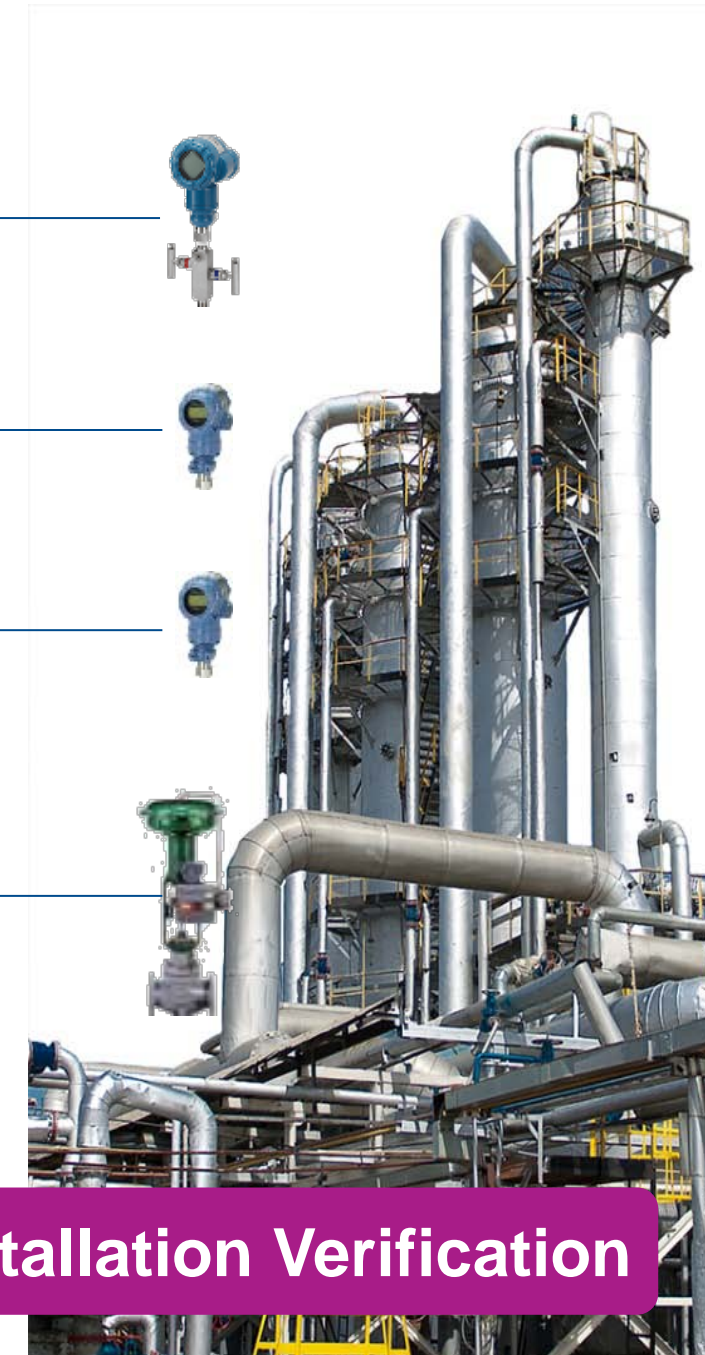
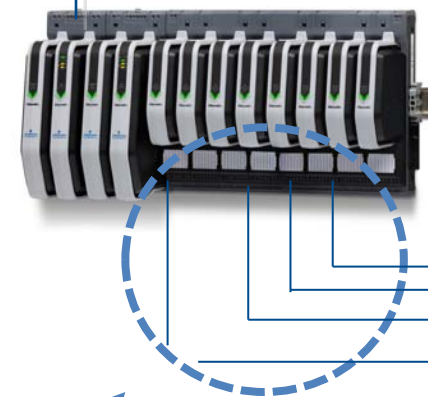
ENGINEERING OFFICE

PLANT



## Upfront I/O binding

Address = Contr1\_1/Card\_4/Channel\_5



Wiring Verification

Installation Verification

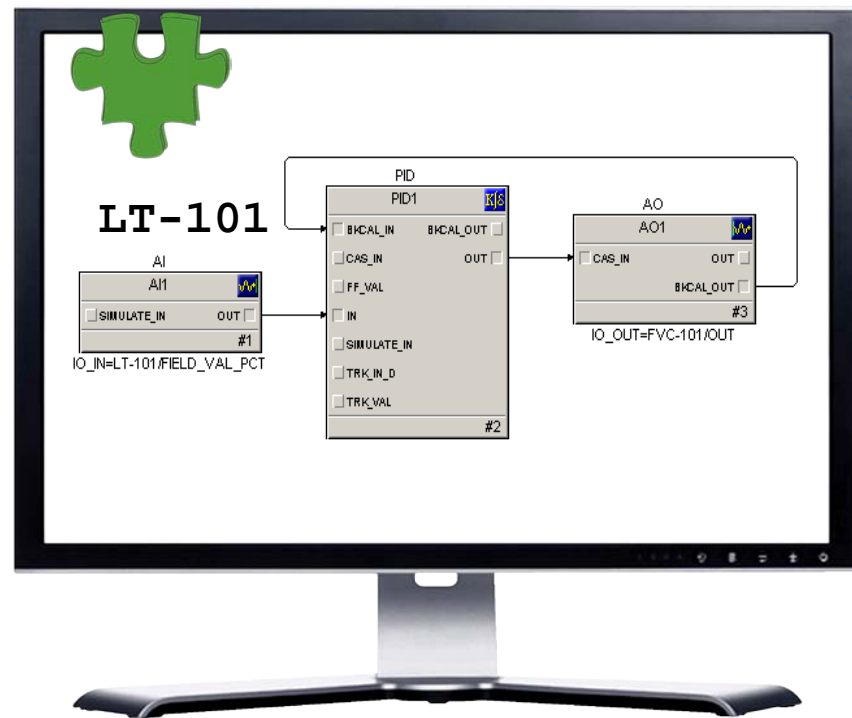
# Smart Commissioning

## The wire connection is irrelevant!

ENGINEERING OFFICE

A

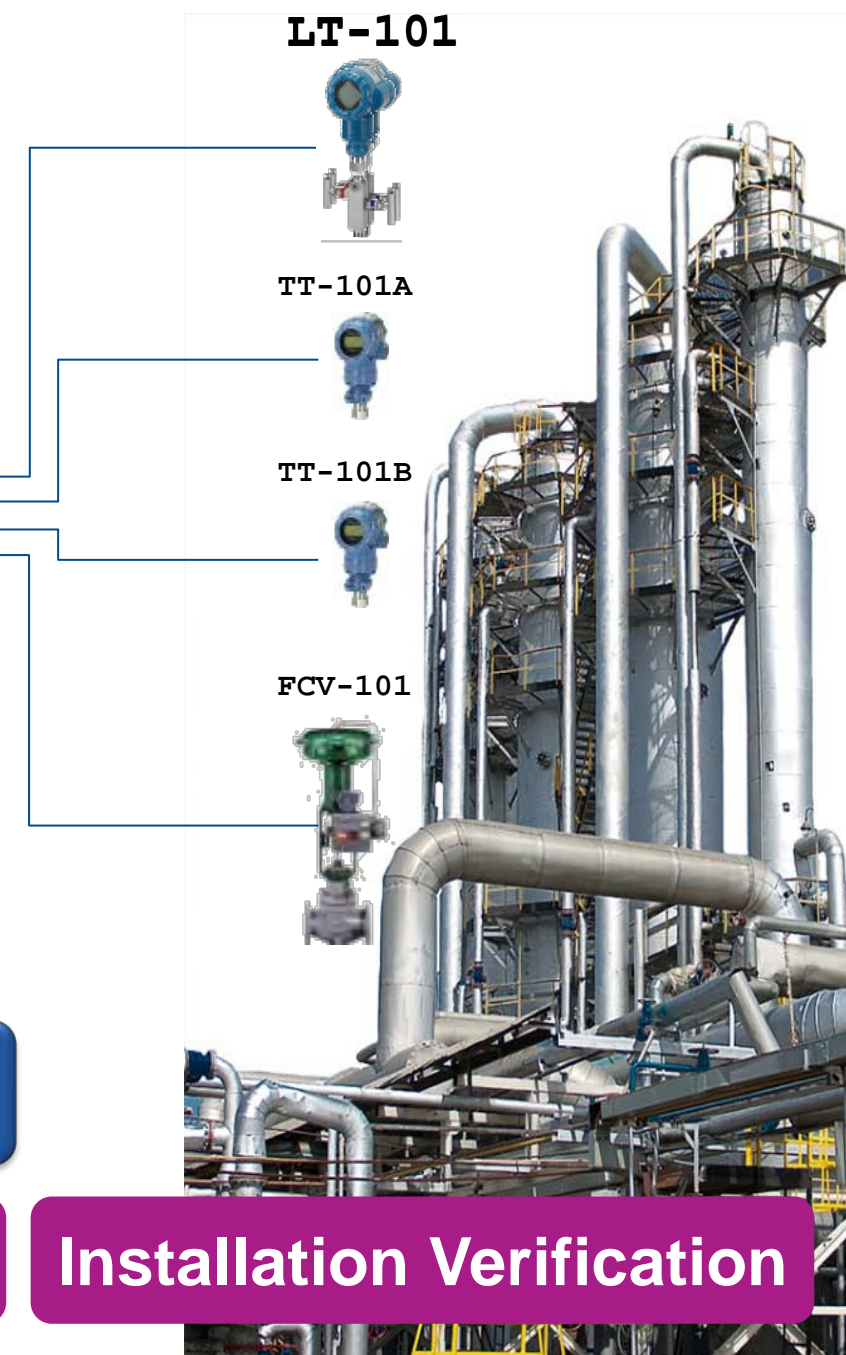
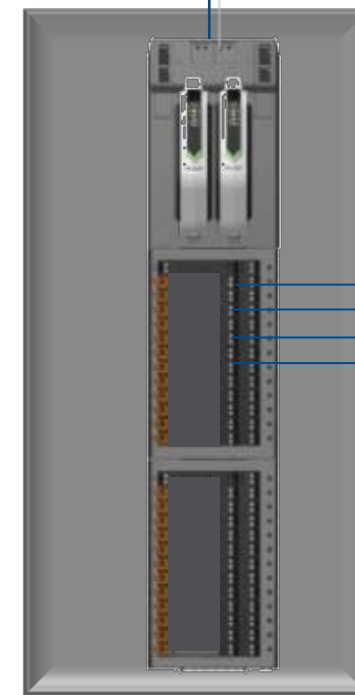
PLANT



### Automatic I/O binding

Address = LT-101

Guarantees the Right Device in the Right Loop



~~Wiring Verification~~

Installation Verification

# *It is EASY with DeltaV*

**Expand without Constraint**

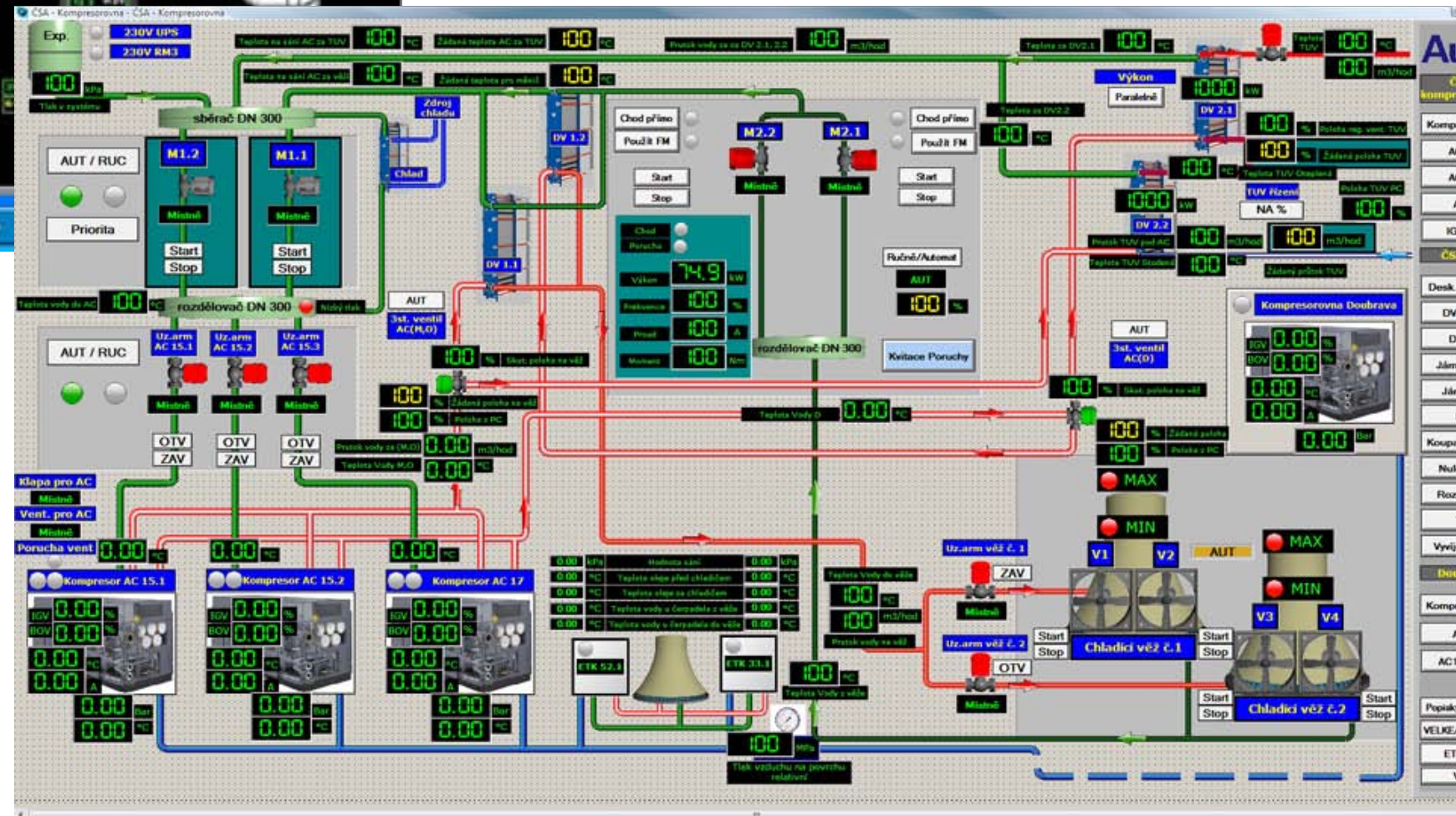
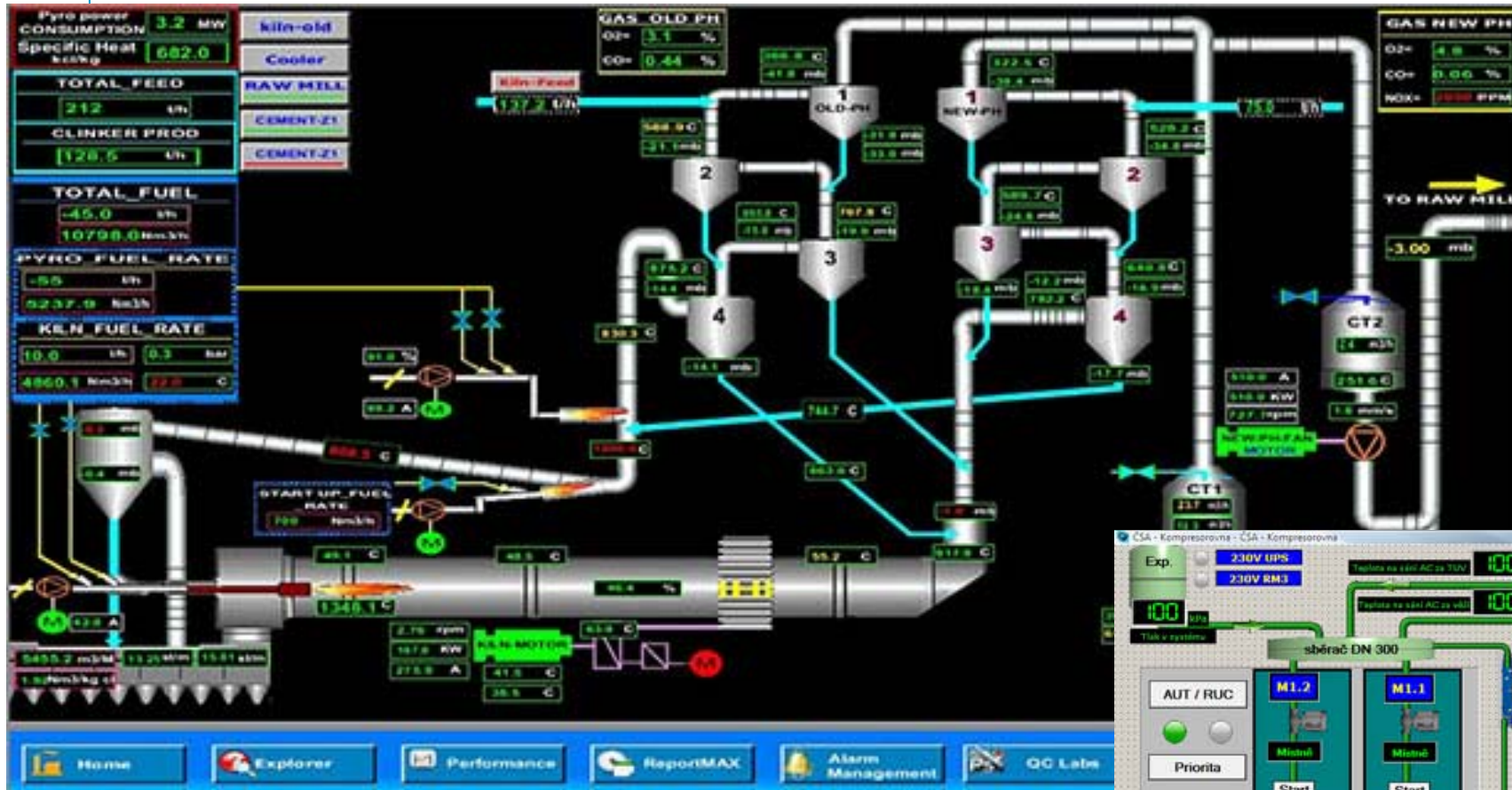
**Improve and Optimize  
with Ease**



**Operate  
with Confidence**

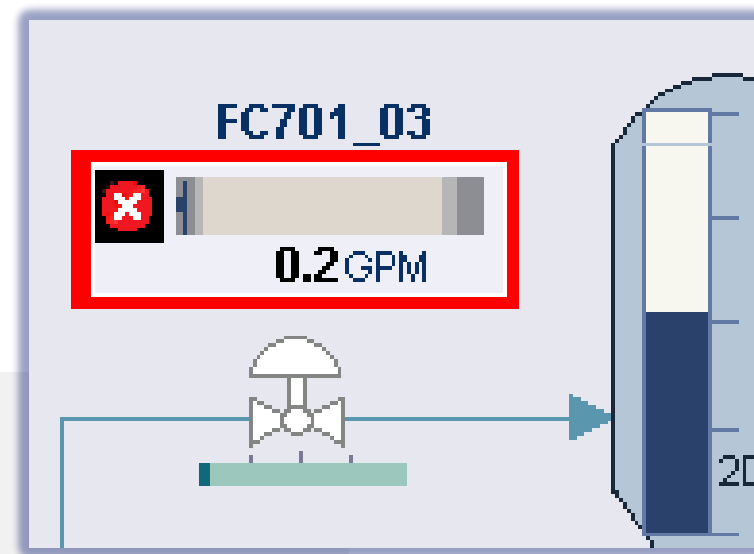
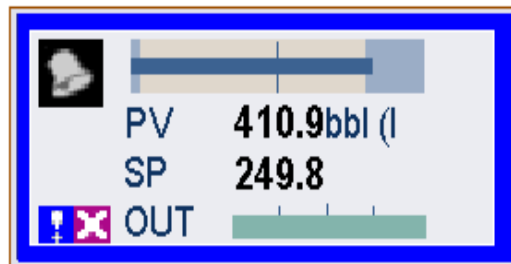
**Manage Safety  
without Compromise**

# If you are still using something like this...



# 80 to 200 to 400: Empower Your Operators

- Empower operators to make quick and better decisions
  - Remain Alert through Quick Scan
  - Identify Problem Early and Decide on the Fly
  - Handle Difficult Situation



FC701\_05  
SP: 82.4 GPM  
PV: 78.5 GPM  
OUT: 84.0 %

84.0 %

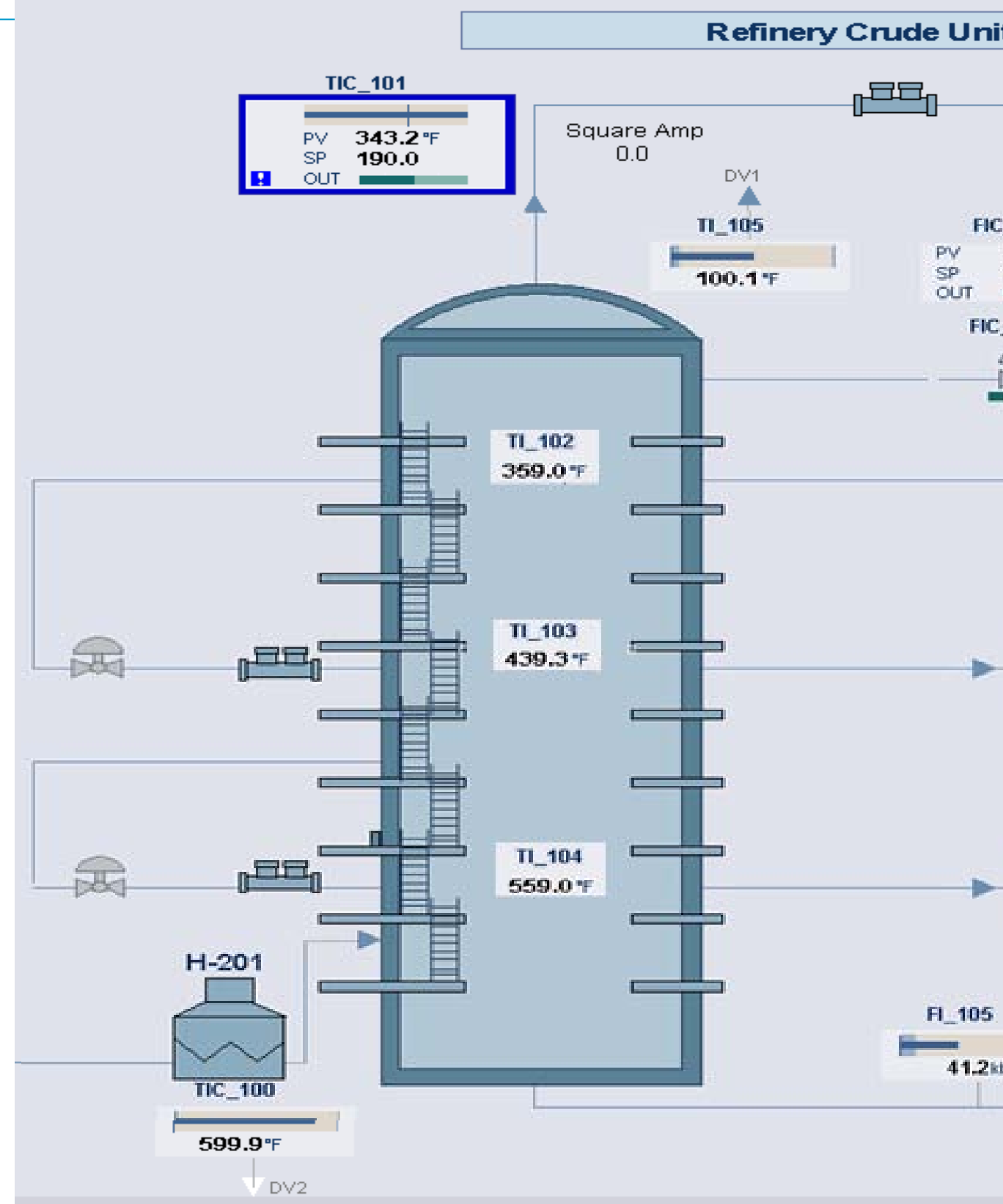
PC701\_02  
SP: 0.0 psig  
PV: 0.1 psig  
OUT: 2.0 %

73.9 %

FLARE

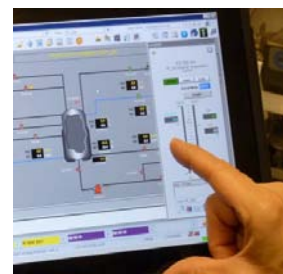
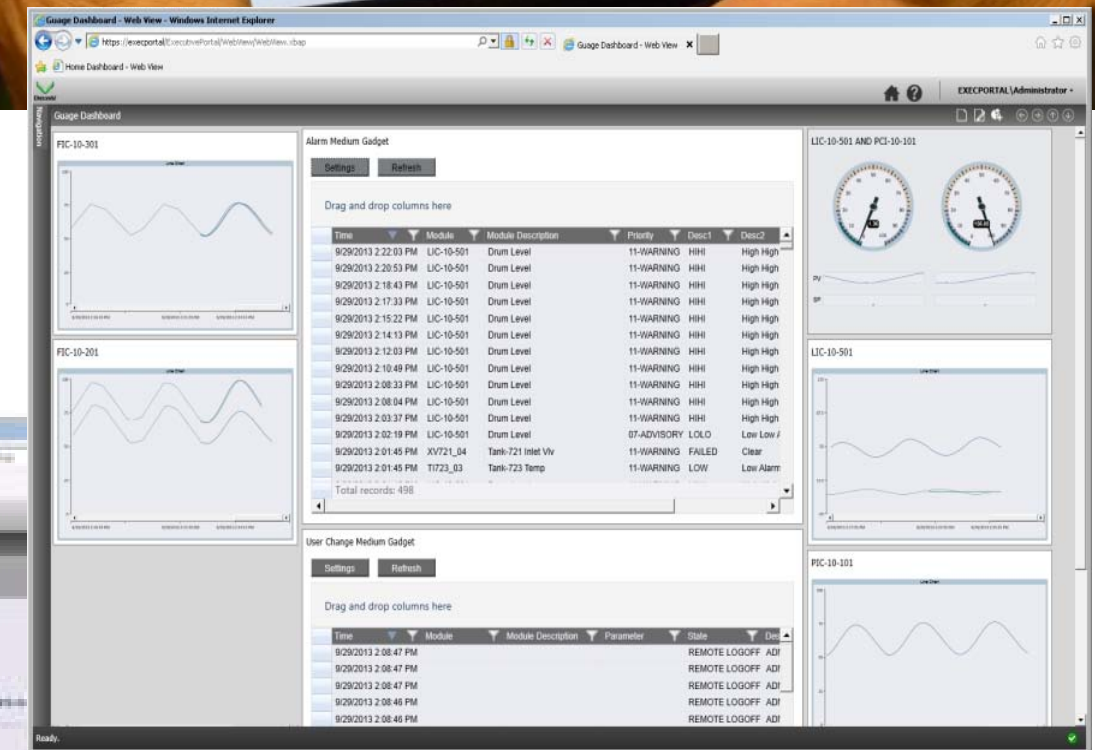
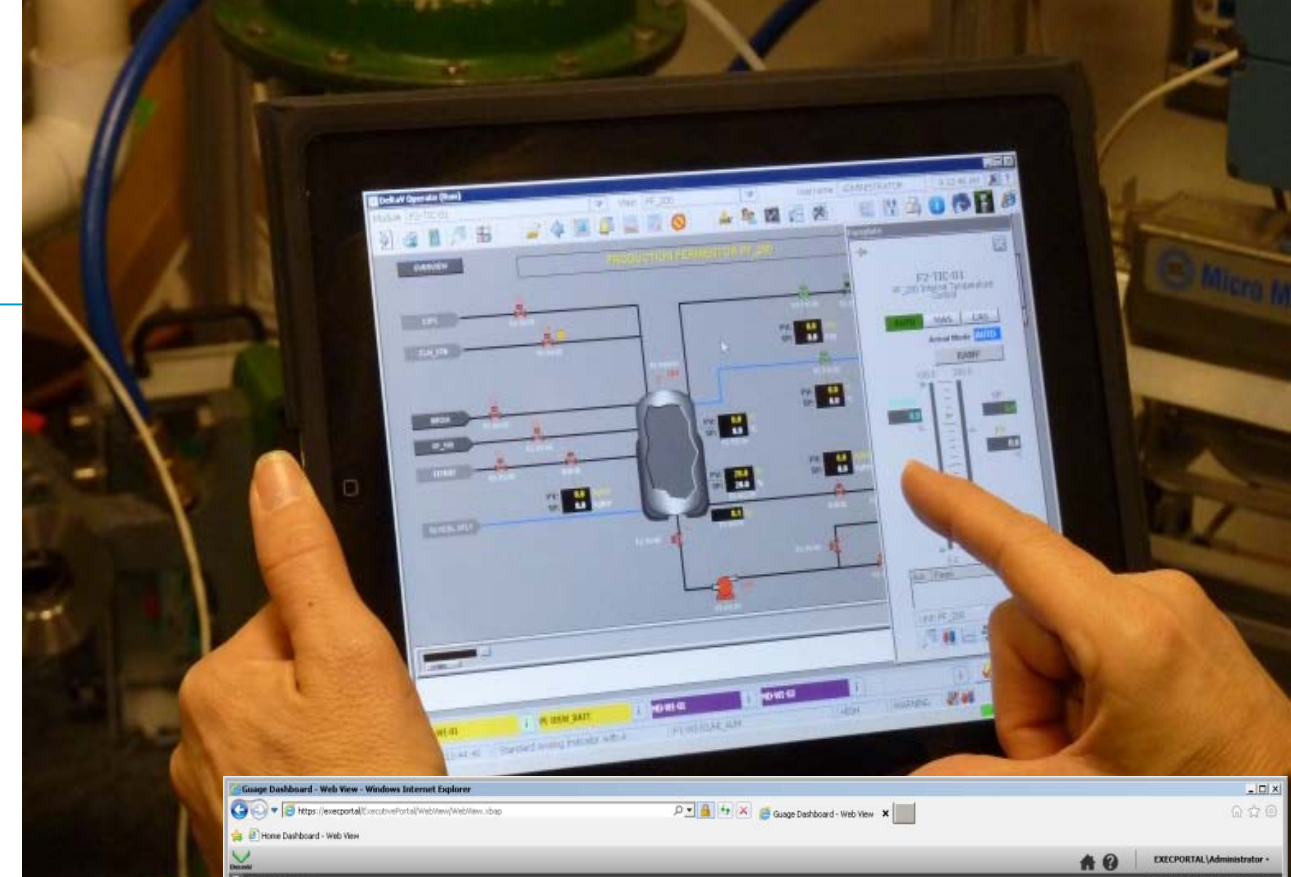
D-701  
Dist Column

Refinery Crude Unit



# “I Want to Monitor from Anywhere”

- DCS data consumers are not just in the control room
- DeltaV Executive Portal
  - DeltaV displays anywhere
  - Read-only
  - View event chronicle and alarming
  - Access Historical process trends



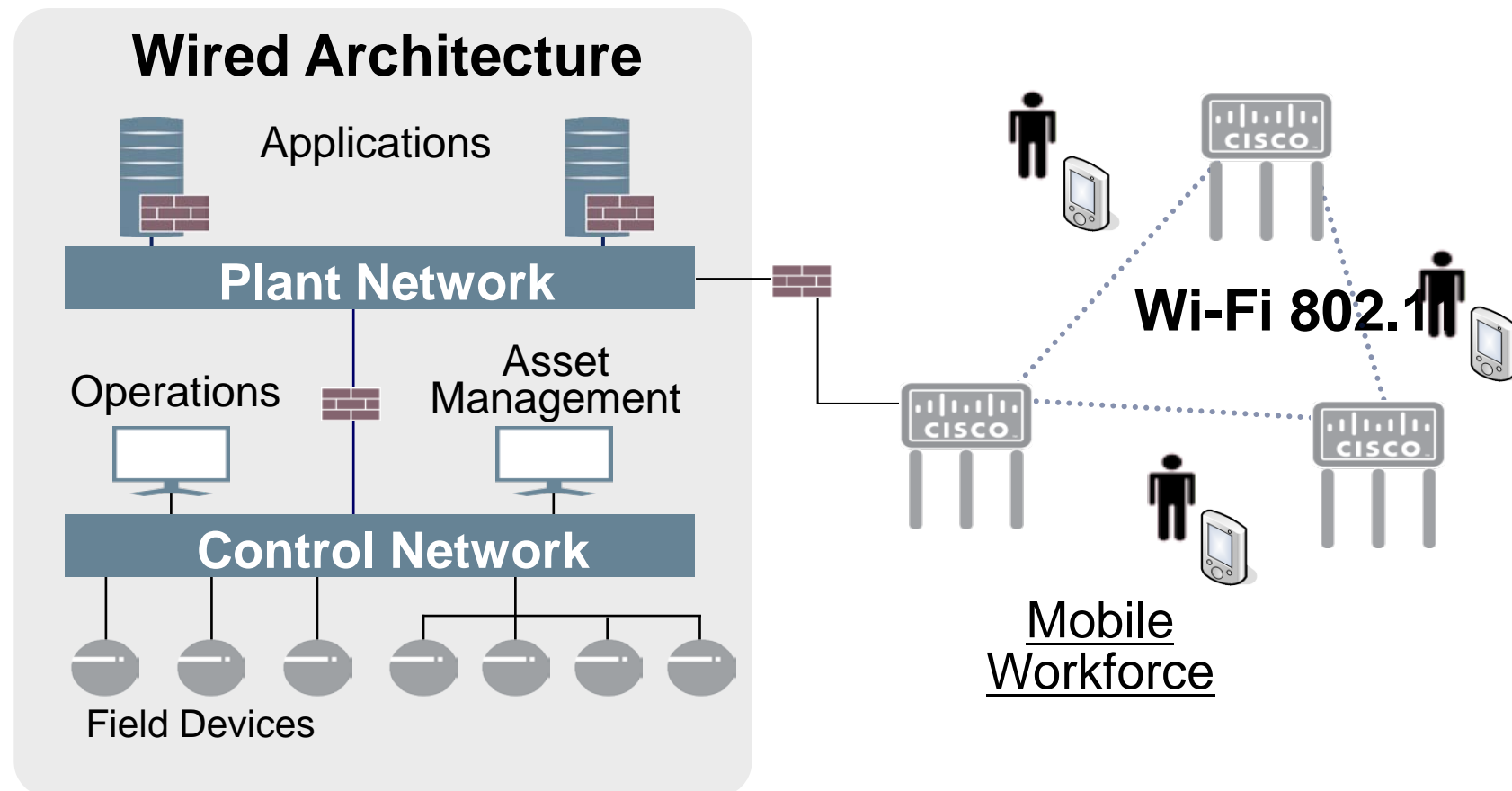
**Executive Portal**



# “I Need to Operate from Anywhere”

## Business drivers

- Operator productivity
  - Remote DCS client
  - Operator rounds
  - Terminal mgmt/OMS
- Maintenance productivity
  - Remote asset management client
  - Maintenance rounds / procedures
- Accuracy and Certainty



Hardened 13"  
PC clients



New ToughPad



Ecom Tab-Ex



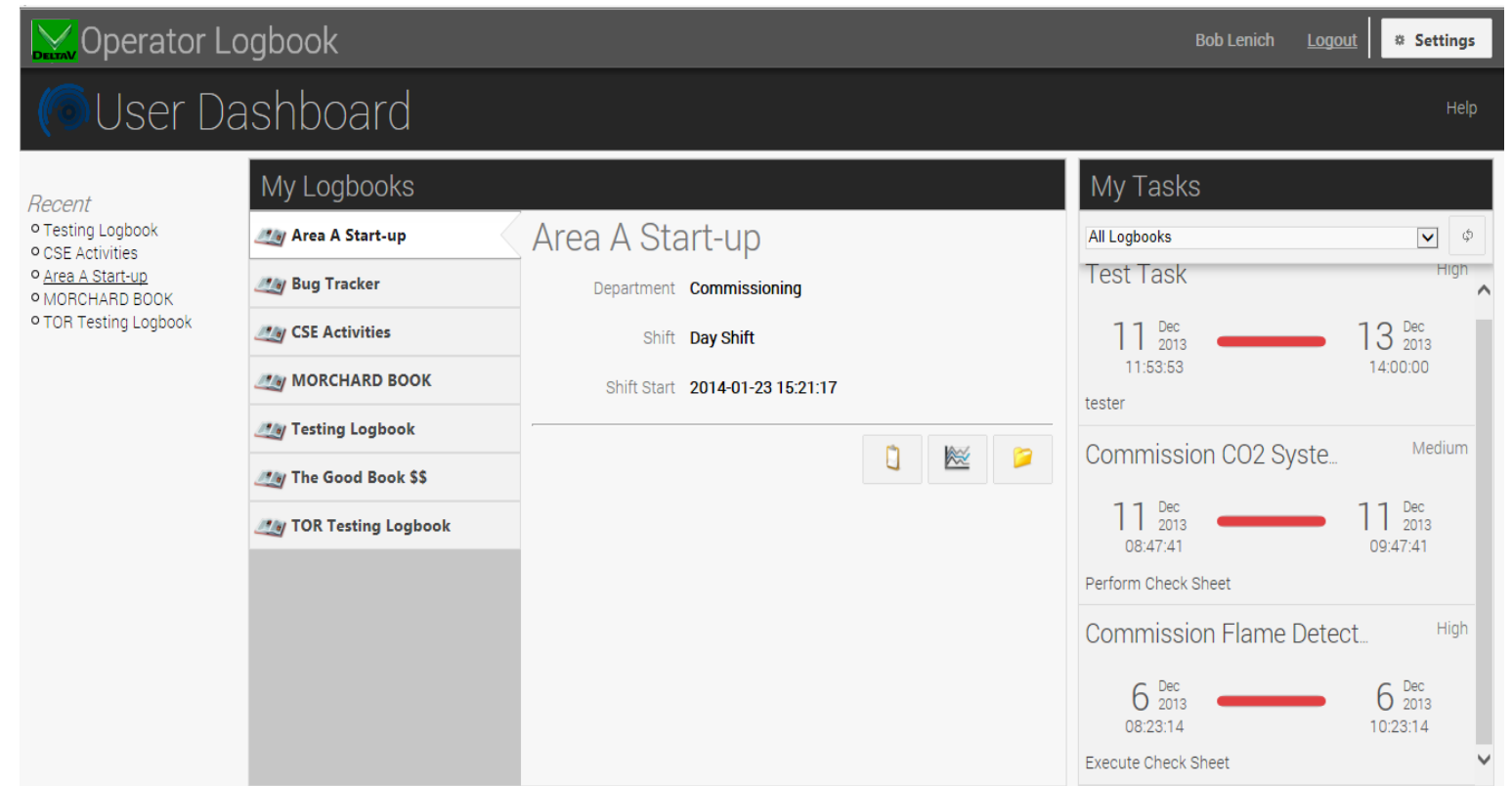
Bartec Pixavi AgileX



Apple iPad  
+  
Rugged enclosure



# Love the Work but Hate the Paper?



The screenshot displays the 'Operator Logbook' User Dashboard. The top navigation bar includes the user name 'Bob Lenich', a 'Logout' link, and a 'Settings' icon. The main content area is divided into three sections: 'Recent' (listing logbooks like 'Testing Logbook', 'CSE Activities', 'Area A Start-up', 'MORCHARD BOOK', and 'TOR Testing Logbook'), 'My Logbooks' (showing a list of logbooks including 'Area A Start-up', 'Bug Tracker', 'CSE Activities', 'MORCHARD BOOK', 'Testing Logbook', 'The Good Book \$\$', and 'TOR Testing Logbook'), and 'My Tasks' (displaying a list of tasks with progress bars and dates, such as 'Test Task' and 'Commission CO2 Syste...').

- Attach documents
- Capture conversations
- Schedule tasks and track progress
- Effective Shift Change

- Identify entries that require resolution
- Sort, filter and report on Log Entries
- Perform full text searches
- Record and Audit Trail

**Improve communication accuracies and accountability via paperless logbook entries**

# Captures Operator's Thoughts



Notes




Images






Discussion


28 Aug 2013 18:34

 Classification: **Calibration** Reason: **Routine**

Calibrated pH Meter 101.

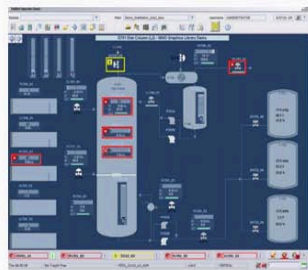
 (0)  (0)  (0)




28 Aug 2013 17:51

 Classification: **Process** Reason: **Alarm**


Area: ... \ **D721 Dist Column**

Pressure Indicator - High Level Alarm.






 (0)  (0)  (0)

28 Aug 2013 16:29

 Classification: **Maintenance** Reason: **Issue**

The humidity in the clean room spiked this afternoon. Maintenance has been notified.

 (0)  (0)  (0)



Form

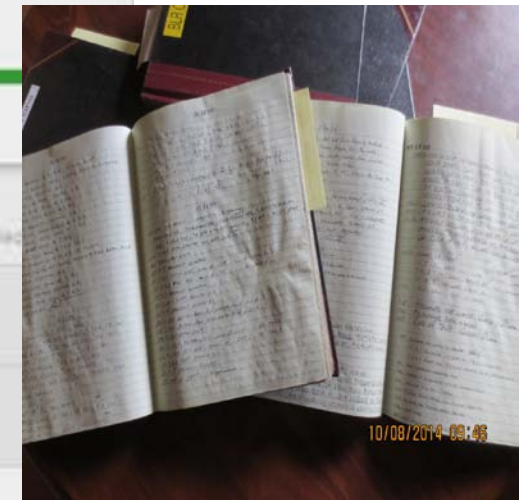
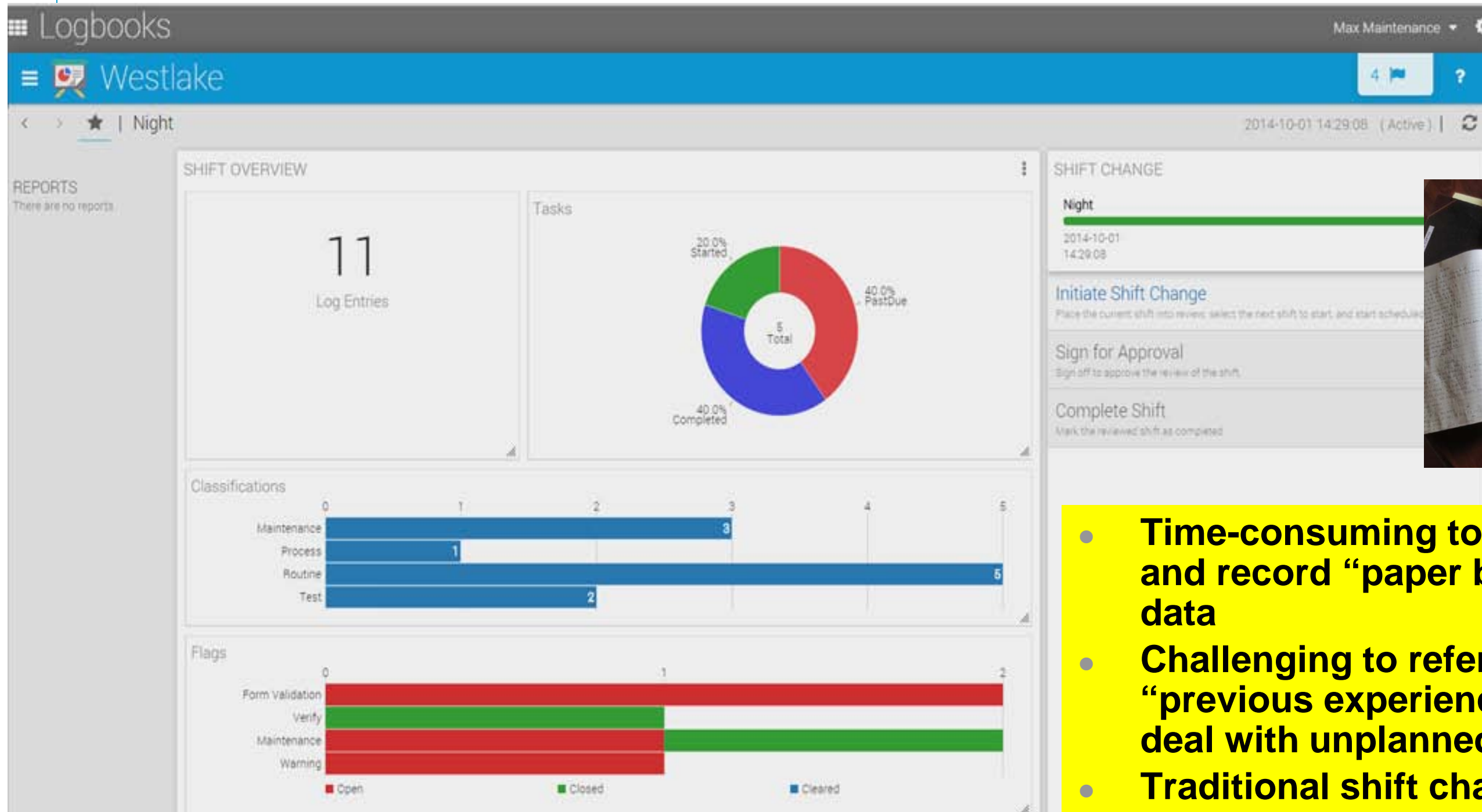


Signatures



Attachments

# Shift Dashboard



- Time-consuming to collect and record “paper based” data
- Challenging to refer to “previous experience” to deal with unplanned events
- Traditional shift change is time-consuming but yet has gaps

# How much is too much?



	Oil & Gas	PetroChem	Power	Other	Best Practice	Standard	
Average Alarms per Day	1200	1500	2000	900	~150-300	~150-300	<b>Alarm Overload</b>
Average Alarms/ 10 Minute Interval	6	9	8	5	~ 1-2	~ 1-2	
Peak Alarms per 10 Minutes	220	180	350	180	≤ 10	≤ 10	<b>Alarm Floods</b>
Average Standing Alarms	50	100	65	35	<10	< 5	<b>Nuisance Alarms</b>
Distribution % (Low/Med/High)	25/40/35	25/40/35	25/40/35	25/40/35	80/15/5	80/15/5	<b>Incorrect Priority</b>
	<b>Actual</b>				<b>Recommended</b>		

ANSI/ISA-18.2-2009  
 Management of Alarm Systems  
 for the Process Industries  
 Approved 23 June 2009

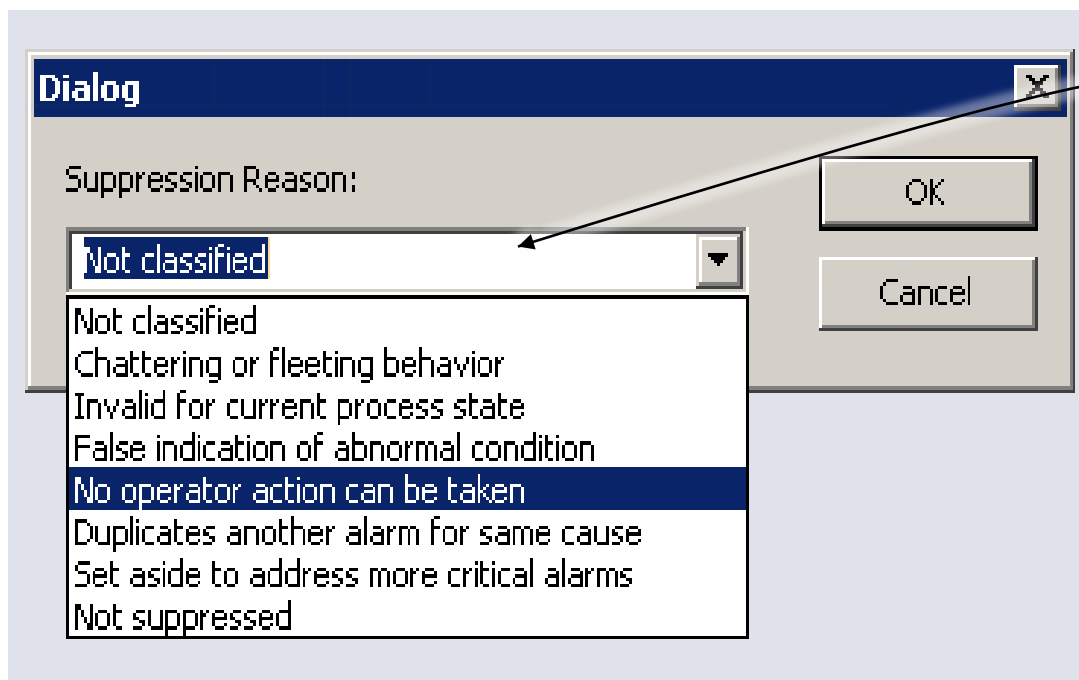
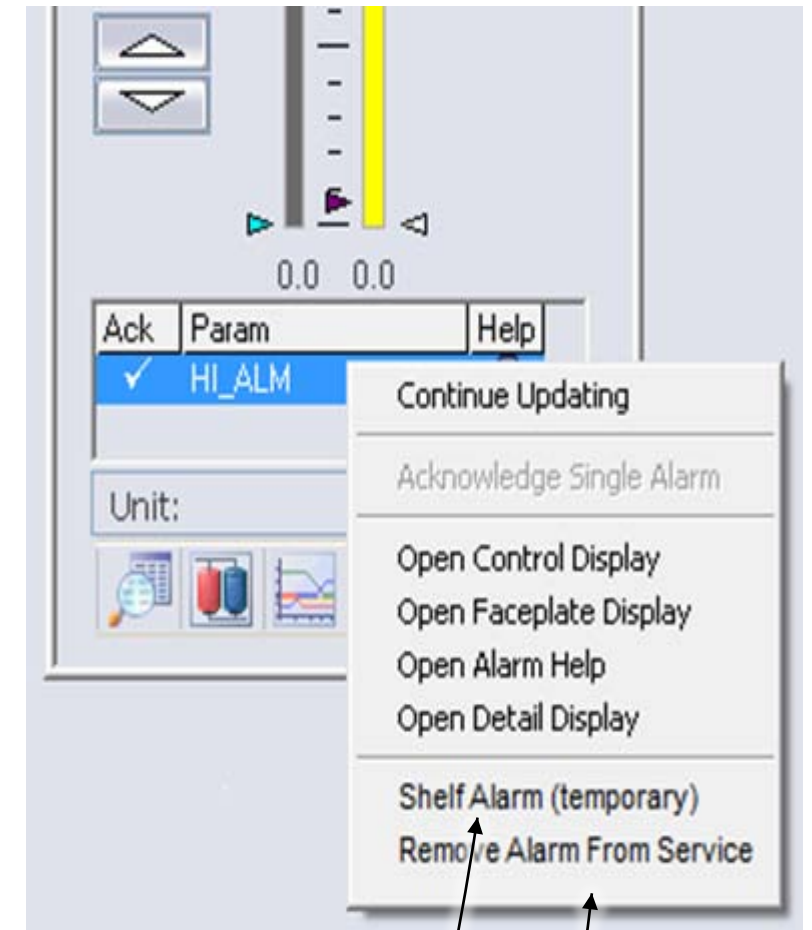
**The international equivalent is in progress, IEC62682.**

# *What else is ISA 18.2 saying...*

- **ISA-18.2 -**
- ...
- 11.2.2c The interface shall provide the ability for the operator to place alarms out-of-service through access controlled methods as allowed in the philosophy.
- 11.2.4a The interface should provide an alarm shelving function.
- ...
- 11.7.3.2 Shelved alarm displays shall provide the following functions: a) sorting of alarms by chronological order of shelving or shelved time remaining; b) sorting of alarms by priority
- 11.7.3.3b Shelved alarms displays should provide operator entry of the reason the alarm was shelved
- 11.8.2 Out-of-service alarm display, or equivalent list capabilities, shall be provided for the alarm system.

# Suppression Ownership and Accountability

- When You Execute a Suppression:
  - Distinction of shelved vs. out of service alarms
  - Separation of privileges
  - Entry of reason for suppression
  - Timing, Distinction and Reason captured in event history



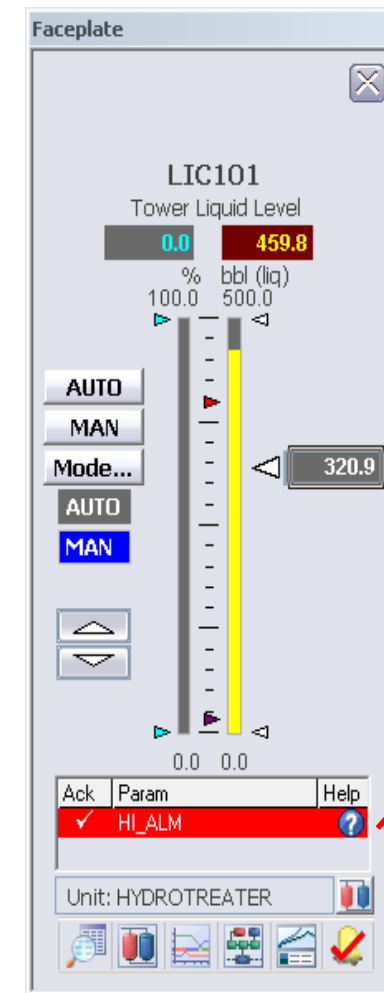
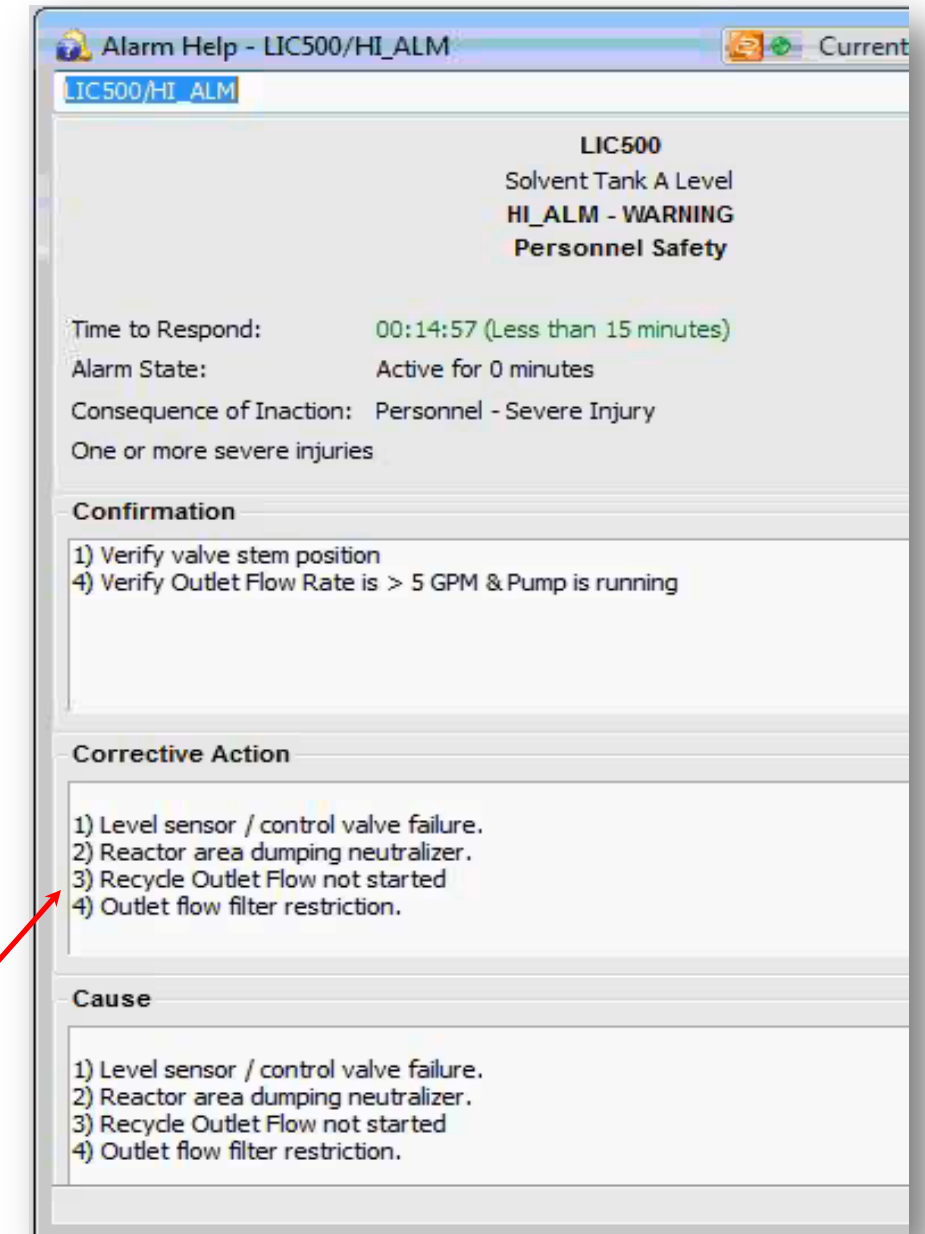
Reason for suppression can be specified by the owner, or by dynamic suppression logic  
**ISA18.2 11.7.3.3** ✓

The operator retains accountability  
**ISA 18.2 11.2.4** ✓

Accountability transfers to maintenance  
**ISA18.2 11.2.2** ✓

# Alarm Help – Knowledge Transfer!

- In-context operator guidance for a consistent correct alarm response
- Enables knowledge capture from senior operators via DeltaV Operate
- Configurable to accommodate any external master alarm database
- Separately downloaded to workstations without effect on control modules

**Knowledge and Experience Transfer –  
Do Now before They Retire!**

**ISA18.2 14.2 ✓**

**..... Alarm response procedures shall be readily accessible to the operator**

# Classic Alarm List

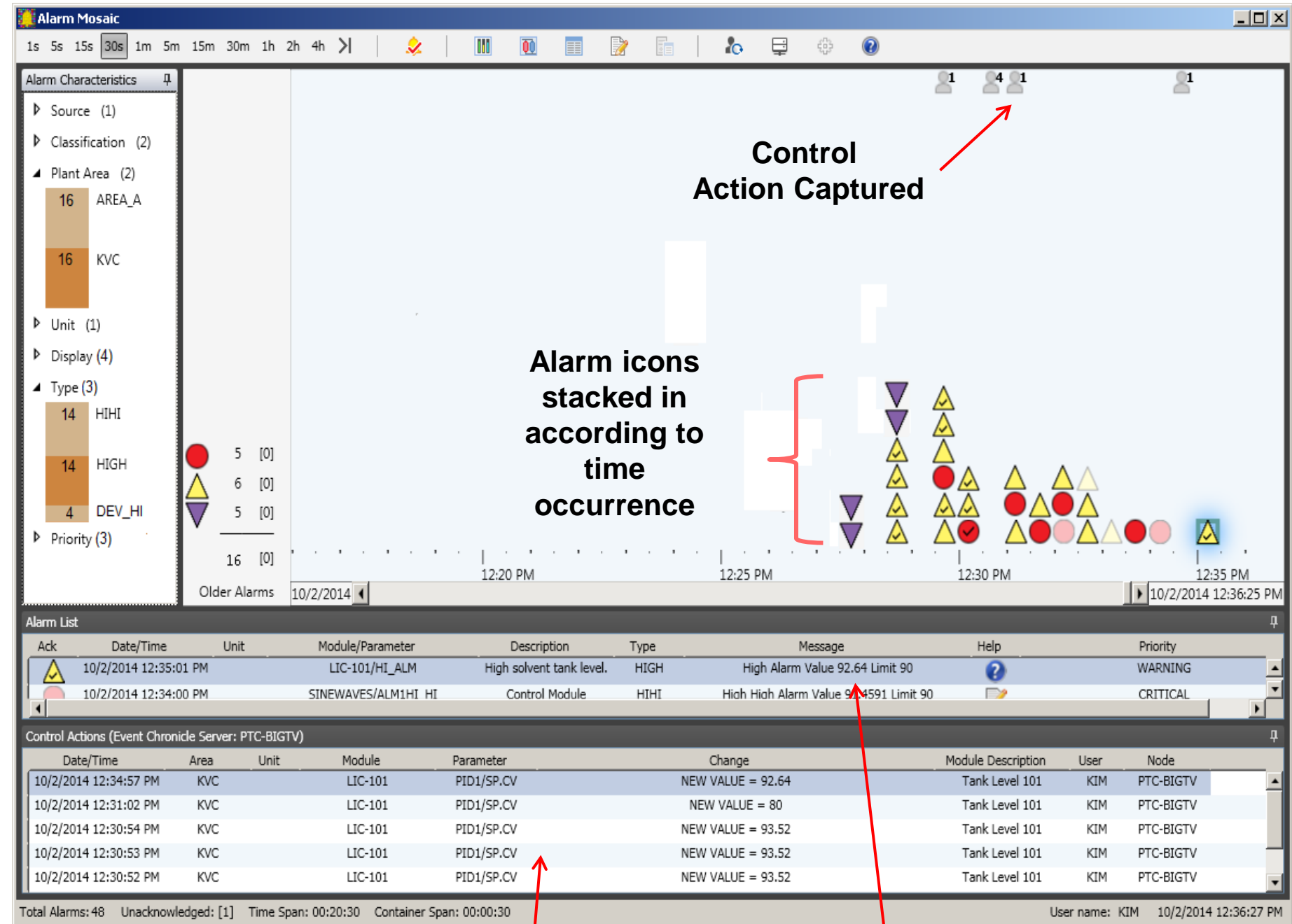
- The classic alarm list – text, text, text...
- Beyond a certain number, some alarms require the scroll bar to see.
- The dynamic motion of scrolling will make it difficult to follow when there is flooding
- But in a flood the most immediate need is to discern the probable single cause for the event.

Ack	Time In	Unit	Module/Param	Description	Alarm	Help	Message	Priority
	10/1/2014 6:57:43		LIC101/HI_HI_ALM	PID control loop	HIHI		High High Alarm Value 97	CRITICAL
	9/26/2014 4:18:54		PI101/PVBAD_ALM	Solvent Tank Pressure	IOF		General I/O Failure	CRITICAL
	9/26/2014 4:19:13		PI101/HI_ALM	Solvent Tank Pressure	HIGH		High Alarm Value 94.86 Li	WARNING
	9/22/2014 5:07:48		CTRL01/MAINT_ALM		MAINT		IO: Not Communicating - A	WARNING
<input type="checkbox"/>	9/26/2014 4:18:54		PI101/LO_LO_ALM	Solvent Tank Pressure	LOLO		Low Low Alarm Value 10 L	CRITICAL
<input type="checkbox"/>	9/26/2014 4:18:54		PI101/LO_ALM	Solvent Tank Pressure	LOW		Low Alarm Value 15 Limit	WARNING
<input checked="" type="checkbox"/>	10/1/2014 6:57:43		LIC101/ALARM1	Pre-Trip Warning - Solver	ANY		Any Alarm Value %P1	CRITICAL
<input checked="" type="checkbox"/>	9/26/2014 4:18:56		ALL-PRIORIT_1/ALARM:	Control Module	COMM		Communication Error	CRITICAL
<input checked="" type="checkbox"/>	9/26/2014 4:18:56		ALL-PRIORIT_1/ALARM:	Control Module	OCD		Open Circuit Detected	CRITICAL
<input checked="" type="checkbox"/>	9/22/2014 5:07:51		LIC101_2/LO_LO_ALM	PID control loop	LOLO		Low Low Alarm Value 0 Li	CRITICAL
<input checked="" type="checkbox"/>	9/22/2014 5:07:51		LIC101_2/PVBAD_ALM	PID control loop	IOF		General I/O Failure	CRITICAL
<input checked="" type="checkbox"/>	9/22/2014 5:07:50		LIC101_1/LO_LO_ALM	PID control loop	LOLO		Low Low Alarm Value 0 Li	CRITICAL
<input checked="" type="checkbox"/>	9/22/2014 5:07:50		LIC101_1/PVBAD_ALM	PID control loop	IOF		General I/O Failure	CRITICAL
<input checked="" type="checkbox"/>	9/22/2014 5:07:50		LIC101_8/LO_LO_ALM	PID control loop	LOLO		Low Low Alarm Value 0 Li	CRITICAL
<input checked="" type="checkbox"/>	9/22/2014 5:07:50		LIC101_8/PVBAD_ALM	PID control loop	IOF		General I/O Failure	CRITICAL
<input checked="" type="checkbox"/>	9/22/2014 5:07:50		LIC101_7/LO_LO_ALM	PID control loop	LOLO		Low Low Alarm Value 0 Li	CRITICAL
<input checked="" type="checkbox"/>	9/22/2014 5:07:50		LIC101_7/PVBAD_ALM	PID control loop	IOF		General I/O Failure	CRITICAL
<input checked="" type="checkbox"/>	9/22/2014 5:07:50		LIC101_6/PVBAD_ALM	PID control loop	IOF		General I/O Failure	CRITICAL
<input checked="" type="checkbox"/>	9/22/2014 5:07:50		LIC101_6/LO_LO_ALM	PID control loop	LOLO		Low Low Alarm Value 0 Li	CRITICAL
<input checked="" type="checkbox"/>	9/22/2014 5:07:50		LIC101_5/LO_LO_ALM	PID control loop	LOLO		Low Low Alarm Value 0 Li	CRITICAL
<input checked="" type="checkbox"/>	9/22/2014 5:07:50		LIC101_5/PVBAD_ALM	PID control loop	IOF		General I/O Failure	CRITICAL
<input checked="" type="checkbox"/>	9/22/2014 5:07:50		LIC101_4/LO_LO_ALM	PID control loop	LOLO		Low Low Alarm Value 0 Li	CRITICAL
<input checked="" type="checkbox"/>	9/22/2014 5:07:50		LIC101_4/PVBAD_ALM	PID control loop	IOF		General I/O Failure	CRITICAL
<input checked="" type="checkbox"/>	9/26/2014 4:18:56		ALL-PRIORIT_1/ALARM:	Control Module	INSPECT		Inspect Limit Active	PROMPT
<input checked="" type="checkbox"/>	9/26/2014 4:18:56		ALL-PRIORIT_1/ALARM:	Control Module	HIHI		High High Alarm Value %I	WARNING
<input checked="" type="checkbox"/>	9/26/2014 4:18:56		ALL-PRIORIT_1/ALARM:	Control Module	DEV		Deviation Alarm Actual %	WARNING
<input checked="" type="checkbox"/>	9/22/2014 5:07:51		LIC101_2/LO_ALM	PID control loop	LOW		Low Alarm Value 0 Limit 1	WARNING
<input checked="" type="checkbox"/>	9/22/2014 5:07:50		LIC101_1/LO_ALM	PID control loop	LOW		Low Alarm Value 0 Limit 1	WARNING
<input checked="" type="checkbox"/>	9/22/2014 5:07:50		LIC101/HI_ALM	PID control loop	HIGH		High Alarm Value 93 Limit	WARNING
<input checked="" type="checkbox"/>	9/22/2014 5:07:50		LIC101_8/LO_ALM	PID control loop	LOW		Low Alarm Value 0 Limit 1	WARNING
<input checked="" type="checkbox"/>	9/22/2014 5:07:50		LIC101_7/LO_ALM	PID control loop	LOW		Low Alarm Value 0 Limit 1	WARNING
<input checked="" type="checkbox"/>	9/22/2014 5:07:50		LIC101_6/LO_ALM	PID control loop	LOW		Low Alarm Value 0 Limit 1	WARNING
<input checked="" type="checkbox"/>	9/22/2014 5:07:50		LIC101_5/LO_ALM	PID control loop	LOW		Low Alarm Value 0 Limit 1	WARNING
<input checked="" type="checkbox"/>	9/22/2014 5:07:50		LIC101_4/LO_ALM	PID control loop	LOW		Low Alarm Value 0 Limit 1	WARNING
<input checked="" type="checkbox"/>	9/26/2014 4:18:56		ALL-PRIORIT_1/ALARM:	critical Alar			222	ADVISORY
<input checked="" type="checkbox"/>	9/26/2014 4:18:56		ALL-PRIORIT_1/ALARM:	Control Module			%	ADVISORY
<input checked="" type="checkbox"/>	9/26/2014 4:18:56		ALL-PRIORIT_1/ALARM:	Control Module	COS		Change of State	ADVISORY

...No change since 1970s...

# DeltaV Mosaic Alarm View for Alarm Floods

- Purpose:
  - Optimized to reduce stress and help operators maintain situational awareness in an alarm flood
- Zero configuration required
- Alarm presented holistically as recognizable patterns
- Automatically identifies alarms with common characteristics
  - Areas, Units, Types
- Identifies control actions that may have precipitated the flood



Control Action List

Alarm List

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# Optimized Process Reliability

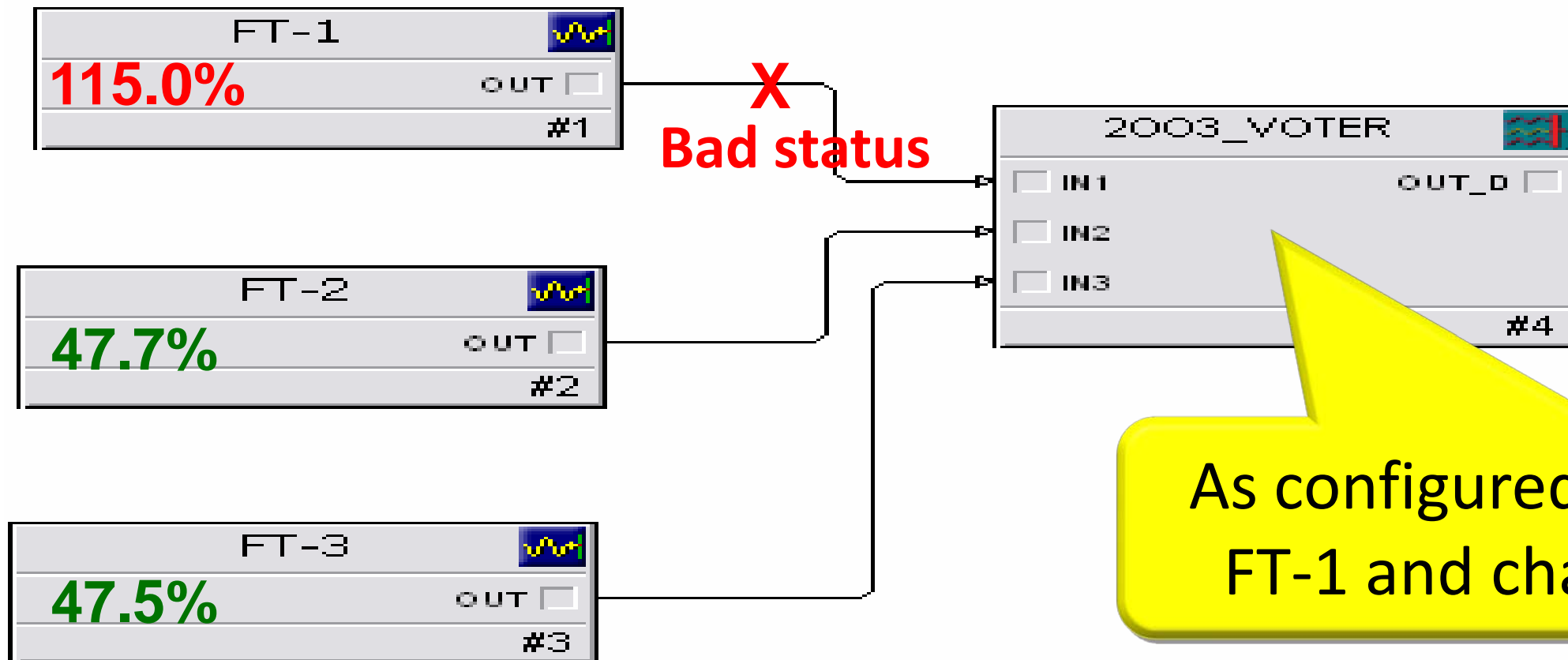
A key component of Emerson's Smart SIS



## SMART SIS

Shuts down your plant when needed for safety, but keeps you running safely when components fail.

***“To be or not to be,  
that is the question...”*** ←

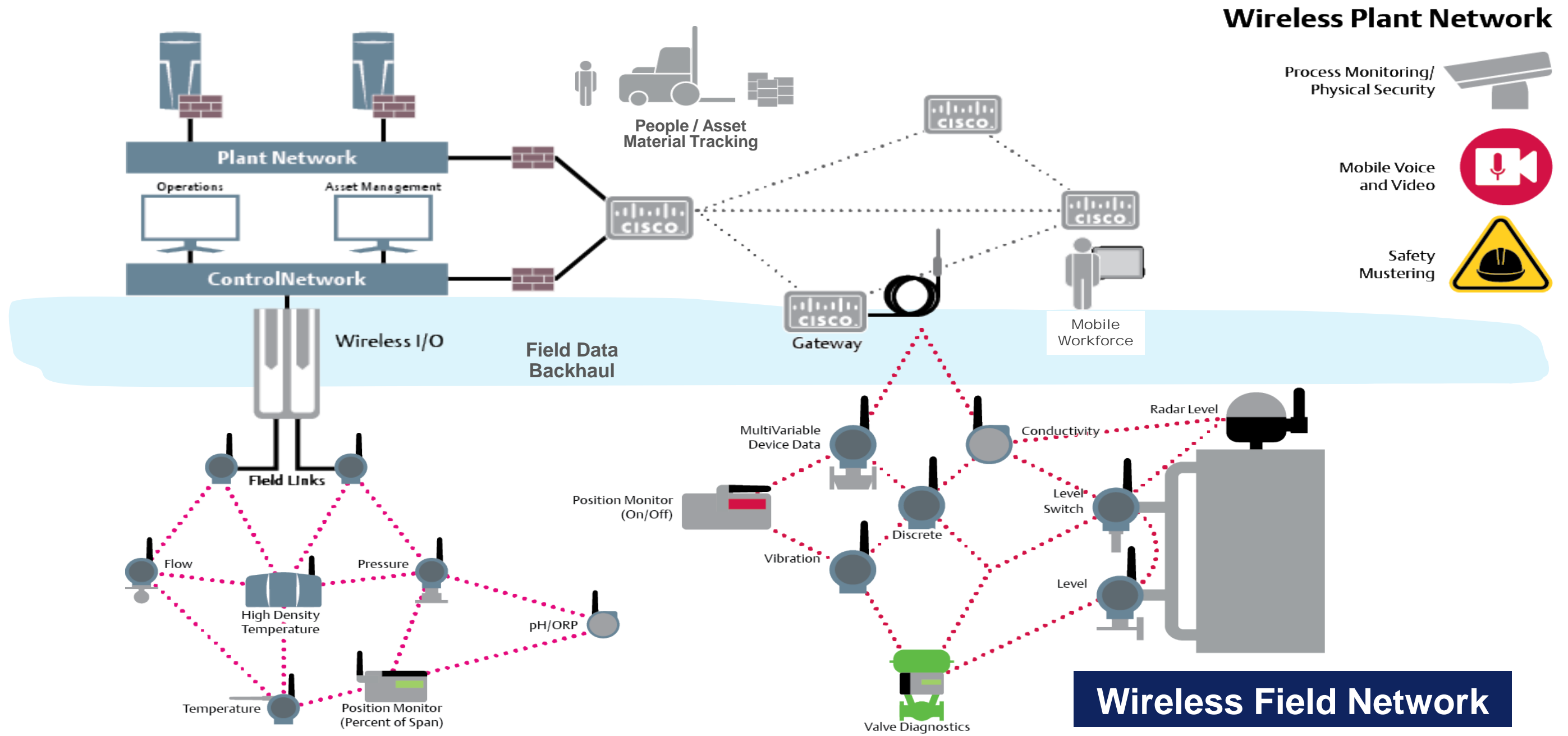


As configured, the voter disregards FT-1 and changes to 1002 voting

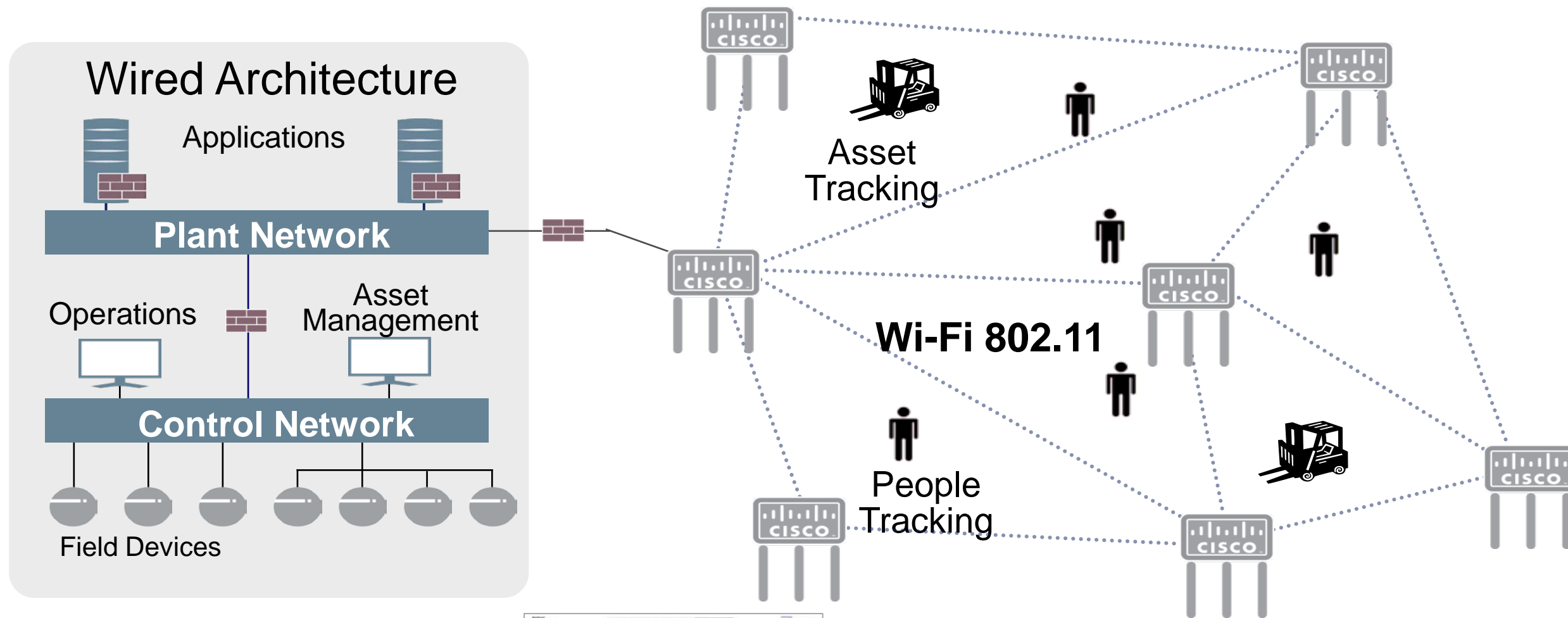
**Process is still running but logic is downgraded  
from 2003 to 1002 voting.**

**“Hamlet” by William Shakespeare**

# Emerson Smart Wireless



# Safety Mustering and Asset Tracking



## People and Asset Tracking



**RFID Exciters - RFID Tags**



**Location Management Application**

- Questions you should be asking:
- Where the heck is he/it/everyone?
  - What on earth is he doing THERE?
  - Stationary > 5 mins ...is he ok?

Are you able to ask these questions?

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# Lifecycle



- Have you gone for your annual checks?
  - What about your DCS system?
- Process Loop Performance Check
  - DeltaV InSight
- System Health Check
  - Site Evaluation Services





- Easily identify control problems
  - Loop service and variability monitoring
  - Device diagnostics
- Quickly tune loops for improved control
  - On-demand and no PhD needed
  - Test tuning with simulation
- Easy to Use – Out of the Box
  - No Configuration Required
  - Adapts to system configuration changes

**Poor control costs your company money**

**“Start Small, Start from Fundamentals...”  
but start where?**

# Control Performance Monitoring

## “Inspect with InSight”

- Explorer tree allows easy navigation of control hierarchy
- Overview display summarizes performance for System, Area, Units and Modules
- Abnormal Control Conditions indicated for Problem Loops:
  - Control Service Status:
    - Incorrect mode
    - Limited control output
    - Bad/Uncertain input
  - Control Performance Status:
    - Standard Deviation
    - Variability Index
    - Oscillation Index
    - Tuning Index

The screenshots illustrate the DeltaV InSight interface for control performance monitoring. The top window shows a bar chart titled 'Control Condition' with the following data:

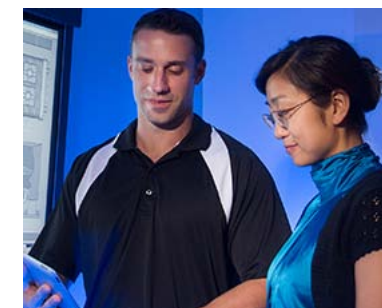
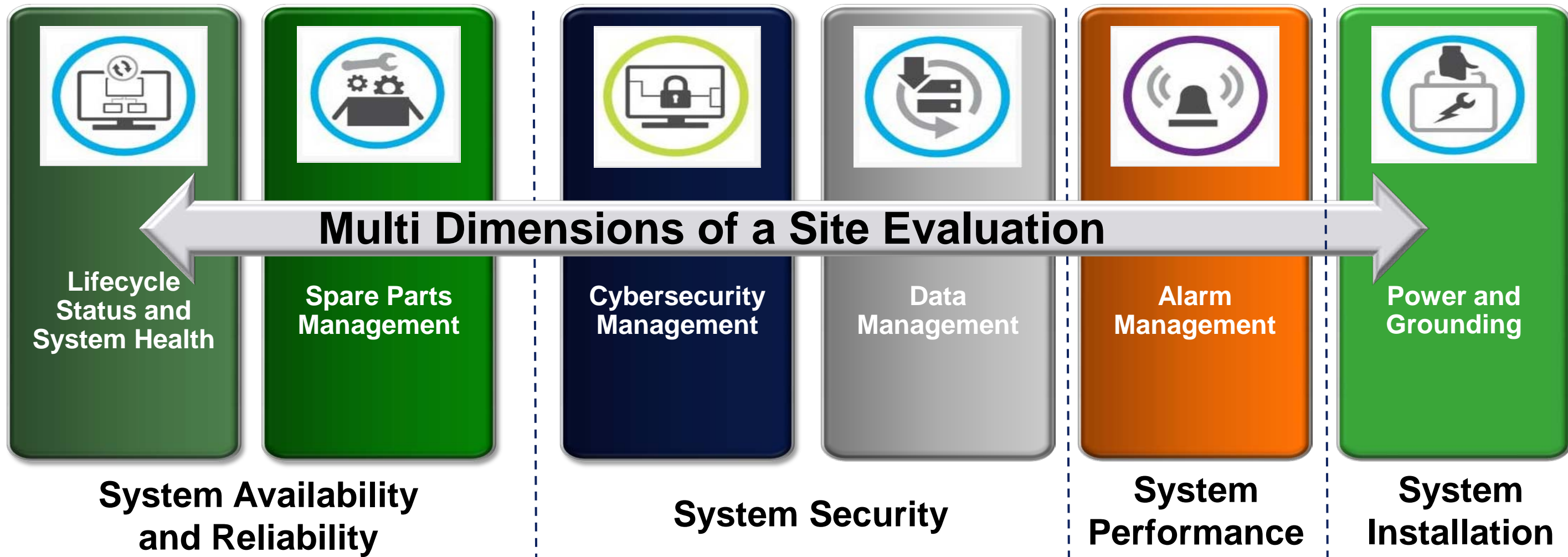
Control Condition	Number of Modules
Incorrect Mode	2
Limited Control	0
Uncertain Input	1
Large Variability	1
Oscillation	4
Tuning	2
Bad Valve	0
Device Alert	0

The middle window shows an 'Abnormal Condition' table with the following data:

Module	Incorrect Mode	Limited Control	Uncertain Input	Large Variability	Oscillation	Tuning	Bad Valve	Device Alert	Priority	Report
AIC110	Yes								3	Yes
AIC144					Yes				3	Yes
AIC178					Yes				3	Yes
AIC351									3	Yes
FIC105									3	Yes
FIC139									3	Yes
FIC173									3	Yes
FIC173_NL									3	Yes
FIC173_NL2									3	Yes
FIC173_NL3									3	Yes
LIC149									3	Yes
LIC183									3	Yes
LIC340									3	Yes
PIC135									3	Yes
PIC169									3	Yes
TIC142									3	Yes
TIC176									3	Yes
TIC545									3	Yes

The bottom window shows the 'PID1' tuning screen with a 'Simulation Response' graph and a 'Tuning for Robustness' graph. The 'Simulation Response' graph shows the process output (OUT) over time (Time in Seconds) for different setpoint (SP) and process variable (PV) entries. The 'Tuning for Robustness' graph shows the phase margin (Phase Margin) over gain margin (Gain Margin).

# What is Site Evaluation Services?



# Site Evaluation Service Report



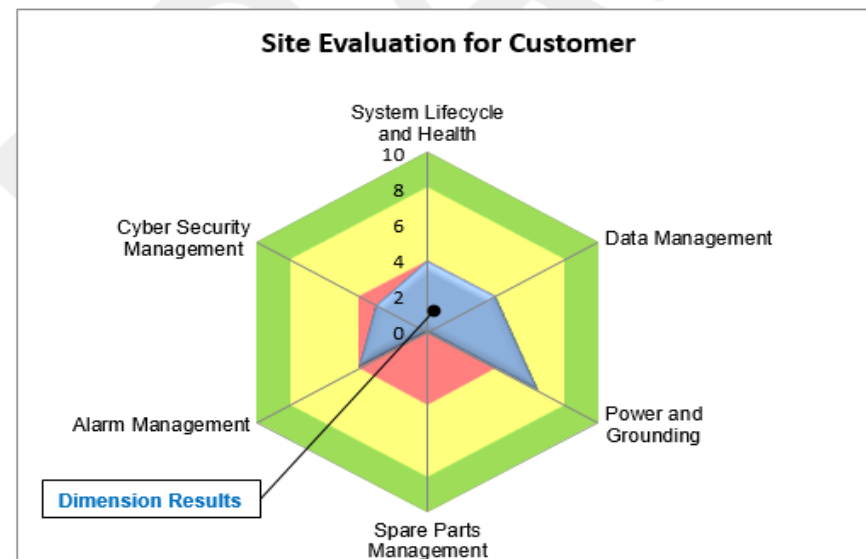
- Executive Summary: .....
- Report Details .....
- About This Report .....
- 1.0 System Lifecycle and Health: .....
- 2.0 Alarm Management:.....
- 3.0 Spares Management: .....
- 4.0 Data Management:.....
- 5.0 Cyber Security Management:.....

## Executive Summary:

This report is a starting point to develop an automation roadmap to achieve the maximum operational performance and reliability from your DeltaV control system. The report will aid in assessing the configuration state and performance of the main elements of your system against Emerson's best practices. This assessment will be used to determine areas for improved performance and highlight potential issues to process performance and uptime.

During the site evaluation visit, system (ID: 0001-0001-XXXX) components were checked for the five Site Evaluation Dimensions listed below

Priority	Site Evaluation Dimensions	Score (Possible 10)	Composite Score (Out of 10)
1	System Lifecycle and Health	4.00	<b>3.58</b>
2	Data Management	4.00	
3	Power and Grounding	6.50	
4	Spare Parts Management	0.00	
5	Alarm Management	4.00	
6	Cyber Security Management	3.00	



## 1.0 System Lifecycle and Health:

System Lifecycle and Health includes – Knowledge Based Articles and hotfixes, Basic System Diagnostics, Lifecycle status of installed Hardware and DeltaV software compatibility.

No.	Key Performance Indicator (KPI)	4.00 (Max 10)
1	KBAs and Hotfixes	0 (Max 4)
2	Diagnostics	2 (Max 2)
3	Lifecycle (Software)	1 (Max 2)
4	Lifecycle (Hardware state)	1 (Max 2)

### Findings:

1. During the analysis, 2 un-dismissed KBA's identified as 'Mandatory' or 'Next Service Interval' was found. Based on Emerson's analyses of customer calls, the primary reason for process downtime at customer facilities is due to the KBA's not reviewed for any required action.

**CONCERN:** There could be KBA's related to product safety or hotfixes for an identified problem. Not acting on KBA's or dismissing them on a regular basis could lead to possible system downtime and loss of revenue.

2. High level DeltaV health checks conducted during the site visit did not find any issues.

3. The required service pack for the software version is not installed.

**CONCERN:** In case of workstation failure, the replacement workstations will have software version 11.3.1 installed which will force updating the entire system. Hotfixes are not available for the installed software version 11.3.

4. All 8 workstations in the system are in Supported® state. Product support for these workstations is available, but oriented towards maintenance.

**CONCERN:** Increased likelihood of WS failure with age. WS obsolescence creates supply issues and reliable replacements are difficult to source. Replacement cost increases over time.

# *It is EASY with Delta V*

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**Expand without Constraint**

**Improve and Optimize  
with Ease**



**Operate  
with Confidence**

**Manage Safety  
without Compromise**



**Thank  
You**



**EMERSON™**  
Process Management