

The background is a dark purple gradient. On the left, there are two vertical neon lines, one blue and one magenta, with a horizontal magenta line intersecting the blue one. On the right, a large, glowing magenta arc curves from the top towards the bottom. The text 'AVEVA WORLD' is centered in a white, bold, sans-serif font.

AVEVA WORLD

APRIL 9, 2025

Eli Lilly: Innovative Environmental Monitoring

SESS-80

Matthew Kishe – Eli Lilly

Meet the Team



Matthew Kishe
Sr. Principal Engineer -
Automation



Kevin Baker
Advisor - Automation

Agenda



Who we are

Introduction to QBMS

Problem Statement

Approach

Implementation Details

Conclusion

Q&A

Our Purpose + Values

Lilly unites caring with discovery to create medicines that make life better for people around the world.

OUR VALUES

Integrity

Excellence

Respect for People

Global Fast Facts

A heritage **150 years strong**, founded on May 10, 1876



Headquarters located in **Indianapolis, Indiana, U.S.A.**



More than **46,913 employees** worldwide



Approximately **11,169 employees** engaged in research and development



Clinical research conducted in more than **55 countries**



Research and development facilities located in **8 countries**



Manufacturing plants located in **9 countries**



Products marketed in approximately **105 countries**

Our Strategy

Our fundamental strategy is predicated on discovering new medicines.

Lilly currently has one of the most robust mid-to-late stage pipelines in its history.

2

MOLECULES AND
INDICATIONS IN
REGULATORY
REVIEW

20

MOLECULES AND
INDICATIONS IN
PHASE 3 CLINICAL
DEVELOPMENT

24

MOLECULES AND
INDICATIONS IN
PHASE 2 TESTING

23

MOLECULES AND
INDICATIONS IN
PHASE 1 TESTING

Evolution Of Monitoring Solution

Opportunity Statement

2020

Utilizing the PI System as an Industrial Internet of Things for Laboratory Monitory.

- Hart-IP
- PI Connector for Hart IP

2021

PI Integration and a Modern Clinical Trial Solution

- IIoT, Asset Framework
- Mobile Research units
- PI OPC UA Connector

2022

Small scale Freezer Monitor for Warehouses

- Turck I/O
- Asset Framework
- PI interface for Modbus TCP/IP

...

2024

Limerick Site-wide Qualified Building Management System

- Turck I/O
- PI Stack
- Kepware



What is a Qualified Building Management System?

Overview

Definition:

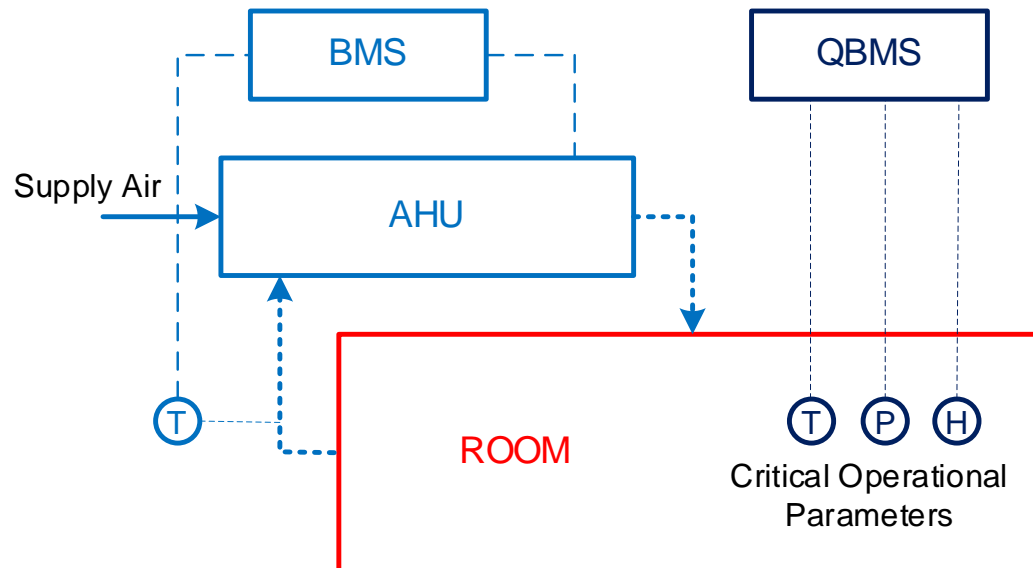
QBMS is an automation system that provides monitoring of critical quality parameters for Heating, Ventilation and Air Condition (HVAC) and controlled temperature chambers.

System Areas:

1. GxP controlled rooms and product areas
2. GxP storage facilities and warehouses
3. GxP controlled temperature chambers

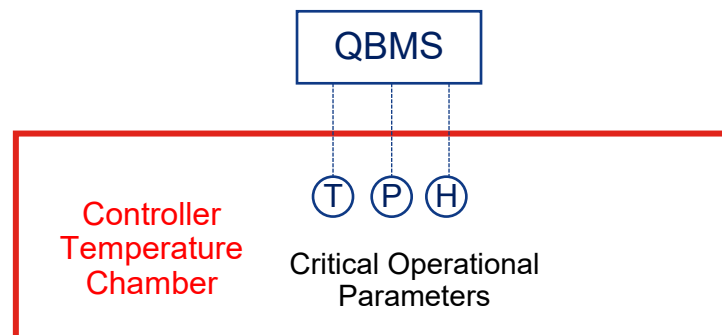
Monitoring Overview of QBMS

Overview



A BMS is used to control the environmental conditions, but is not relied upon to monitor/record/alarm parameters that impact quality.

The QBMS, independent of the BMS, monitors and records all parameters that impact quality and provides alarms for appropriate action to be taken.



The QBMS Grade A probes monitor and record all parameters that impact quality and provides alarms for appropriate action to be taken

Utilizing PI to be more than a Historian

Problem Statement

QBMS WITH REMOTE I/O

Challenge

- Secure storage for GxP data that can directly impact product quality.
- Reduce project cost associated with deploying full SCADA system and support.
- System needs to be scalable and flexible
- Shortened timeline, same validation expectations
- Reduce the automation footprint

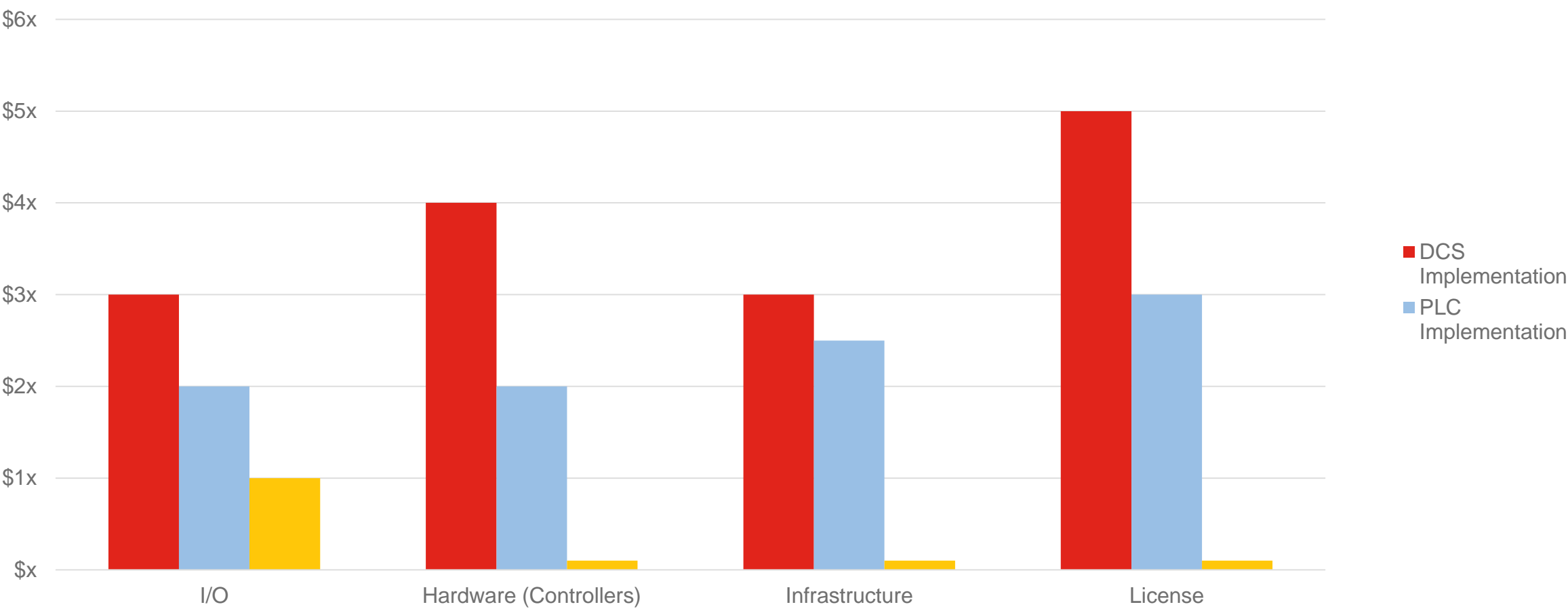
Solution

- Utilize Remote I/O (Turck Excom) to provide Signal I/O monitoring across the facility.
- Take advantage of off the shelf features of the PI system.
 - PI Asset Framework
 - PI Analysis
 - PI Event Frames
 - PI Notifications
 - PI Vision

Benefits

- Alarms (Event Frames) for process monitoring excursions. Acknowledging and commenting
- Notifications directly sent to phone/email
- PI Vision Dashboards with both Realtime and historical monitoring.

Cost Assessment: PI Solution vs DCS/PLC Solution



A Typical Model...

System Implementation

Automation Control Stack L1/2 – DCS/PCS

Data sources [L0-Devices]

- Instrument probes
- CPP,OPP Signals

Temperature

Differential Pressure

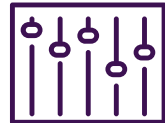
Relative Humidity

CO2

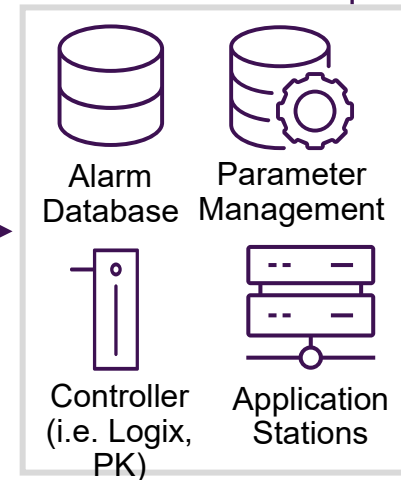
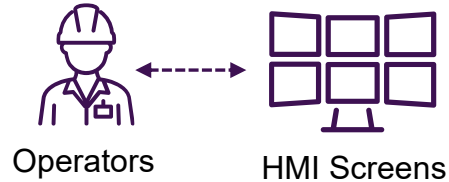
Door Switches

Profibus IP
Ethernet
TP

Modbus
TCP/IP
Rockwell CIP

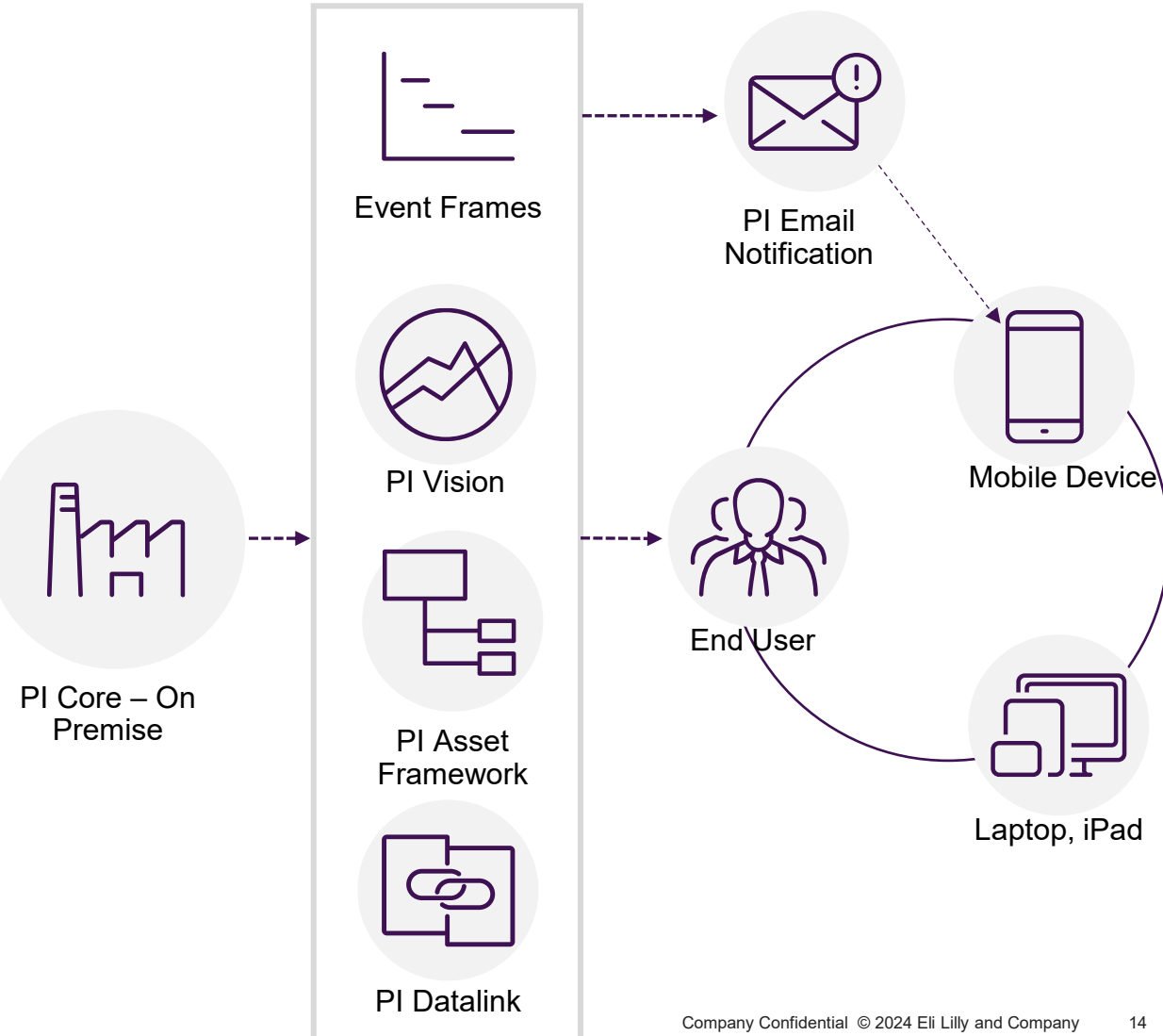


I/O
Panel



PI Ecosystem L3

End User L4



An innovative Model...

System Implementation

Automation
Control Stack
L1/2 – DCS/PLC

PI Ecosystem
L3

End User
L4

Data sources [L0 – Devices]

- Instrument probes
- CPP,OPP Signals

Temperature

Differential Pressure

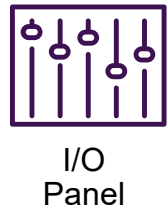
Relative Humidity

CO2

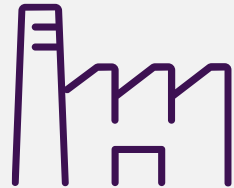
Door Switches

Profibus IP
Ethernet
TP

Modbus
TCP/IP
Rockwell CIP



Kepware + PI
Interface for
OPC



PI Core – On
Premise



Operators



IGEL /
Workstation



Event Frames
(Alarms)



PI Vision



PI Asset
Framework



PI Datalink



PI Email
Notification



Mobile Device



End User



Laptop, iPad

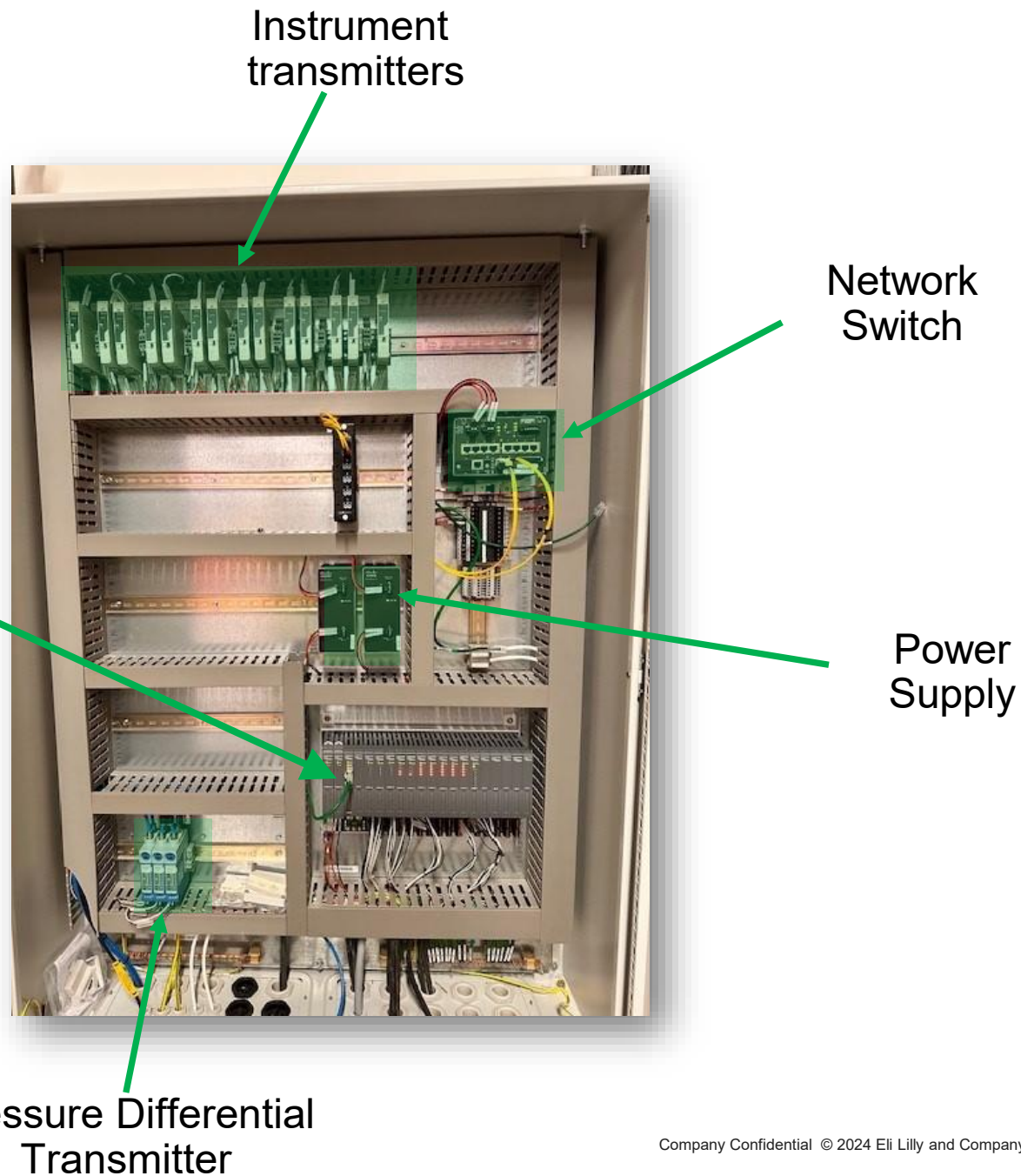
Remote I/O

Excom Turck I/O



Turck ExCom as remote Signal I/O can easily be integrated in a control area. Communication Protocol:

- Modbus TCP/IP
- Ethernet IP
- Profibus IP



AF Hierarchy to represent areas, room, and devices

Implementation

Site
Building
Room
Equipment
Instrument

Database Name

PI System Explorer (Administrator)

File Search View Go Tools Help

Database Query Date Back Check In Refresh New Element New Attribute Search Elements

Elements

Site

LIM01 - Laboratory & Administration

062 - Micro Low Bioburden Prep

INC-018670AX

TT-018670AXQ

INC-018670AY

REFR-018620J

063 - Micro Water/Endotoxin Testing

064 - Micro Product Testing

084 - Virology

086 - Cell Culture

087 - Stability Chamber Room

089 - BioAssay Lab

090 - Sample Receipt & Management

091 - Reference Sample Storage

1067 - Sample Receipt Reference Standard

1070 - Master Mix Room NC

LIM03 - Logistics Centre

001 - Working Cell Bank Freezer

011 - Sampling Room

012 - Sampling MAL

013 - Sampling PAL

015 - Inbound Staging Room

017 - 2-8C Cold Room

024 - ASRS Room

Elements

Event Frames

Library

Unit of Measure

Contacts

Management

TT-018670AXQ

General Child Elements Attributes Ports Analyses Notification Rules Version

Group by: Category Template

Filter

Name	Value
Alarm Active	1
Device Channel Signal	Normal
Process Variable	51.119 °C
Alarm Delay	0 s
Alarm Enabled	True
Hi Alarm Delay	0 s
Hi Limit	1E+06 °C
HiHi Alarm Delay	0 s
HiHi Limit	25 °C
Lo Alarm Delay	0 s
Lo Limit	-1E+06 °C
LoLo Alarm Delay	0 s
LoLo Limit	20 °C
Measurement Type	Temperature
Unit Description	
Unit Name	TT-018670AXQ
Unit Parent	INC-018670AX
Unit Type	

Alarm Limits, Delays
Parameterization



Templates for consistency and efficiency

Implementation

Database Name

PI System Explorer (A

File View Go Tools Help

Database Query Date Back

Library

Database Name

Templates

Element Templates

Area

Carbon Dioxide Transmitter(AT)

Pressure Differential Transmitter(PDT)

Process Cell

Relative Humidity Transmitter(HT)

Room

Site

Switch Transmitter(ZS)

Switch Transmitter(ZSO)

Temperature Transmitter(TT)

Unit

Event Frame Templates

Channel Failure Event

Door Interlock Alarm

Hi Alarm Event

HiHi Alarm Event

Lo Alarm Event

LoLo Alarm Event

Open Door Alarm Event

Model Templates

Transfer Templates

Enumeration Sets

Reference Types

Tables

Elements

Event Frames

Library

Unit of Measure

Contacts

Management

Temperature Transmitter(TT)

General Attribute Templates Ports Analysis Templates Notification Rule Templates

Filter

Name	Description	Default
Alarm Active		0
Device Channel Signal		
Process Variable		0 °C
Alarm Delay		0 s
Alarm Enabled		True
Hi Alarm Delay		0 s
Hi Limit		0 °C
HiHi Alarm Delay		0 s
HiHi Limit		0 °C
Lo Alarm Delay		0 s
Lo Limit		0 °C
LoLo Alarm Delay		0 s
LoLo Limit		0 °C
Measurement Type		0

Name: Hi Alarm Delay

Description:

Properties: <None>

Categories:

Default UOM: second

Value Type: Double

Default Value: 0 s

Display Digits: -5

Data Reference: Table Lookup

Settings...

SELECT [Hi_Delay] FROM Limits WHERE DeviceTag = '%Element%'

Hi Alarm Event

General Attribute Templates

Filter

Name	Description	Default Value
Average Value	Average value during Hi Alar...	0
Maximum Value	Maximum Value during Hi Alar...	0
Minimum Value	Maximum Value during Hi Alar...	0

Name: Average Value

Description: Average value during Hi Alarm Excursion

Properties: <None>

Categories:

Default UOM: <None>

Value Type: Double

Default Value: 0

Display Digits: -5

Data Reference: PI Point

Settings...

. \Elements[.]Process Variable;TimeRangeMethod=Average

Parametrization – Limits and Delays

Implementation

The screenshot shows the PI System Explorer (Administrator) interface. The 'Limits' table is selected in the left-hand 'Library' pane. The main window displays a table with 11 columns: DeviceTag, Room/System, HiHi, Hi, Lo, LoLo, HiHi_Delay, Hi_Delay, Lo_Delay, LoLo_Delay, and Delay. The table contains 32 rows of data, each representing a specific alarm limit and delay configuration for different device tags and room/systems.

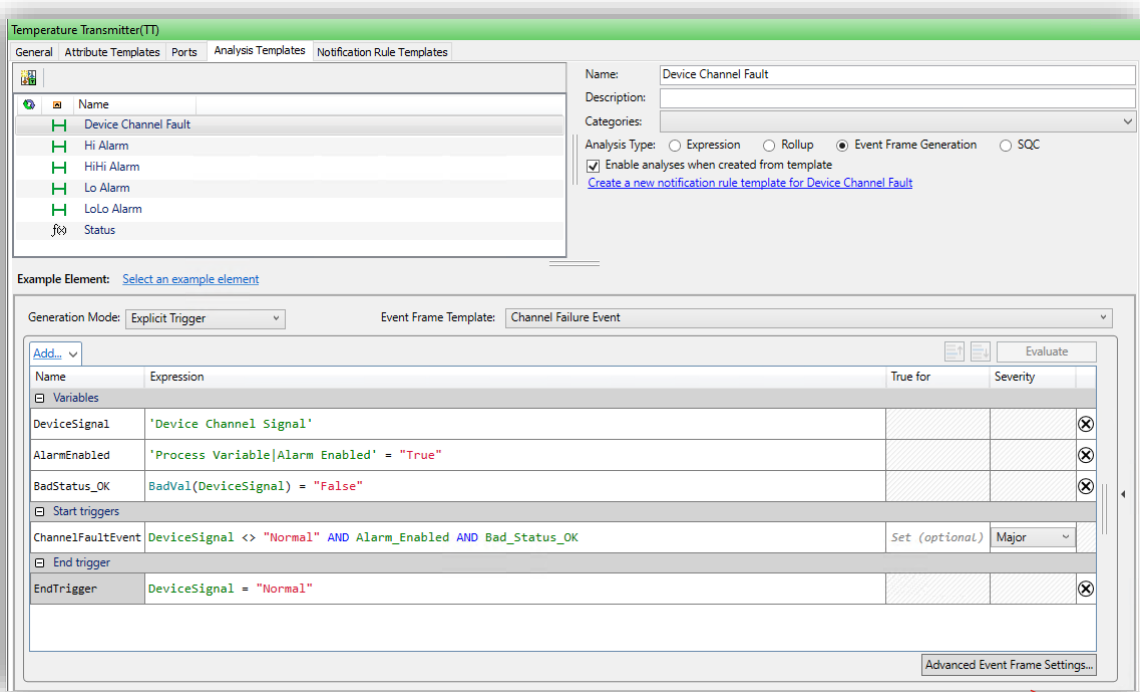
DeviceTag	Room/System	HiHi	Hi	Lo	LoLo	HiHi_Delay	Hi_Delay	Lo_Delay	LoLo_Delay	Delay
TT-030001ARMQ	30001	-135	-160	-999999	-999999	0	0	0	0	0
TT-030001BRMQ	30001	-135	-160	-999999	-999999	0	0	0	0	0
PDT-030011ARMQ	30011	999999	17.5	12.5	10	0	180	180	180	0
TT-030011ARMQ	30011	30	28	17	15	0	60	60	0	0
PDT-030012RMQ	30012	999999	999999	5	2.5	0	0	180	180	0
ZSC-030012Q1	30012	999999	999999	-999999	-999999	0	0	0	0	180
ZSC-030012Q2	30012	999999	999999	-999999	-999999	0	0	0	0	180
PDT-030013RMQ	30013	999999	999999	5	2.5	0	0	180	180	0
TT-030013ARMQ	30013	30	28	17	15	0	60	60	0	0
ZSC-030013Q1	30013	999999	999999	-999999	-999999	0	0	0	0	180
ZSC-030013Q2	30013	999999	999999	-999999	-999999	0	0	0	0	180
TT-030015ARMQ	30015	30	28	17	15	0	60	60	0	0
TT-030015BRMQ	30015	30	28	17	15	0	60	60	0	0
TT-030015CRMQ	30015	30	28	17	15	0	60	60	0	0
TT-030015DRMQ	30015	30	28	17	15	0	60	60	0	0
TT-030017ARMQ	30017	8	7	3	2	60	60	0	0	0
TT-030017BRMQ	30017	8	7	3	2	60	60	0	0	0
TT-030017CRMQ	30017	8	7	3	2	60	60	0	0	0
TT-030017DRMQ	30017	8	7	3	2	60	60	0	0	0
TT-030017ERMQ	30017	8	7	3	2	60	60	0	0	0
TT-030017FRMQ	30017	8	7	3	2	60	60	0	0	0
TT-030024ABRMQ	30024	30	28	17	15	0	0	0	0	0
TT-030024ADRMQ	30024	30	28	17	15	0	0	0	0	0
TT-030024AFRMQ	30024	30	28	17	15	0	0	0	0	0
TT-030024AHRMQ	30024	30	28	17	15	0	0	0	0	0
TT-030024AKRMQ	30024	30	28	17	15	0	0	0	0	0
TT-030024AMRMQ	30024	30	28	17	15	0	0	0	0	0

Lookup Table for individual monitoring limits for HiHi, Hi, Lo, Low and delay

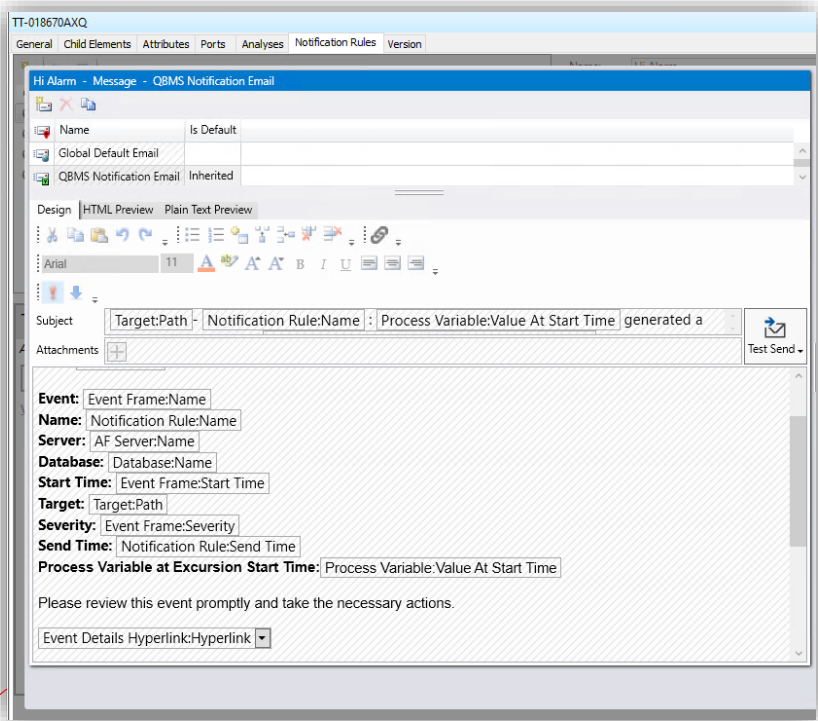
Alarm Limits and Delay Parameters

Analysis and Notifications

Implementation



Analysis per element
Type



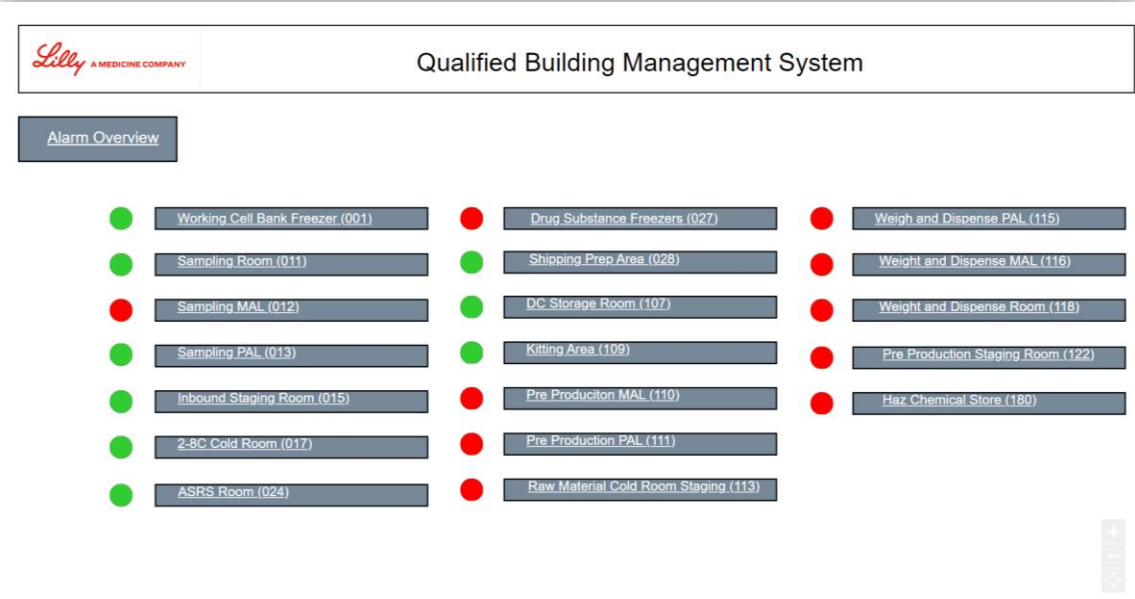
Event Notifications

Analysis & Notification templates include:

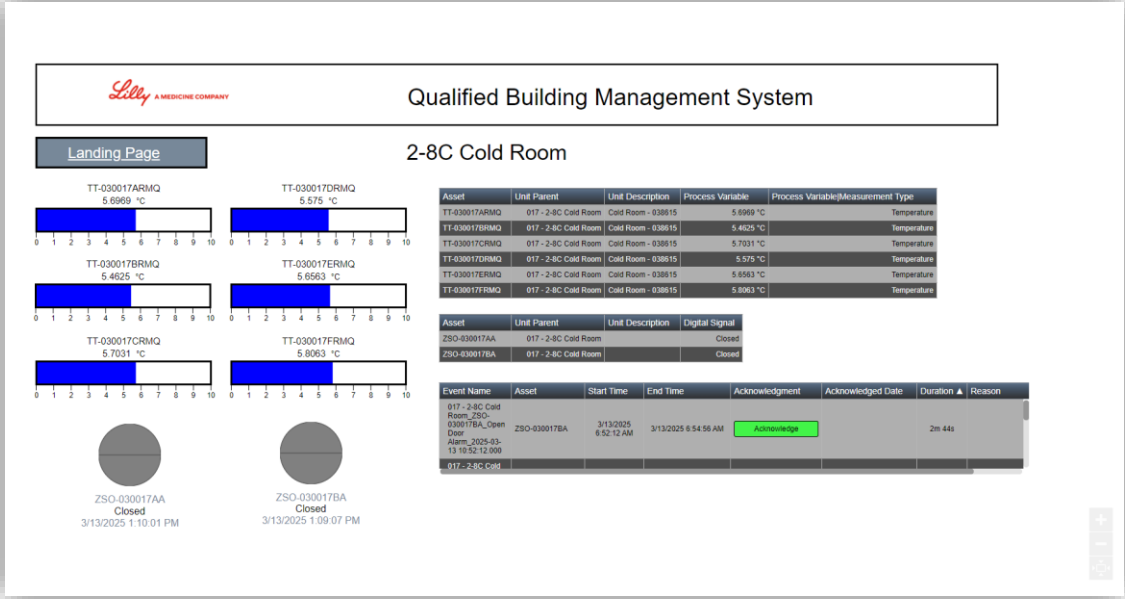
- Lo Alarm
- LoLo Alarm
- Hi Alarm
- HiHi Alarm
- Channel Status (Fault)

Bringing it Together through PI Vision

Implementation



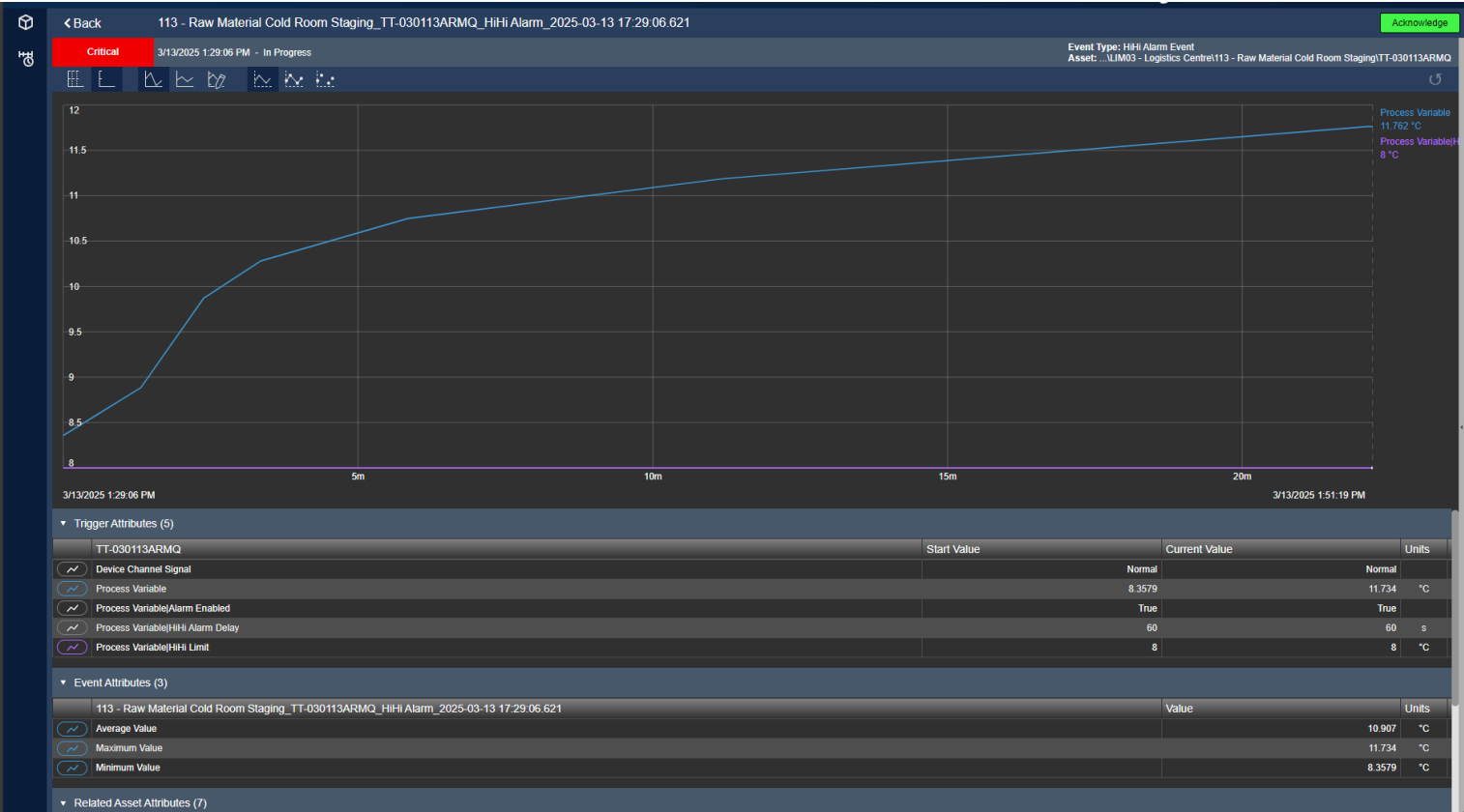
PI Vision Navigation Screen



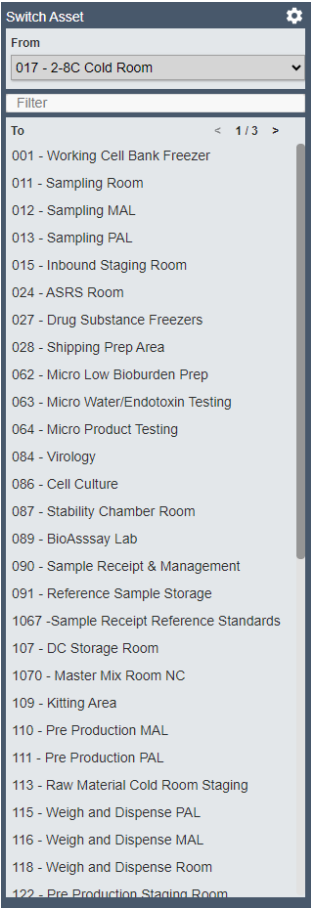
Event Notifications

Bringing it Together through PI Vision

Implementation



Alarm (Event Frame)



Asset Context Switching

Conclusion

- PI enabled:
 - Access to data – Monitoring system to support site
 - GMP Alarm and Events
 - Dashboard/Visualizations
 - Reduced Automation Stack – No control, monitoring only
 - Scalable and flexible solution for expansion
- Cost Savings (\$\$\$)
 - Licenses Costs
 - Hardware costs (I/O, Controllers, HMI's)
 - Infrastructure (Servers, Databases)
- Future Work
 - Changing approach in upcoming new sites.

Acknowledgments

“Standing on the shoulders of giants”

Kevin Baker
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James Wiesler
Director, Automation
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Kinsale PI Team

Altamir Gomes, Carolina Ferreira, James Nation
Cognizant PI, Ireland

Thank
you

Lilly A MEDICINE COMPANY

Eli Lilly and Company reduces project delivery costs by 25%

Challenge

- **Rising Costs:** Increasing automation part prices strained budgets and complicated procurement
- **Tight Timelines:** Compressed schedules pressured project delivery timelines
- **Scalability & Maintenance:** Rigid systems hindered expansion and efficient maintenance

Solution

- Implemented AVEVA™ PI System™ to optimize data collection, analysis, and reporting for monitoring Qualified Building Management Systems using Excom Turck I/O.

Results

- **Engineered a monitoring system for QBMS, eliminating the need for DCS or PLCs, achieving a 25% cost reduction**
- **Architected the solution with scalability in mind, enabling seamless integration for future site growth and expansion**

