

EMPOWER YOUR ANALYTICS WITH OPERATIONAL DATA

2019 OSISOFT NEW DELHI SEMINAR

OT/IT Integration

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Oct. 2019

*Regional Seminars
New Delhi, INDIA*

OT/IT Integration - Takeaways

- Automate/Change existing **business process**
 - **Small** amounts of data
 - Trigger a work order in SAP PM..., Initiate a workflow in IBM Maximo
 - What, Why, How... with use cases
 - **People, Process, Technology**
- Cloud based machine learning, Enterprise data lake ...
 - **Large** amounts of data
 - Microsoft Azure, Amazon AWS, Google Cloud, SAP HANA, R, Python ...
 - What, Why, How... with use cases

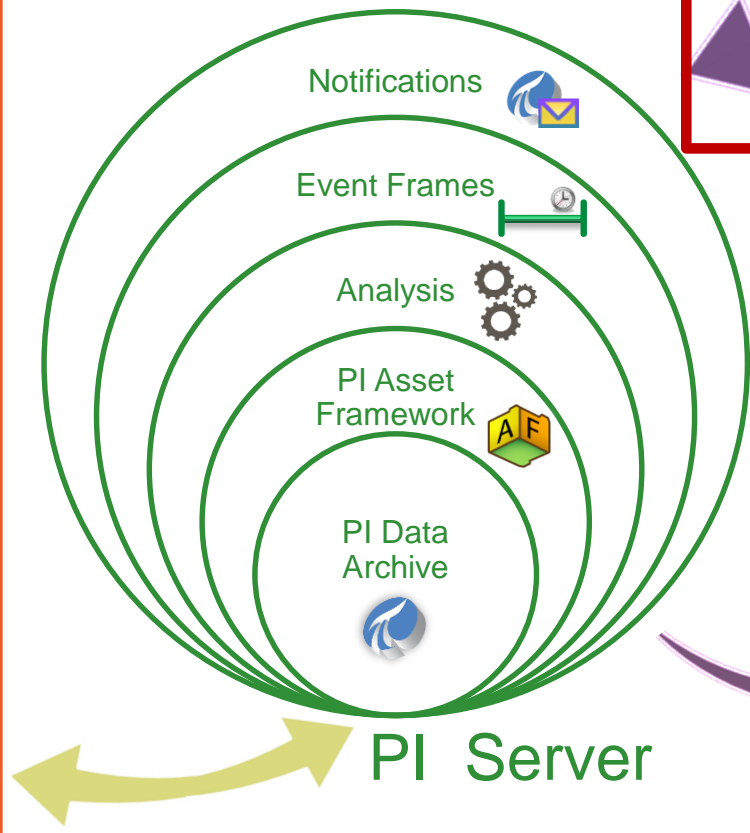
OT=Operations Technology
IT=Information Technology

OT/IT Integration - Takeaways

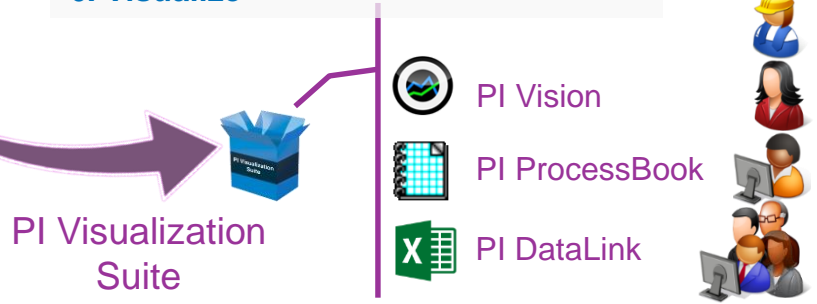
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The Modern PI System



1. Connect to relevant sources
2. Collect and archive data
3. Assign context (asset-based)
4. Add Analytics logic
5. Alert and notify
6. Visualize



Production Maintenance Inventory Quality



Production Maintenance Inventory Quality

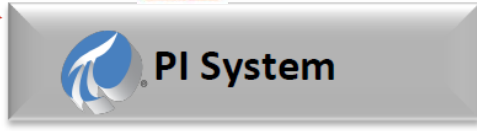


PI Notifications

XML



PI OLEDB Enterprise



ORACLE

PI JDBC



INFOR



PI Web Services API

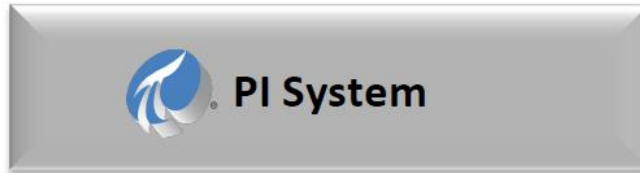
MINCOM

Ventyx

PI Data Access family of products

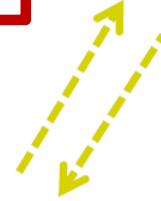


PI System Access (PSA) license







Business Integration – What?

- Data/Event integration (transactions)
 - 1000s/day
 - small amounts of data (per transaction)
- Visual integration



Business Integration – What (Data, Event, Visual)

- Data - motor run-hours (once a day) 
- Event - motor vibration (on alert) 
- Event - raw material consumed, goods produced 
- Data - lab data (pH, density...) for a batch 
- Visual integration
 - shared asset naming convention or data model
 - Loosely coupled URLs



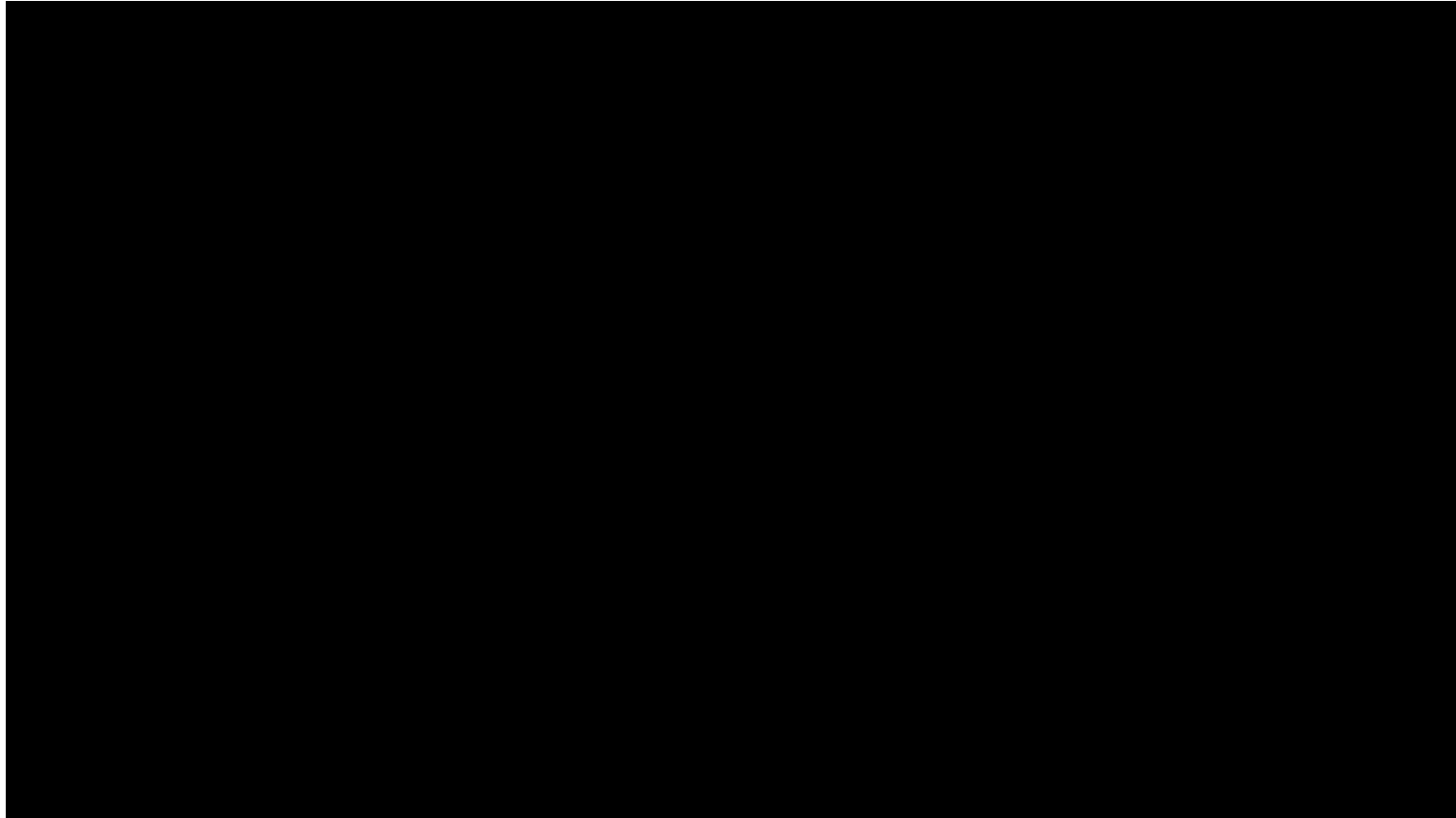
Business Integration – Why

Enable **business agility (time enough to act)**

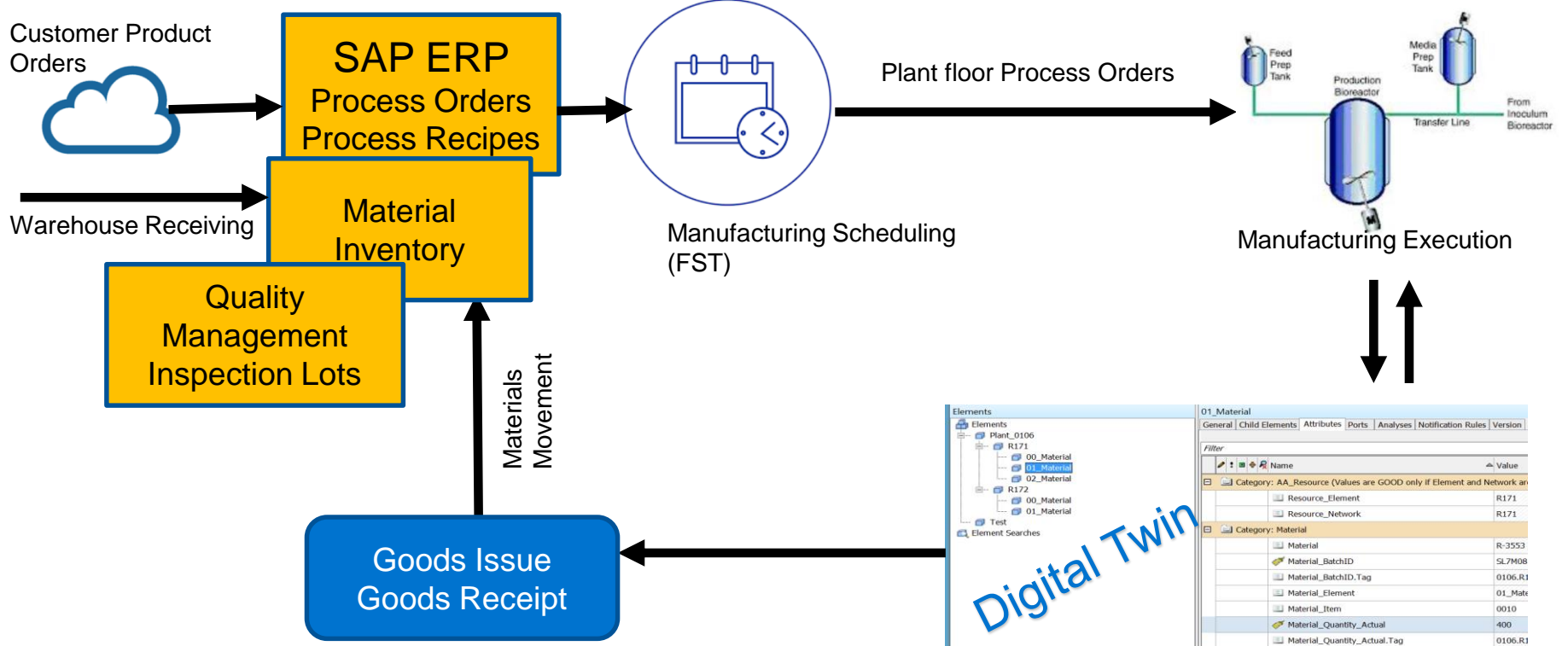
- Available-to-promise (ATP), better inventory, visibility into capacity
- Condition-based maintenance (CBM) for better asset reliability, reduce maintenance cost
- Quality – compare production runs, close out orders faster
- Visual – visibility into PI System data throughout the enterprise



Maintenance & Reliability - Video



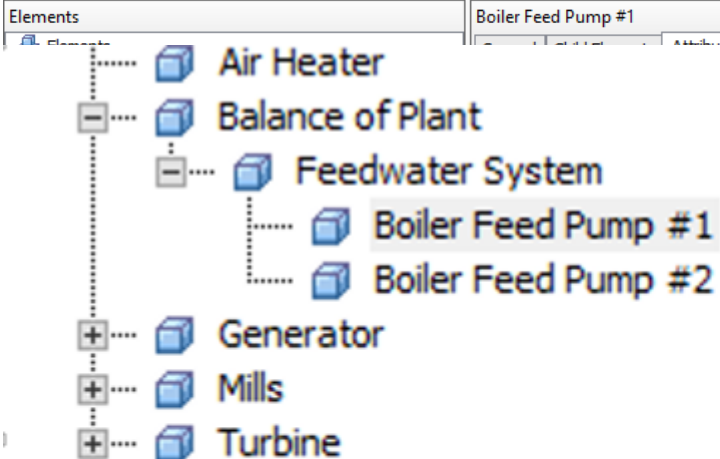
Integration with Production Planning/Management System



Manufacturing Operations Data Management

To Do List – Work Management

- Create a watch list – early warning system
 - Equipment usage – run hours, tons processed, start/stop cycles...
 - Equipment condition alerts – filter clogged, heat-exchanger fouled, motor vibration high...
- Notify the asset owner – with links to details
- Create a report – across asset and production events



<input checked="" type="checkbox"/>		Control Oil Pressure	33.965976...
<input checked="" type="checkbox"/>		Discharge Pressure	147.82136...
<input checked="" type="checkbox"/>		Enter Low Pressure Safet...	8.9459667...
<input checked="" type="checkbox"/>		EXT Steam Pressure	-2.501819...
<input checked="" type="checkbox"/>		Suction Pressure	194.44204...

Category: RunHours

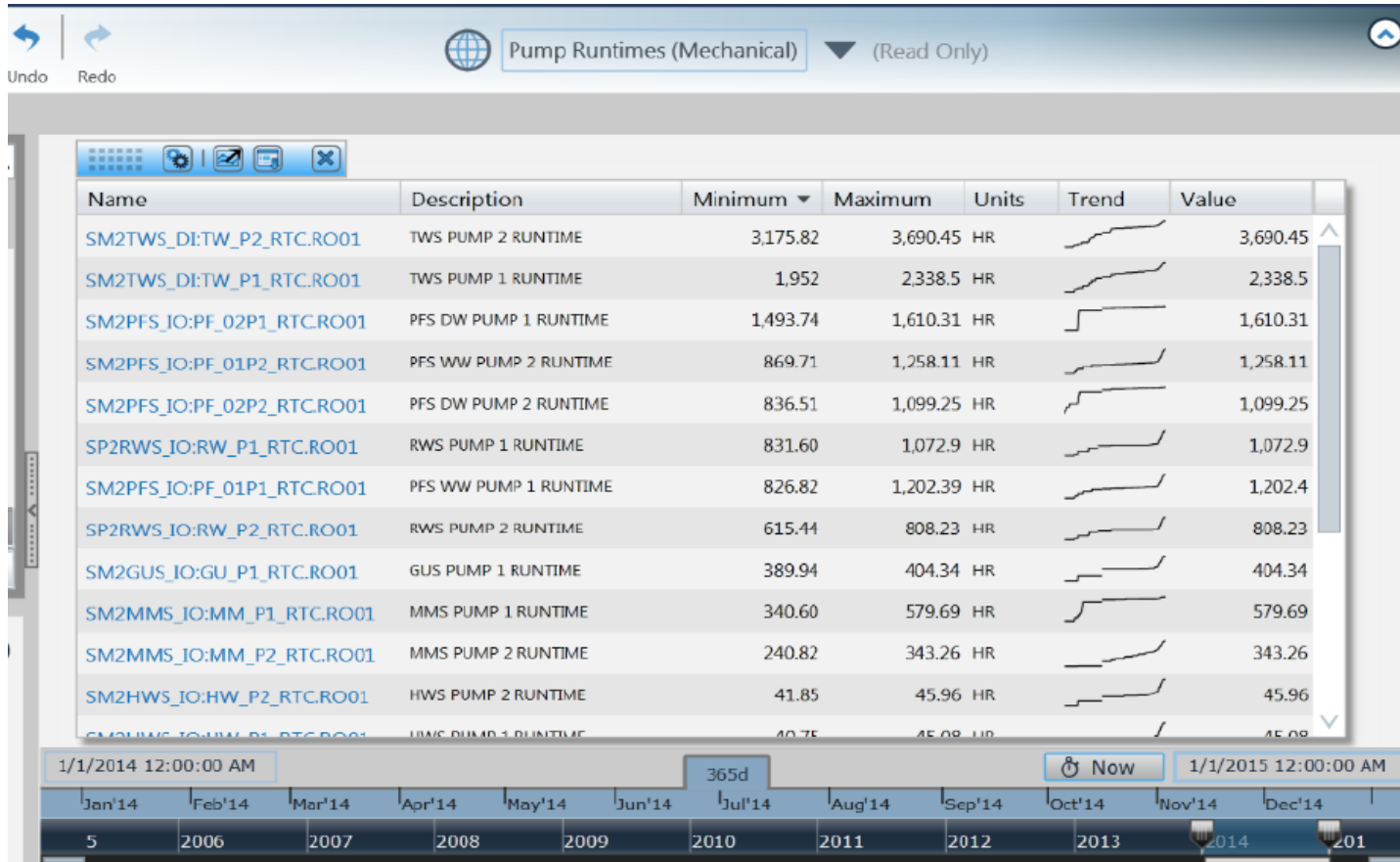
		RunHours_MonthTD	204 h
		RunHours_WeekTD	87 h

zz_RunHours_Report
 Wind Power Generation Fleet
 mission and Distribution
 Marches
 Archives

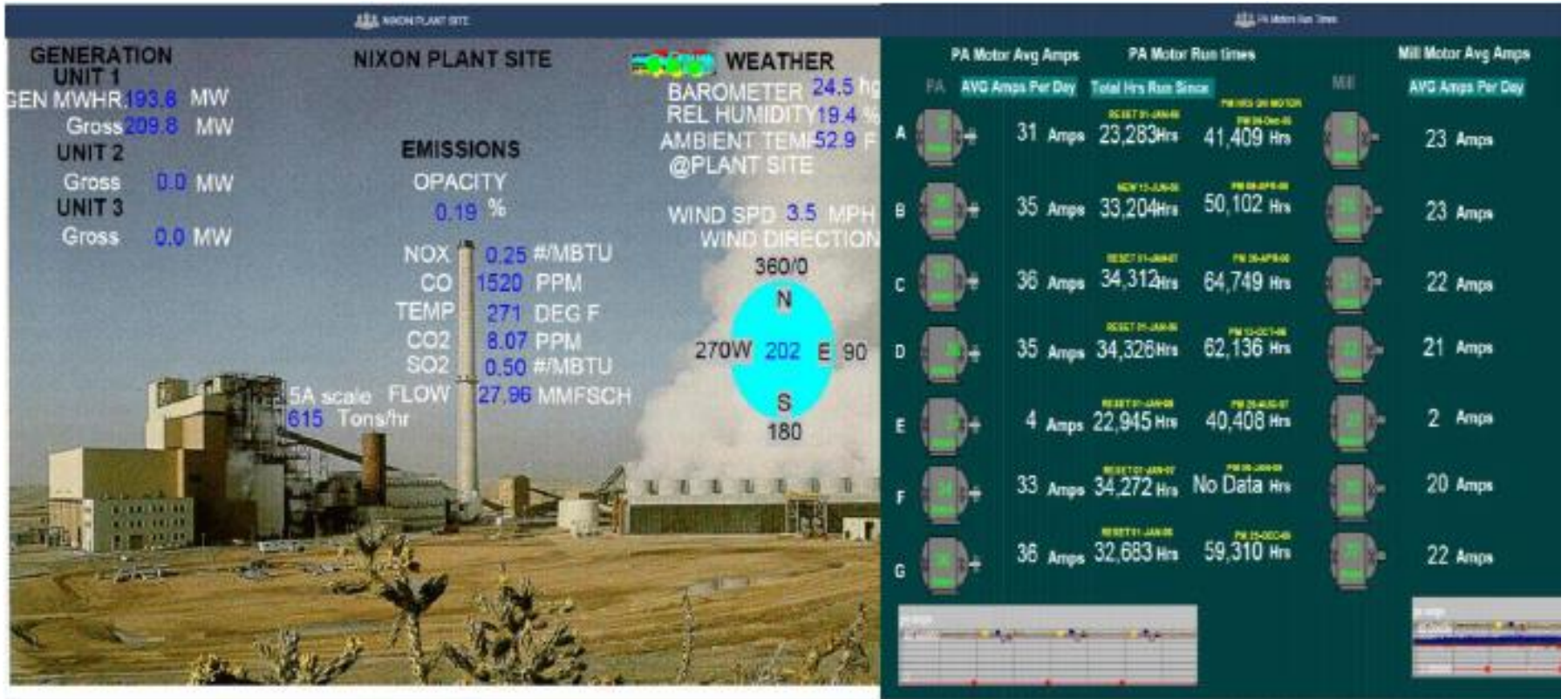
- Notifications
- Contacts
- Analyses

<input checked="" type="checkbox"/>		Inboard Bearing Vibration Y	0.162708...
<input checked="" type="checkbox"/>		Outboard Bearing Vibratio...	0.1727749...
<input checked="" type="checkbox"/>		Outboard Bearing Vibratio...	0.1693600...

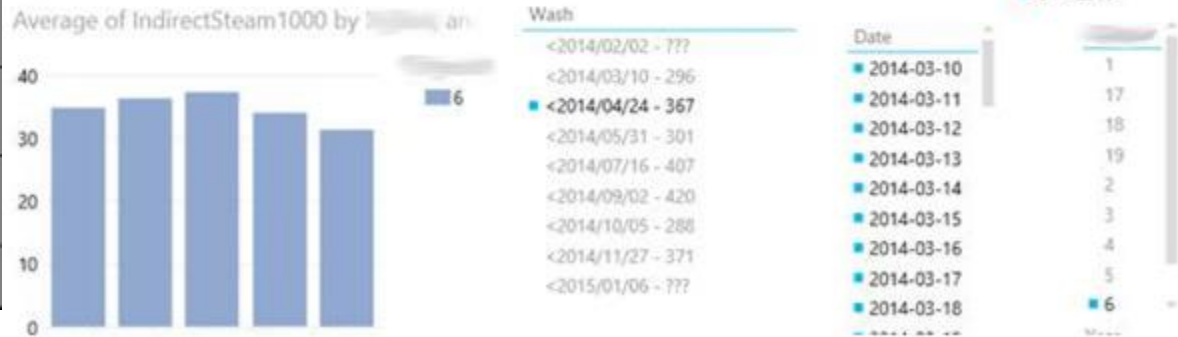
San Francisco Public Utility Commission – Pump run hours



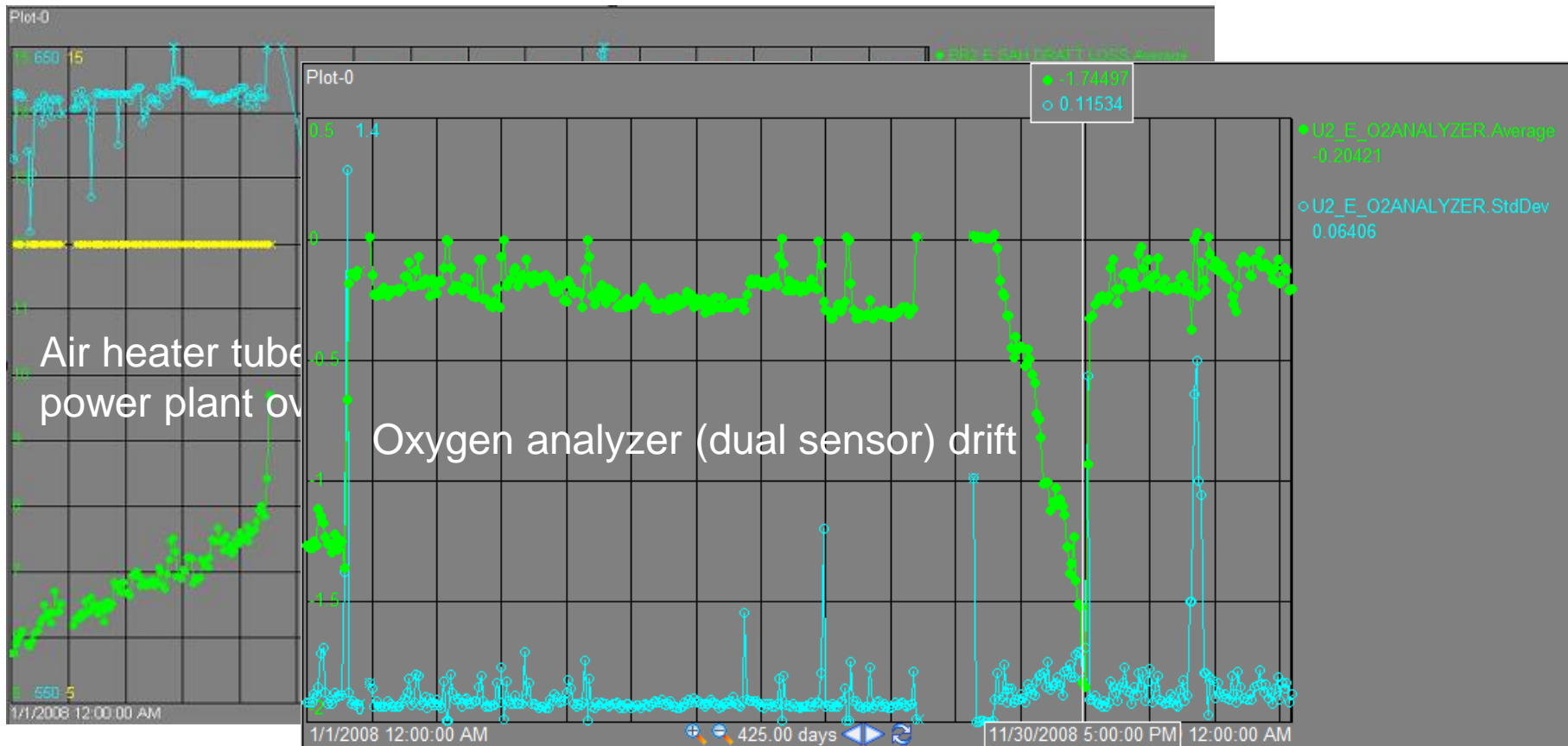
Colorado Spring Utilities – Motor run hours



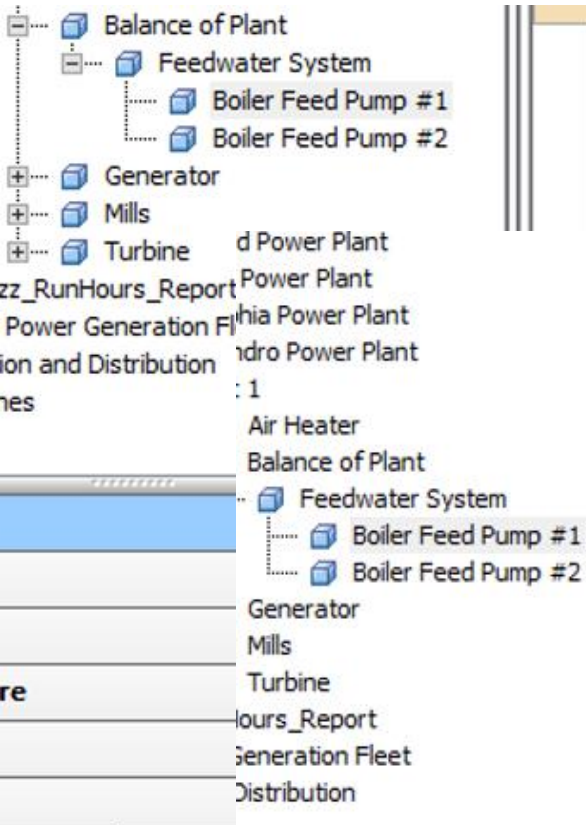
Filter clogging, Heat exchanger fouling...



Air heater tubes plugging, Oxygen analyzer drift...



Motor vibration alert calculations



<input checked="" type="checkbox"/>	Bearing Vibration High Limit	2 mils
<input checked="" type="checkbox"/>	Control Oil Pressure Low Limit	32 psi
<input checked="" type="checkbox"/>	Discharge Flow Low Limit	1700 k lb/hr

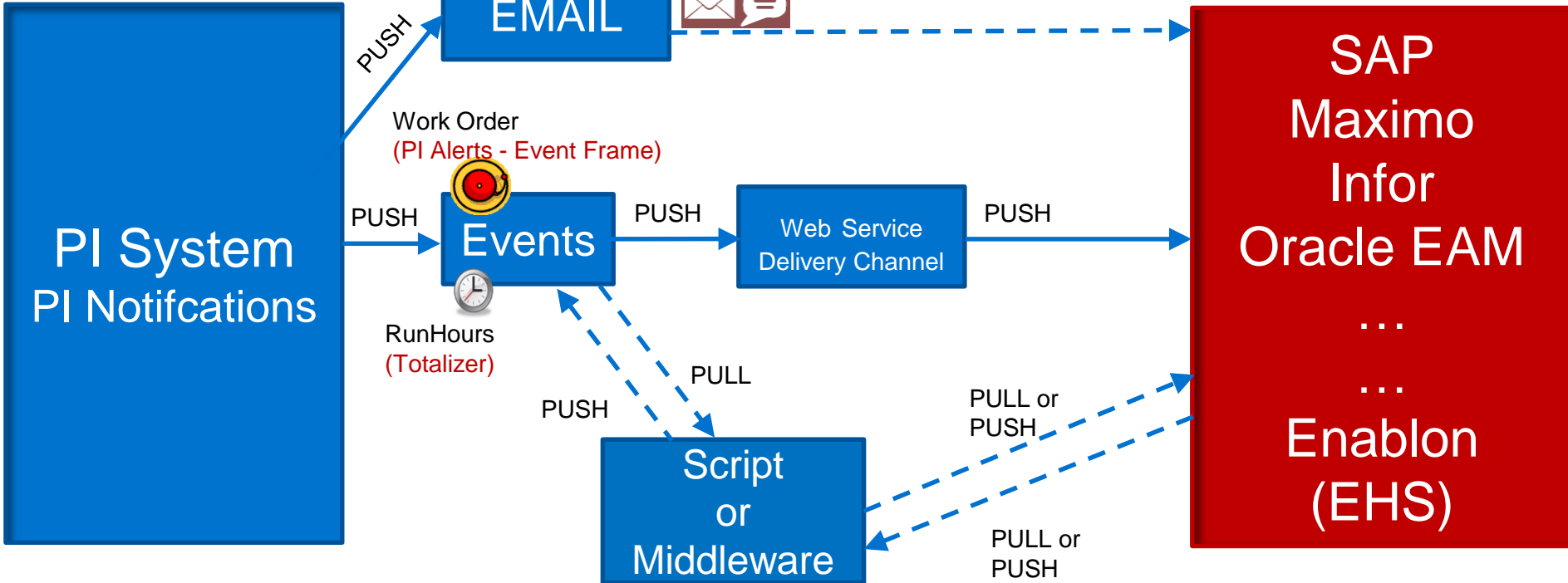
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Boiler Feed Pump High Bearing Temperature	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Boiler Feed Pump Low Discharge Flow Anomaly	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Boiler Feed Pump Low Pump Speed	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Boiler Feed Pump Suction Pressure Anomaly	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Boiler Feed Pump Vibration Anomaly	<input checked="" type="checkbox"/>

Event Frame Template: Boiler Feed Pump Vibration Anomaly

Name	Expression
OutboardYFault	'Outboard Bearing Vibration Y' > Limit
StartTrigger	if InboardXFault or InboardYFault or OutboardXFa

Evaluated at 3/29/2015 7:10:46 PM

PI System to External Systems



Application Middleware=BizTalk, TIBCO, WebSphere...

\\myAF\myAFDB_vc13 - PI System Explorer (Administrator)

File View Go Tools Help

Database Query Date Back Check In Refresh New Template New Attribute Template Search Element Temp

Library

- myAFDB_vc13
 - Categories
 - Analysis Categories
 - Attribute Categories
 - Element Categories
 - Reference Type Categories
 - Table Categories
 - Templates
 - Element Templates
 - MaximoMeterTemplate
 - Event Frame Templates
 - Model Templates
 - Notification Templates
 - Transfer Templates
 - Enumeration Sets
 - Reference Types
 - Tables

MaximoMeterTemplate

General Attribute Templates Ports

Group by: Category

Filter

Name	Description	Default Value
Category: <None>		
IsEnabled	Required, 0=False, 1=True If True, send the reading to Maximo	0
LastUpload_Error	Last Upload Error	
LastUpload_Reading	Last Uploaded Reading and Timestamp	
Category: MaximoMeter		
ASSETNUM	Required; specify either ASSETNUM or LOCATION, if both are specified LOCATION will override	
INSPECTOR	Required	OSIsoft PI
ISDELTA	Required for CONTINUOUS meters, 0=False, 1=True	0
LOCATION	Required; specify either ASSETNUM or LOCATION, if both are specified LOCATION will override	
METERNAME	Required, meter names are case sensitive	
NEWREADING	Required, points to a PI Tag	
SITEID	Required	

Elements

Event Frames

Library

Unit of Measure

MyPI

Notifications

Contacts

\\myAF\myAFDB_vc13 - PI System Explorer (Administrator)

File Edit View Go Tools Help

Database Query Date Back Check In Refresh New E

Elements

- Elements
 - BR430_RUNHOURS
- Event Frames
- Library
- Unit of Measure
- MyPI
- Notifications
- Contacts

BR430_RUNHOURS

General Child Elements Attributes Ports Versi

Filter

Name Value

Category: <None>

- IsEnabled
- LastUpload_Error
- LastUpload_Reading

Category: MaximoMeter

- ASSETNUM
- INSPECTOR
- ISDELTA
- LOCATION
- METERNAME
- NEWREADING
- SITEID

BR430_RUNHOURS

General Child Elements Attributes Ports Version

Filter

Name Value

Category: <None>

IsEnabled	1
LastUpload_Error	
LastUpload_Reading	99.66188 / 2013-10-26 14:46:42

Category: MaximoMeter

ASSETNUM	
INSPECTOR	OSIsoft PI
ISDELTA	1
LOCATION	BR430
METERNAME	RUNHOURS
NEWREADING	99.66188
SITEID	BEDFORD

Report across asset events

Select a DAY

2015_01_13

Search Start 1/10/2015

10-Jan-

Search End *

24-Mar-

GENERAL INFORMATION

DAY NAME	2015_01_13
Site	San Leandro Power Plant
Unit	Unit 1
Start Time	13-Jan-15 00:00:00
End Time	14-Jan-15 00:00:00
Duration	1 0:00:00
Duration (min)	1440.0
Day of Week	TUESDAY
Day Type	WEEKDAY
Element Path	\\DFPIAF\Power Generation\Generation\OSIsoft Power\San Leandro Power Plant\Unit 1

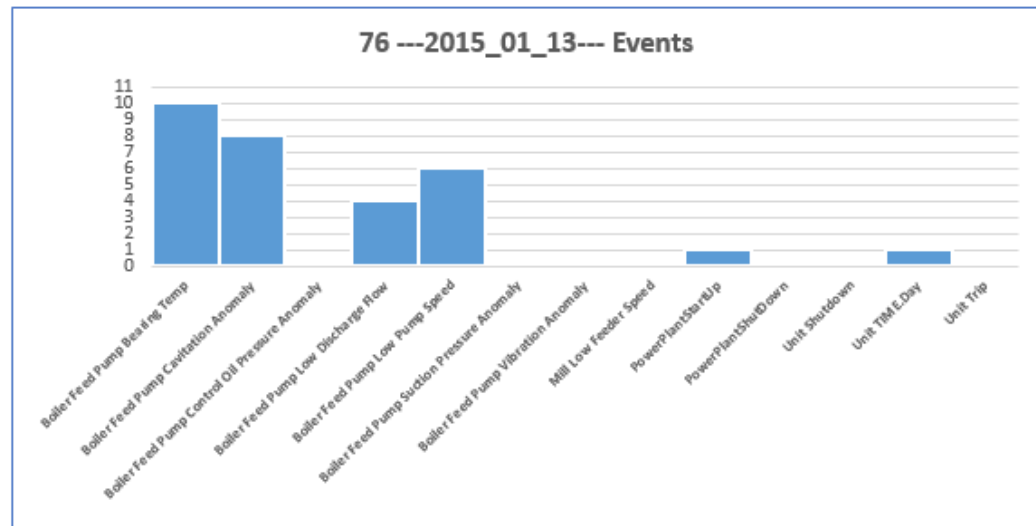
AMBIENT TEMPERATURE

Ambient Temperature.Min	36.23
Ambient Temperature.Avg	38.02
Ambient Temperature.Max	40.44

TURBINE OVERVIEW

HP Overall Efficiency.Avg	0.00
IP Overall Efficiency.Avg	0.00

(76) Events during DAY ---2015_01_13--- on <<Unit 1>>



Equipment display & SAP WorkOrder info in PI Vision

- BOILERS
 - 52-B-101A
 - 52-B-101B
 - 52-B-101C
 - 52-B-101D
 - 52-B-101E
- COMPRESSORS
 - 15-K-101
 - 15-K-102A
 - 15-K-102B
 - 15-K-103
 - 16-K-101 WGC
 - 19-K-101 HPC
 - 58-K-101A
 - 58-K-101B
 - 58-K-101C
- DCS
- FURNACES
 - 11-F-101
 - 12-F-101
 - 13-F-101
 - 14-F-101
 - 14-F-102
 - 21-F-101
 - 21-F-102

Boiler Detail
Asset: 52-B-101B
Ad Hoc Display

Boiler Details

52-B-101B

<p>Manufacturer ISHIKAWAJIMA HARIMA HEAVY IND</p> <p>Installation Date 01.05.1994</p> <p>Description STEAM BOILER 52-B-101B</p> <p>Type IHI-SC-261S</p> <p>Serial Number RM-20793-01</p> <p>Size 8700HX6600WX12200D</p>	<p>O2 Excess 2.6655</p> <p>Efficiency 92.369 %</p> <p>FO Press 13.722</p> <p>ATM Steam Press 9.653</p> <p>Steam Flow 51.584</p> <p>Steam Temp 378.98</p> <p>T Stack 161.1</p>
---	--

Last Maintenance
1/10/2016 12:00:00 AM

Next Maintenance
1/10/2018 12:00:00 AM

Overdue
-35.062 d

THIR	Waktu	Detail	Detail	Detail
1	11 May 2010	a. Burner ble rusak b. Refractory rusak	Perbaikan burner ble perbaikan refractory internal	
2	14 February 2011	a. Burner ble rusak b. Refractory rusak c. Insulation rusak	Perbaikan burner ble perbaikan refractory internal next overhaul 2015	
3	11 October 2012	a. Plate at register rusak b. Burner ble rusak dan crack c. Refractory rusak dan crack	Perbaikan burner ble perbaikan refractory internal next overhaul 2015	a. Tube arah insulasi ns
4	19 April 2013	a. Refractory rusak b. Intermittent blowdown valve flash pada mengopert bagging	perbaikan refractory internal next overhaul 2015	
5	10 September 2014	a. EDU economizer rusak	perbaikan refractory internal	
6	16 February 2015	a. Refractory rusak b. Burner bow terdapat gerangan at	perbaikan refractory internal next overhaul 2015	
7	10 January 2016	a. Refractory rusak b. Insulation bagian bawah furnace rusak	next overhaul 2015	
8	-	-	-	-
9	-	-	-	-
10	-	-	-	-

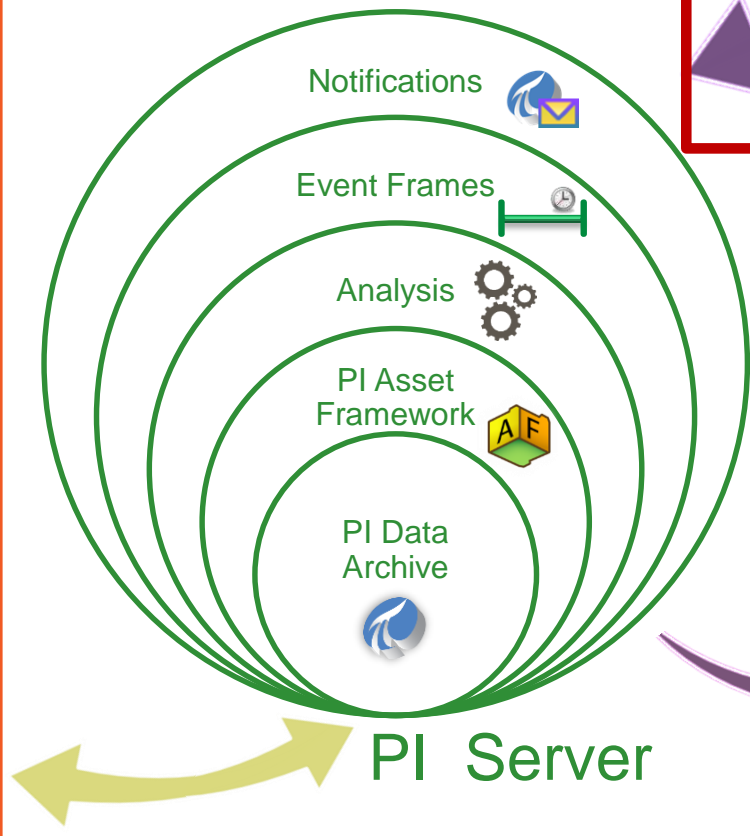
12/5/2017 2:31:22 PM
8h
Now
12/5/2017 10:31:22 PM

OT/IT Integration - Takeaways

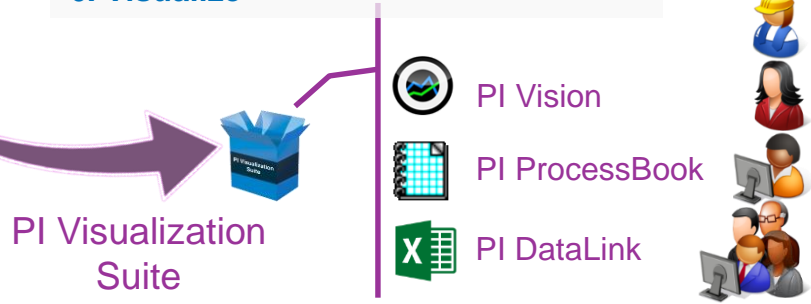
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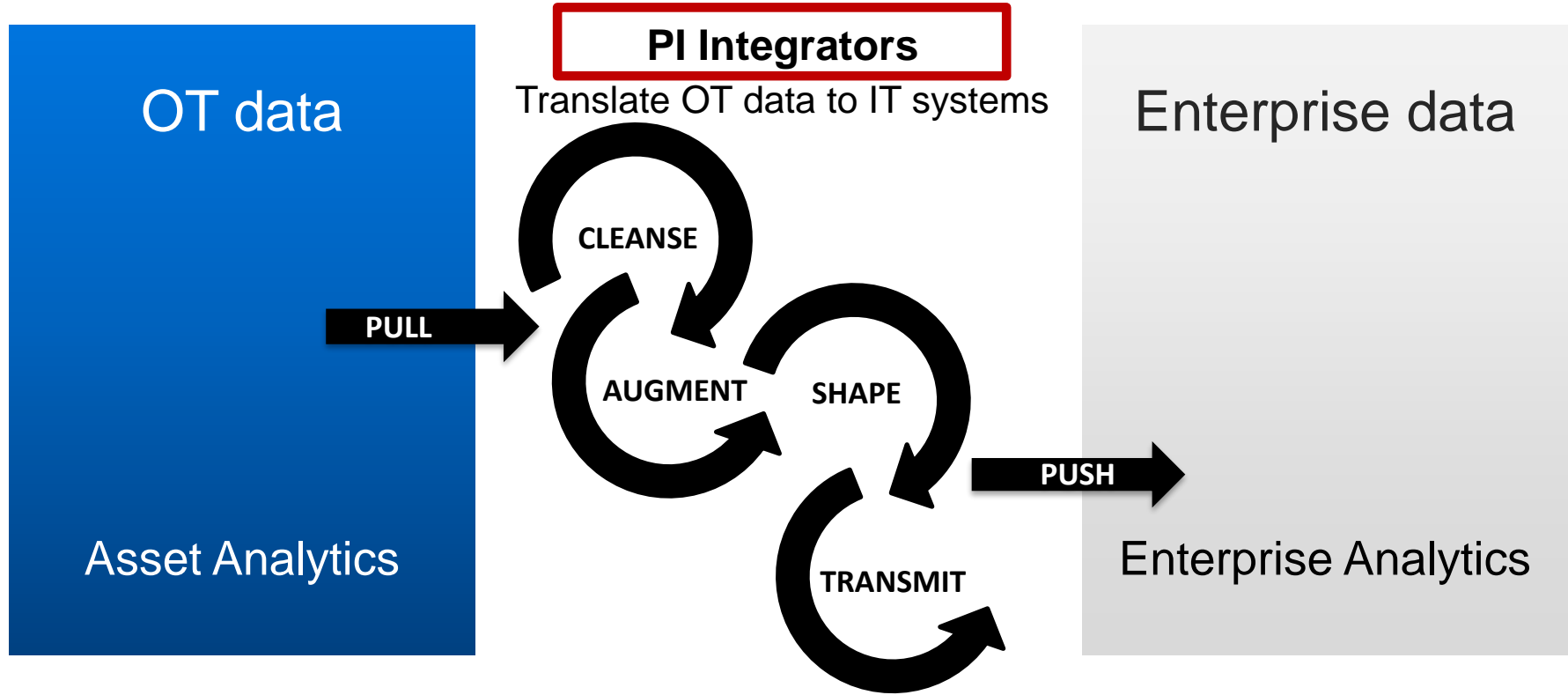
The Modern PI System



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Integrate OT & IT Data with Data Management



OSIsoft has a multi-cloud strategy for *repeatable patterns* with major cloud vendors



Azure



Google
Cloud Platform

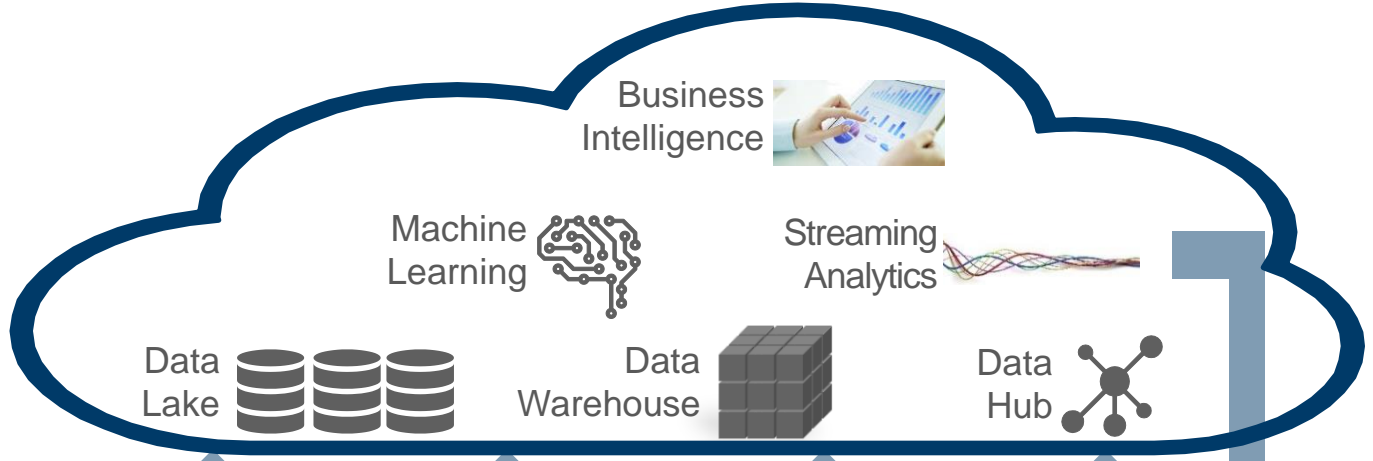
Repeatable Patterns for Extending into Cloud

**Data
Science**

**Virtualized
PI System**

**Architecting
for IoT**

Data Science



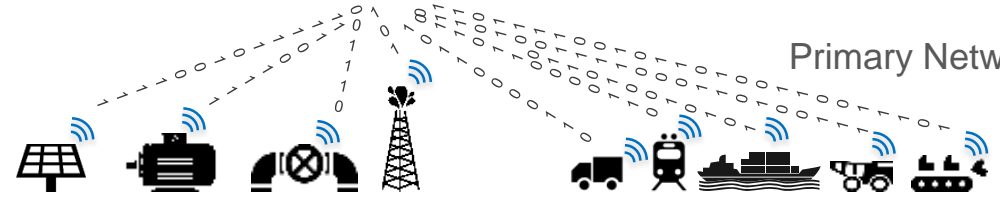
On-Prem



Streaming & ML Insights

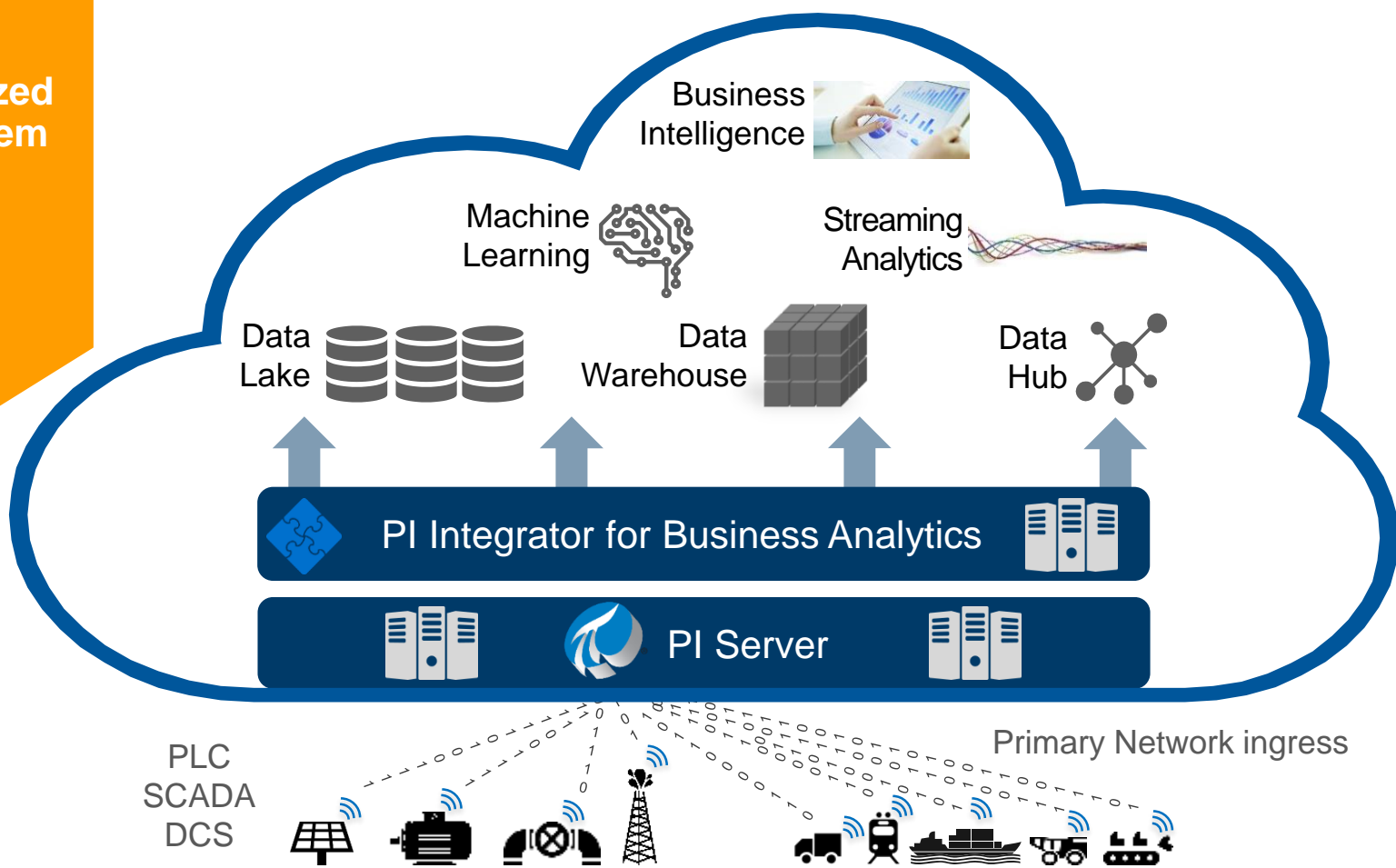


PLC
SCADA
DCS

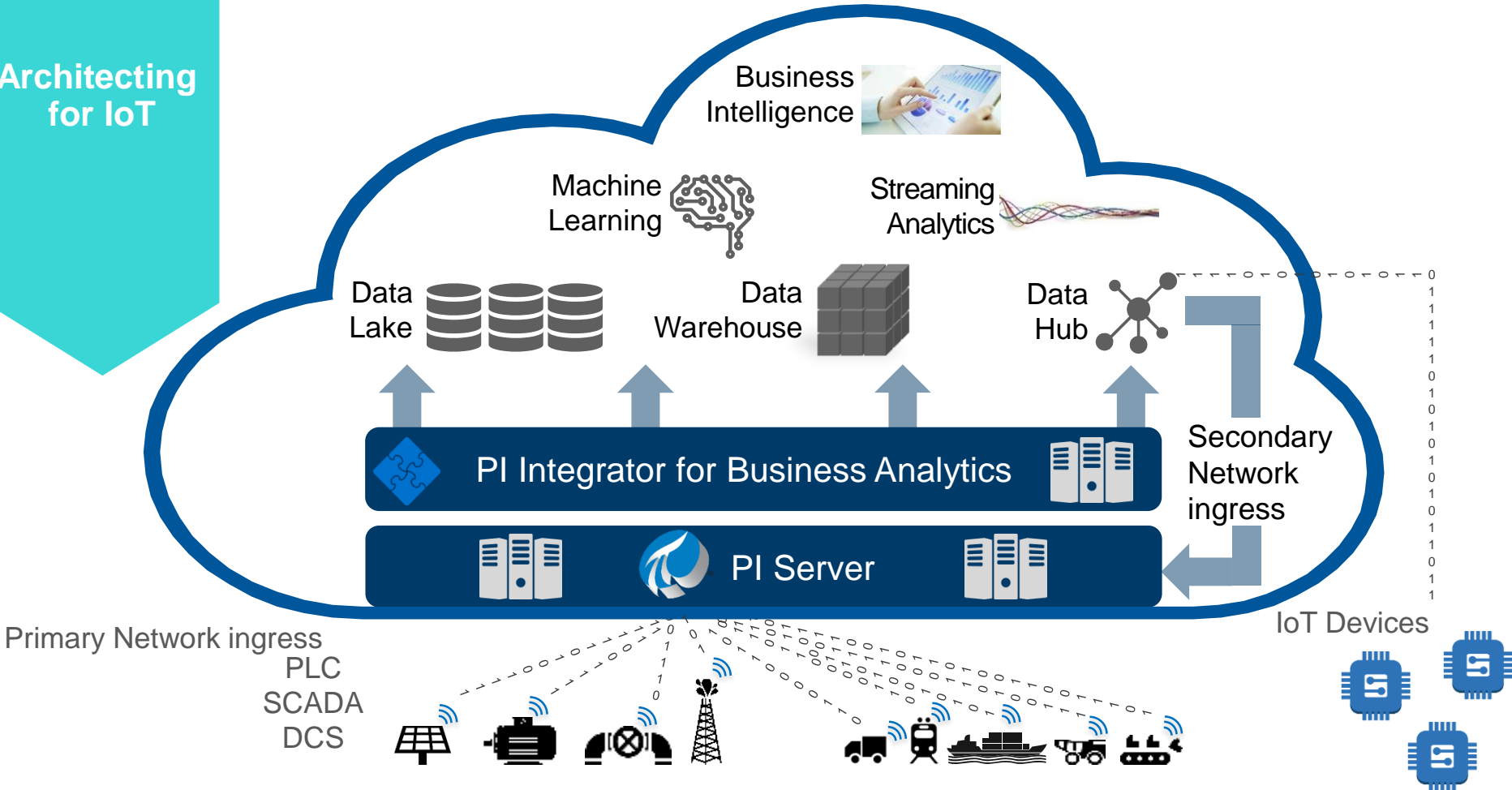


Primary Network ingress

Virtualized PI System



Architecting for IoT



Customer Success Stories with Microsoft Azure ML (Machine Learning)

Deschutes Brewery

Deschutes used machine learning to improve their brewery processes

- Saving up to 72 hours per batch
- Deferring an \$8 million upgrade

Lonza Specialty Ingredients

Expanded production capacity limits

- Used machine learning to identify major drivers for reaction times
- 6 weeks – total time to value

- ✓ **Process optimization**
- ✓ **Improved maintenance**
- ✓ **Energy management**
- ✓ **Predictive operations**
- ✓ **And more...**

<https://www.osisoft.com/presentations/brewing-beer-the-smart-way/>

<https://www.osisoft.com/presentations/rcip--data-analytics-and-manufacturing-process-optimization/>

Customer Success Stories in AWS

TransCanada

Gas demand forecasting

Georgia Pacific

Self-service analytics and
data lakes

TEPCO

Running PI System
workloads in AWS

The OSIsoft PI System & SAP

SAP Hana IoT Integrator by OSIsoft

Operations data combined
with ERP for advanced
analytics and data science

SAP Analytics Cloud

- Digital Boardroom
- SAP Data Hub
- Mobile Experience

Customer Success Story

Marathon Oil

System of Record for Operational Data

The PI System collects 700,000 data points with 1400 updates per second

OT Data, Enterprise Analytics

Over 100,000 PI System data points are fed every five minutes into SAP Hana

Simplified Processes

- Automated data prep
- Agile application development
- Optimized E&P processes

<https://www.osisoft.com/presentations/the-pi-system-and-sap-hana--operating-at-the-speed-of-business/>

Other Cloud Integrations

Development in Progress - Preview
Google Cloud Platform

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Thank You

Next Steps:

- >Your OT/IT integration use cases
- >PI Workshop
- ><https://learning.osisoft.com/>
- ><https://pisquare.osisoft.com/> (Community & Developer)