

Power Industry Trends and Technology

Presented by: David Thomason – Industry Principal
Global Power Generation
Kevin Walsh – Industry Principal T&D/Smart Grids

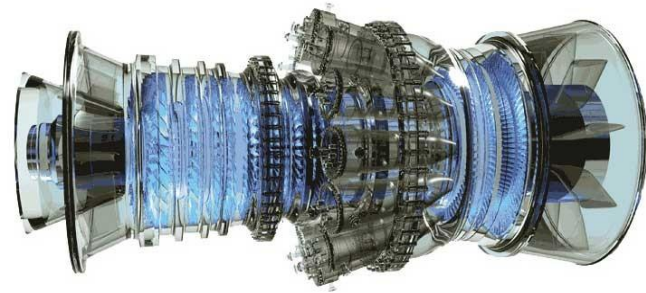


BIO / Experience

David Thomason has 33 years experience in applying information technology to the requirements of the electrical utility & power generation industry.

An active advocate in the use of advanced analytics and technologies to enhance value. David's experience at a fuel diverse 30K MW competitive power company includes multi-market EMS, Plant Analytics systems, SAP Work and Material Management, custom SW development & Support teams.

He joined OSIsoft in February 2011 in Business Development focusing on global power generation.



One foot in the business and one in IT! 😊

Power & Utilities Industry



Power Generation

- Thermal
- Nuclear
- Renewables



Water

- Utilities
- Desalination
- Irrigation
- Industrial
- Metering
- Lifecycle



T&D – Smart Grid

- Grid Mgmt
- Phasor
- Substation
- Dist. Automation
- Dist. Generation
- Microgrids



AMI-Smart Grid

- Operational Data Manager
- Home Area Net
- Demand Response

Power & Utility Verticals

An Evolving Generation Landscape



Natural Gas



Coal



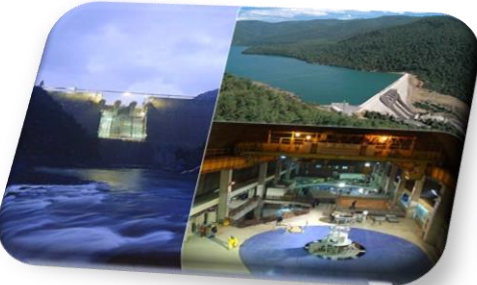
Wind



Solar PV & CSP

Traditional Power Generation

Renewable Generation



Hydro

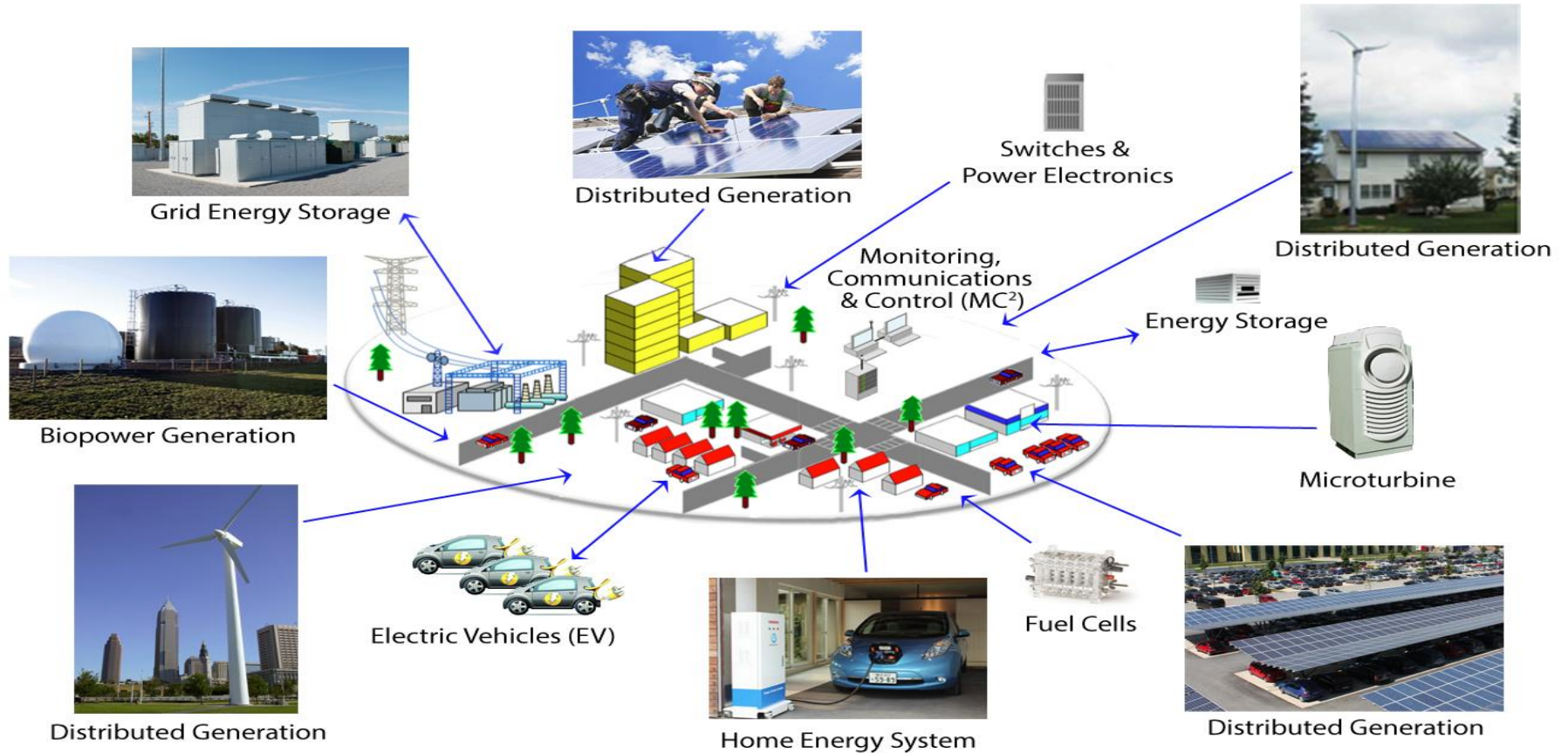


Nuclear



Geo-thermal / Biomass / Tidal / Battery

And Still Evolving ...



Power & Utility Industry Challenges

- Strive to be the **Low Cost Provider**
- Increase **Reliability** with limited **Power Reserves**
- Plant and T&D **life extensions** while undergoing modernization
- Addressing ever changing **Regulatory** requirements
- Optimizing **renewable** and **distributed** energy sources
- Demand for higher **availability** and **flexibility**
- Traditional Plants operating **outside of design**
- Information needs for **Situational Awareness**
 - Market / Grid conditions (Hydro levels, Power, Fuel, Ancillary Services...)
 - Current and Forecasted Capability
 - Weather
 - Environmental Compliance
 - Security
- Need to respond and make **decisions in real-time**

The PI System Supporting Key Power & Utility Processes



Power Industry Value Areas (savings \$)

- Independent software company, not the point system or DCS \$\$
- Standard platform for notifications, events, applications and development \$\$
- Cost effective instrumentation projects \$\$
- Reduce and optimize maintenance \$\$
- Improve scheduling of outages, labor and work \$\$
- Better planning for equipment and materials \$\$\$
- Avoiding regulatory impacts and market fines \$\$\$
- Reduction in forced outages, improve reliability, and availability \$\$\$\$\$
- Cultivate and leverage the collective “mind” power of the organization \$\$\$\$\$

Power Industry Technology Trends

From:

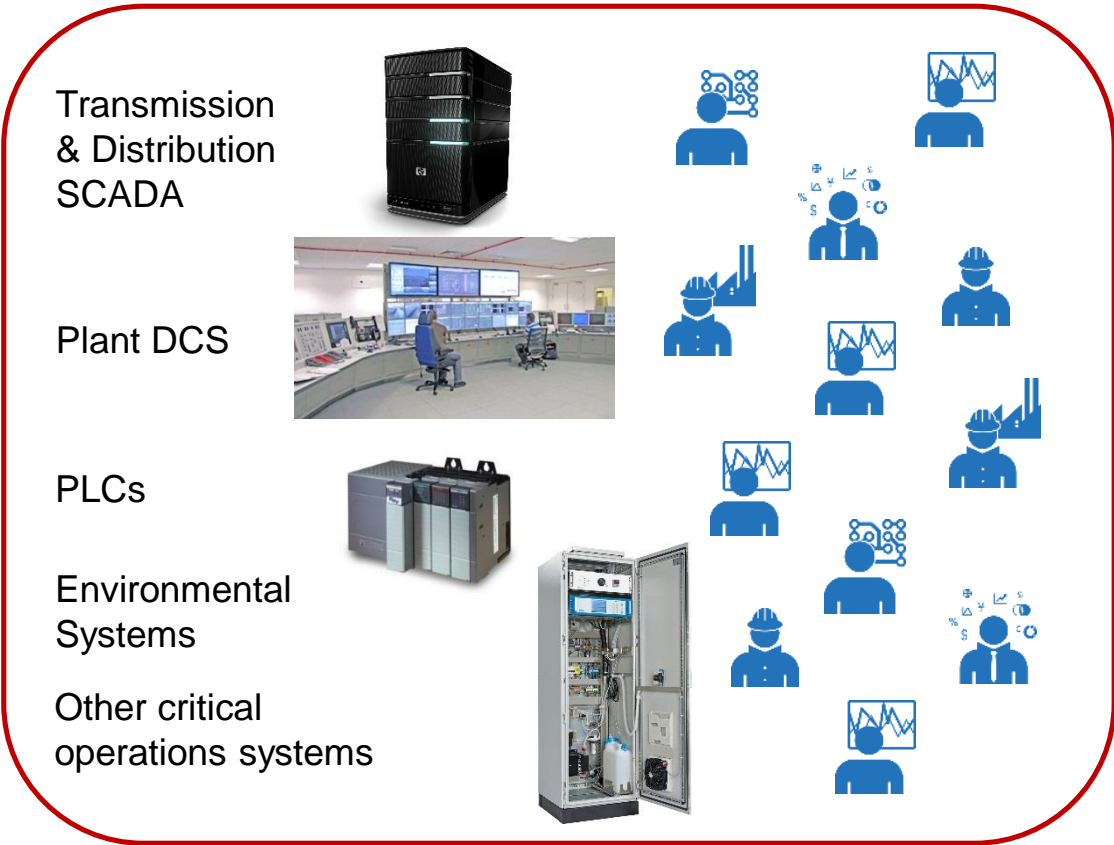
- Static / periodic equipment condition assessments
- Many disparate data systems
- Limited staff resources use beyond assigned facilities
- Multiple projects, solutions with delayed value realization
- High Cost Reactive Maintenance
- Aggregating information to assess adverse events



To:

- Dynamic **real-time** online condition monitoring
- **Single source** of all plant and enterprise data
- Leveraging **experts** throughout the company for multiple sites and assets
- Common data **infrastructure** that supports continuous improvement in many areas
- **Proactive & Predictive** Based Maintenance
- Real-time situational **awareness**, market **predictability** and planned **response**

Security - Cyber Risk Management



Transmission & Distribution SCADA

Plant DCS

PLCs

Environmental Systems

Other critical operations systems

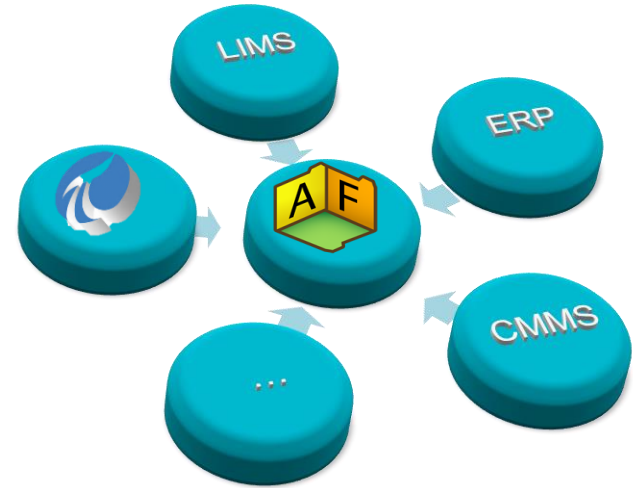
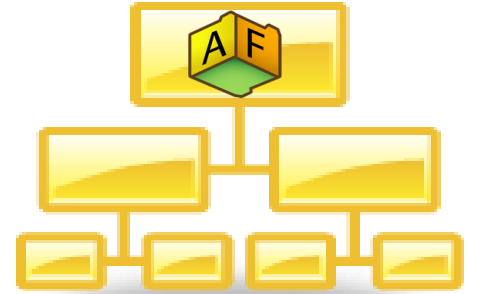
Electronic Security Perimeter ESP



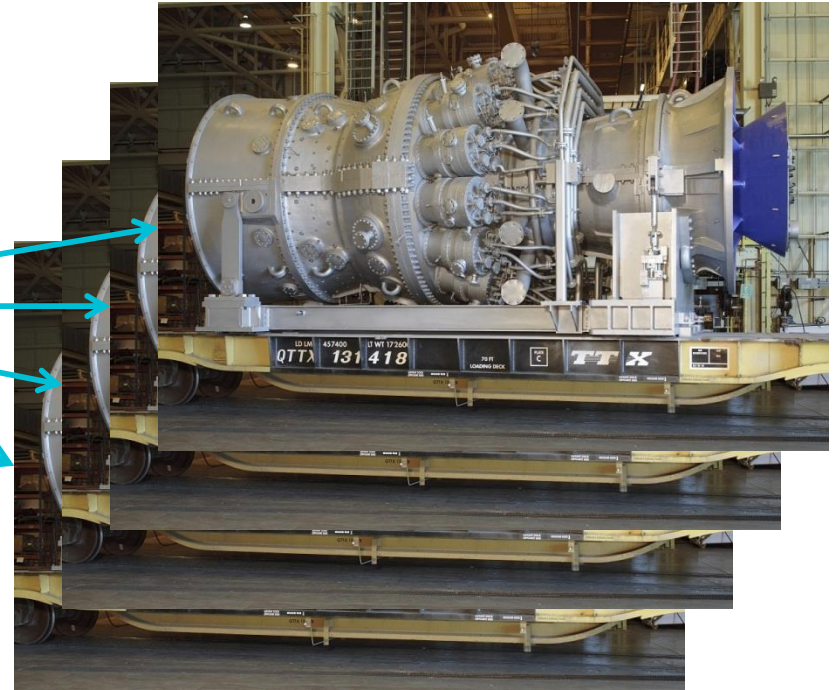
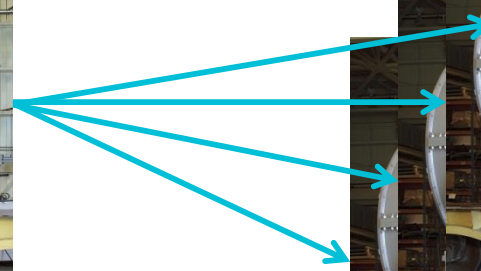
Limiting direct access to cyber assets in the ESP while expanding information use.

PI Asset Framework (PI AF)

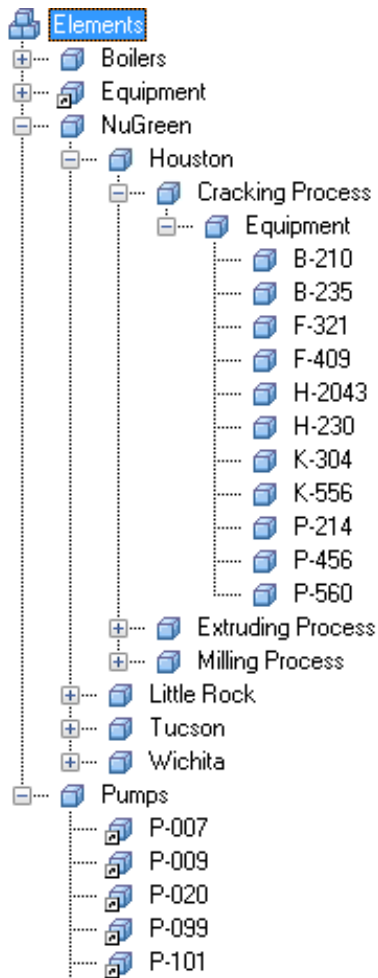
- Organize your assets' data in a **hierarchical**, **scalable**, **secure**, and **extensible** database
- Model data from **different PI Servers**
- Relate **non time-series** data sources
- Integrate with tools **analyses** and **notifications** tools
- Supports **knowledge capture** and **knowledge transfer**



A Common View for Similar Assets



Organize data in AF



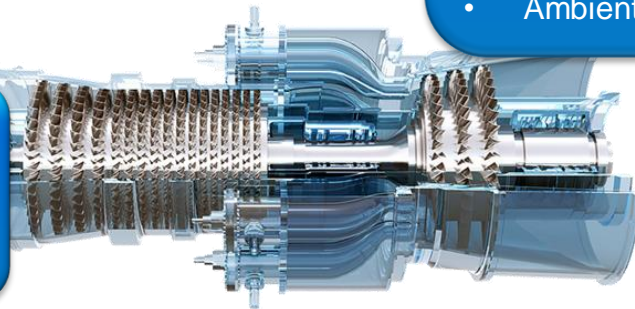
Analyses

- Efficiency analysis
- Key Performance Indicators (KPI)

Time-series

- Exhaust temperature
- Exhaust flow
- Measured MW output
- Vibration data
- Inlet pressure
- Inlet flow
- Ambient temperature

Events
Downtime
Startup
Failure



Asset details

- Name
- Model
- Manufacturer

Notifications

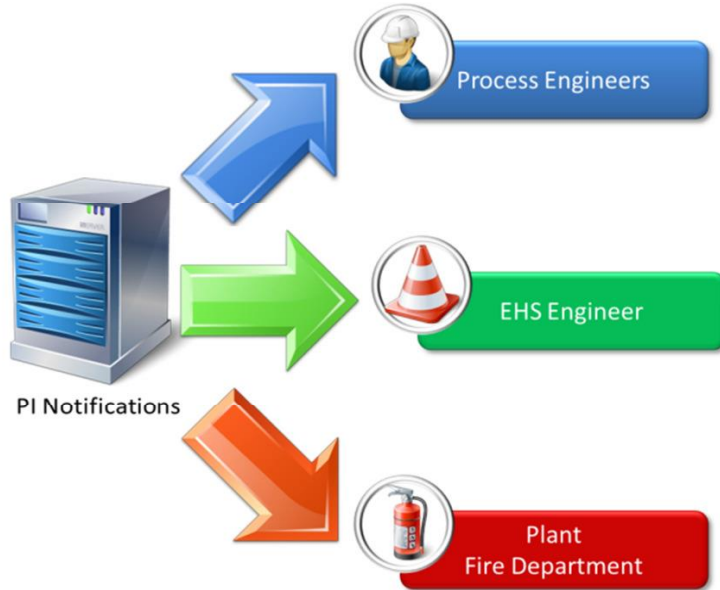
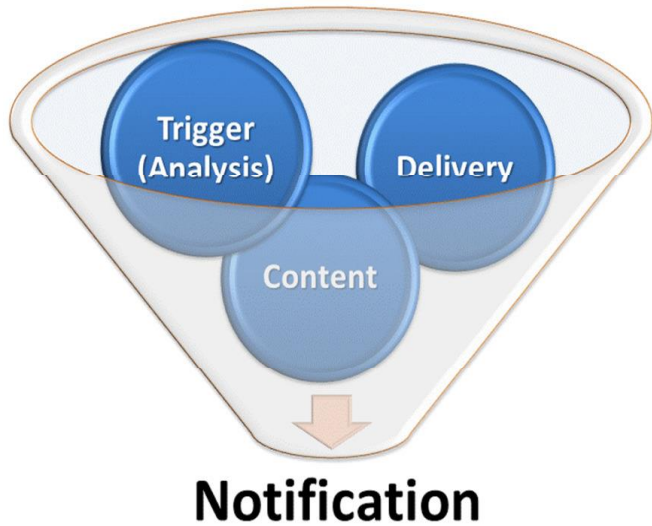
- High speed
- Rotor failure
- Low pressure

External data

- Performance curves
- Last maintenance date
- Design documents
- Best operating procedures

Notifications

- Single platform that spans all your systems
- Simple or complex with aggregated information
- Replicated via templates
- Delivered with direct links to triggering events and data



PI Notifications Keeps You Informed



DELIVER

From: PINotAdmin
To: Mariana Sandin
Cc:
Subject: Transformer TR0842 Load is in I

[Instant PI WebPars Trend](#)
[Acknowledge With Comment](#)
[Acknowledge](#)

Name:	Transformer Load -
State:	High
Trigger Time:	7/29/2012 9:07:01
Start Time:	7/29/2012 9:07:01
End Time:	1/1/1970 12:00:00
Triggering Conditions:	Load > 22
Target:	TR0842

Wind Farm availability is under 70%

DF PI Notifications - Offline

pinotifications@osisoft.test.int 2:45 PM

- Wind Farm availability is under 70%
- Name: Wild River Wind Farm
- Server: DFPIAF
- Database: Windtopia
- Start Time: 8/1/2012 2:30:00 PM Pacific Daylight Time (GMT-07:00:00)
- Trigger Time: 8/1/2012 2:45:00 PM Pacific Daylight Time (GMT-07:00:00)
- Target: Wind Power Generation Fleet\Wild River Wind Farm
- State: OutsideControl
- Priority: Normal
- Link: [Wind Farm Overview](#)

Actions: [Acknowledge](#)

DF PI Notifications
Wind Farm availability is under 70%

Redirect Ignore



Web Service



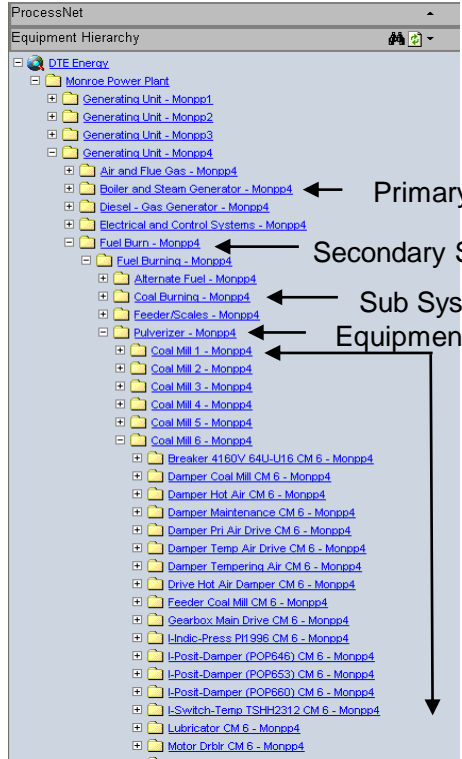
AF Structures & Templates

Example AF for Power & Utilities:

- **Corp** (ie...AGL, DEWA) ← **Corp Level – KPIs, Production rollups, ...**
 - **Generation** (ie.. GU, Power Gen...) ← **Biz Unit Level – KPIs, Total Production,...**
 - **Plant** ← **Plant Level – KPIs, Production, Performance, Info, ...**
(May org by type fossil, renewable, nuke, hydro)
 - **Unit # (1, A,)** ← **Unit Level – Production, Performance, Info, ...**
 - » **Primary System** ← **Primary System - Performance Calcs**
 - » **Sub-System** ← **Sub-System - Performance Calcs**
 - » **Equipment** ← **Equipment Specific Templates**
 - RT Condition Monitoring
 - Calculations (Runtime, Start Count...)
 - CBM Scoring
 - MFG Name plate
 - Work Mgmt (\$spent, \$planned,...)
 - **T&D**
 - **Substation(s)**
 - **Feeders**
 - » **Equipment**

Each level templates w/ Calcs, notifications, element relative displays...

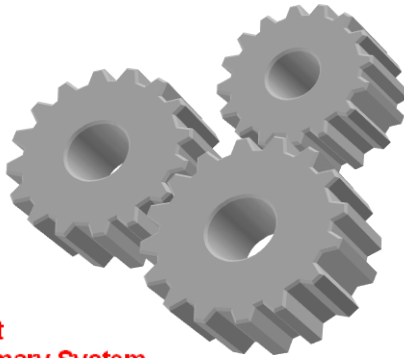
Common Thread Equipment Hierarchy



Primary System
 Secondary System
 Sub System
 Equipment

Sub Equipment

- DTE Energy – **Business Unit**
- Monroepower Plant – **Plant**
- Generating Unit - Monpp4 – **Unit**
- Fuel Burn - Monpp4 – **Primary System**
- Fuel Burn - Monpp4 – **Secondary System**
- Pulverizer - Monpp4 – **Sub System**
- Coal Mill 1 - Monpp4 – **Equipment / Sub Equip**
- Breaker 4160V 64U-U16 CM 1 - Monpp4
- Damper Coal Mill CM 1 - Monpp4
- Damper Hot Air CM 1 - Monpp4
- Damper Maintenance CM 1 - Monpp4
- Damper Pri Air Drive CM 1 - Monpp4



- Equipment Hierarchy
- Hierarchical System Index (HSI)
 - Work Breakdown Structure (WBS)

PI AF – Structure and Attributes



The screenshot displays the PI AF software interface. On the left is a tree view of the 'Elements' hierarchy, including 'OSISoft Power', 'Big Creek Power Plant', 'Cleveland Power Plant', 'Houston Power Plant', 'New UNIT', 'Philadelphia Power Plant', 'San Leandro Power Plant', 'Unit 1', 'Air Heater', 'Balance of Plant', 'Feedwater System', 'Boiler Feed Pump #1', 'Boiler Feed Pump #2', 'Generator', 'Generator A', 'Mills', 'Mill 1', 'Mill 2', 'Mill 3', 'Mill 4', 'Turbine', 'Turbine A', and 'Wind Power Generation Fleet'. The main area shows a table of attributes grouped by category. Callouts point to various features: 'AF – Asset Framework' points to the tree view; 'Categories for Attribute Groupings' points to the category headers in the table; 'Reference Data from other systems' points to the 'Category: <None>' header; 'Element Template' points to the 'Category: Bearing Temperatures' header; 'Attribute alias elements normalizes diverse tag / point names' points to the 'Inboard Bearing Temperature' and 'Outboard Bearing Temperature' rows; 'Performance curves, limits, for calculated Values' points to the 'Category: Limits' header; and 'Real-time Data' points to the 'Category: Flows' header.

Name	Value
Category: <None>	
In Service Date	1-Jan-13
Last Service Date	8-Nov-13
Manufacturer	GE
Serial Number	1B395
Category: Bearing Temperatures	
Inboard Bearing Temperature	
Outboard Bearing Temperature	122.390983581543 deg F
Category: Flows	
Auxiliary Steam Flow	14.8983793258667 lb
Discharge Flow	1634.23645019531 k lb/hr
Discharge Flow Total	757539.875 lb
EXT Steam Flow Total	260660.078125 lb
Flow entering economizer	3257.94702148438 k lb/hr
Main Steam Flow	38.3094062805176 k lb/hr
Category: Limits	
Bearing Vibration High Limit	2 mils
Control Oil Pressure Low Limit	32 psi
Discharge Flow Low Limit	1700 k lb/hr
Suction Pressure High Limit	160 psi

AF – Asset Framework

Categories for Attribute Groupings

Reference Data from other systems

Element Template

Attribute alias elements normalizes diverse tag / point names

Real-time Data

Performance curves, limits, for calculated Values

PI AF Asset Based Analytics – Event Frames

Element Template

EF Start Trigger

Time True

Root Cause Child Events

Type = EF Generation

PE Functions

Functions
Insert functions into the expression

- Abs
- Acos
- And
- Ascii
- Asin
- Atn
- Atn2
- Avg
- BadVal
- Bod
- Bom
- Bonm
- Ceiling
- Char
- Compare
- Concat
- Convert
- Cos
- Cosh
- Cot
- Coth
- Exp

Abs(number x)
Return the absolute value of an integer or real number.
Example: Abs(1)

Attributes

Boiler Feed Pump Turbine

Name: Boiler Feed Pump Vibration Anomaly
Description: Boiler Feed Pump Vibration Anomaly
Categories:
Analysis Type: Expression Rollup Event Frame Generation

Event Frame Template: Boiler Feed Pump Vibration Anomaly

StartTrigger Expression: `if ('Inboard Bearing Vibration X' > 'Bearing Vibration High Limit') Then true else if ('Inboard Bearing Vibration Y' > 'Bearing Vibration High Limit') Then true else if ('Outboard Bearing Vibration X' > 'Bearing Vibration High Limit') Then true else if ('Outboard Bearing Vibration Y' > 'Bearing Vibration High Limit') then true else false`

EndTrigger: *Type an expression (optional)*
[Add a new expression](#)

Evaluated at: 11/2014 7:35:22 AM

StartTrigger true for: 30 Seconds

Generate child root cause event frame before parent event frame starts

Duration: 1 Days

Name: Root Cause
Category:
Scheduling: Event-Triggered Periodic
Trigger on: Any Input

PI AF Asset Based Analytics – Backfilling Events

- Analyses
- Choose a filter
- Analysis Template
- All (117)
 - No Template (1)
 - Boiler Feed Pump Turbine\Boiler Feed Pump Cavitation Anomaly (8)
 - Boiler Feed Pump Turbine\Boiler Feed Pump Control Oil Pressure Anom
 - Boiler Feed Pump Turbine\Boiler Feed Pump High Bearing Temperature
 - Boiler Feed Pump Turbine\Boiler Feed Pump Low Discharge Flow Anom
 - Boiler Feed Pump Turbine\Boiler Feed Pump Low Pump Speed (8)
 - Boiler Feed Pump Turbine\Boiler Feed Pump Suction Pressure Anomaly
 - Boiler Feed Pump Turbine\Boiler Feed Pump Vibration Anomaly (8)
 - Gas Turbine Template\GTExhaustGasTempDiff1vP2 (2)
 - Gas Turbine Template\GTExhaustGasTempDiff1vP3 (2)
 - Gas Turbine Template\GTExhaustGasTempDiff1vP4 (2)
 - Gas Turbine Template\GTExhaustGasTempDiff2vP1 (2)
 - Gas Turbine Template\GTExhaustGasTempDiff2vP3 (2)
 - Gas Turbine Template\GTExhaustGasTempDiff2vP4 (2)
 - Gas Turbine Template\GTExhaustGasTempDiff3vP1 (2)
 - Gas Turbine Template\GTExhaustGasTempDiff3vP2 (2)
 - Gas Turbine Template\GTExhaustGasTempDiff3vP4 (2)
 - Gas Turbine Template\GTExhaustGasTempDiff4vP1 (2)
 - Gas Turbine Template\GTExhaustGasTempDiff4vP2 (2)
 - Gas Turbine Template\GTExhaustGasTempDiff4vP3 (2)
 - Gas Turbine Template\GTExhaustGasTemperatureAnomaly (2)
 - Mill\Mill Low Feeder Speed (16)
 - Coal Plant\Plant Generating (4)
 - Coal Plant\Plant Not Generating (4)
 - Combined Cycle Power Plant Template\PowerPlantShutdown (1)
 - Combined Cycle Power Plant Template\PowerPlantStartUp (1)
 - Unit\Unit Shutdown (4)
 - Unit\Unit Trip (4)

Analyses

8 checked analyses

✓	Status	Element	Name	Template	Backfilling
✓	🟢	Generation\OSISoft Power\Cleveland Power Plant\Unit 1\Balance of Plant\Feedwater System\Boiler Feed Pump #1	Boiler Feed Pur	Boiler Feed Pump Vibration	🟢
✓	🟢	Generation\OSISoft Power\Cleveland Power Plant\Unit 1\Balance of Plant\Feedwater System\Boiler Feed Pump #2	Boiler Feed Pur	Boiler Feed Pump Vibration	🟢
✓	🟢	Generation\OSISoft Power\Philadelphia Power Plant\Unit 1\Balance of Plant\Feedwater System\Boiler Feed Pump #1	Boiler Feed Pur	Boiler Feed Pump Vibration	🟢
✓	🟢	Generation\OSISoft Power\Philadelphia Power Plant\Unit 1\Balance of Plant\Feedwater System\Boiler Feed Pump #2	Boiler Feed Pur	Boiler Feed Pump Vibration	🟢
✓	🟢	Generation\OSISoft Power\San Leandro Power Plant\Unit 1\Balance of Plant\Feedwater System\Boiler Feed Pump #1	Boiler Feed Pur	Boiler Feed Pump Vibration	🟢
✓	🟢	Generation\OSISoft Power\San Leandro Power Plant\Unit 1\Balance of Plant\Feedwater System\Boiler Feed Pump #2	Boiler Feed Pur	Boiler Feed Pump Vibration	🟢
✓	🟢	Generation\OSISoft Power\Houston Power Plant\Unit 1\Balance of Plant\Feedwater System\Boiler Feed Pump #2	Boiler Feed Pur	Boiler Feed Pump Vibration	🟢
✓	🟢	Generation\OSISoft Power\Houston Power Plant\Unit 1\Balance of Plant\Feedwater System\Boiler Feed Pump #1	Boiler Feed Pur	Boiler Feed Pump Vibration	🟢

Backfill Events into History

Operations

- [Start checked analyses](#)
- [Stop checked analyses](#)
- [Backfill checked analyses](#)

Pending Operations

No pending operations

Analysis details

Overview Errors And Warnings

🟢 Boiler Feed Pump Vibration Anomaly configuration

Analysis type: Event Frame Generation

Description:
 Element path: Generation\OSISoft Power\Cleveland Power Plant\Unit 1\Balance of Plant\Feedwater System\Boiler Feed Pump #1
 Template: Boiler Feed Pump Vibration Anomaly
 Schedule: Natural

🟢 Status

In AF: Enabled
 In PI Analysis Service: Running

Analysis configuration

PI DataLink 2014 – Pump Relative Report

Search Start **1/10/2014 0:00** 10-Jan-14 00:00:00
 Search End **29-Apr-14 06:40:12** 29-Apr-14 06:40:12

Site Name **San Leandro Power Plant**
 Unit Name **Unit 1**
 Pump Name **Boiler Feed Pump #2**

Now looking at BFP2

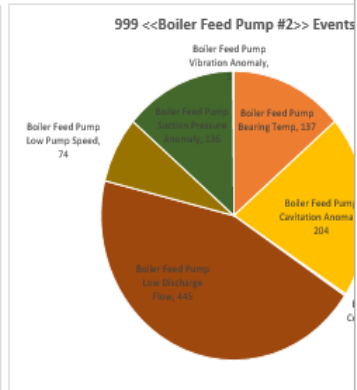
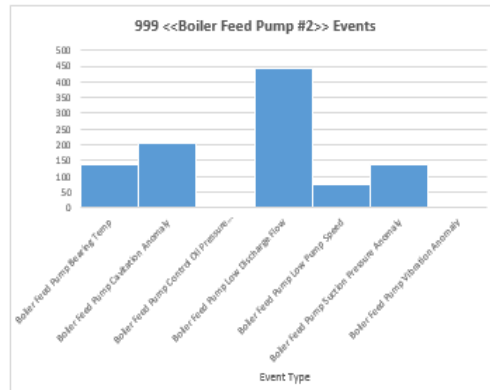
Pump Information [PI AF]

UOM	VIBRATION DATA				Bearing Oil Pressure	Control Pressure	Pressure	Suction Pressure	BEARING TEMPERATURE		UOM
	Inboard Bearing Vibration X	Inboard Bearing Vibration Y	Outboard Bearing Vibration X	Outboard Bearing Vibration Y					Inboard Bearing Temperature	Outboard Bearing Temperature	
Value at Start: 10-Jan-14 00:00:00	1.02	0.95	0.74	0.68	14.80	35.78	3689.14	115.66	147.31	125.44	Value at Start: 10-Jan-14 00:00:00
Value at End: 29-Apr-14 06:40:12	0.97	0.87	0.75	0.74	14.78	35.75	3776.16	129.87	147.36	125.26	Value at End: 29-Apr-14 06:40:12
Minimum	0.05	0.04	0.03	0.03	14.71	35.46	-38.58	6.60	71.83	73.63	Minimum
Average	0.85	0.89	0.62	0.61	15.61	37.00	2628.75	111.23	128.93	116.20	Average
Maximum	2.72	1.88	3.68	3.70	19.98	46.30	4099.07	207.40	155.31	135.38	Maximum
StDev	0.53	0.54	0.30	0.31	0.78	1.47	1698.24	50.97	29.67	19.54	StDev

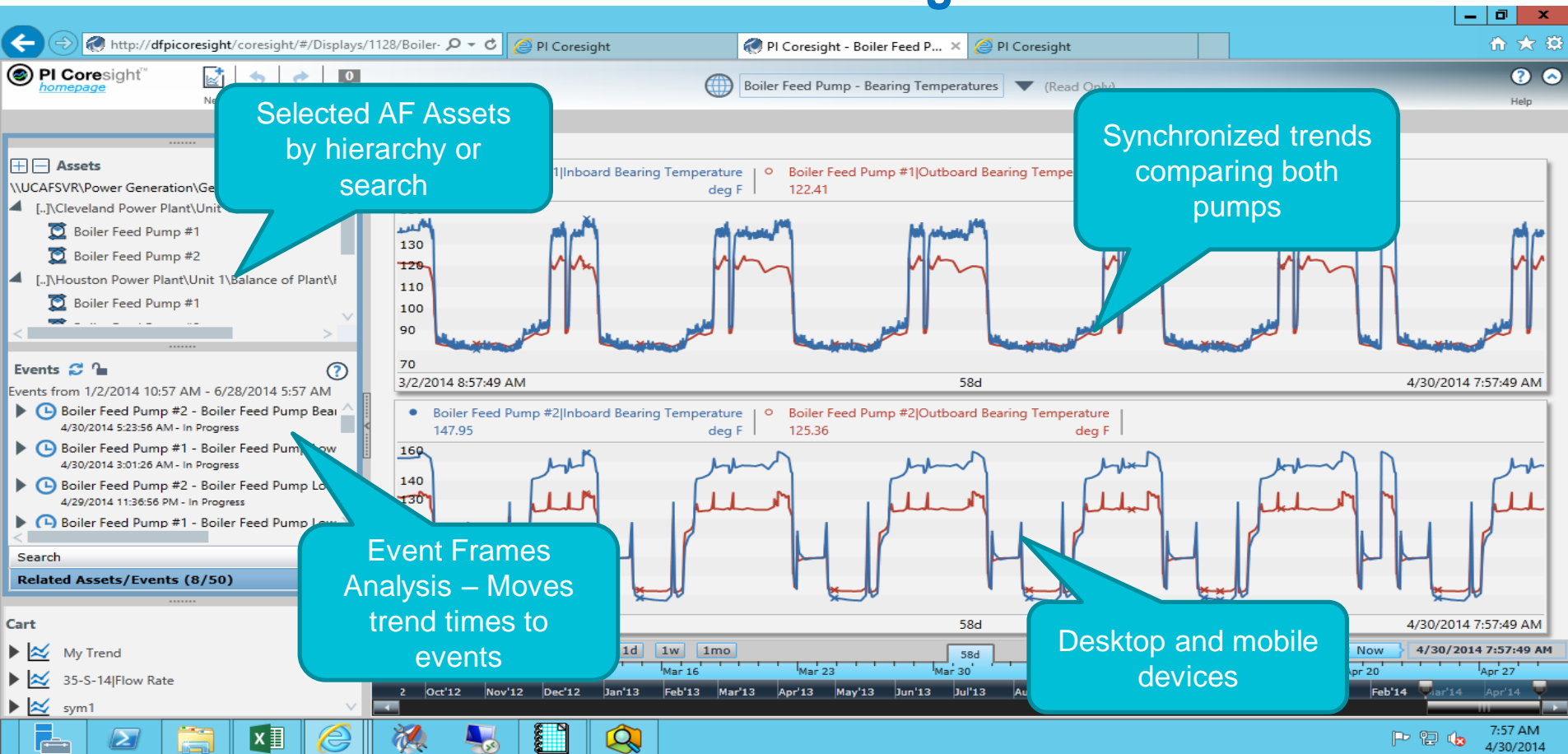
Pump Events [PI EF] (999)

EF NAME	EVENT CATEGORY	EVENT TEMPLATE
	Minimum: 0.00128	Minimum: 1.4
	Average: 0.164243	Average: 1003.3
	StdDev: 2.120659	StdDev: 3607.8
	Maximum: 31.130201	Maximum: 45423.0

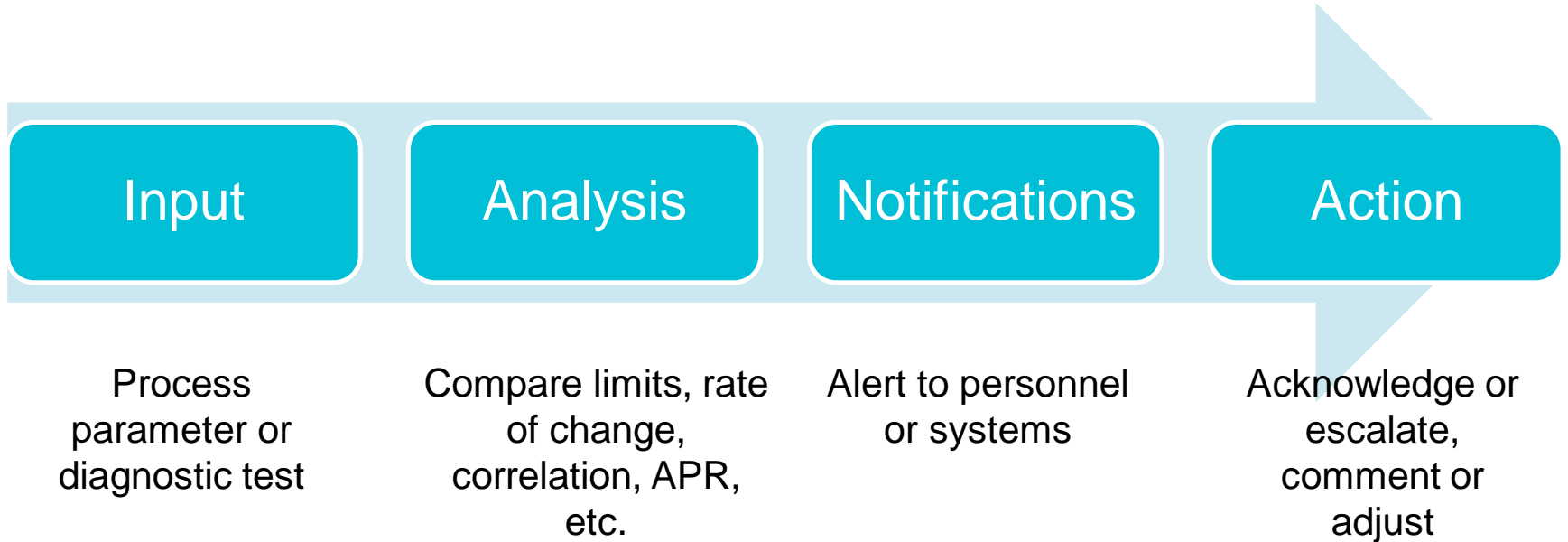
Event name	Start time	End time	Duration	Event template	Duration Minutes
Boiler Feed Pump #2 - Boiler Feed Pump L	10-Jan-14 00:00:00	11-Jan-14 06:40:00	16:40:00	Boiler Feed Pump Low Discharge Flow	1840.0
Boiler Feed Pump #2 - Boiler Feed Pump L	10-Jan-14 00:00:00	11-Jan-14 06:40:00	16:40:00	Boiler Feed Pump Low Discharge Flow	1840.0
Boiler Feed Pump #2 - Boiler Feed Pump E	10-Jan-14 00:00:00	12-Jan-14 21:05:00	2 21:05:00	Boiler Feed Pump Bearing Temp	4145.0
Boiler Feed Pump #2 - Boiler Feed Pump E	10-Jan-14 00:00:00	10-Jan-14 05:20:00	0 5:20:00	Boiler Feed Pump Bearing Temp	320.0
Boiler Feed Pump #2 - Boiler Feed Pump E	10-Jan-14 00:00:00	12-Jan-14 21:05:00	2 21:05:00	Boiler Feed Pump Bearing Temp	4145.0
Boiler Feed Pump #2 - Boiler Feed Pump E	10-Jan-14 00:00:00	10-Jan-14 05:20:00	0 5:20:00	Boiler Feed Pump Bearing Temp	320.0
Boiler Feed Pump #2 - Boiler Feed Pump C	10-Jan-14 00:00:00	10-Jan-14 18:40:00	2 18:40:00	Boiler Feed Pump Cavitation Anomaly	4000.0
Boiler Feed Pump #2 - Boiler Feed Pump C	10-Jan-14 00:00:00	12-Jan-14 18:40:00	2 18:40:00	Boiler Feed Pump Cavitation Anomaly	4000.0
Boiler Feed Pump #2 - Boiler Feed Pump E	11-Jan-14 00:30:00	24-Jan-14 21:05:00	13 20:35:00	Boiler Feed Pump Bearing Temp	19355.0
Boiler Feed Pump #2 - Boiler Feed Pump E	11-Jan-14 00:30:00	24-Jan-14 21:05:00	13 20:35:00	Boiler Feed Pump Bearing Temp	19355.0
Boiler Feed Pump #2 - Boiler Feed Pump C	11-Jan-14 07:10:00	11-Jan-14 16:00:00	0 8:50:00	Boiler Feed Pump Cavitation Anomaly	530.0
Boiler Feed Pump #2 - Boiler Feed Pump C	11-Jan-14 07:10:00	11-Jan-14 16:00:00	0 8:50:00	Boiler Feed Pump Cavitation Anomaly	530.0
Boiler Feed Pump #2 - Boiler Feed Pump C	12-Jan-14 16:00:00	13-Jan-14 10:45:00	0 18:45:00	Boiler Feed Pump Cavitation Anomaly	1125.0
Boiler Feed Pump #2 - Boiler Feed Pump C	12-Jan-14 16:00:00	13-Jan-14 10:45:00	0 18:45:00	Boiler Feed Pump Cavitation Anomaly	1125.0
Boiler Feed Pump #2 - Boiler Feed Pump L	12-Jan-14 18:55:00	12-Jan-14 19:55:00	0 1:00:00	Boiler Feed Pump Low Discharge Flow	60.0
Boiler Feed Pump #2 - Boiler Feed Pump L	12-Jan-14 18:55:00	12-Jan-14 19:55:00	0 1:00:00	Boiler Feed Pump Low Discharge Flow	60.0
Boiler Feed Pump #2 - Boiler Feed Pump C	12-Jan-14 19:55:00	12-Jan-14 20:16:00	0 0:20:00	Boiler Feed Pump Cavitation Anomaly	20.0
Boiler Feed Pump #2 - Boiler Feed Pump C	12-Jan-14 19:55:00	12-Jan-14 20:16:00	0 0:20:00	Boiler Feed Pump Cavitation Anomaly	20.0
Boiler Feed Pump #2 - Boiler Feed Pump L	12-Jan-14 20:55:00	14-Jan-14 08:50:00	11:55:00	Boiler Feed Pump Low Discharge Flow	2155.0
Boiler Feed Pump #2 - Boiler Feed Pump L	12-Jan-14 20:55:00	14-Jan-14 08:50:00	11:55:00	Boiler Feed Pump Low Discharge Flow	2155.0



CBM / Proactive Maintenance Monitoring

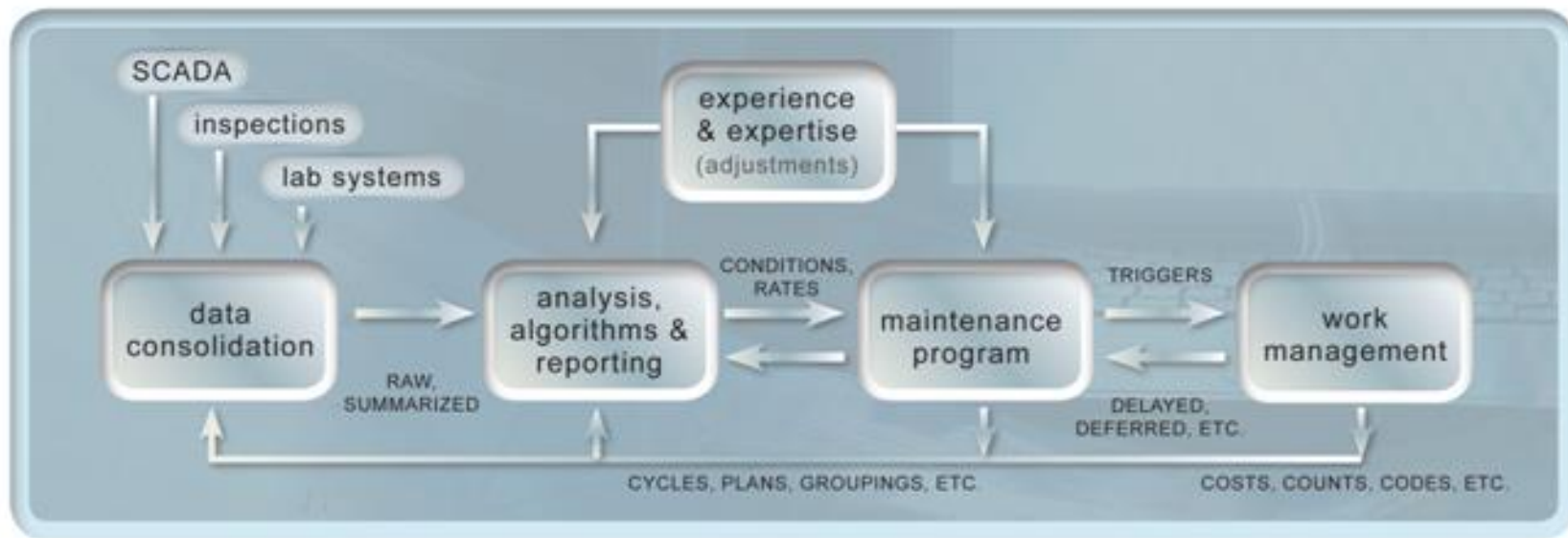


Real-Time Condition Monitoring



It's a Journey not a Destination

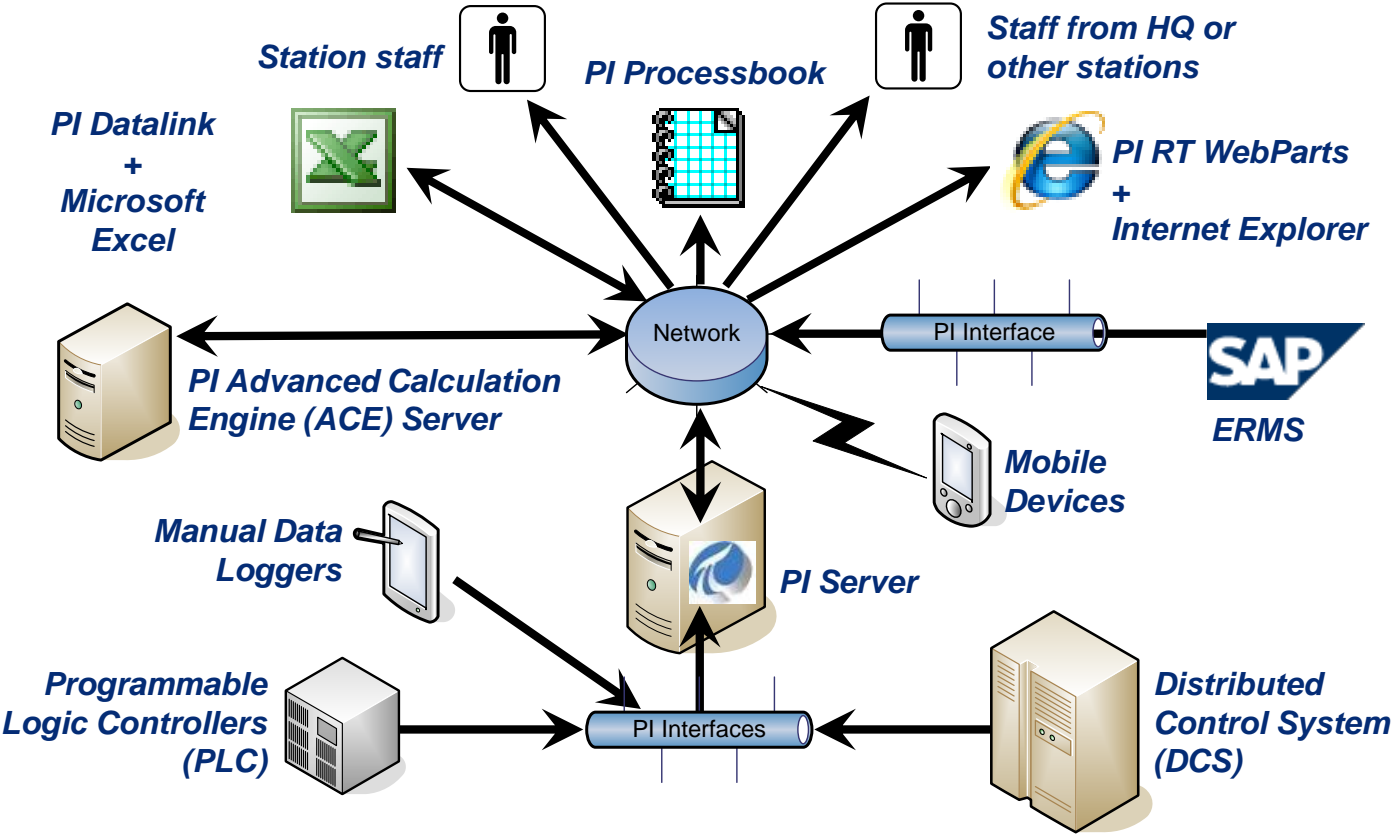
- Get started!
- Continue to improve
- Continue to tie the process together
- Get more from existing data & systems



How OSIsoft Can Help

- Prescriptive Guidance
- EA Services
- Workshops
- Customer Presentations
- PI Square
- Partners (products, services, partnerships)

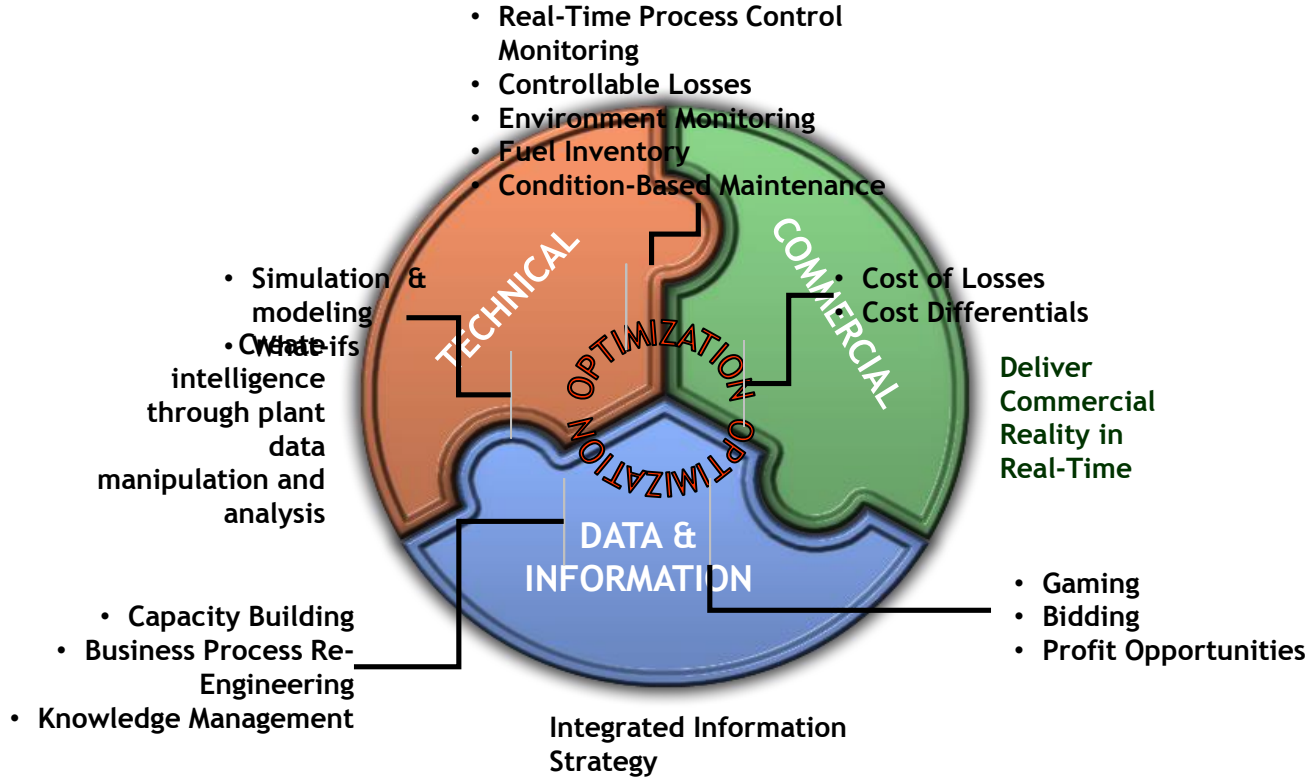
Deploying PI System provides the infrastructure to unify, store, visualize and analyze data from various sources of different protocol.



The real challenge is to transform this data into actionable information in order to make the right decisions and thus improve our technical and business performance.



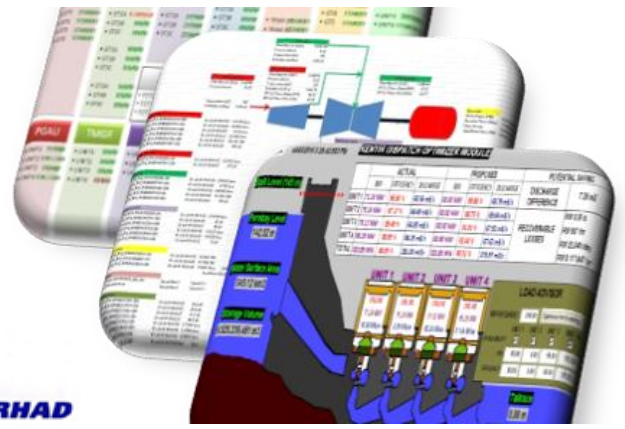
The infrastructure installed allow us to analyze data and make strategic decisions related to technical and commercial aspects of the business.



EVOLUTION OF THE PI SYSTEM IN TENAGA'S POWER GENERATION FLEET

Tenaga

“Deploying the PI System provides the infrastructure to unify, store, visualize and analyze our data. The real challenge is to transform this data into actionable information in order to make the right decisions and thus improve our technical and business performance.”
Abd Ghafar Abd Latif - Project Manager
Generation Plant Management System



CHALLENGES

- Diverse Power Plant Fleet
- Inhomogeneous sources of operational data
- Real time process data locked within isolated control systems
- Technical performance and business intelligence reliant on offline data

SOLUTION

- Deploy PI System as unifying data infrastructure
- Adopt in-house implementation approach to build internal competencies
- Continuous Change management
- Continuous in-house application development

RESULTS

- Plant data available to all personnel
- Over USD 7 million savings from in-house project implementation approach
- Over USD 10 million tangible savings from plant analysis & optimization
- Generate revenue by providing PI System deployment service to others

Improving Real-time and Spatial Decision Making by Combining the PI System with Esri ArcGIS

DONG Energy

"Portfolio Data Overview across OSIsoft and Esri platforms will reduce HSE risk and OPEX cost through improved asset integrity"

Anders Røpke, Lead Data Architect - Energy Management DONG Energy

DONG
energy



CHALLENGES

- Accessing an offshore wind turbine is extremely dangerous
- Working in an offshore wind turbine is 15 times more expensive compared to an onshore turbine

SOLUTION

- Better logistical planning through access to production, control and spatial data on a map

RESULTS

- Asset integrity improvements will potentially reduce unscheduled visits to 1.800 offshore wind turbines and reduce OPEX cost with up to ~20M EUR / year ^(NPV)

Transmission and Distribution Trends

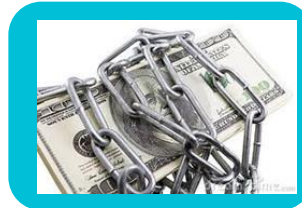
T&D Industry Pain Points



Aging Infrastructure



Asset Management



Budget Constraints



Capacity Planning



Smart Grid Integration



Renewables Integration

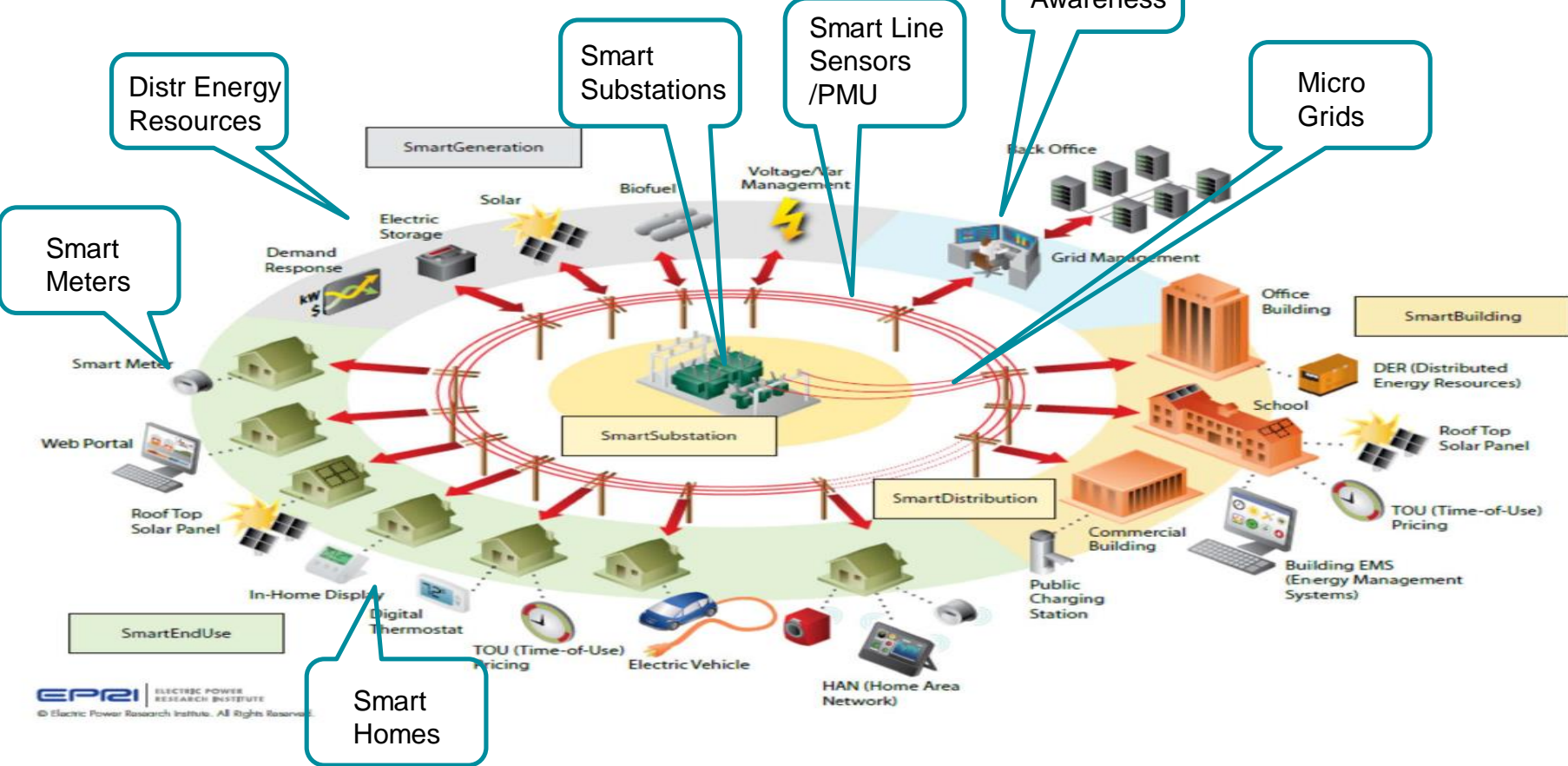


Compliance

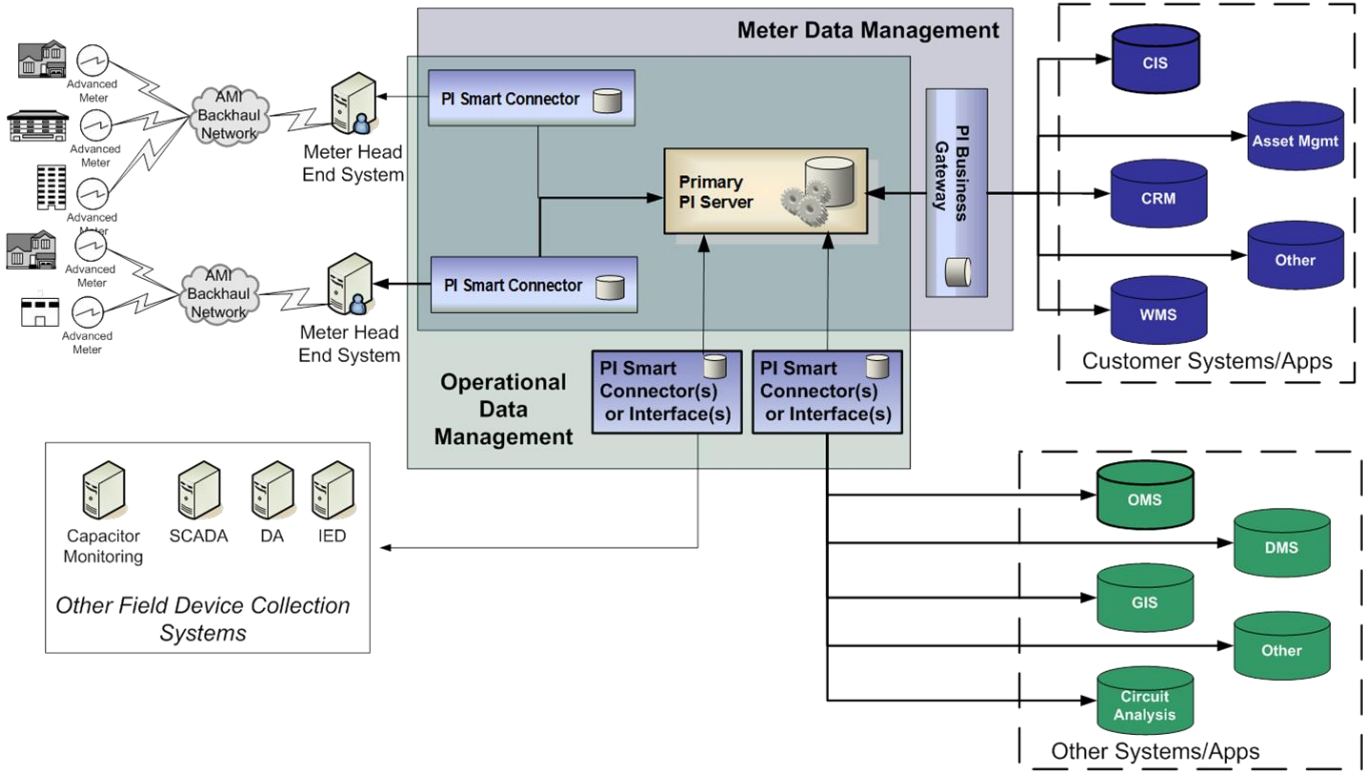


New Industry Trends:
GIS Integration, Big
Data, etc.

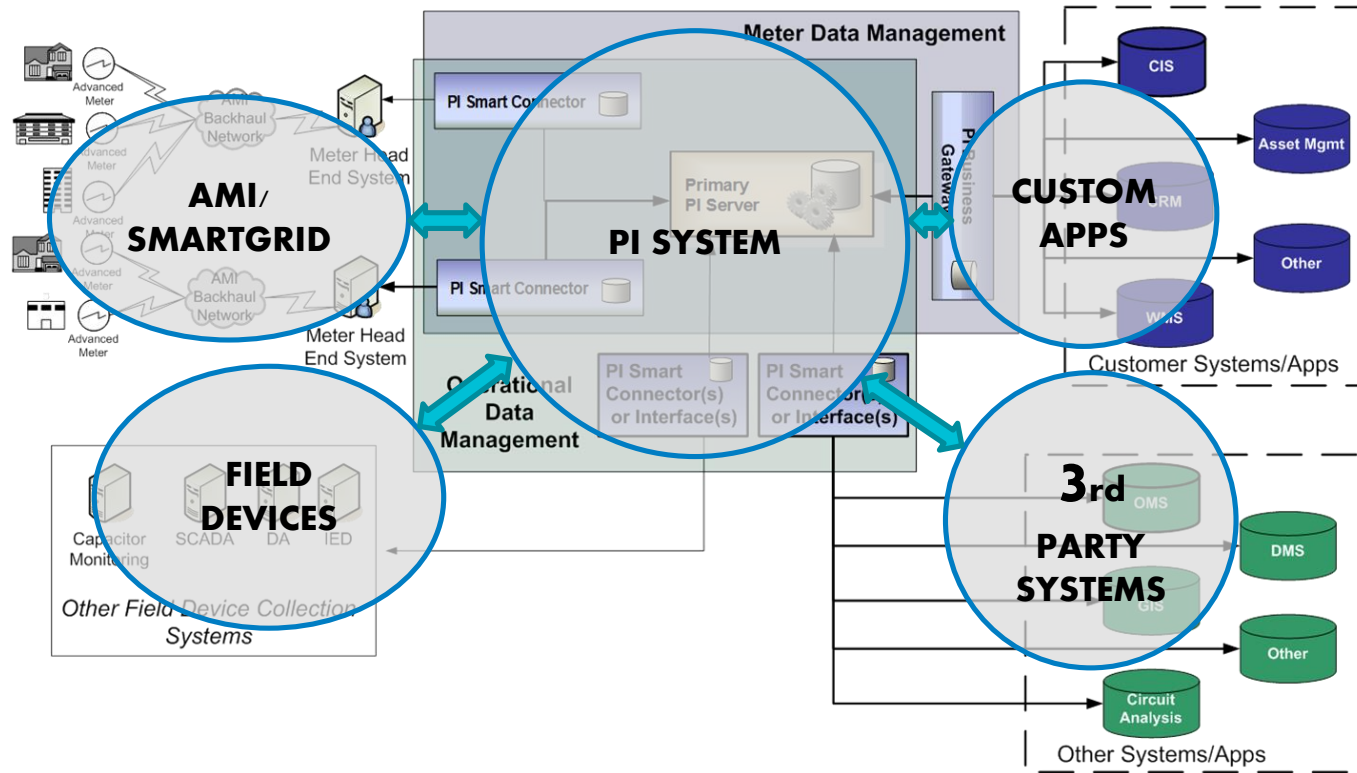
Why is Data important?



How does T&D use PI?

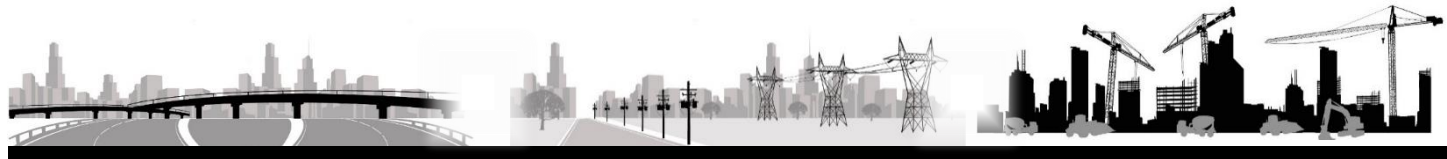


How does T&D use PI?



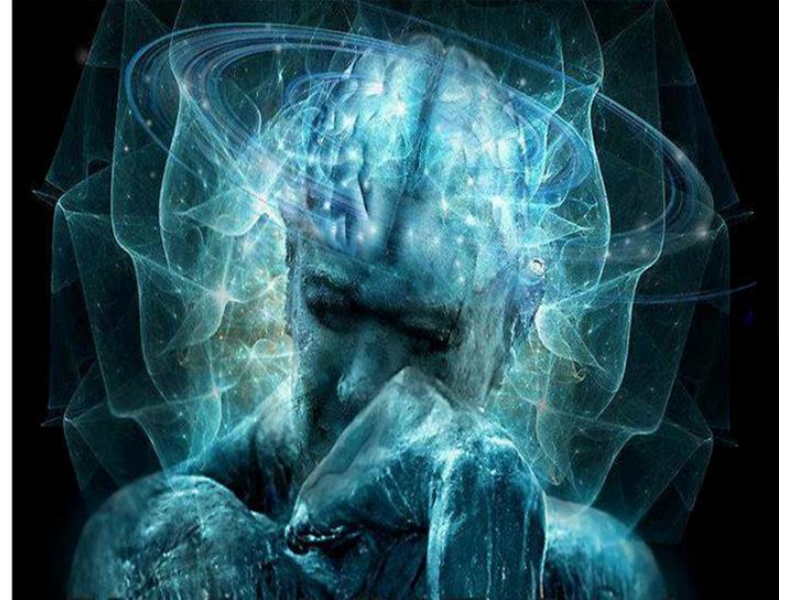
Why PI System?

- Standardizing your T&D / Smart Grid data infrastructure on OSIsoft's PI System provides value to a utility in many areas such as
 - ✓ Provides greater Situational Awareness
 - ✓ Increases equipment life
 - ✓ Improves Operations
 - ✓ Reduces CapEx and O&M spend and so lower TCO
 - ✓ Broadens access to a common source for all OT data
 - ✓ Improves decision-making capabilities of staff
 - ✓ Provides End to End Visibility to drive Innovation
- Users across the enterprise include: Operations, Engineering, Energy Trading, Customer Service, Maintenance, and Executive Management



We believe People with Data can Transform their world

- All data, securely, in real-time with context and history
- Decision Making is:
 - Faster
 - More Accurate and Complete
 - More Effective
- Preserve and expand knowledge
- Enable situational awareness and predictability
- Increase speed of execution
- Cultivate and leverage the collective “mind” power of the organization



감사합니다

谢谢

Danke

Merci

Gracias

Thank You

ありがとう

Спасибо

Obrigado

During the Speaker Q&A

Please wait for the
microphone before asking
your questions

State your
name & company





THANK YOU

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