



OSIsoft.
**PARTNER
MEETING** 2012
E M E A
The **Power** of **Data**



PI Asset Framework and Event Frames

Presented by **Hans Otto Weinhold**

OSIsoft Senior Customer Support Engineer

PI System Themes



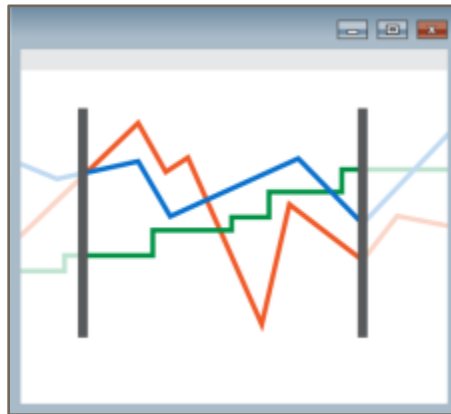
Scale

More data
Fast Performance
More robust



Asset-Centric PI

Manage data via
Asset context –
Reuse many times



Event Frames

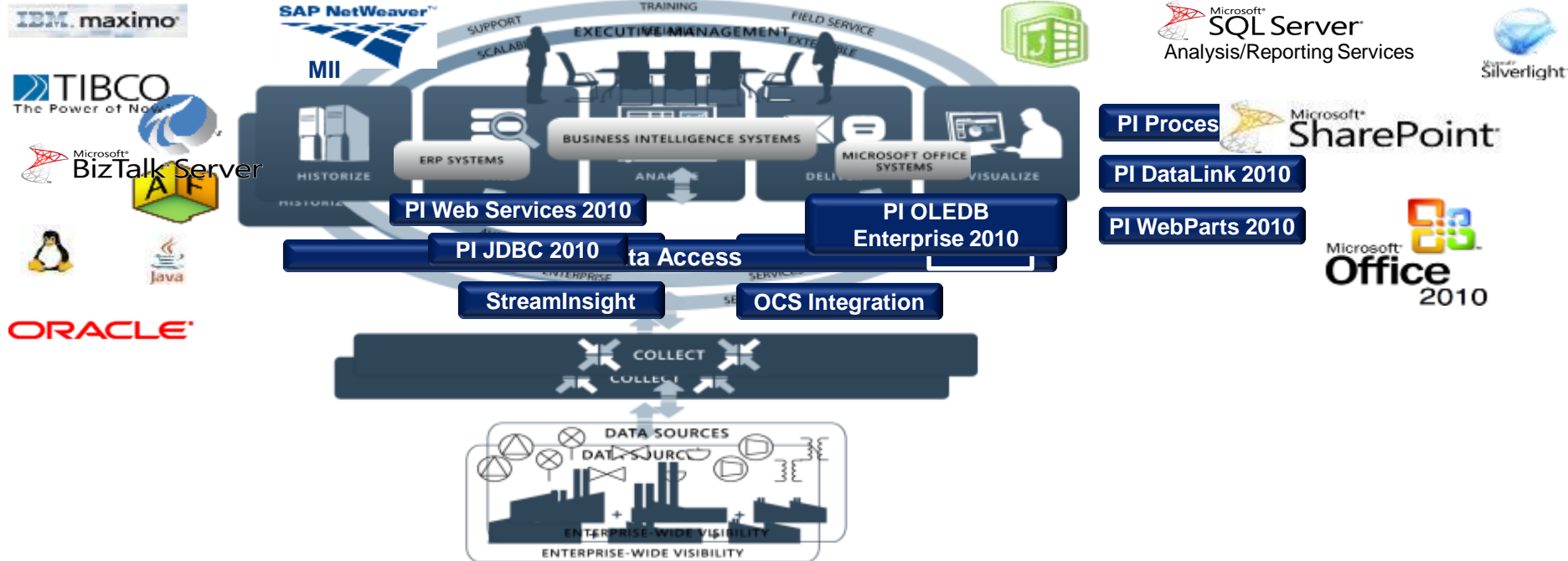
Identify and use
important events
and related data



Visualization

Many roles
Different formats
Any device

The PI System



PI System Themes



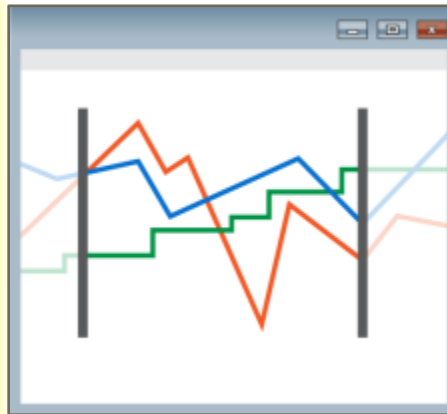
Scale

More data
Fast Performance
More robust



Asset-Centric PI

Manage data via
Asset context –
Reuse many times



Event Frames

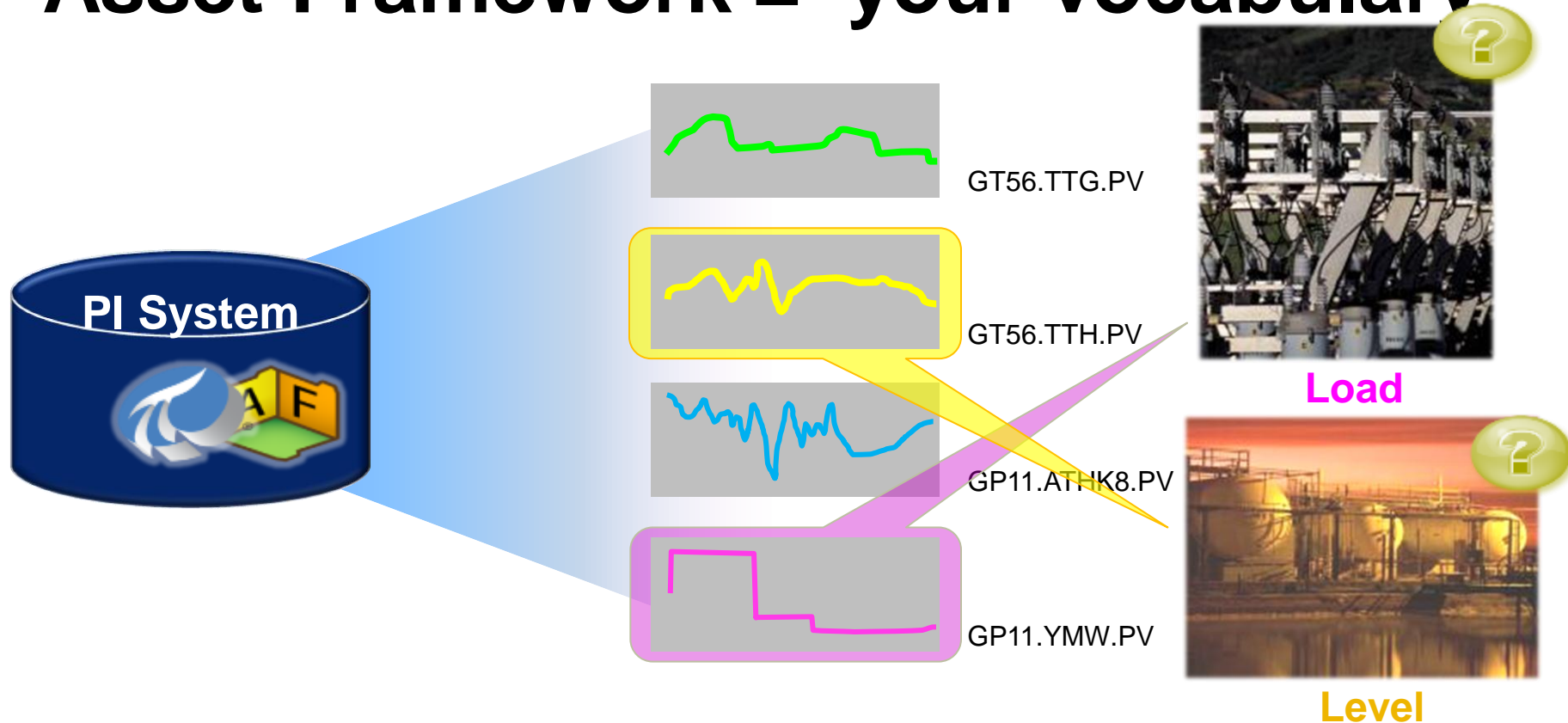
Identify and use
important events
and related data



Visualization

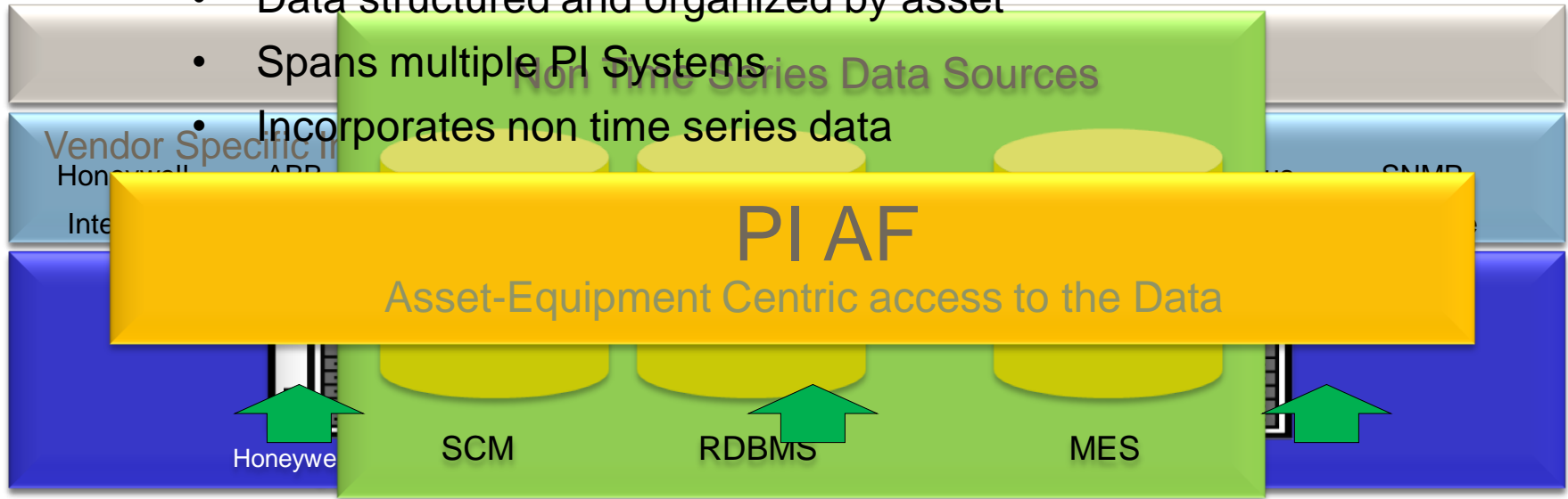
Many roles
Different formats
Any device

Asset Framework = your vocabulary



spans all your data

- Data structured and organized by asset
- Spans multiple PI Systems
- Incorporates non time series data



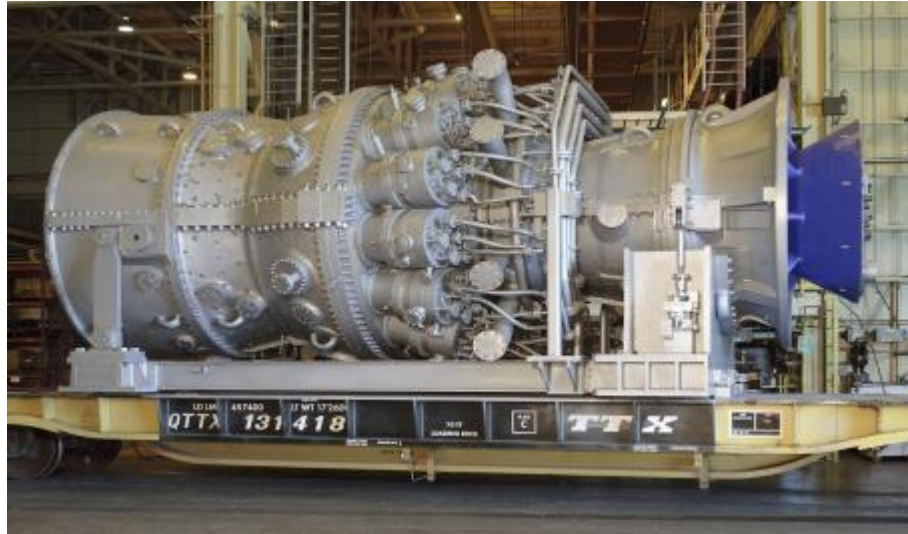
Asset Centric PI System

- **PI AF provides an asset centric view of your plant**
- **Establish relationships**
 - Build hierarchies, categories and connectivity models
 - Relate asset properties to your disparate data
- **Standardize, common view**
 - Templates for similar assets
- **Apply domain knowledge via PI Notifications and analyzes**
- **Access your data via PI Data Access products**

Build a Complete Picture of Your Asset

PI Tags

- Inlet pressure
- Inlet flow
- Ambient temperature



PI Tags

- Exhaust temperature
- Exhaust flow
- Measured MW output

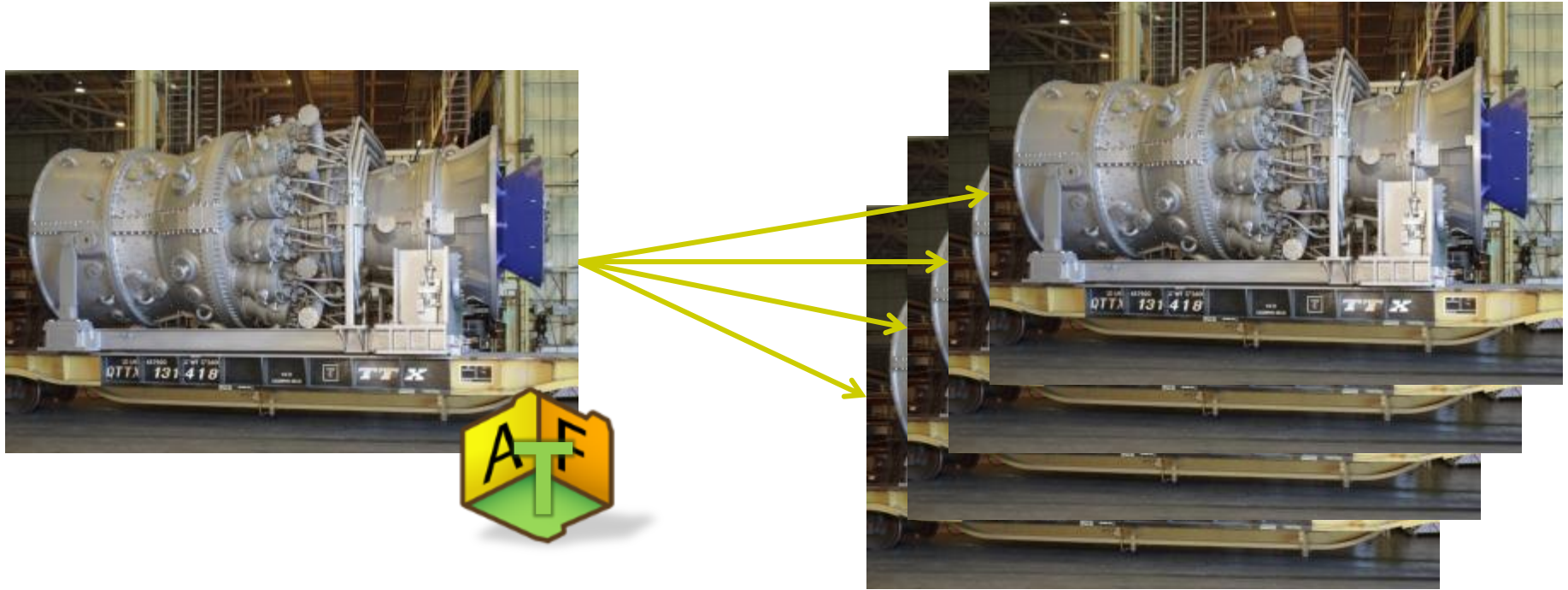
External Databases

- Performance curves
- Last service date
- Design documents
- Inspection best practice

Calculations

- Performance calculations
- KPI's

Common View for Similar Assets



Add Value to your PI System

UC2011-SK - PI System Explorer

File Edit View Go Tools Help

Elements

Elements

- Big Creek Power Plant
 - Condenser
 - Gas Turbine 1
 - Gas Turbine 2
 - HRSG 1
 - HRSG 2
 - Steam Turbine
 - System Configuration

Event Frames

Library

Unit of Measure

MyPI

Notifications

Contacts

28 Attributes

Prices

Power Factor

Electricity Price

Gas Fuel Price

Oil Fuel Price

Compressor Discharge Pressure	16.2847557067871 bar(g)
Compressor Discharge Tempe...	433.991912841797 °C
Compressor Inlet Temperature	19.9780979156494 °C
Exhaust Gas Pressure	0.0206421613693237 bar(g)
Exhaust Gas Temperature - #...	594.774108886719 °C
Exhaust Gas Temperature - #...	597.018737792969 °C
Exhaust Gas Temperature - #...	595.317443847656 °C
Exhaust Gas Temperature - #...	598.902770996094 °C
Fuel Oil Flow	-0.0620765015482903 m3/h
Fuel Oil Pressure	15.818398475647 bar(g)
Fuel Oil Temperature	33.3455696105957 °C
Gas Fuel Flow	70317.8671875 m3/h
Gas Fuel Pressure	36.21142578125 bar(g)
Gas Fuel Temperature	68.7641372680664 °C
Gas Turbine Speed	3000.62158203125 rpm
Gross MW Output	261.549621582031 MW
In Service Date	2/25/2009 12:00:00 AM
Inlet Guide Vane Angle	95.78909 %
Inlet Pressure Loss	1.60181736946106 mbar(g)

nts

nts

g Creek Power Plant

Condenser

Gas Turbine 1

Gas Turbine 2

HRSG 1

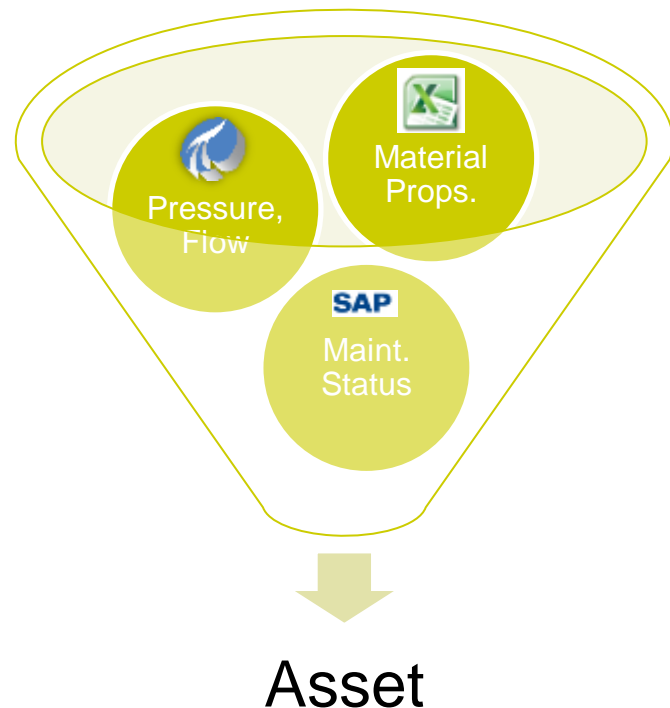
HRSG 2

Steam Turbine

ystem Configuration

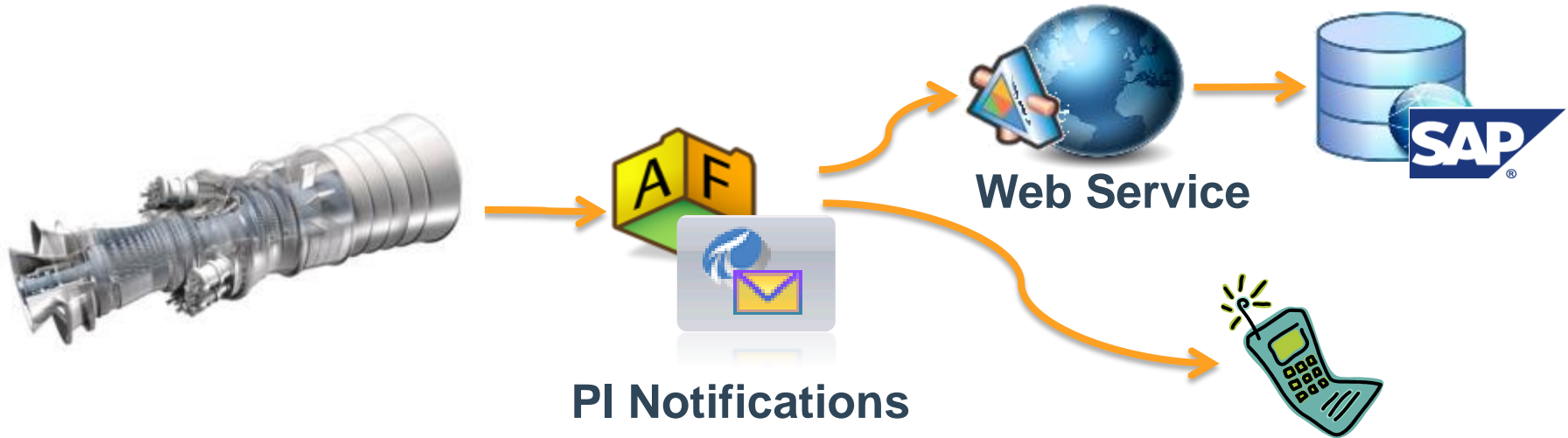
Add Value to your PI System

- **Tie asset properties to your data**
 - Static values, PI Tags from multiple PI Servers, static or linked Tables
 - Custom data references to other data sources



Add Value to your PI System

“One of GT exhaust thermocouples has been acting up... Let’s keep an eye on it and create a work order for maintenance if it fluctuates more than 5% in 5 seconds. Make sure Bob is notified of this also.”



Add Value to your PI System

Event Frames Are Part of Asset Framework

- GT #2 tripped again last night!!
- How many times has this happened in the last year?
- What were the operating conditions when it tripped?
- Let's find and gather all these events and analyze them.



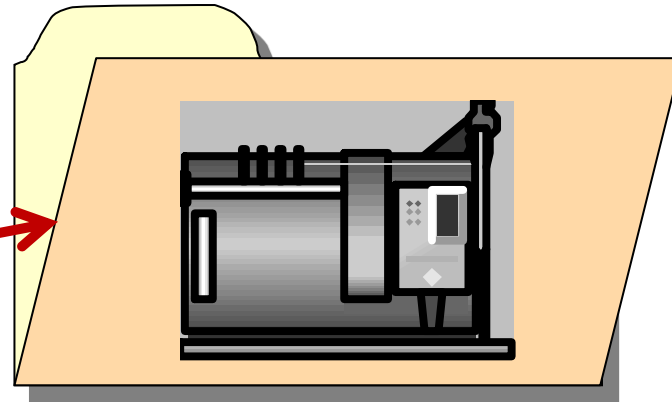
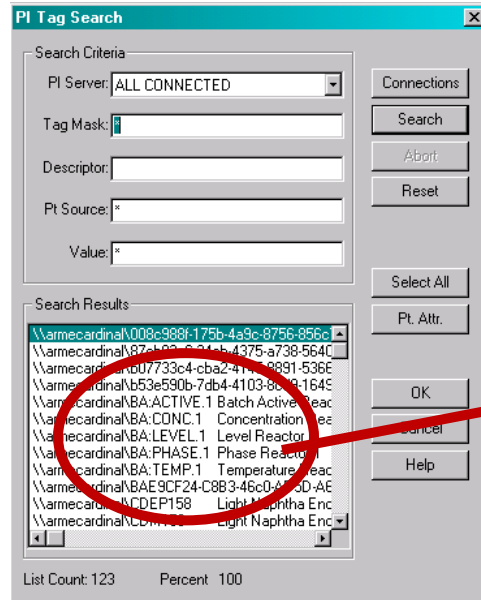
Downtime Events

- Asset of interest
- Start/End Times
- Reason Codes
- Asset Conditions

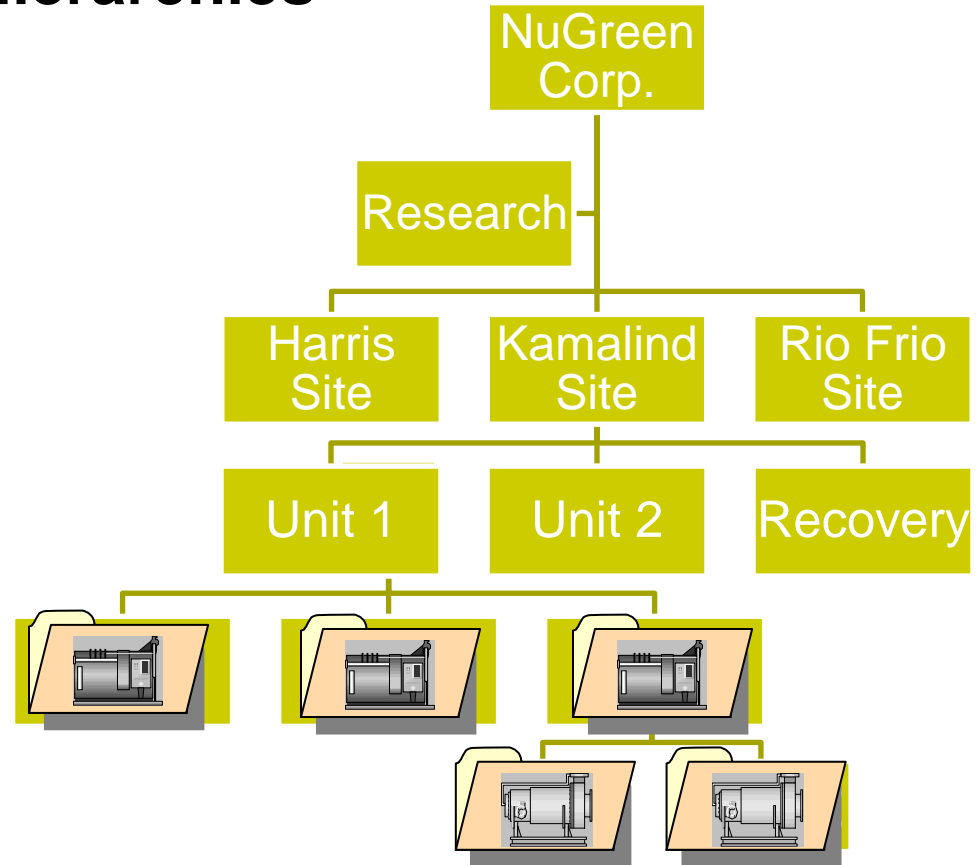


How to begin

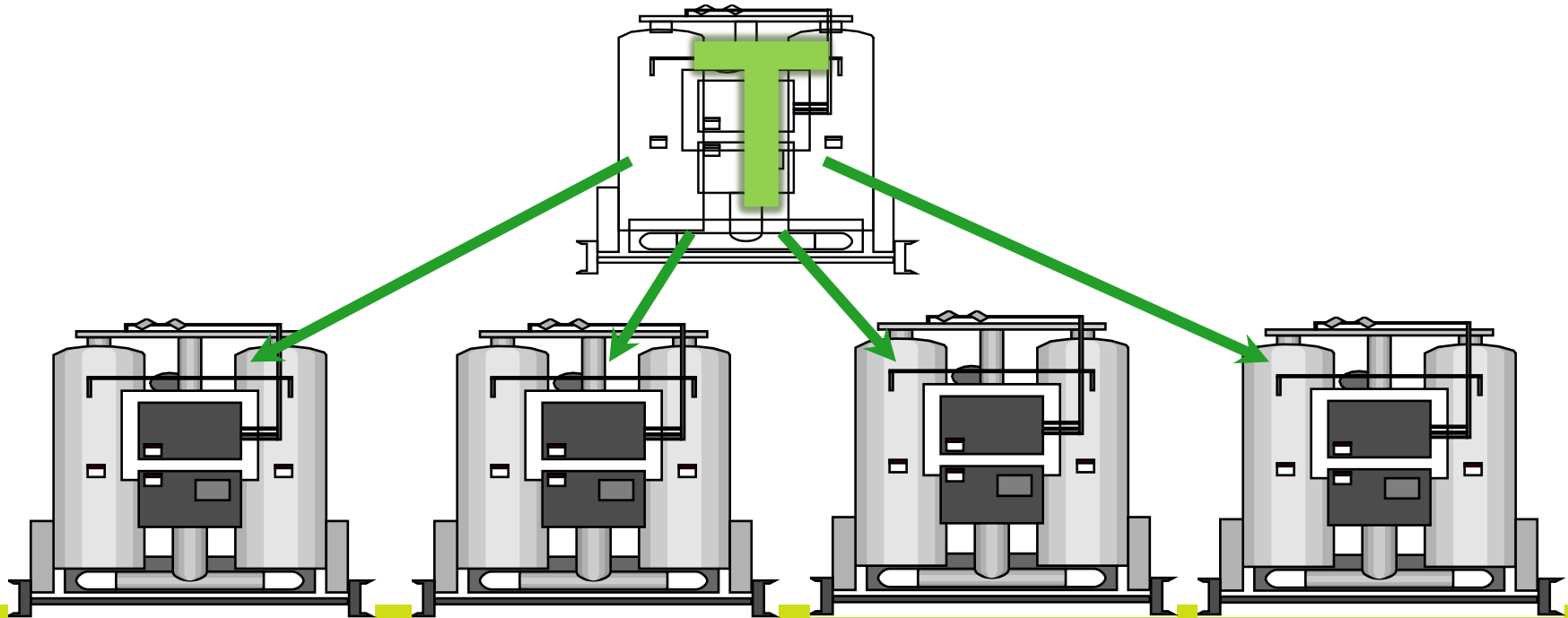
Sort Your Tags into Elements Which Represent Your Equipment



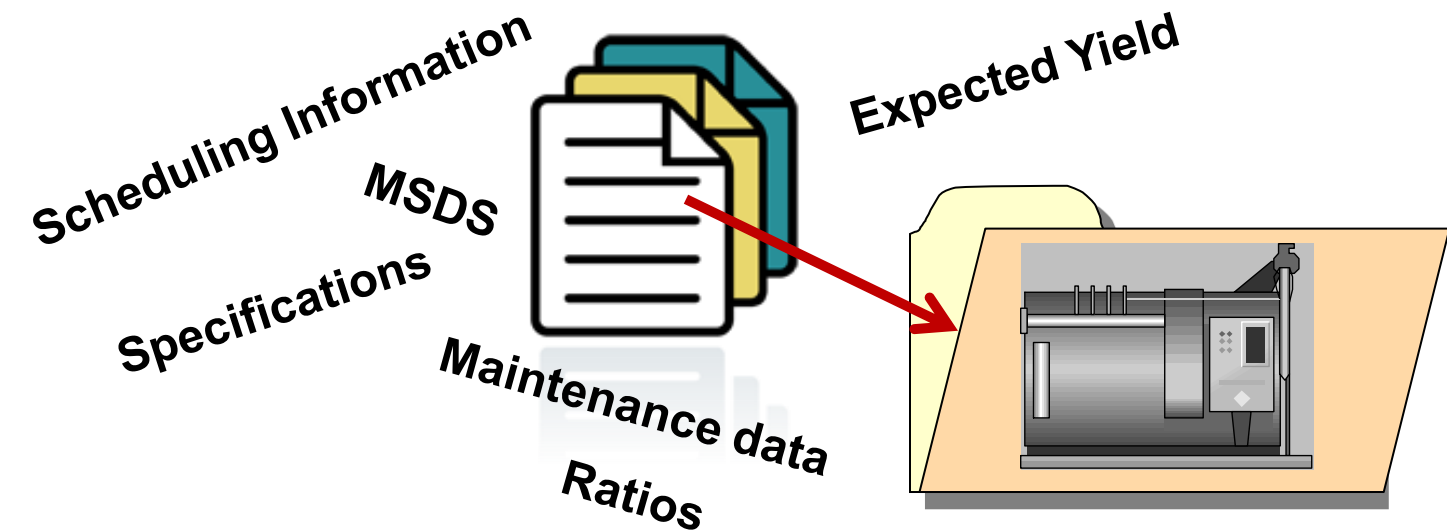
Organize the Assets into Hierarchies



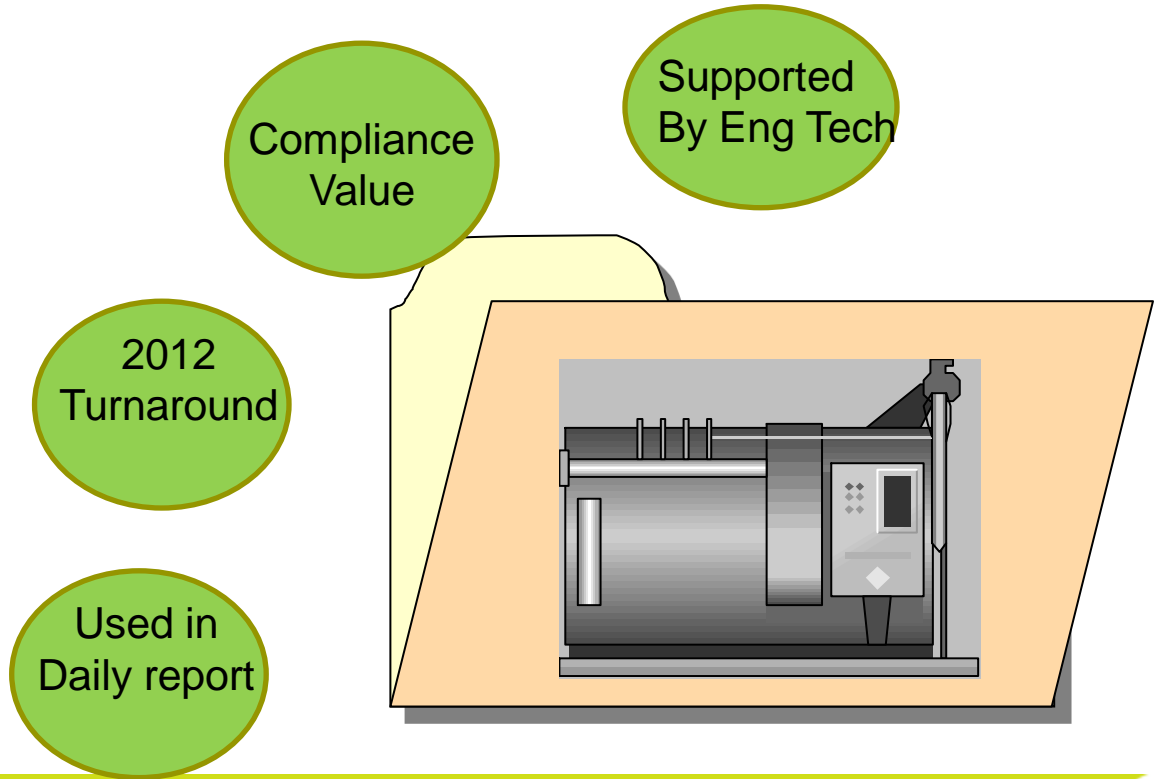
Manage and Extend Elements by creating Powerful **Templates**



Add Efficiency Calculations, KPIs, Reference Data from Relational Databases and Other Information to Add More Value



Add Key Words (Categories) to Make Them Easier to Search for



It Might Take a Team

Process “nerds” – subject matter experts - who understand the data well enough to build the calculations and define the relationships



&



IT “geeks” who can wrangle the XML and SQL, to build large databases

AF – Putting AF into Best Practice

Shaping your data by:

1. Defining types of assets

Schema how to attribute Elements



Templates

2. Association to a “real” asset

Created from Template



Elements

3. Describing the “real” asset

having Units Of Measurements (UOM)
can come via data references from everywhere



Attributes

4. Physical/logical asset structure



Hierarchy

5. Assets connectivity

Model : Collections of connected elements

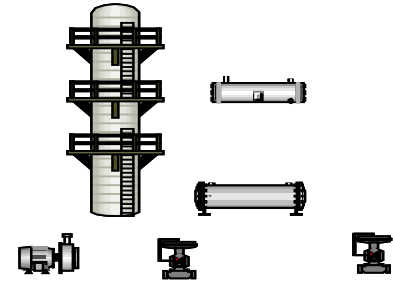


Model

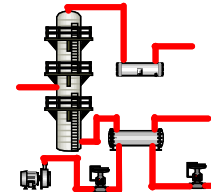
Condensor
Heatexchanger
Column
Valve
Pipe
Pump

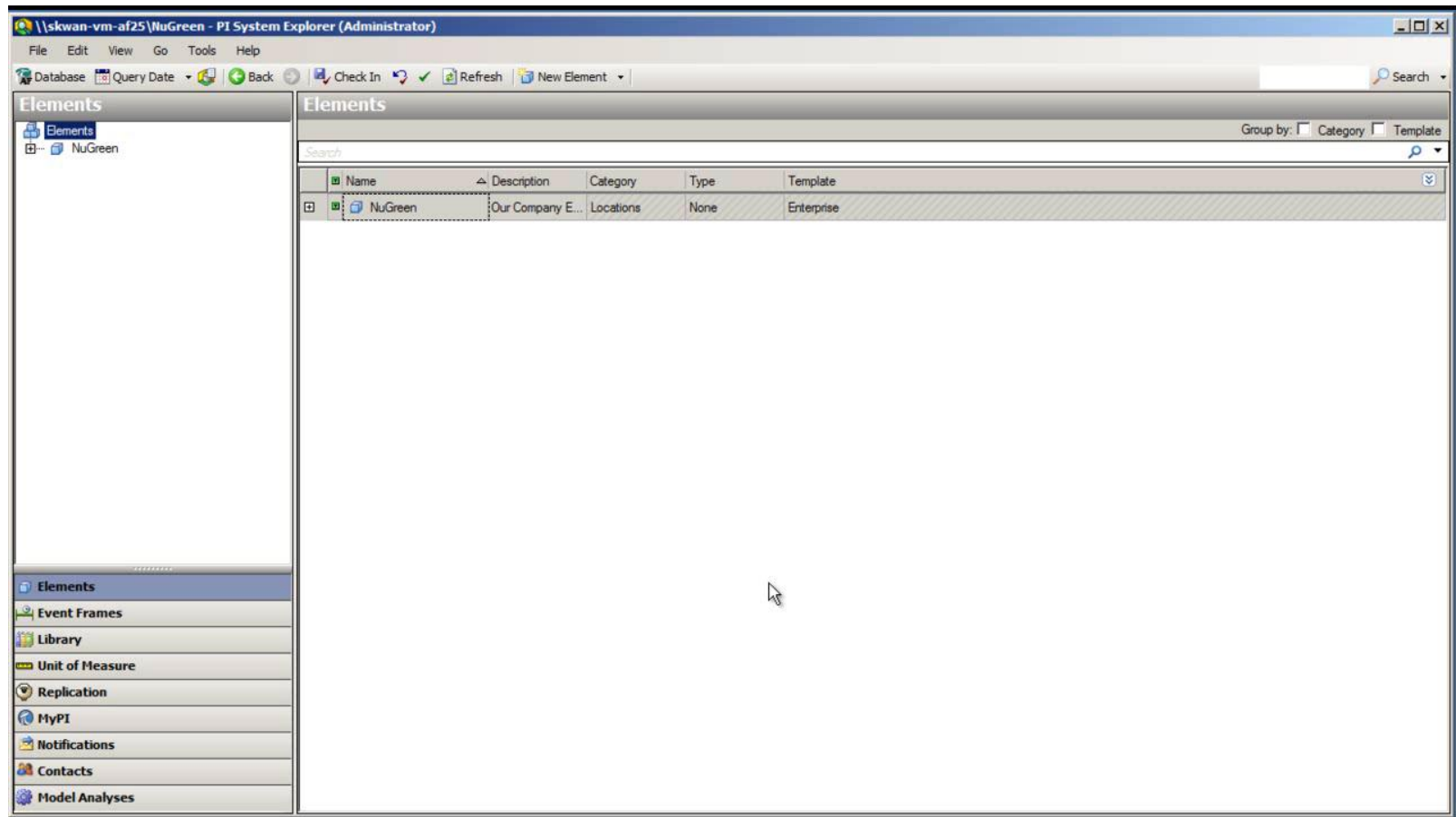
Column661
Condensor661
P661_1
P661_2
HeatExchanger661
Valve661_1
Valve661_2

OpeningGrade
InspectionResult
LastInspection
SerialNumber
XZY



PI Point: \\MOBILEVBC\Valve661_1.OpeningGrade
Table Lookup: SELECT InspectionResult FROM ...
Table Lookup: SELECT LastInspection FROM ...
Table Lookup: SELECT SerialNumber FROM ...
Formula: A=OpeningGrade:[A]*0.98]







Insight PI Asset Framework

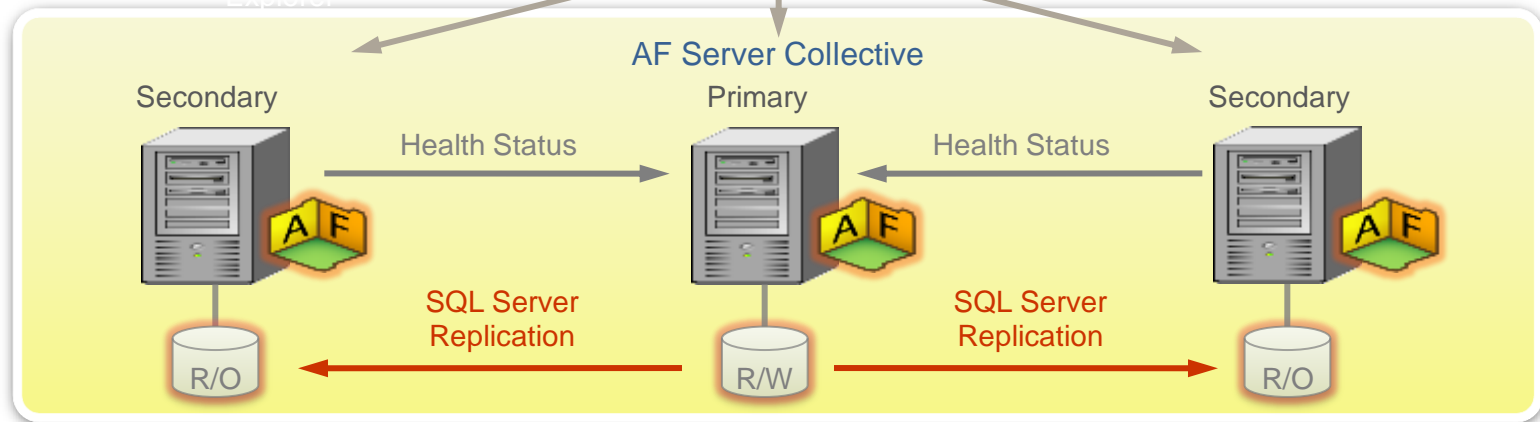
AF HA Collective



PI Notifications, AF-based PI Clients
(PI WebParts, ProcessBook, DataLink, etc.)



AF SDK Library



Extending PI AF

- Enhance functionality of PI AF by your own Plugins
 - Access new data sources (Data References)
 - Notifications to users or systems (Delivery Channels)
- Easy deployment – no ‘roll-outs’ – just register

Mapping assets – User example UC 2012

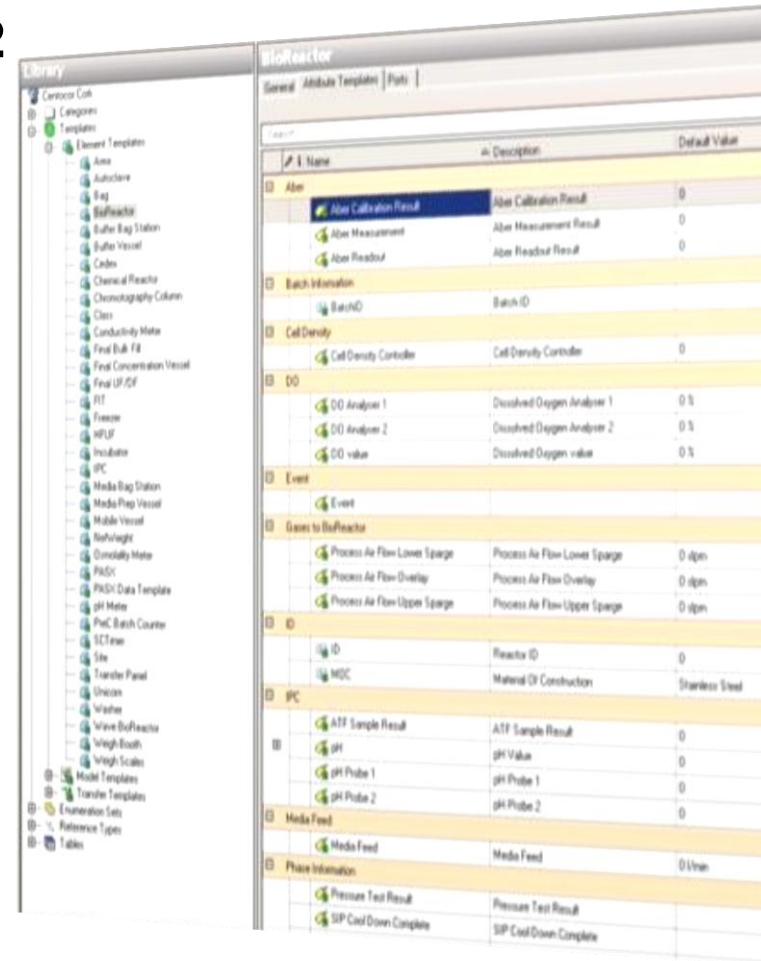
PI Asset Framework – PI AF in Janssen

Super Class concept.

- Class based templates – built in conjunction with process and subject matter experts.
- Only process critical information grouped together in a logical model.
- Ensures that the entire organisation have a common taxonomy.

PAS|X \ PI AF

- Using Unit based templates allows us to build unit based MBR elements that can be applied on other sites.



Item Name	Description	Default Value
Batch Information		
BatchID	Batch ID	
Cell Density		
Cell Density Controller	Cell Density Controller	0
DO		
DO Analyser 1	Dissolved Oxygen Analyser 1	0 %
DO Analyser 2	Dissolved Oxygen Analyser 2	0 %
DO value	Dissolved Oxygen value	0 %
Event		
Event		
Gas to BioReactor		
Process Air Flow Lower Spurge	Process Air Flow Lower Spurge	0 dpm
Process Air Flow Overlay	Process Air Flow Overlay	0 dpm
Process Air Flow Upper Spurge	Process Air Flow Upper Spurge	0 dpm
ID		
ID	Reactor ID	0
MDC	Material Of Construction	Stainless Steel
IPC		
ATF Sample Result	ATF Sample Result	0
pH	pH Value	0
pH Probe 1	pH Probe 1	0
pH Probe 2	pH Probe 2	0
Media Feed		
Media Feed	Media Feed	0 l/min
Phase Information		
Pressure Test Result	Pressure Test Result	
SIP Cool Down Complete	SIP Cool Down Complete	

Asset-centric Visualization

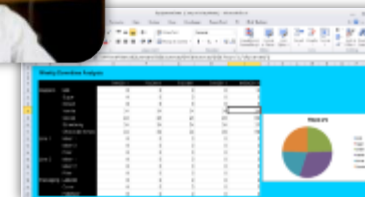
PI Coresight:
Ad Hoc Analysis &
Collaboration



PI WebParts: Composite
Apps, Shared broadly



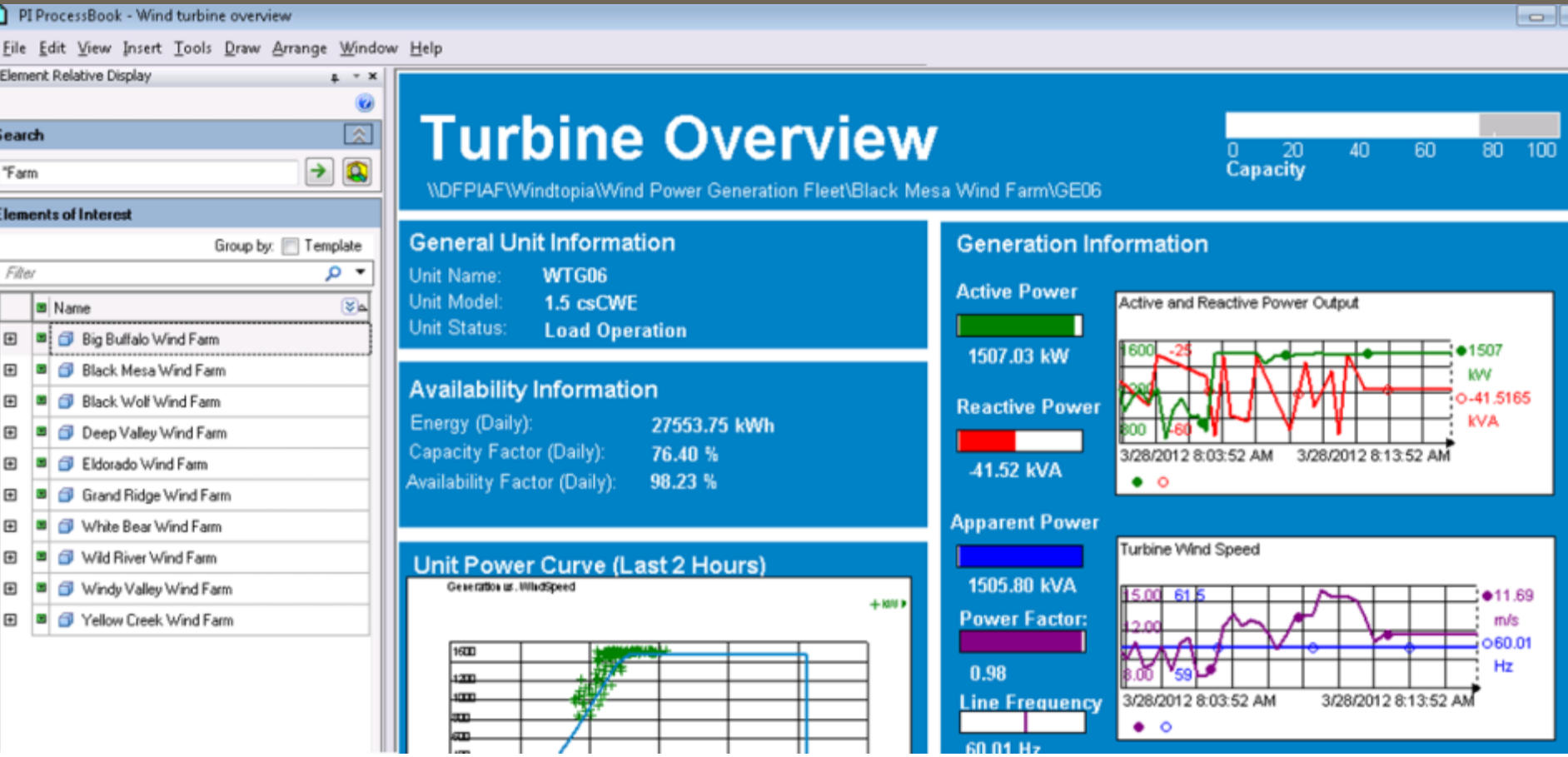
PI DataLink:
Reporting and
analytics in Microsoft
Excel



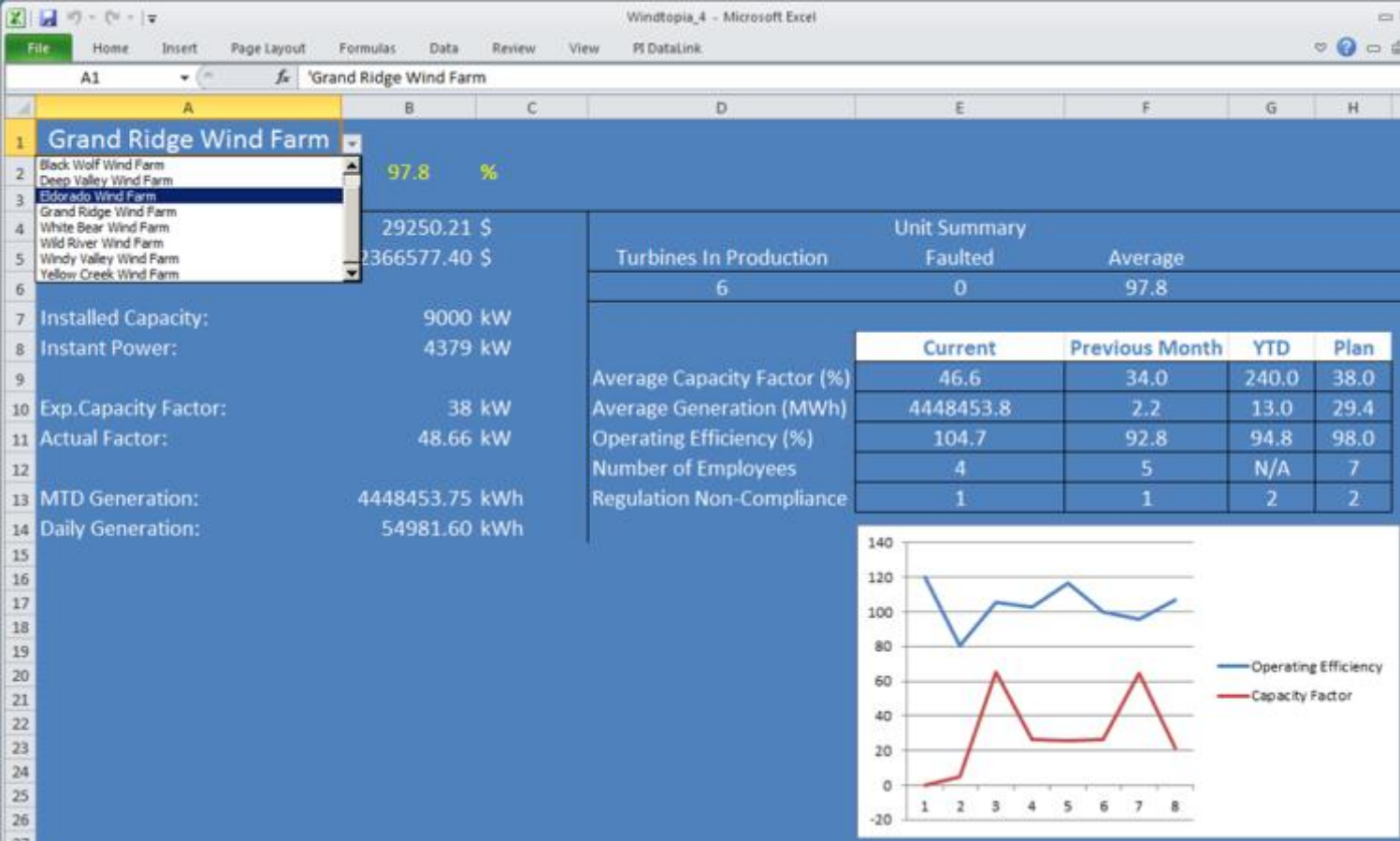
PI ProcessBook:
Display authoring and
Process monitoring



Asset-centric displays in PI ProcessBook 2012



Asset-relative reports in PI DataLink 2012



Consolidate and share with PI WebParts



Explore assets with PI Coresight

PI Coresight[™]
homepage

New Undo Redo Messages

Power Generation Farms

Help

\\DFPIAF\Windtopia\Wind Power Generation Fleet

Big Buffalo Wind Farm

Black Mesa Wind Farm

Black Wolf Wind Farm

Deep Valley Wind Farm

Eldorado Wind Farm

Grand Ridge Wind Farm

White Bear Wind Farm

Wild River Wind Farm

Windy Valley Wind Farm

Search

Related Assets (10)

Cart

Big Buffalo Table

Deep Val... Revenue

134.35

Deep Val...y Energy

252.53

Name	Value	Units	Trend
Big Buffalo Wind Farm Farm Availability	76.986	%	
Big Buffalo Wind Farm Farm Expected Power	9,119	kW	
Big Buffalo Wind Farm Farm Total Power	-36	kW	

Name	Value	Units	Trend
Black Mesa Wind Farm Farm Availability	72.235	%	
Black Mesa Wind Farm Farm Expected Power	12,833	kW	
Black Mesa Wind Farm Farm Total Power	-65	kW	

● Big Buffalo Wind Farm|Farm Total Power
-36 kW

○ Black Mesa Wind Farm|Farm Total Power
-65 kW

◆ Grand Ridge Wind Farm|Farm Total Power
-26 kW

3/23/2012 5:48:09 AM 1h 8h 1d 1w 1mo 1h Now 3/23/2012 6:48:09 AM

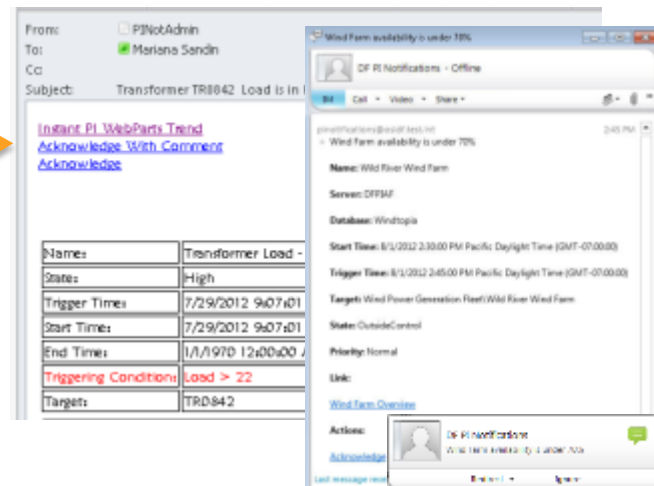
5:48 5:58 6:08 AM 6:18 6:28 6:38 3/22/2012, 3:00 AM 9 AM 3 PM 3/22/2012, 9:00 PM 3 AM

PI Notifications keeps you informed of your assets

“One of the turbine’s exhaust thermocouples has been acting up... Let’s keep an eye on it and create a work order for maintenance if it fluctuates more than 5% in 5 seconds. Make sure Bob is notified of this also.”



DELIVER



Web Service



PI System Themes



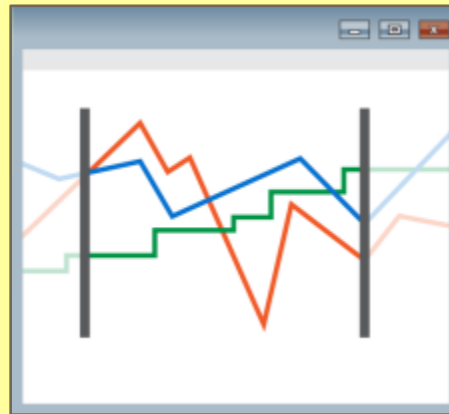
Scale

More data
Fast Performance
More robust



Asset-Centric PI

Manage data via
Asset context –
Reuse many times



Event Frames

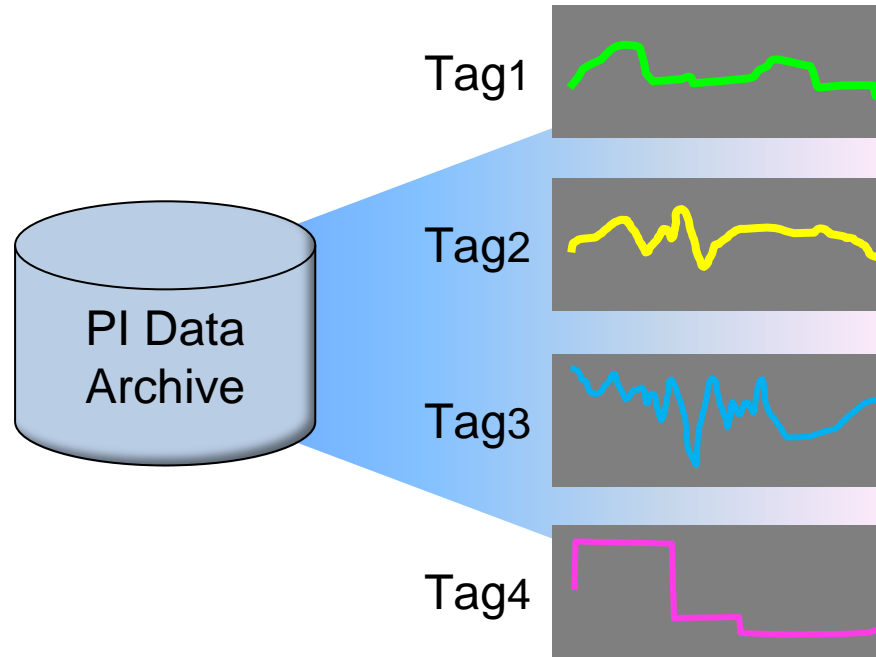
Identify and use
important events
and related data



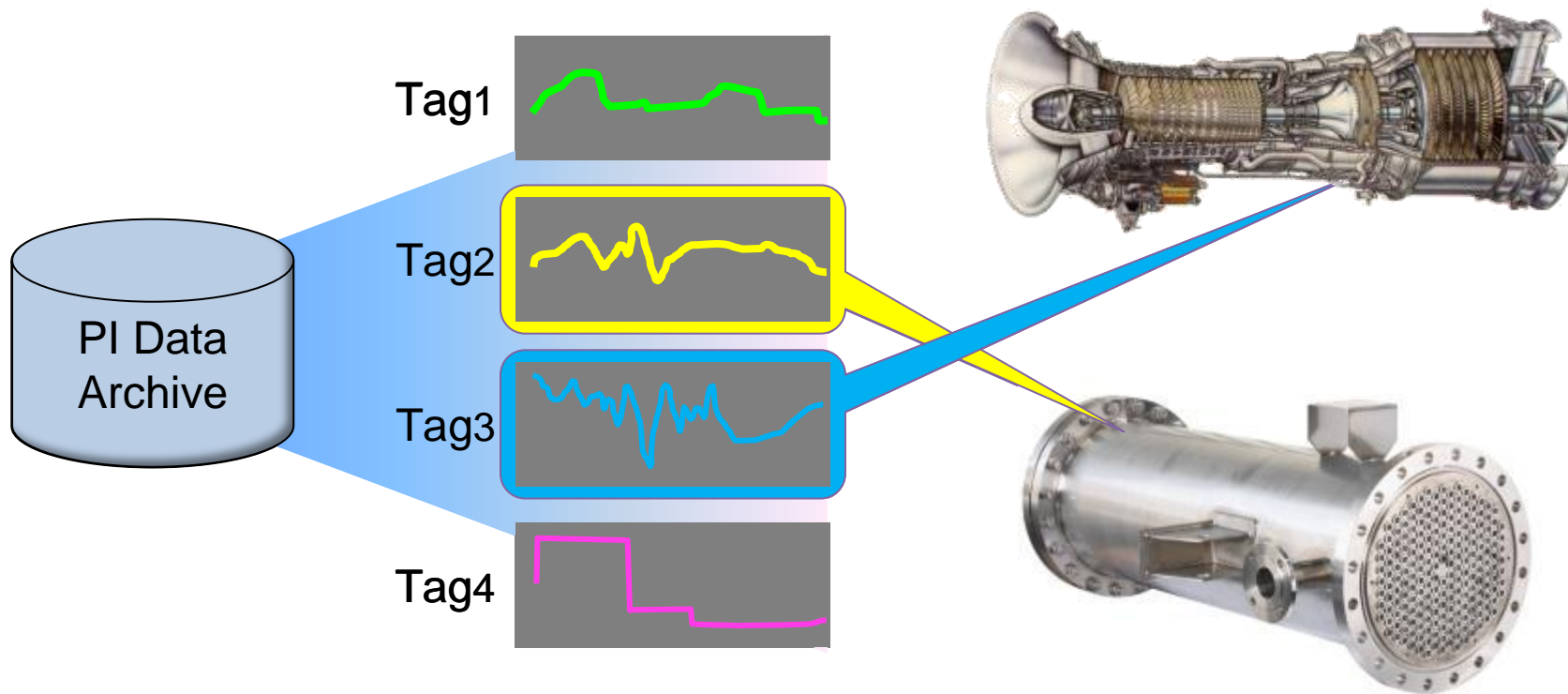
Visualization

Many roles
Different formats
Any device

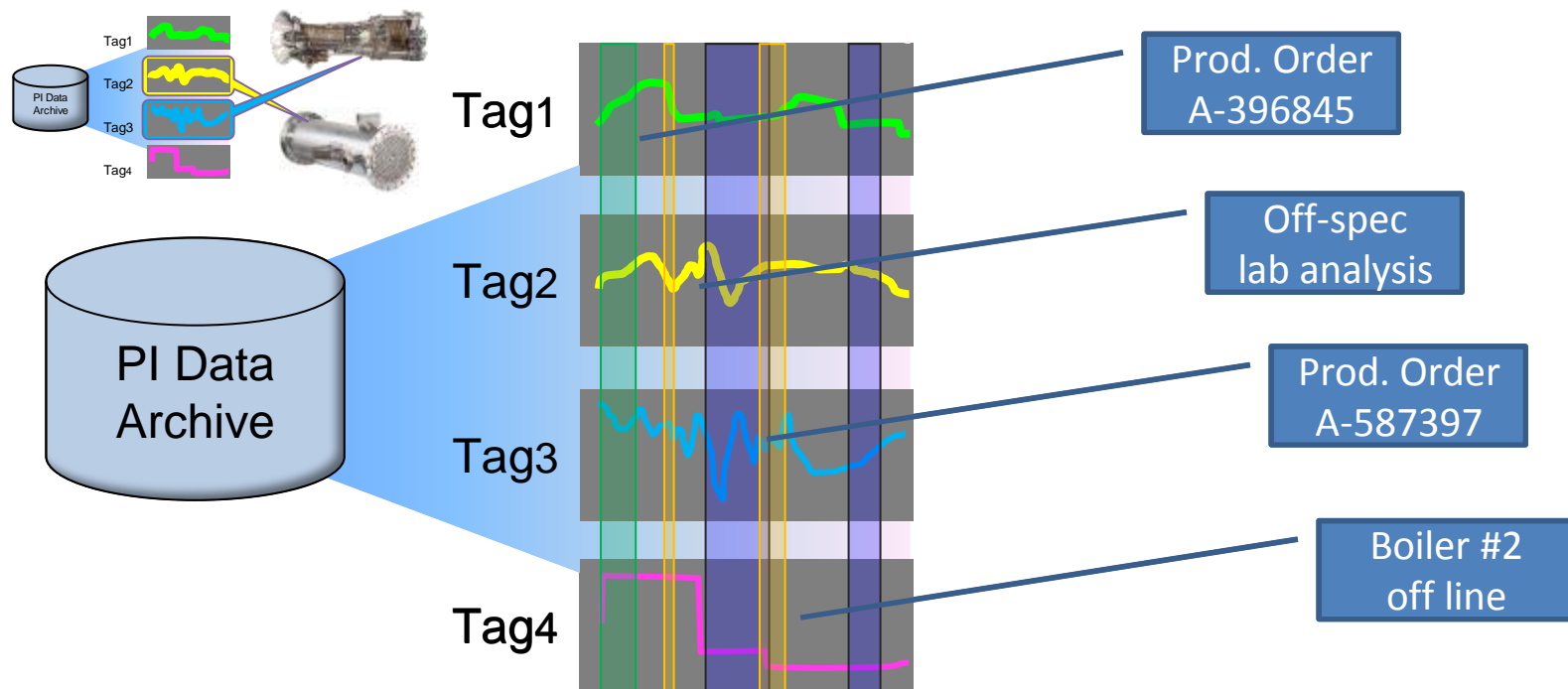
PI Server – Time series data and Tags



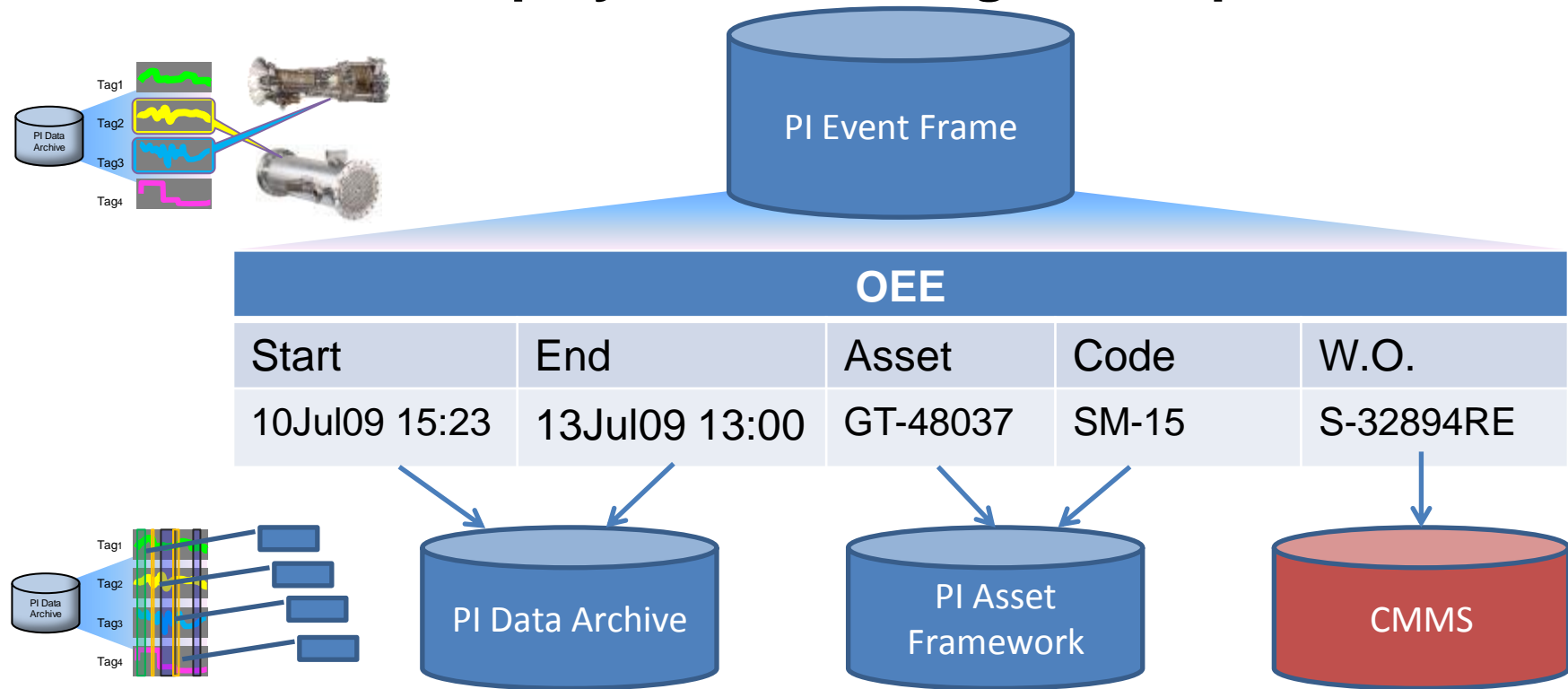
PI AF helps you find the right tags using



PI Event Frames helps you find the right time periods



PI Event Frames helps you find the right time periods

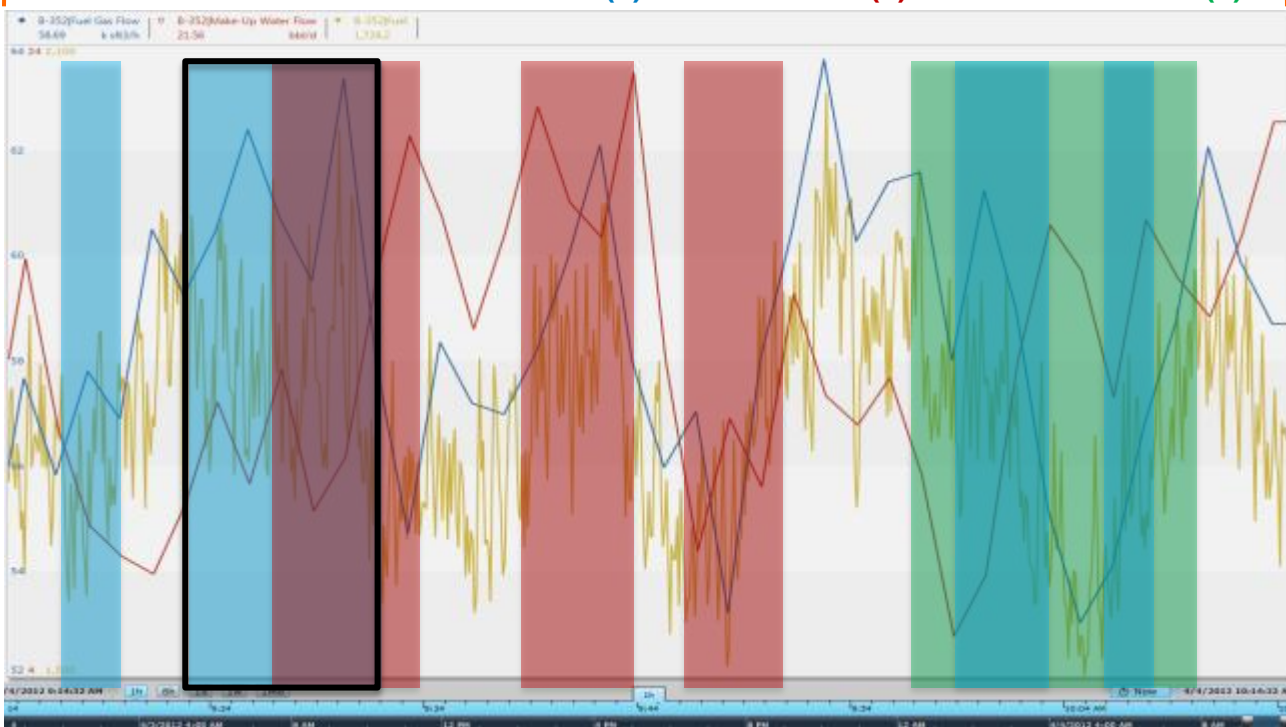


PI Event Frames = events + related data

Excursions (4)

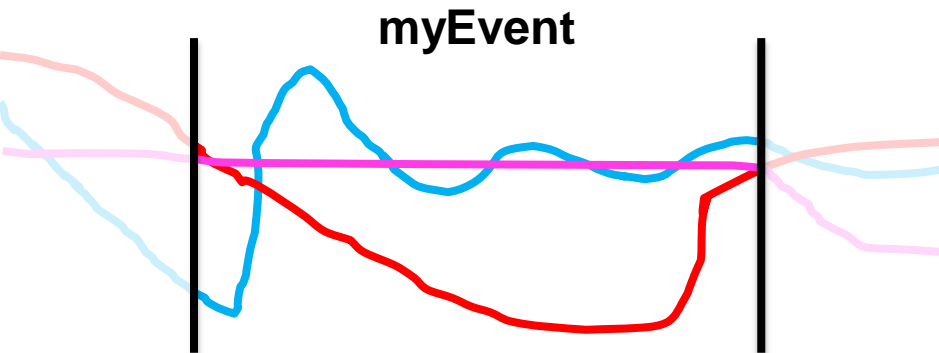
Downtime (3)

Product XYZ (1)

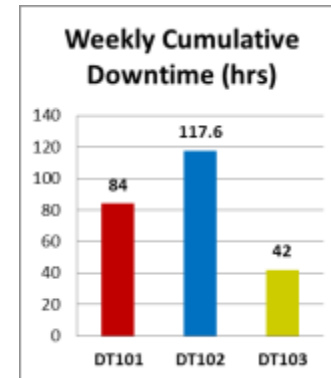
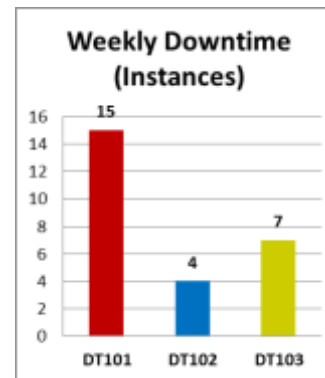


Event Attribute	Value
Name	Ex 20121215-0002
Start	15-Dec-2012 10:35:02
End	15-Dec-2012 10:47:26
Duration	12 min, 24 sec
Asset	Boiler-459
Excursion Type	High Violation
Fuel Gas Flow.Avg	37.12 k sft3/h
Fuel.Start	823.48 k sft3/ton
myPIKPI.Max	47.19 bbl/d

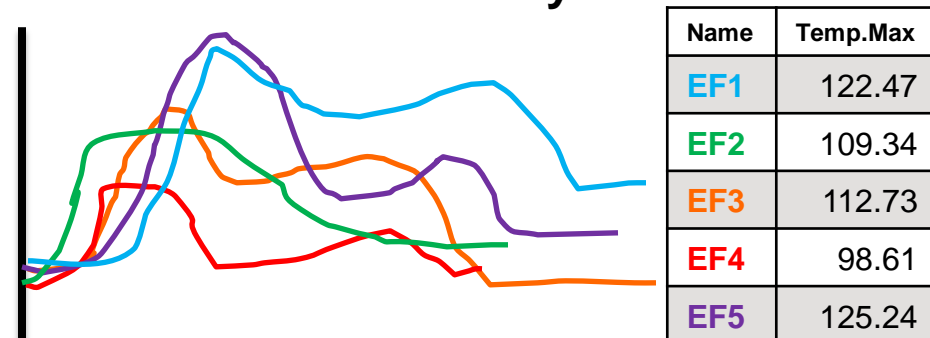
Simplify Data Analysis



Perform Asset Comparisons



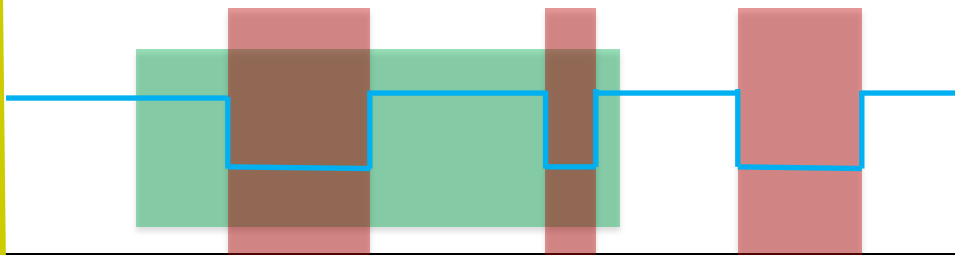
Event Overlay Trend



Perform Comparisons

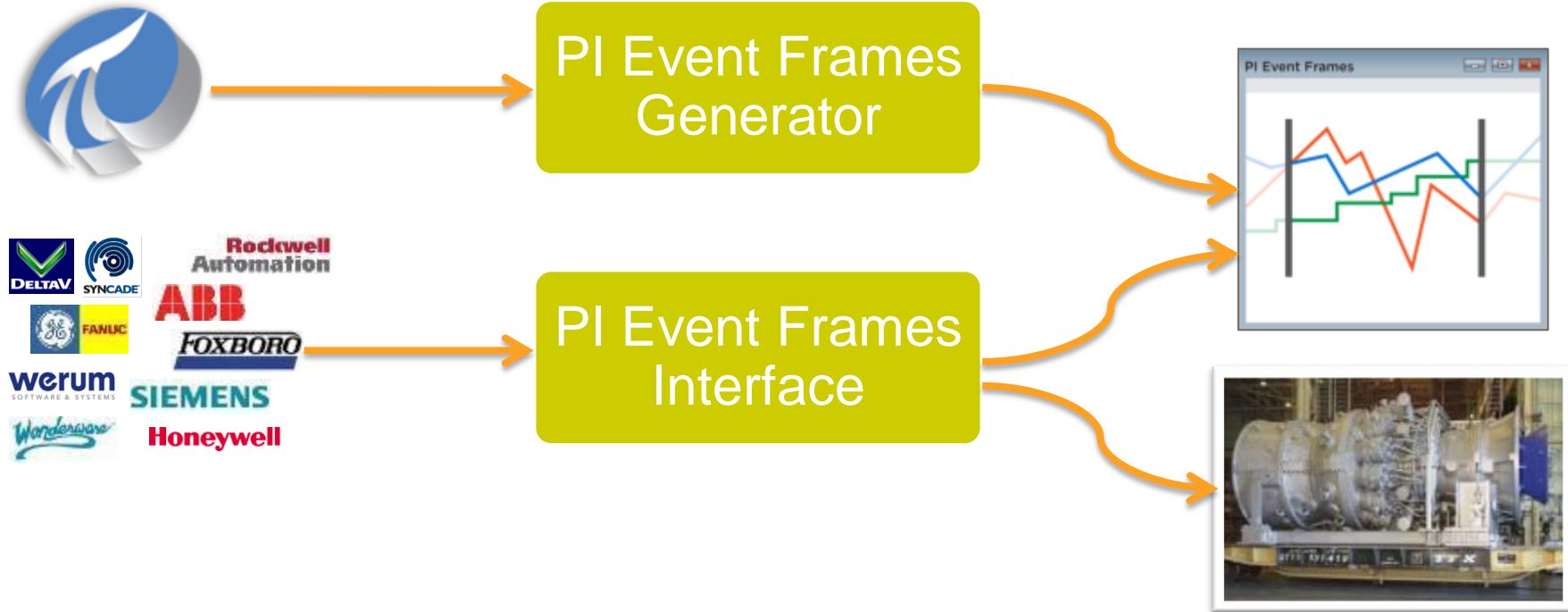
Downtime Events

Product XYZ (1)
Downtime (2)

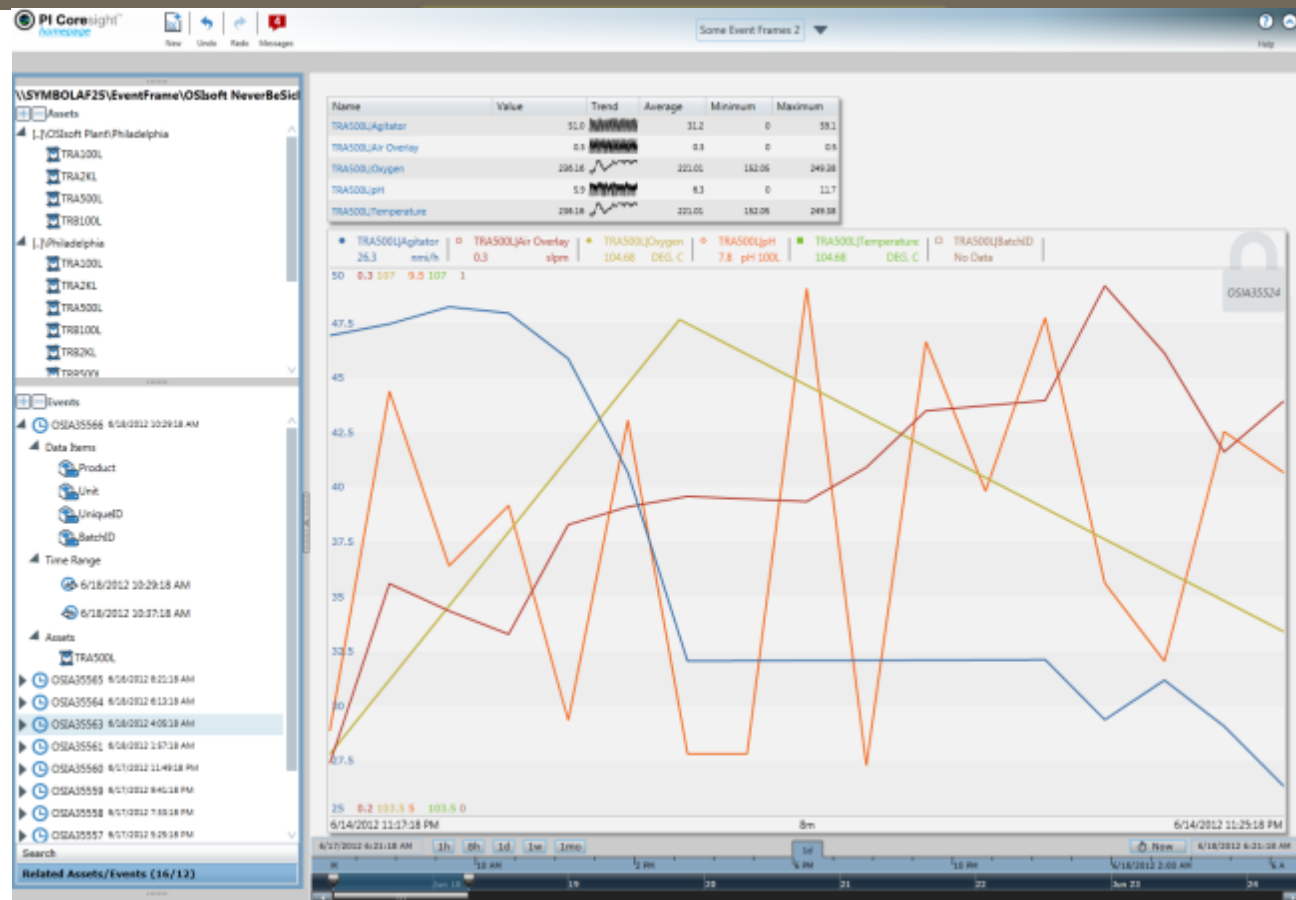


Discover Relationships

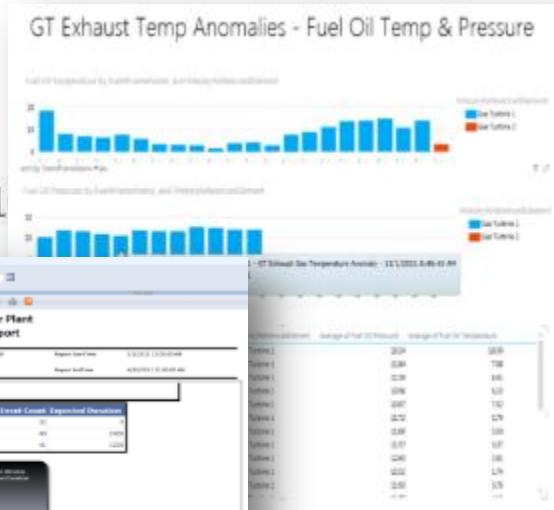
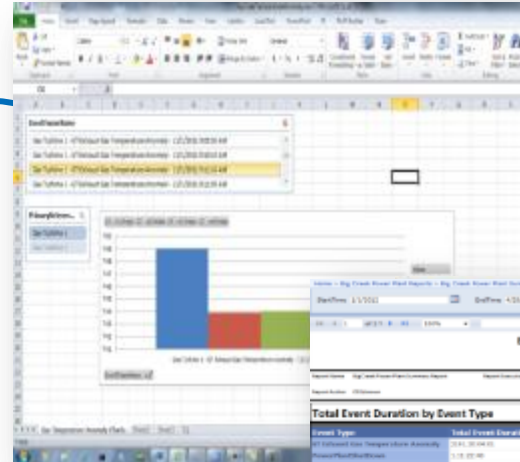
PI Interfaces – Collect or Generate Events



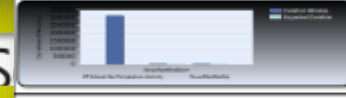
PI Coresight - Discover and Visualize Events



PI Data Access – Integrate your events with other systems



Microsoft
BizTalk



Total Event Duration by Asset

Asset Name	Event Type	Total Event Duration	In Minutes	Event Count	Expected Duration
Big Creek Power Plant	PowerPlantOutage	3,432.00	280	20	2000
Big Creek Power Plant	PowerPlantStartup	3,384.00	278	40	1000
Big Creek Power Plant	GT Exhaust Gas Temperature Anomaly	3,432.00	280	20	2000
Big Creek Power Plant	GT Exhaust Gas Temperature Anomaly	3,432.00	280	20	2000





The Rich Data Access: AF SDK 2012

Presented by **Andreas Schremmer**
vCampus Engineer



THANK YOU

Brought to you by  **OSIsoft.**