



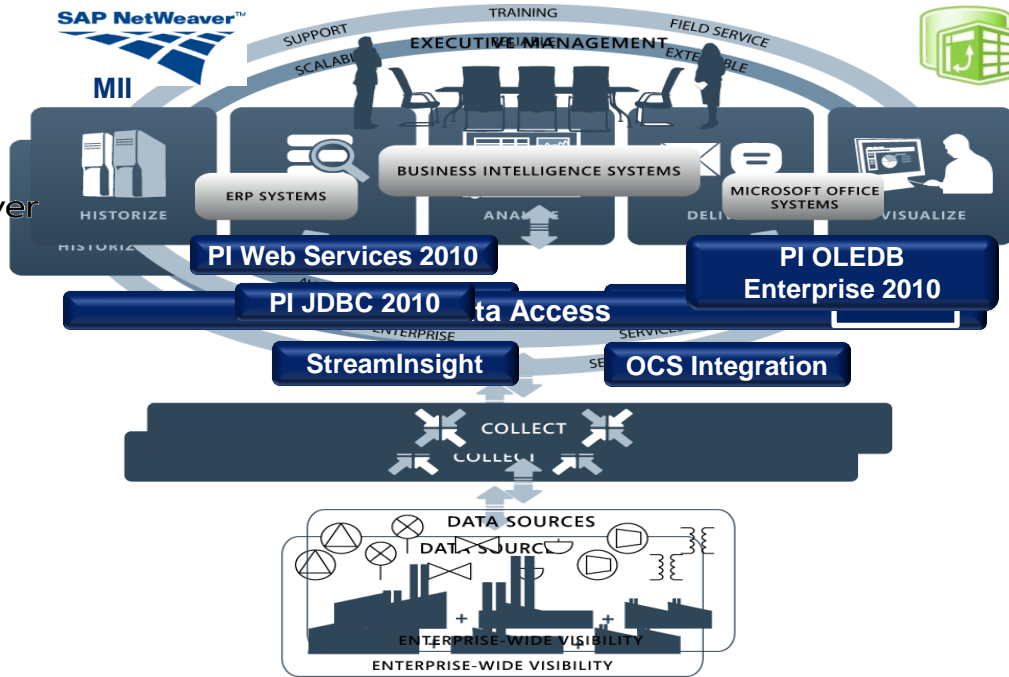
OSIsoft®
REGIONAL
SEMINARS 2012
The **Power** of **Data**



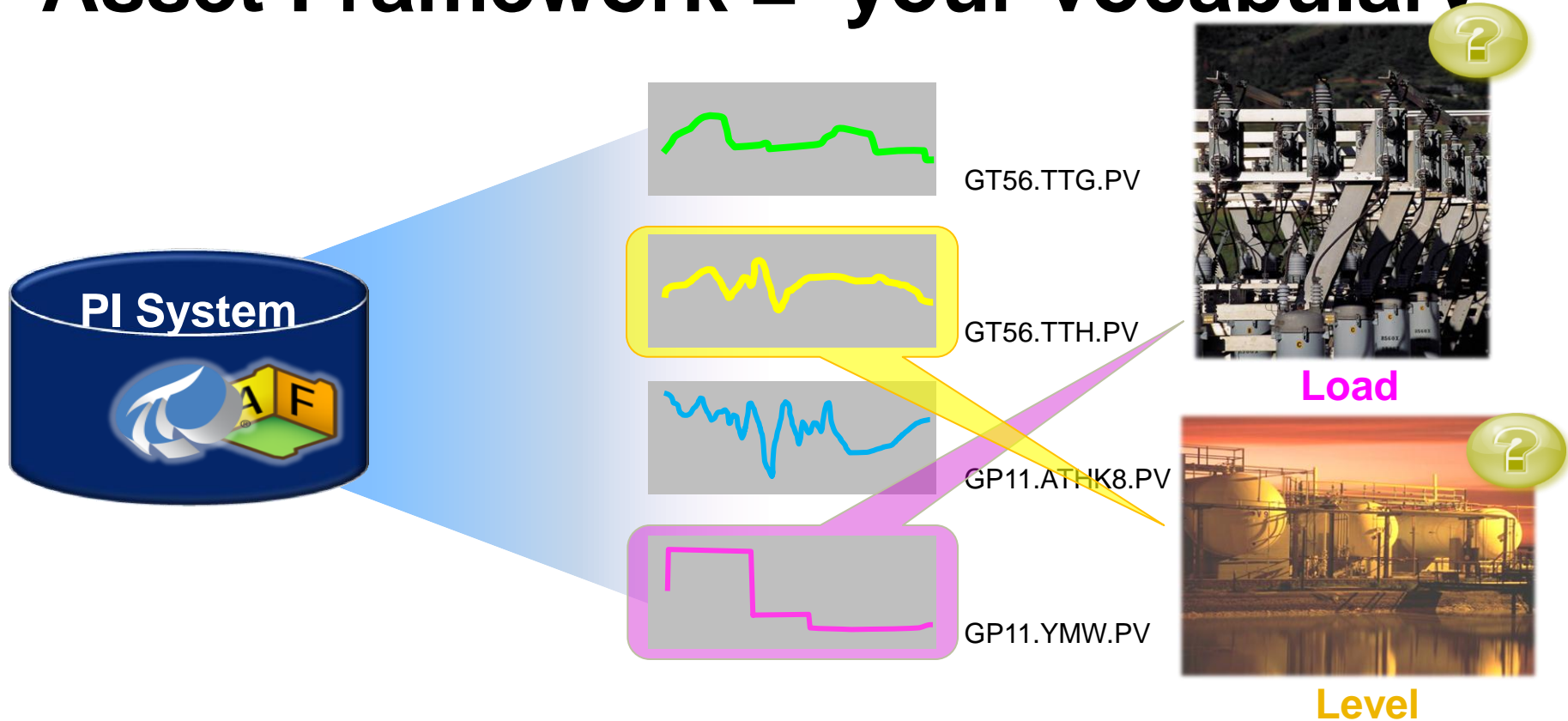
PI Asset Framework

Presented by **OSIsoft**

The PI System

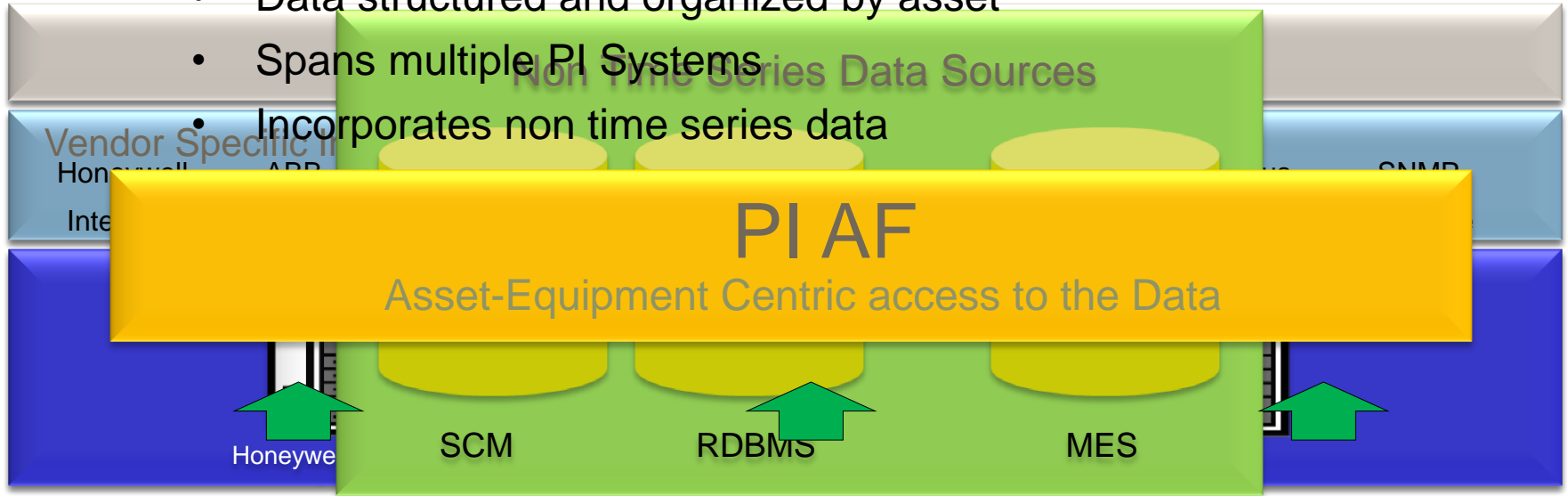


Asset Framework = your vocabulary



spans all your data

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



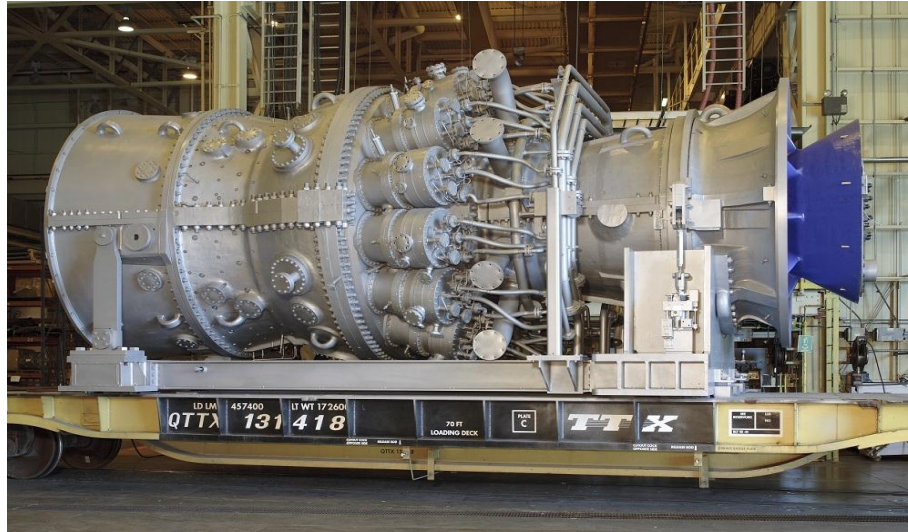
Asset Centric PI System

- **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

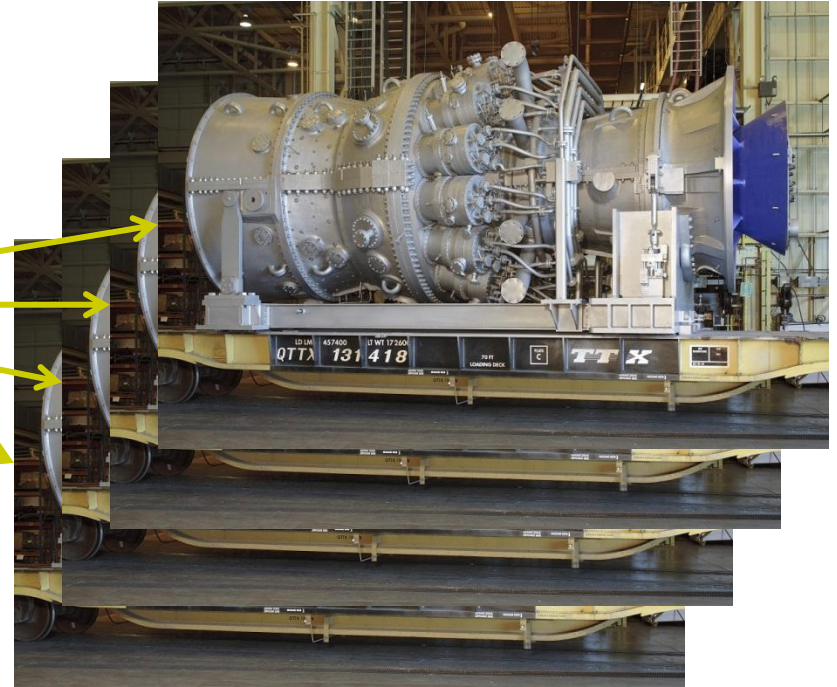
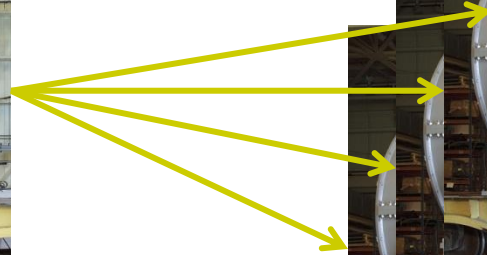
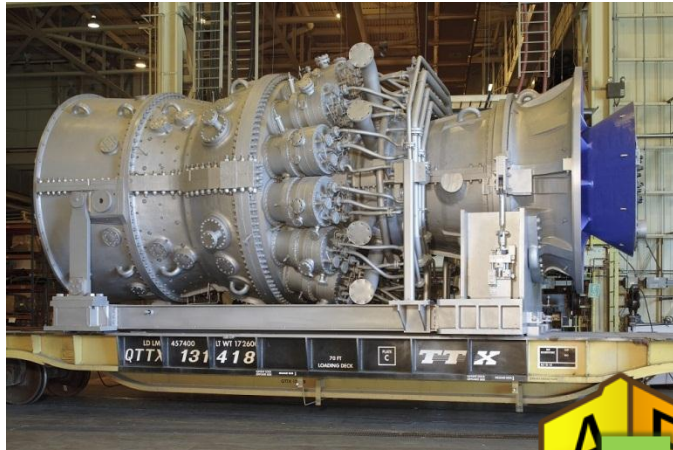
External Databases

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

Calculations

- Performance calculations
- KPI's

Common View for Similar Assets



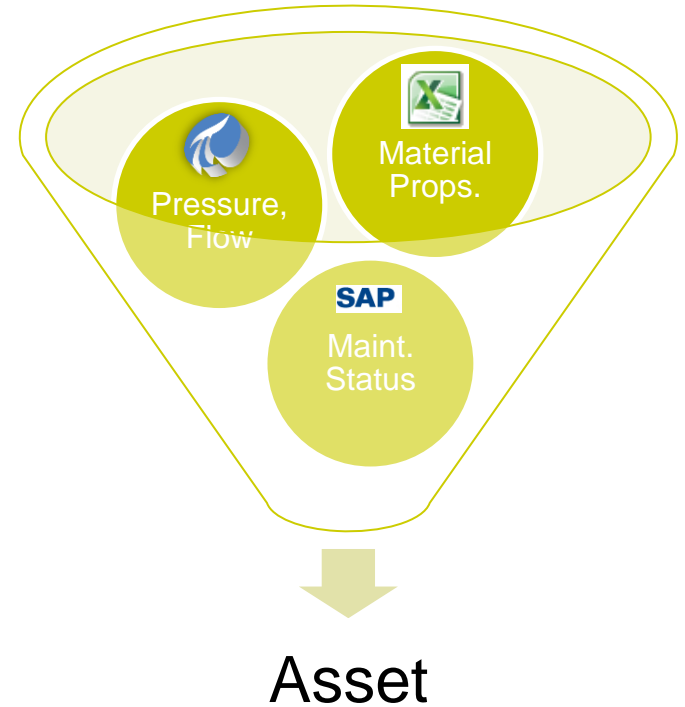
Add Value to your PI System

The screenshot displays the UC2011-SK - PI System Explorer interface. On the left, a tree view under 'Elements' shows the hierarchy: Big Creek Power Plant, Condenser, Gas Turbine 1, Gas Turbine 2, HRSG 1, HRSG 2, Steam Turbine, and System Configuration. Below the tree is a 'Library' section with 'Unit of Measure', 'MyPI', 'Notifications', and 'Contacts'. A 'Prices' section is also visible, containing 'Electricity Price', 'Gas Fuel Price', and 'Oil Fuel Price'. The main area is a table of data points.

| Element Name | Value | Unit |
|----------------------------------|-----------------------|-------------------|
| Compressor Discharge Pressure | 16.2847557067871 | bar(g) |
| Compressor Discharge Temperature | 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 | m ³ /h |
| Fuel Oil Pressure | 15.818398475647 | bar(g) |
| Fuel Oil Temperature | 33.3455696105957 | °C |
| Gas Fuel Flow | 70317.8671875 | m ³ /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) |

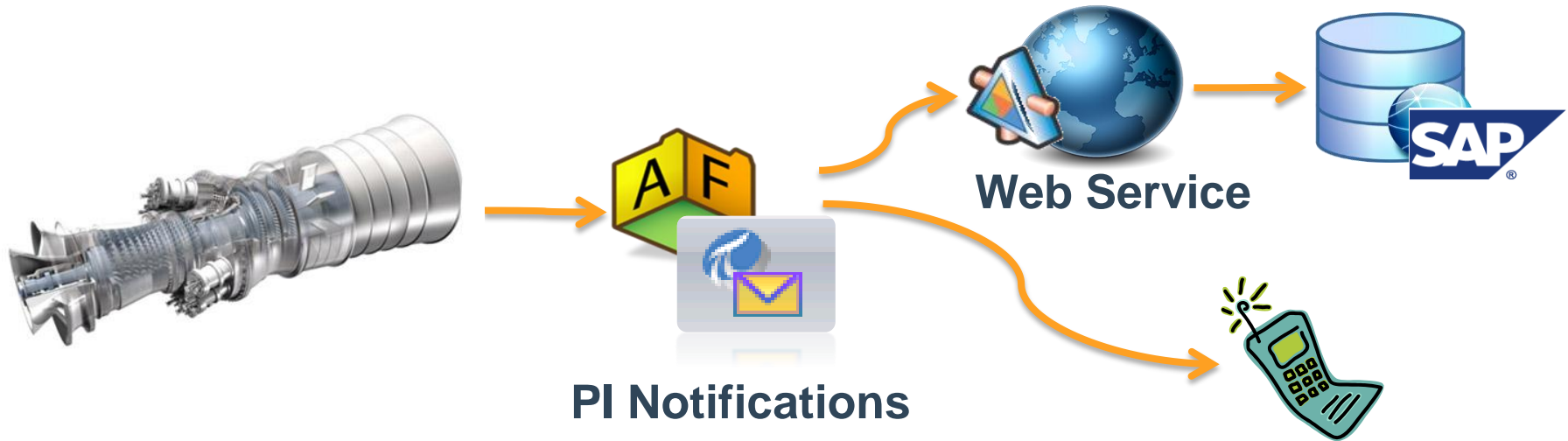
Add Value to your PI System

- **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.



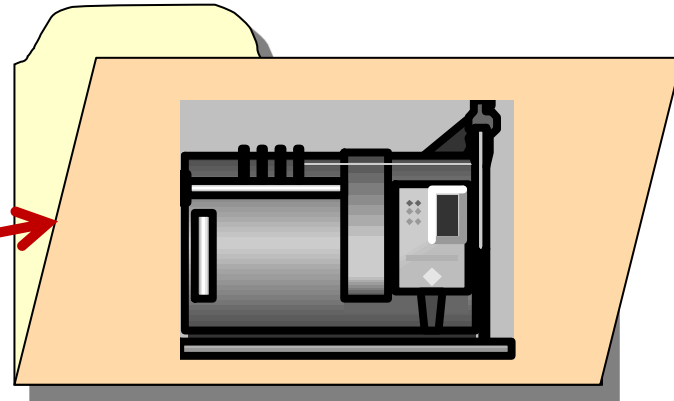
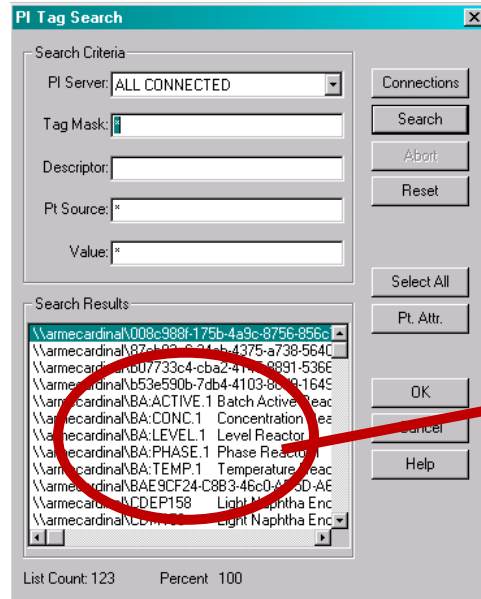
Downtime Events

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

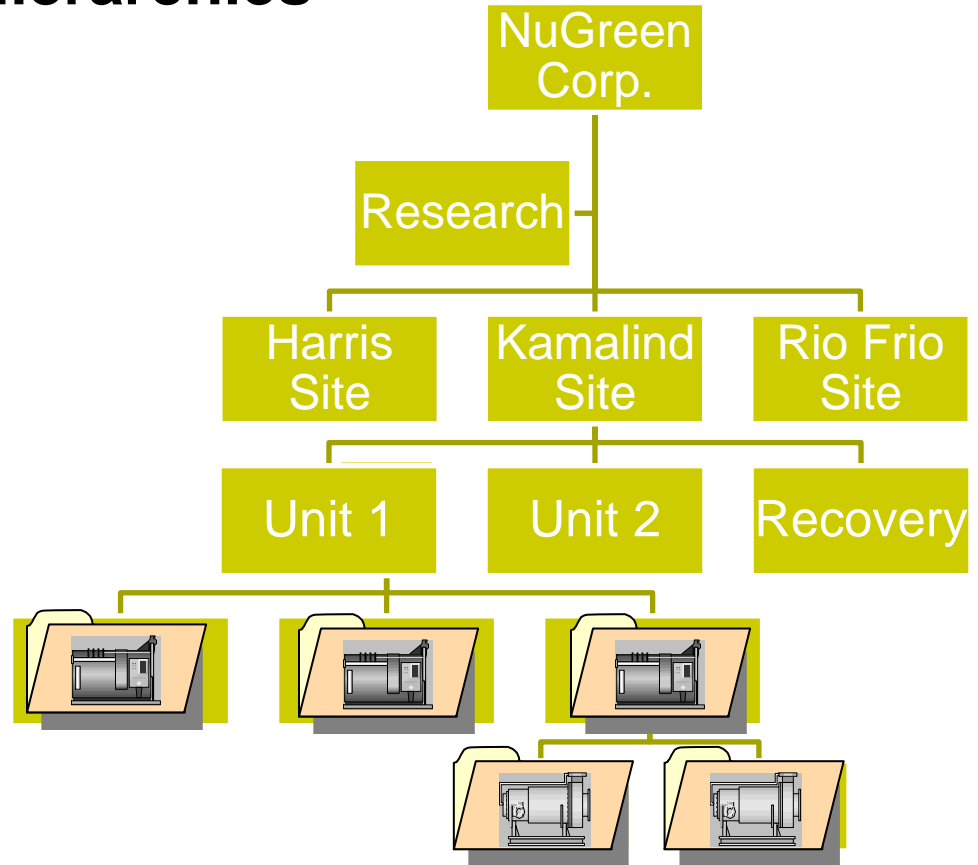


How to begin

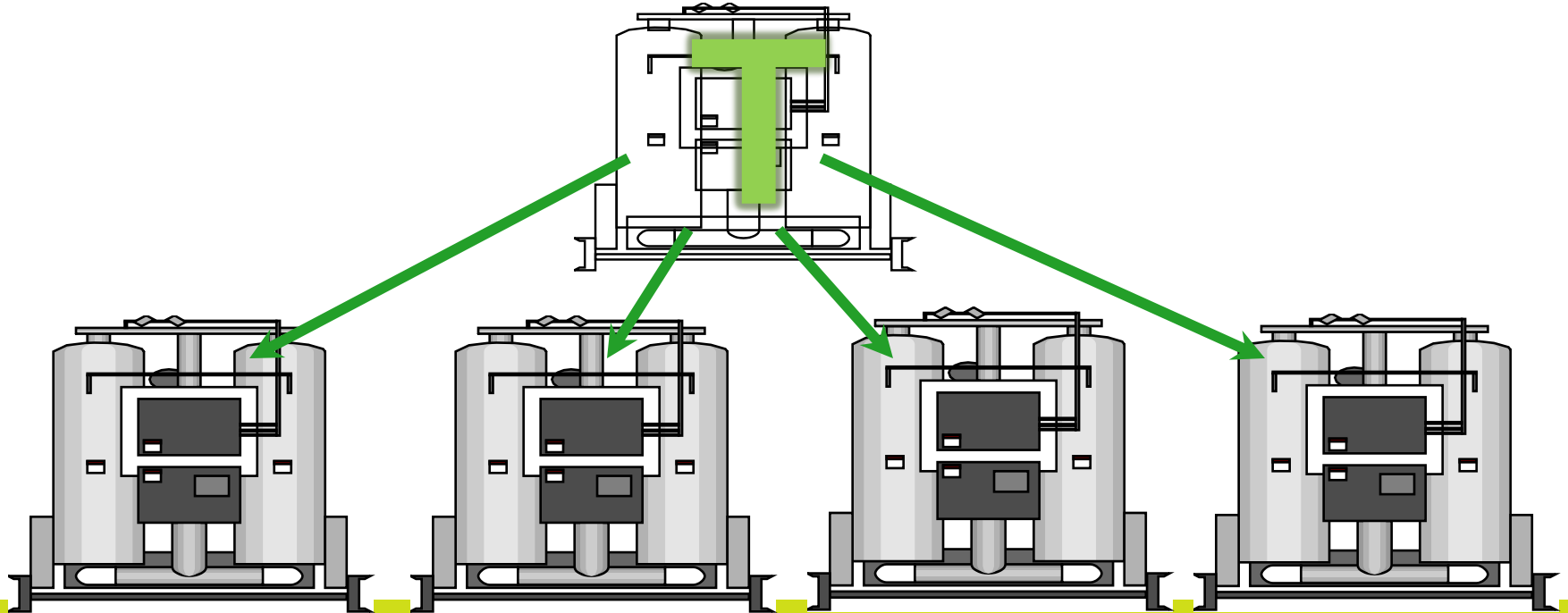
Sort Your Tags into Elements Which Represent Your Equipment



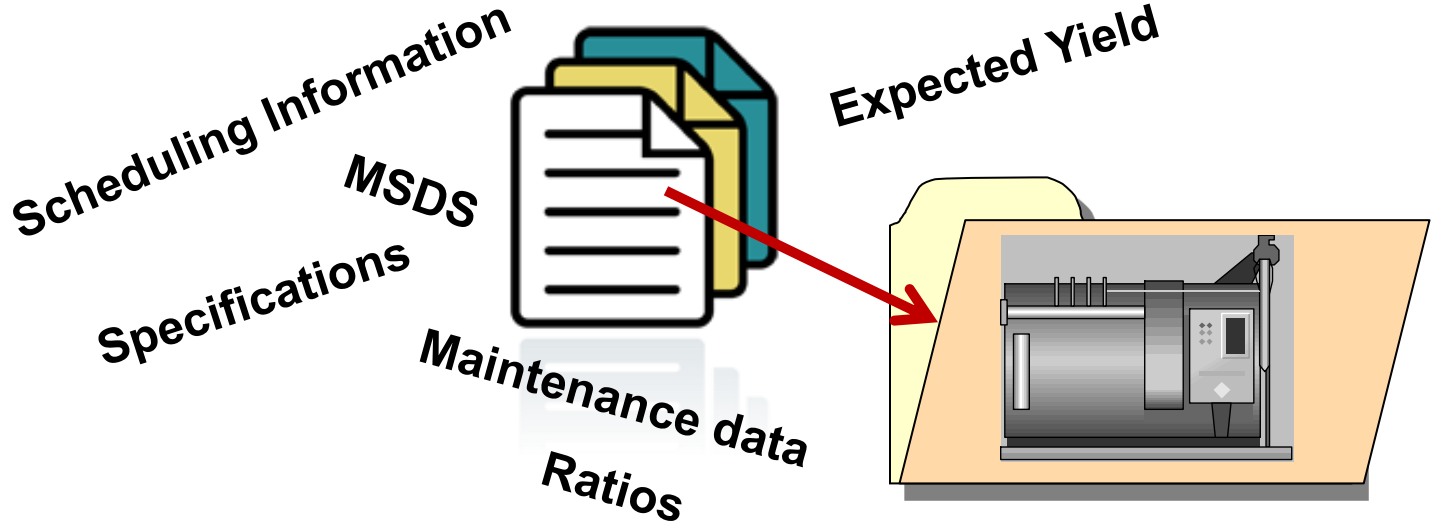
Organize the Assets into Hierarchies



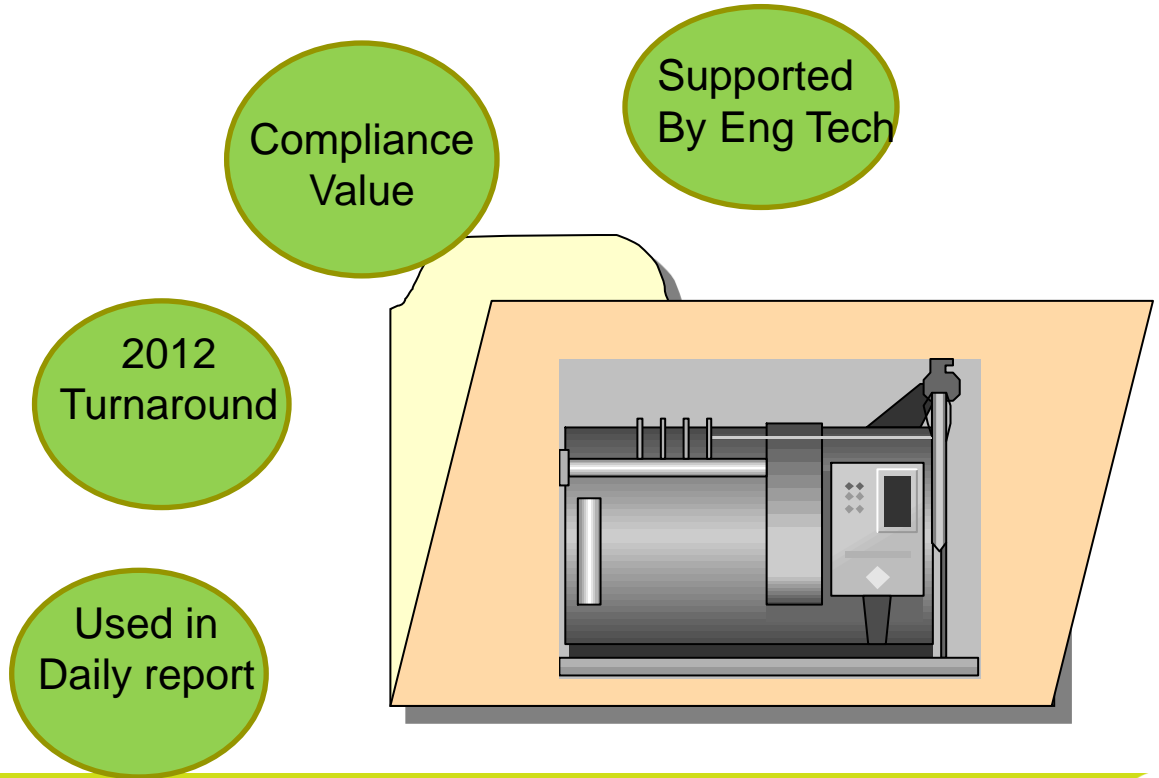
Manage and Extend Elements by creating Powerful **Templates**



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

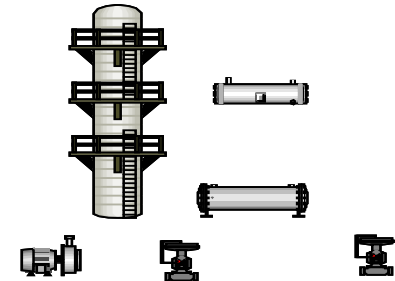
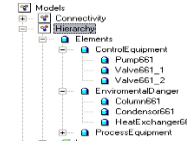


Model

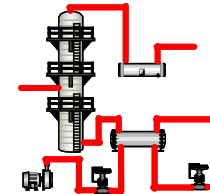
Condensor
Heatexchanger
Column
Valve
Pipe
Pump

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]



\\skwan-vm-af25\NuGreen - PI System Explorer (Administrator)

File Edit View Go Tools Help

Database Query Date Back Check In Refresh New Element Search

Elements

Elements NuGreen

Group by: Category Template

| Name | Description | Category | Type | Template |
|---------|------------------|-----------|------|------------|
| NuGreen | Our Company E... | Locations | None | Enterprise |

Elements

- Event Frames
- Library
- Unit of Measure
- Replication
- MyPI
- Notifications
- Contacts
- Model Analyses



Insight PI Asset Framework

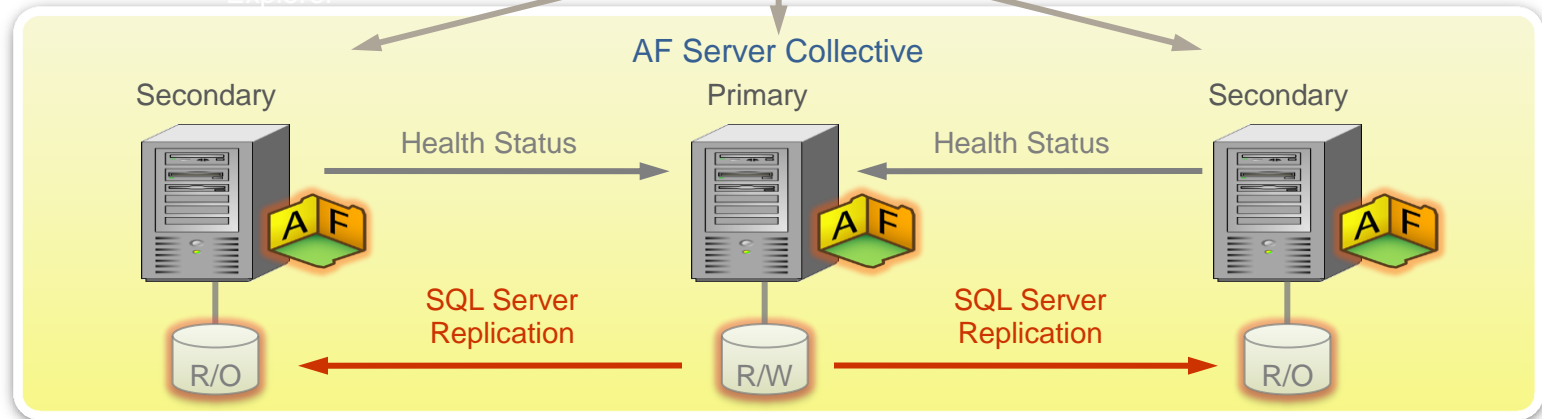
AF HA Collective



PI Notifications, AF-based PI Clients
(PI WebParts, ProcessBook, DataLink, CoreSight 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

- Create **domain/industry specific** applications
- Focus on **doing it right**
- Personal development **PI System**
- **Community experience**
- Tech Conference: **OSIsoft vCampus Live!**



```
AFTimeRange tr = new AFTimeRange(new AFTime(tex
AFValues vals = _afDB.Elements["Pump123"].Attri

lstValues.Items.Clear();
foreach(AFValue val in vals)
{

    lstValues.Items.Add(val.Value.ToString() +
}
```

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.

The screenshot displays the PI AF software interface. On the left is a 'Library' pane showing a hierarchical tree of templates under 'Centocor Cork'. The main area shows the 'BioReactor' template details, including a table of elements and their default values.

| Name | Description | Default Value |
|-------------------------------|-------------------------------|-----------------|
| Aber | | |
| Aber Calibration Result | Aber Calibration Result | 0 |
| Aber Measurement | Aber Measurement Result | 0 |
| Aber Readout | Aber Readout Result | 0 |
| 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 | | |
| Gases to BioReactor | | |
| Process Air Flow Lower Sparge | Process Air Flow Lower Sparge | 0 slpm |
| Process Air Flow Overlay | Process Air Flow Overlay | 0 slpm |
| Process Air Flow Upper Sparge | Process Air Flow Upper Sparge | 0 slpm |
| ID | | |
| ID | Reactor ID | 0 |
| MOC | 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 | |



THANK YOU

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