



Asset Centric PI System

PI Asset Framework

PI Event Frames

PI Notifications

Presented by

Stephen Kwan, OSIsoft



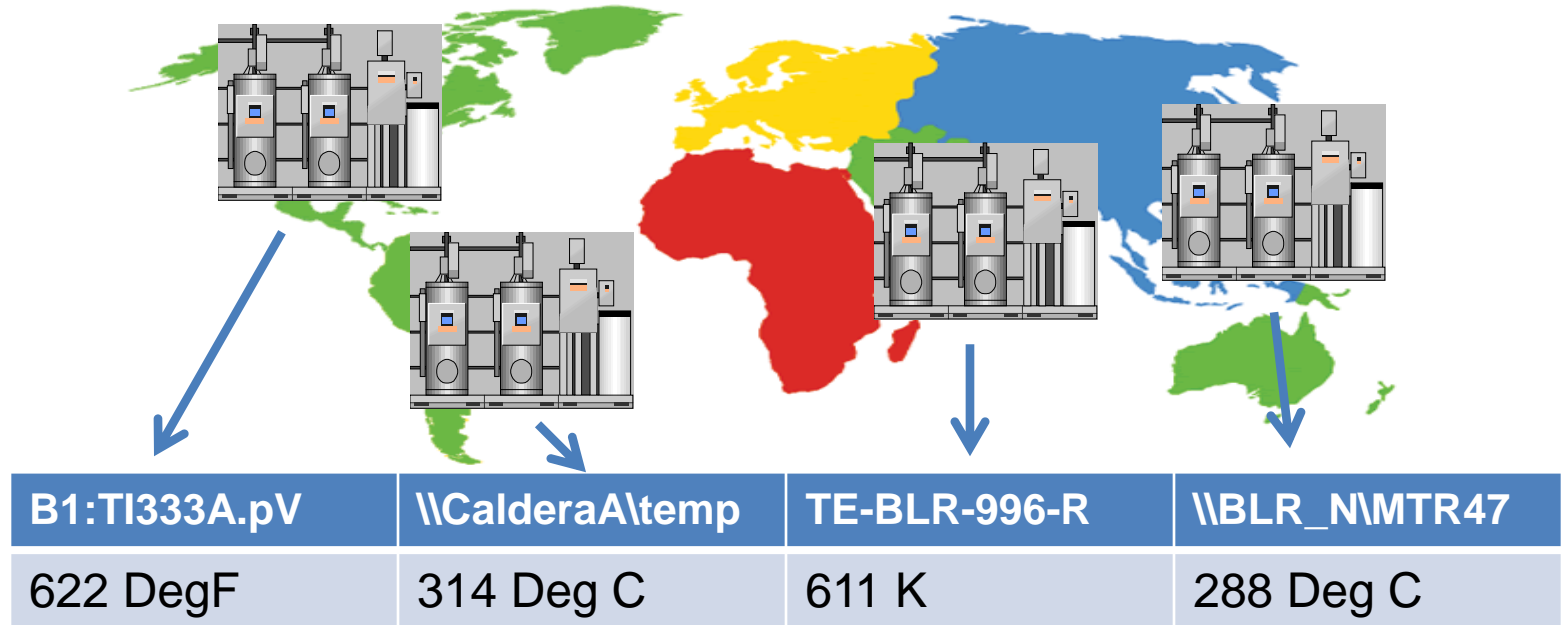
Business Challenges

- **Overwhelming amount of data from disparate sources**
 - Multiple disparate data systems
 - Diverse data types
 - Complicated, inconsistent naming, definition and structure
- **Make business decisions based on data and events**
 - Difficult to find the exception rather than the norm
- **Applying domain knowledge and expertise consistently**
- **Standardization across businesses**

People Think in Terms of Assets



Enterprise Companies Work Collaboratively

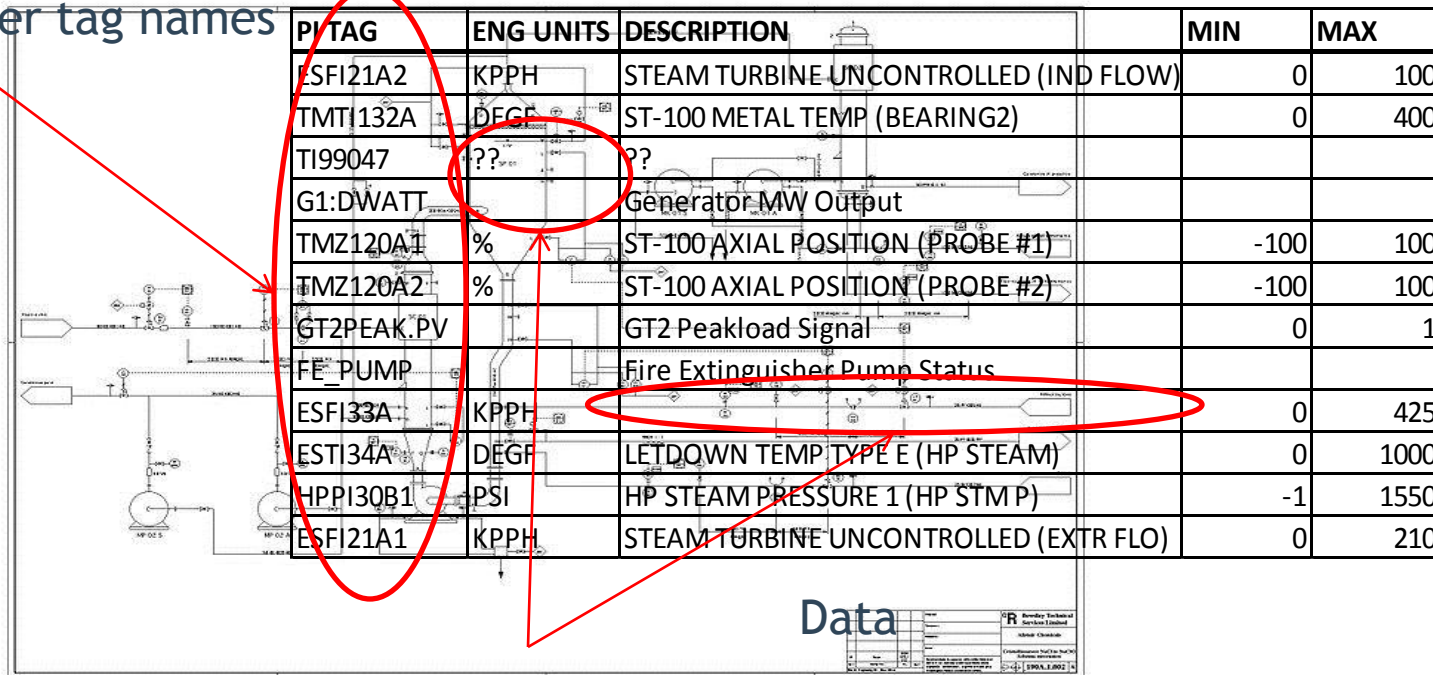


The process is the same ...

The instrumentation is different

Relate Your Assets to Your Data

Difficult to decipher tag names



P# TAG	ENG UNITS	DESCRIPTION	MIN	MAX
ESFI21A2	KPPH	STEAM TURBINE UNCONTROLLED (IND FLOW)	0	100
TMT1132A	DEGF	ST-100 METAL TEMP (BEARING2)	0	400
TI99047	??	??		
G1:DWATT		Generator MW Output		
TMZ120A1	%	ST-100 AXIAL POSITION (PROBE #1)	-100	100
TMZ120A2	%	ST-100 AXIAL POSITION (PROBE #2)	-100	100
GT2PEAK.PV		GT2 Peakload Signal	0	1
FE_PUMP		Fire Extinguisher Pump Status		
ESFI33A	KPPH		0	425
ESTI34A	DEGF	LETDOWN TEMP TYPE E (HP STEAM)	0	1000
HPPI30B1	PSI	HP STEAM PRESSURE 1 (HP STM P)	-1	1550
ESFI21A1	KPPH	STEAM TURBINE UNCONTROLLED (EXTR FLO)	0	210

Data

Rev: 1.0
Date: 11/11/2011
By: [Signature]
Checked: [Signature]
Approved: [Signature]
Project: [Signature]
Drawing No: 1100A.1.002

Missing or incomplete data - difficult to find what you need

P&ID



Meta-data

- **PI Server is extremely good at:**
 - Collecting data from almost anywhere
 - Historization and playback of time-series data
 - Scale to very large size
 - Reliable
- **PI Server is focused on a points database**
- **Meta-data: a *structure* for the data**



Why Add Structure?

- **Structure is *your* knowledge applied to *your* points**
- **Structure helps you:**
 - Establish relationship between your assets and data
 - Capture domain expertise and share
 - Build applications
 - Answer new questions



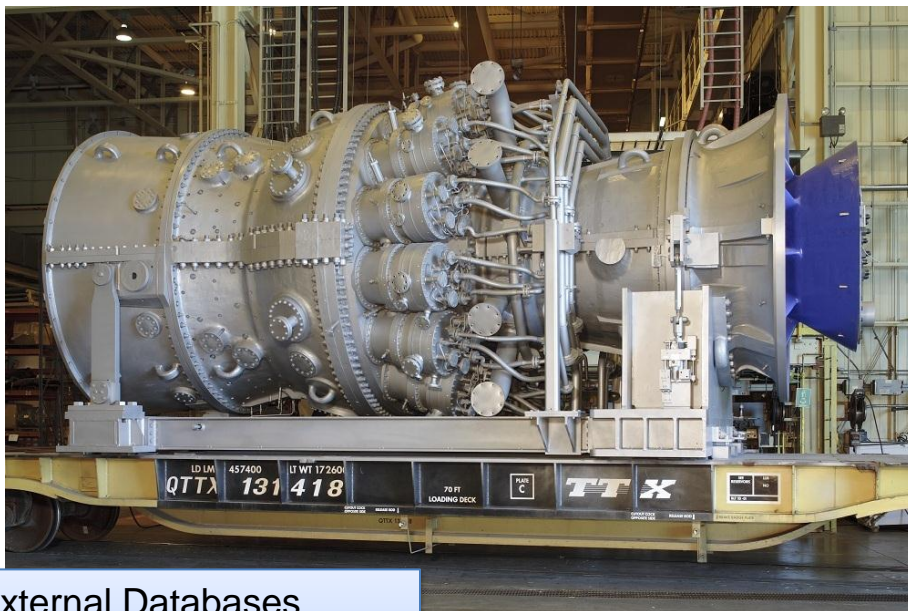
PI Asset Framework (PI AF)

- **PI AF is part of the PI Server package**
- **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
- **Work with your data by assets and events**
- **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

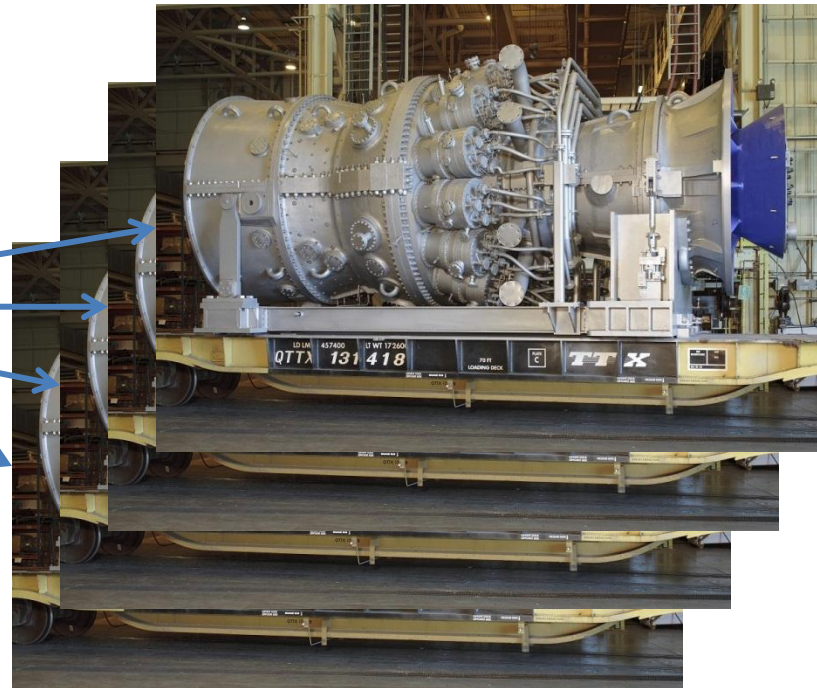
External Databases

- 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

Electricity Price

Gas Fuel Price

Oil Fuel Price

Power Factor

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 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)

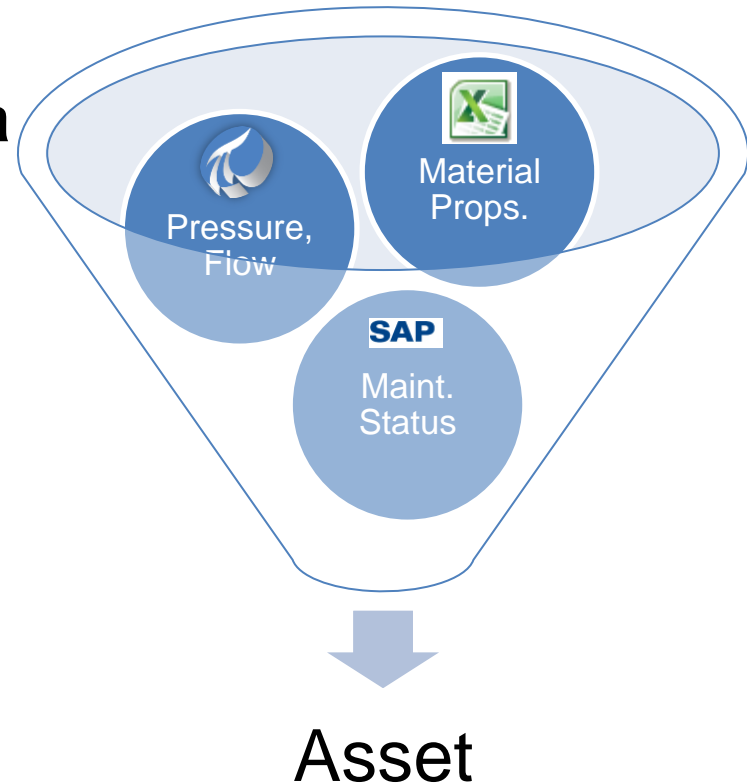
Big Creek Power Plant

- Condenser
- Gas Turbine 1
- Gas Turbine 2
- HRSG 1
- HRSG 2
- Steam Turbine

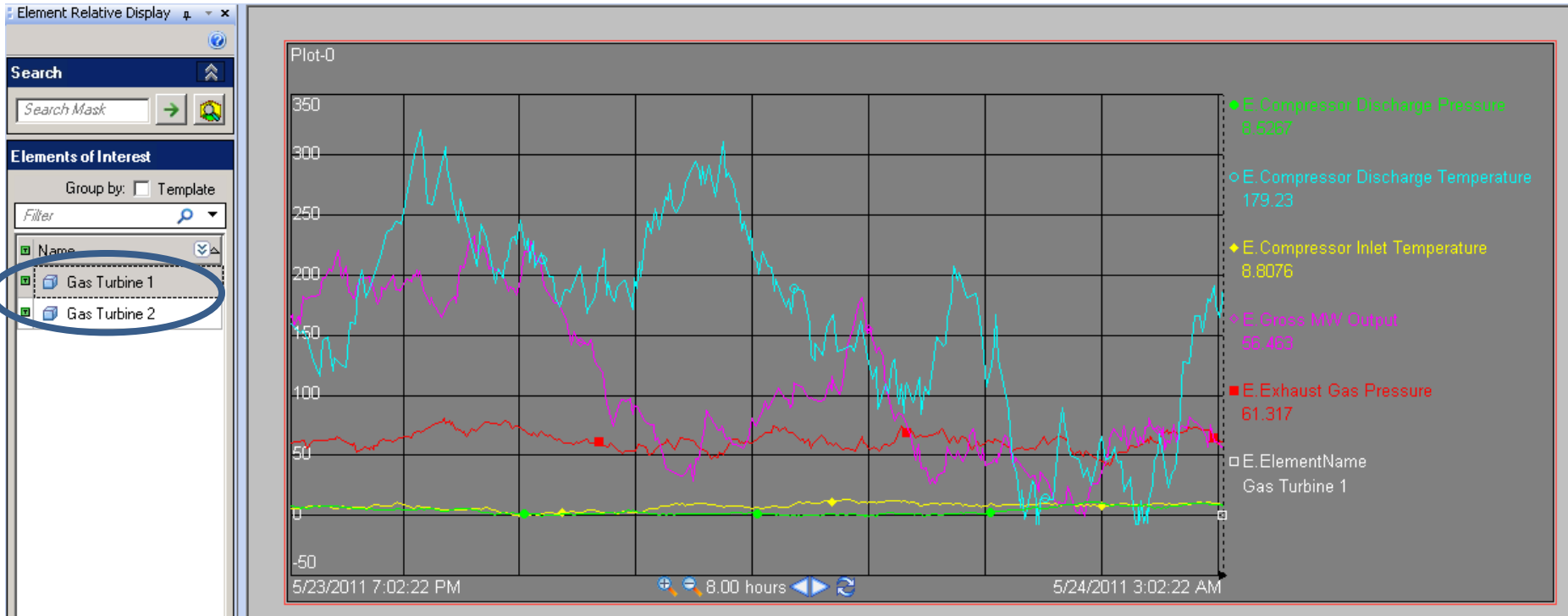
System Configuration

Add Value to your PI System

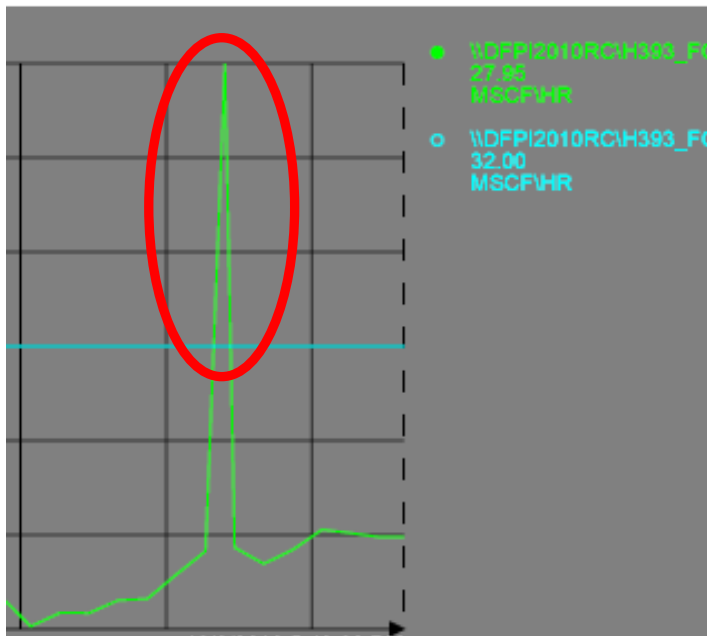
- **Tie asset properties to your data**
 - Static values, PI Tags from multiple PI Servers, static or linked Tables
 - Custom data references to other data sources



Build Once and Reuse for Similar Asset



Not Always Watching Your Data



Receive Information about Key Events



Web
Services

Other
Applications

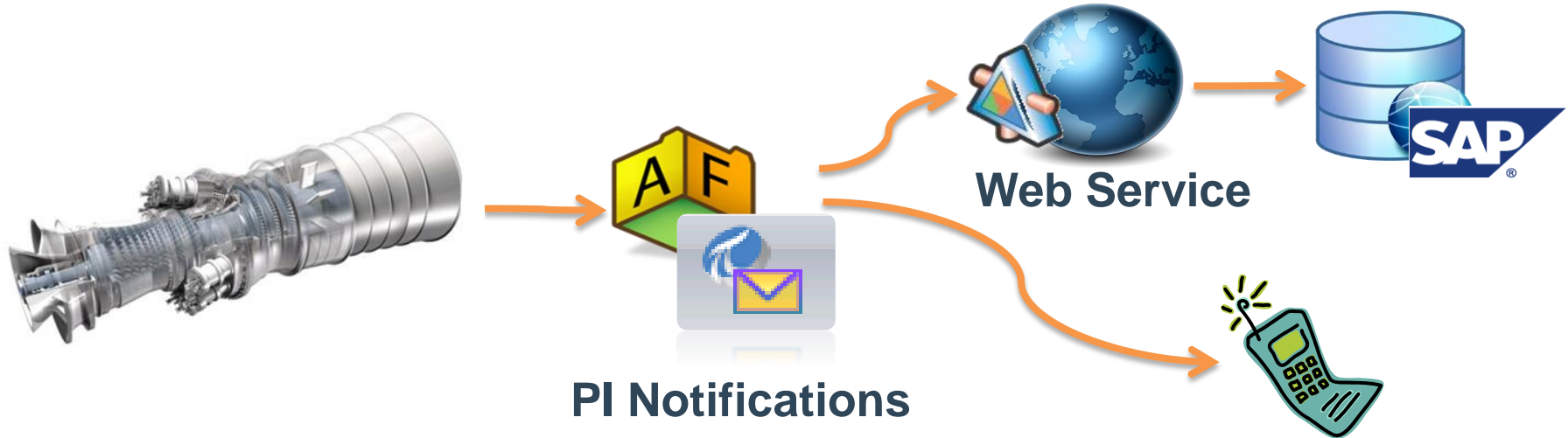
PI Notifications

- Identify insight that requires action
- Create trigger condition(s)
 - Comparisons, Performance Equations, SQC
- Specify information to be delivered
 - Customized for the recipient
 - Links to content
- Deliver to recipients, applications or systems when key events occur
 - Contacts or Windows users – Escalate if necessary
 - Email, web service, Office Communicator
 - Custom delivery channel



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.”



Work with your Data by Events

Event Frame



Name = DT23032011-2

Start time = 23-Mar-2011 09:32

End time = 23-Mar-2011 09:50

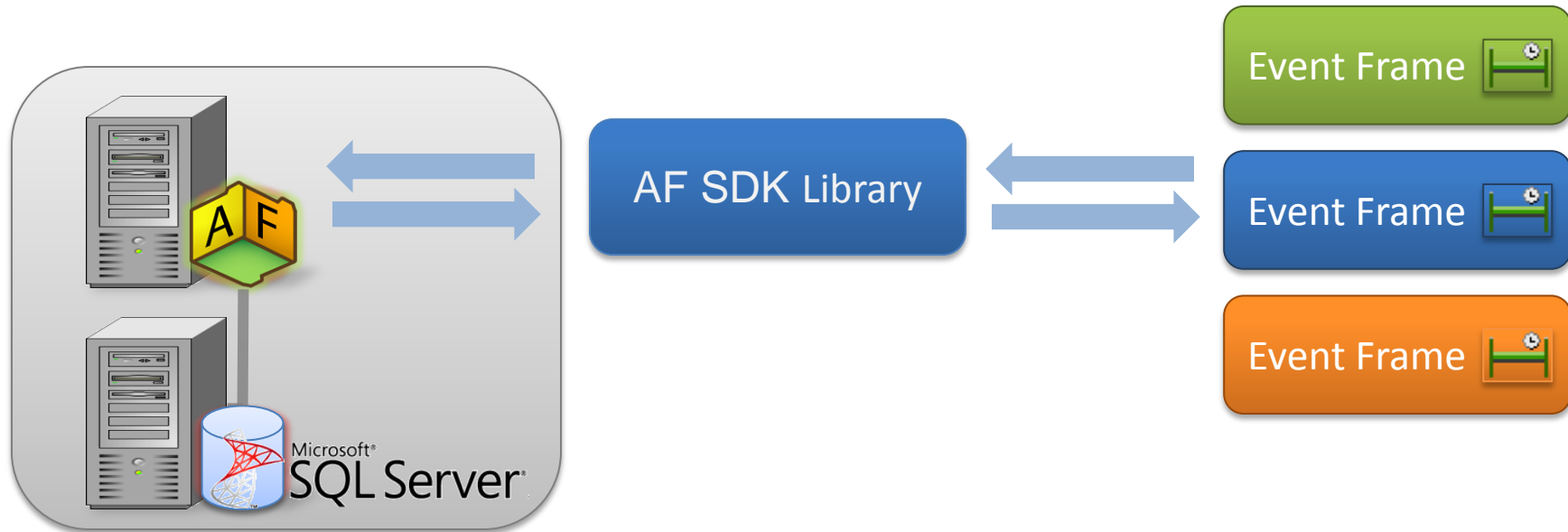
Asset = Boiler 3

Attribute = Mechanical

Attribute = Fuel line clogged

An Event Frame records important process or business events and helps you find the related real-time data.

Event Frames are part of PI AF





What can Event Frames help you understand?

- Downtime and Overall Equipment Effectiveness (OEE)
- Excursions
- Startups, shutdowns
- Products (batch, mining, paper, etc.)
- Shifts, days

Different Events have Different Attributes

Downtime



Startup



Batch



DT23032011-2

Name

ST23032011-2

BPS77-23032011-2

23-Mar-2011 09:32

Start Time

23-Mar-2011 09:32

23-Mar-2011 09:32

23-Mar-2011 09:50

End Time

23-Mar-2011 09:50

23-Mar-2011 09:50

Boiler 3

Turbine 2

Related Assets

Mixer 1

Mechanical

Standard procedure

BPS77

Fuel line clogged

Event-Specific Attributes

Prepolymer 16

Feed stock 78-YNW

Different Events have Different Attributes

Downtime



DT23032011-2

23-Mar-2011 09:32

23-Mar-2011 09:50

Boiler 3

Mechanical

Fuel line clogged



Reason code



Comment



Startup



ST23032011-2

23-Mar-2011 09:32

23-Mar-2011 09:50

Turbine 2

Standard procedure



Startup procedure



Batch



BPS77-23032011-2

23-Mar-2011 09:32

23-Mar-2011 09:50

Mixer 1

BPS77

Prep

Feed stock 78-VMA



Recipe



Product



Source



Add Value to your PI System

- 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






Benefits of an Asset Centric PI System

- **Common asset models and relationships**
 - Standardization across your entire enterprise
 - Benefit all users forever
 - **Work with your assets and not points/tags**
 - No need to memorize point/tag names
 - **Quickly and efficiently find the data you need**
 - Reference asset properties to different data sources
 - Search and find information across all your data sources
- 



Benefits of an Asset Centric PI System

- **Combine disparate data in analyzes and reports**
 - Calculate KPI
 - Compare actual versus estimate
 - **Build your solution once and reuse on all similar assets**
 - Element Relative Display in PI ProcessBook and PI WebParts
 - **Empower other PI System components**
 - **Expose your common asset structure and data via PI Data Access**
- 



Thank you

