



OSIsoft PI System evolutions for the Transmission & Distribution Industries

Agenda

PI System is helping you transform your world

Mobility

Geospatial
Insights

Actionable
Information

Cross
Company
Collaboration

Forecasting

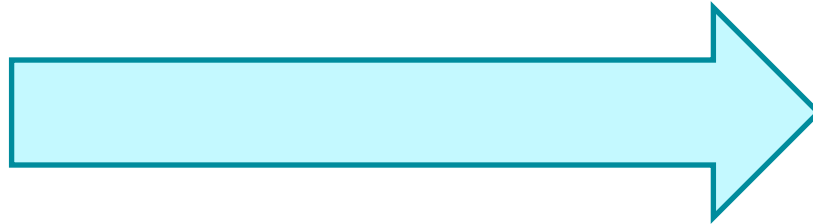
Enabling
Analytics
Systems

The PI System Infrastructure



Wherever your data starts

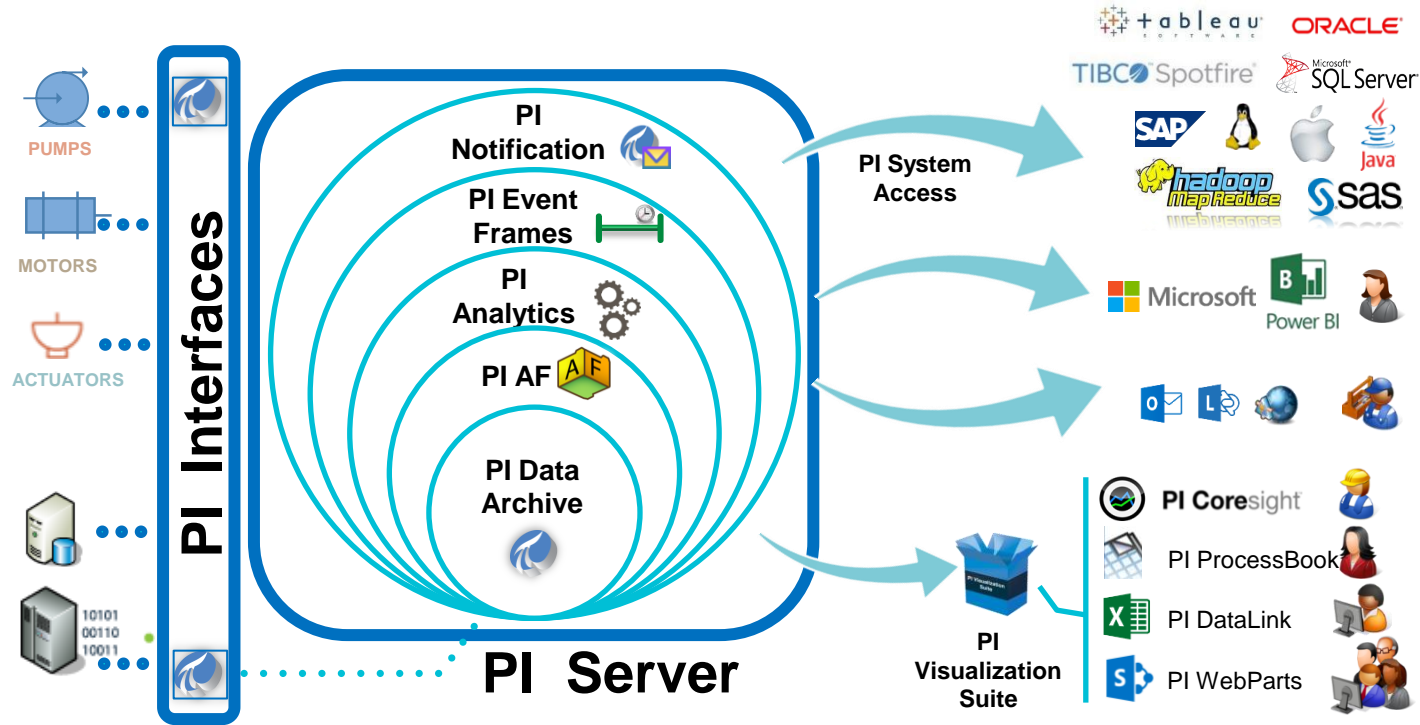
to Wherever your data needs to go



The **PI System Infrastructure**
is everything in between



The PI System Infrastructure



PI Connectors are helping you transform your world

Mobility

Geospatial
Insights

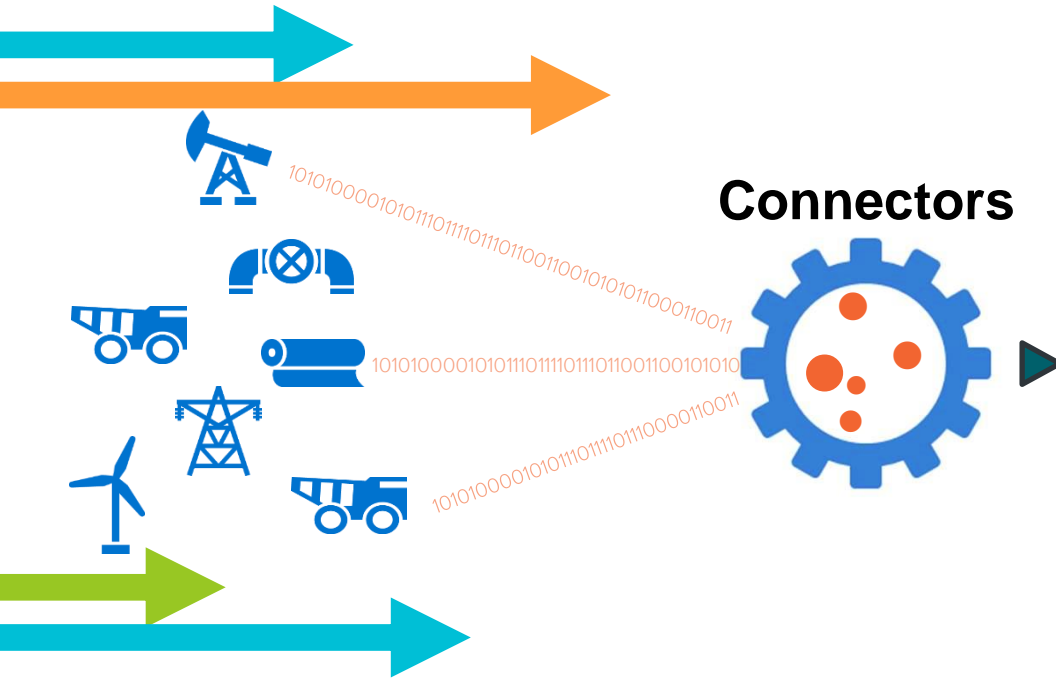
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PI Connectors



- Data source is the **system of record**
- Data collected in terms of **assets** as defined by the data source
- Assets **auto-created** in PI Asset Framework
- Tags **auto-created** in PI Data Server, linked to PI Asset Framework Elements
- Events collected and stored in **Event Frames**
- Easy to **configure**

PI Connectors for T&D companies

PI Connector	Market	Status
IPMI	Datacenters	
EtherNet/IP	High-speed discrete	
IEC 60870-5-104	T&D Substations	Beta
RTscada	T&D	Beta
BACnet	Facilities	Beta
Siemens Simatic PCS 7	Many	Beta
DNP3 (Embedded)	T&D	Development
IEC 61850	Substations, wind generation, etc.	Planned

Many others protocols in addition

PI Cloud Connect is helping you transform your world

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PI Cloud Connect

Securely Share PI System Data Across Geographic & Organizational Boundaries

Simply Publish and Subscribe

Create Publication

Progress bar: Data Source, Publication Scope, Publication Name

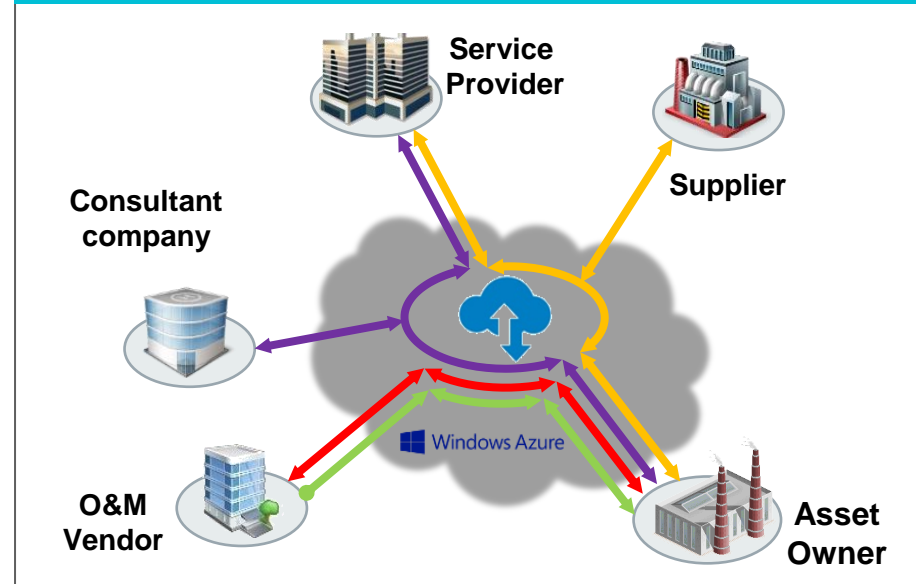
Browse your AF asset hierarchy to select the AF element that you want to publish

- ▶ Anacortes Refinery
- ▶ Baton Rouge Refinery
- ▶ E&P
- ▶ Gas
 - ▶ Compressor Stations
 - ▶ Blain River
 - ▶ Brunswick Station
 - ▶ Levis Station
 - ▶ Newport Station
 - ▶ Oxnard
 - ▶ Powder River Basin
 - ▶ Transwestern Station
 - ▶ Viking Station
 - ▶ Gas Plants
 - ▶ Key Performance Indicators

Data source: DFPIAF.Petrolux

Selected AF element to publish: \\DFPIAF\Petrolux\Gas\Compressor Stations\Powder River Basin

Supports Any Sharing Scenario



Forecast data is helping you transform your world

Mobility

Geospatial
Insights

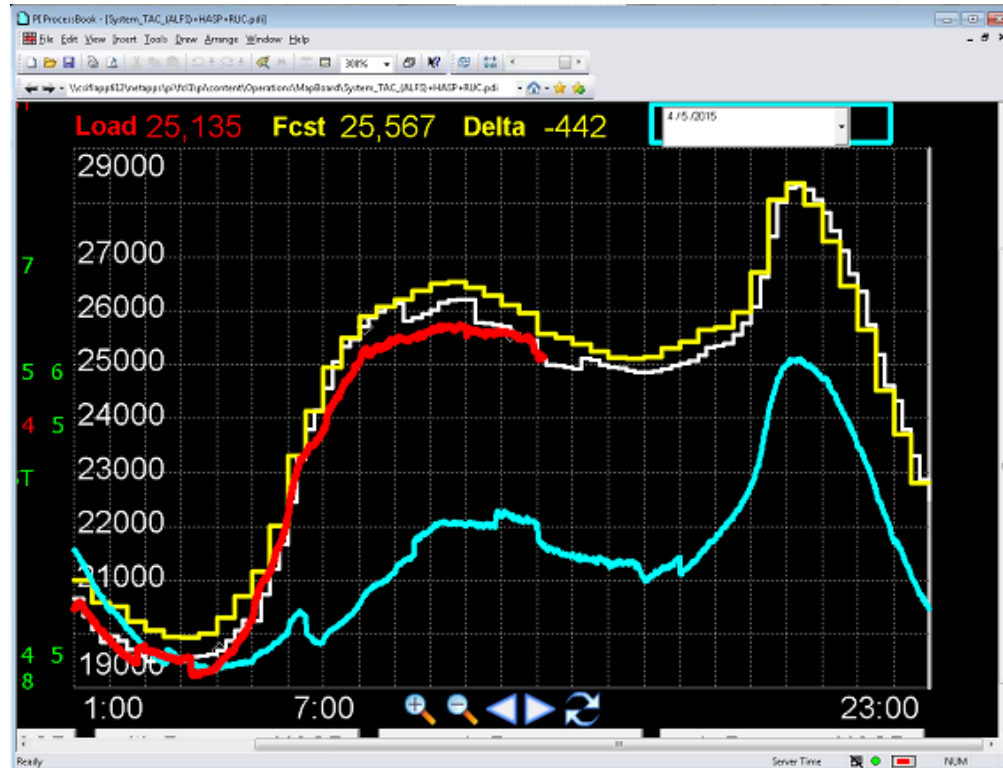
Actionable
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Cross Company
Collaboration

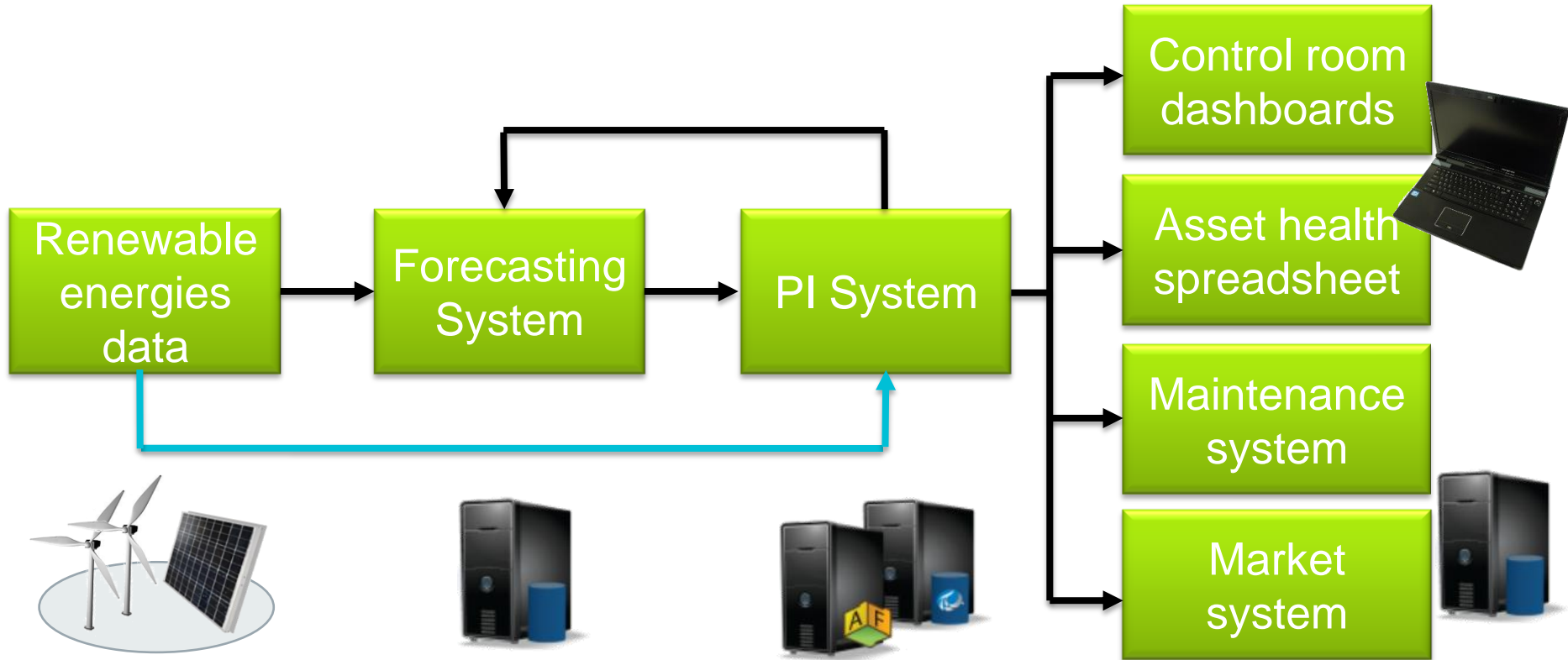
Forecasting

Enabling
Analytics Systems

Forecast data in the T&D industry



Sample PI System for T&D



PI Asset Framework is helping you transform your world

Mobility

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Cross Company
Collaboration

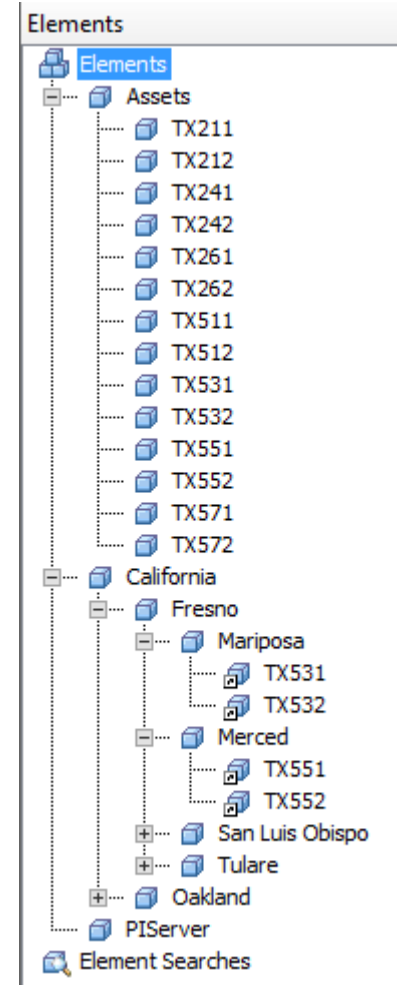
Forecasting

Enabling
Analytics Systems

PI Asset Framework

The hierarchy

- Group by geography or business units
 - Ex.: Areas deserved by utility
- Group by asset types
 - Ex.: Electric lines
- Group by problems you need to solve
- Use references for different “views”



PI Asset Framework

- Elements
 - Physical object or logical entity
 - Ex.: Transformer
- Attributes
 - Properties of an element
 - Ex.: Current
- Use templates for standardization and scalability

The screenshot shows the 'Well1' interface with tabs for General, Child Elements, Attributes, Ports, Analyses, and Version. The 'Attributes' tab is active, displaying a table of well properties categorized into Location, Power Consumption, Pressure, and Production.

Filter		Name	Value
Category: Location			
		Latitude	31.8633 °
		Longitude	102.3656 °
Category: Power Consumption			
		Power Consumption	56.0296424692635 kW
Category: Pressure			
		Bottom hole pressure	8566.92281345228 psia
		Casing pressure	1674.35956852248 psia
		Line Pressure	1293.01026221039 psia
		Tubing pressure	1205.05609722112 psia
Category: Production			
		30 Day Production Total forecast	261371.060310946 Mscf
		IP	830 mscfd
		P30	21073.7592401507 Mscf
		P60	42037.2686356412 Mscf
		P90	62993.2170116624 Mscf
		P180	125900.79756186 Mscf
		Production Rate	652.232350852449 mscfd

PI Asset Framework

Templates

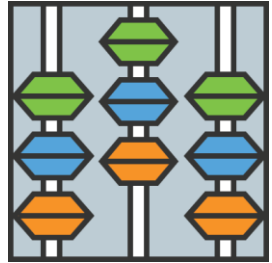
- How we define a particular class of objects
- These definitions are used throughout the PI System
- Auto-create PI Points to ensure consistency
- Use template inheritance to define attributes



PI Asset Framework

Analyses

- 150+ built in functions
- Use variables in expressions for readability
- Scheduled analyses should write outputs to PI Points
- Ensure PI Analysis Service has proper security
- Use analysis templates for standardization and scalability



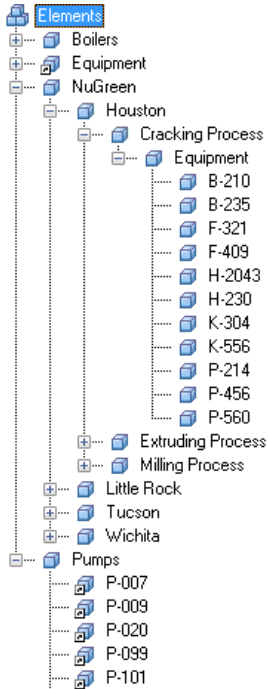
PI Asset Framework



Event Frames

- Use EF to define important events for assets
 - Days
 - Start-ups and shutdowns
 - Shifts & crew shift reports
 - Tests on operating equipment
 - Downtime, outages
- Use templates for standardization and scalability

PI Asset Framework



Analyses

- Efficiency analysis
- Key Performance Indicators (KPI)

Events

- Downtime
- Startup
- Failure

Notifications

- High speed
- Rotor failure
- Low pressure

Time-series

- In-Flow
- Pressure
- Vibration data

Asset details

- Name
- Model
- Manufacturer

External data

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



PI Integrators are helping you transform your world

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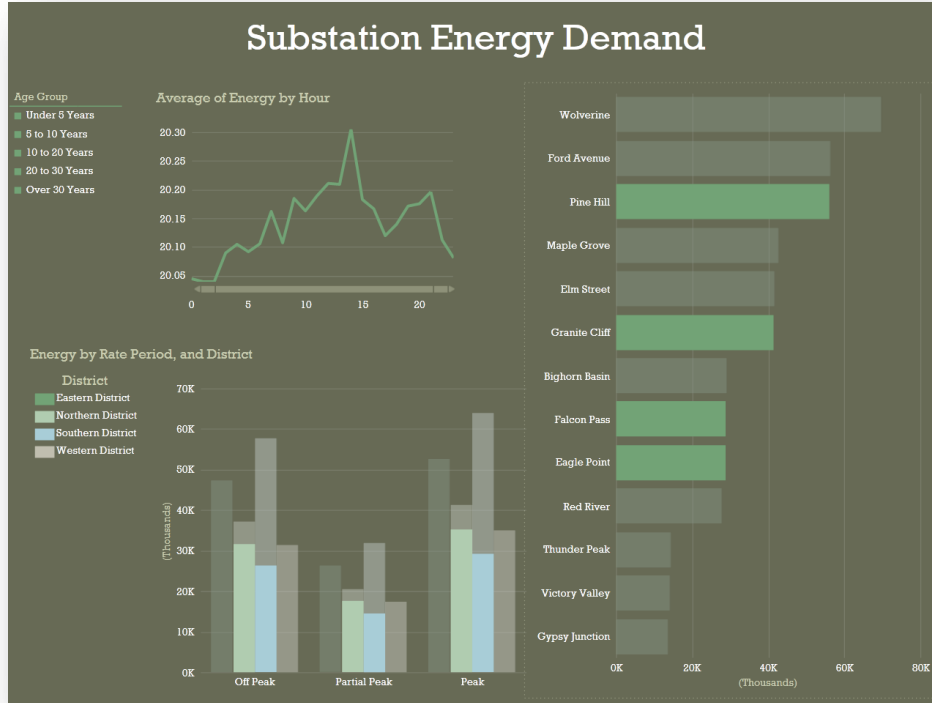
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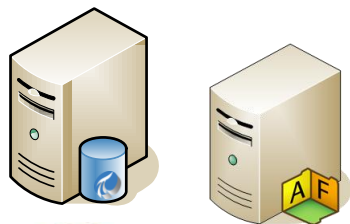
Why do you need a PI Integrator?



Real-time Data isn't perfect

- Naturally incomplete (delays, shutdowns)
- Not evenly spaced
- Doesn't look and behave like SQL (RDBMS)
- Subject to errors in measurement
- Varies in fidelity
- Needs context (Assets, Events)
- Hard to collect effectively

From Raw Data to Decision Ready Data



System of Record

- Guaranteed Delivery & Storage
- Full Fidelity of Sensor
- Optimized for Real-Time
- Backup/Restore
- HA
- Security



Needs:

Cleanse

Augment

Shape

Transmit



Visual Analytics



Statistical Analytics



Analytics Packages

- Designed to Analyze Large Sets
- Expects that the Data Exists
- Problem Defines Data Shape
- Typically Evenly Spaced in Time

PI Integrators

- Reduce the Complexity of Analyzing **Real-World Industrial Data**
- PI data delivered to the **tools you use** and to the people that can make a difference

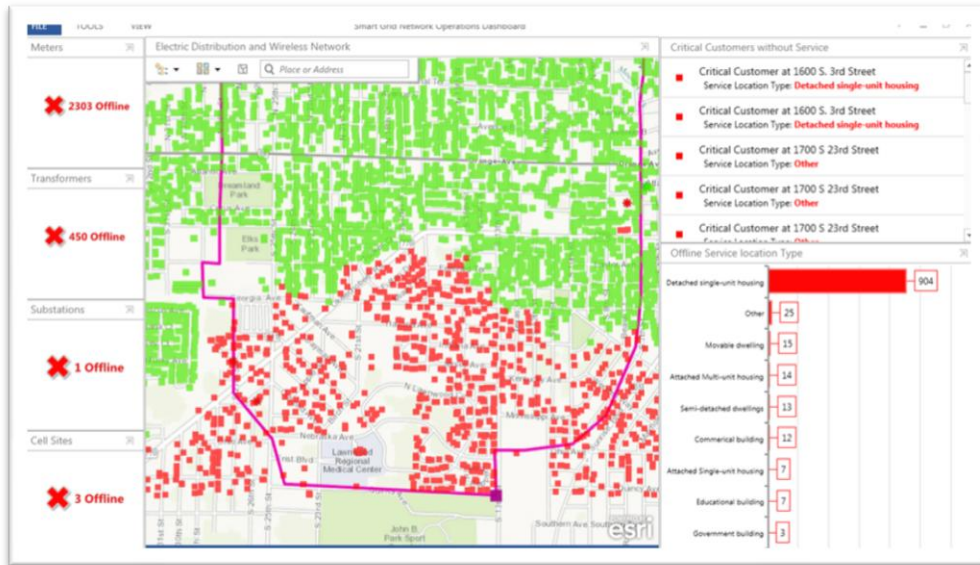
A screenshot of a data integration tool interface. The interface is divided into several panes. On the left, there is a tree view showing a hierarchy of folders and files. The main pane displays a table with the following columns: Name, CASTKey, LocalTime, and GMTTh. The table contains 19 rows of data, all with the same Name and CASTKey values, and LocalTime values ranging from 08:30:00.000 to 12:45:00.000 on 2014-12-07. The GMTTh values are all 2014-1. The interface also shows various toolbars and a status bar at the bottom.

Name	CASTKey	LocalTime	GMTTh
TCOS_174372_4PH	\\ODCMSAPSC101P\ESP_Sites\Entties\ESP\Gillette\...	2014-12-07 08:30:00.000	2014-1
TCOS_174372_4PH	\\ODCMSAPSC101P\ESP_Sites\Entties\ESP\Gillette\...	2014-12-07 08:45:00.000	2014-1
TCOS_174372_4PH	\\ODCMSAPSC101P\ESP_Sites\Entties\ESP\Gillette\...	2014-12-07 09:00:00.000	2014-1
TCOS_174372_4PH	\\ODCMSAPSC101P\ESP_Sites\Entties\ESP\Gillette\...	2014-12-07 09:15:00.000	2014-1
TCOS_174372_4PH	\\ODCMSAPSC101P\ESP_Sites\Entties\ESP\Gillette\...	2014-12-07 09:30:00.000	2014-1
TCOS_174372_4PH	\\ODCMSAPSC101P\ESP_Sites\Entties\ESP\Gillette\...	2014-12-07 09:45:00.000	2014-1
TCOS_174372_4PH	\\ODCMSAPSC101P\ESP_Sites\Entties\ESP\Gillette\...	2014-12-07 10:00:00.000	2014-1
TCOS_174372_4PH	\\ODCMSAPSC101P\ESP_Sites\Entties\ESP\Gillette\...	2014-12-07 10:15:00.000	2014-1
TCOS_174372_4PH	\\ODCMSAPSC101P\ESP_Sites\Entties\ESP\Gillette\...	2014-12-07 10:30:00.000	2014-1
TCOS_174372_4PH	\\ODCMSAPSC101P\ESP_Sites\Entties\ESP\Gillette\...	2014-12-07 10:45:00.000	2014-1
TCOS_174372_4PH	\\ODCMSAPSC101P\ESP_Sites\Entties\ESP\Gillette\...	2014-12-07 11:00:00.000	2014-1
TCOS_174372_4PH	\\ODCMSAPSC101P\ESP_Sites\Entties\ESP\Gillette\...	2014-12-07 11:15:00.000	2014-1
TCOS_174372_4PH	\\ODCMSAPSC101P\ESP_Sites\Entties\ESP\Gillette\...	2014-12-07 11:30:00.000	2014-1
TCOS_174372_4PH	\\ODCMSAPSC101P\ESP_Sites\Entties\ESP\Gillette\...	2014-12-07 11:45:00.000	2014-1
TCOS_174372_4PH	\\ODCMSAPSC101P\ESP_Sites\Entties\ESP\Gillette\...	2014-12-07 12:00:00.000	2014-1
TCOS_174372_4PH	\\ODCMSAPSC101P\ESP_Sites\Entties\ESP\Gillette\...	2014-12-07 12:15:00.000	2014-1
TCOS_174372_4PH	\\ODCMSAPSC101P\ESP_Sites\Entties\ESP\Gillette\...	2014-12-07 12:30:00.000	2014-1
TCOS_174372_4PH	\\ODCMSAPSC101P\ESP_Sites\Entties\ESP\Gillette\...	2014-12-07 12:45:00.000	2014-1



PI Integrator for Esri ArcGIS

Overlay Assets and Real-time Information onto Esri Maps



- Overview of your PI System assets using Esri maps
- Esri maps become live with PI System data
- Drill into asset data using PI Coresight
- Import Esri ArcGIS assets into PI Asset Framework

When can you start ?

Mobility

PI Coresight 2014



Geospatial
Insights

PI Integrator for Esri



Actionable
Information

PI Server 2014 R2



Cross Company
Collaboration

PI Cloud Connect



Forecasting

PI System 2015

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PI Integrator for BI, Hana

THANK YOU

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