



# OSIsoft PI System evolutions for the Oil & Gas Industries

# Agenda

PI System is helping you transform your world

Mobility

Geospatial  
Insights

Actionable  
Information

Cross  
Company  
Collaboration

Forecasting

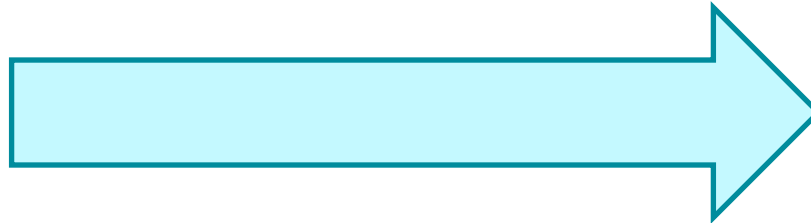
Enabling  
Analytics  
Systems

# The PI System Infrastructure



Wherever your data starts

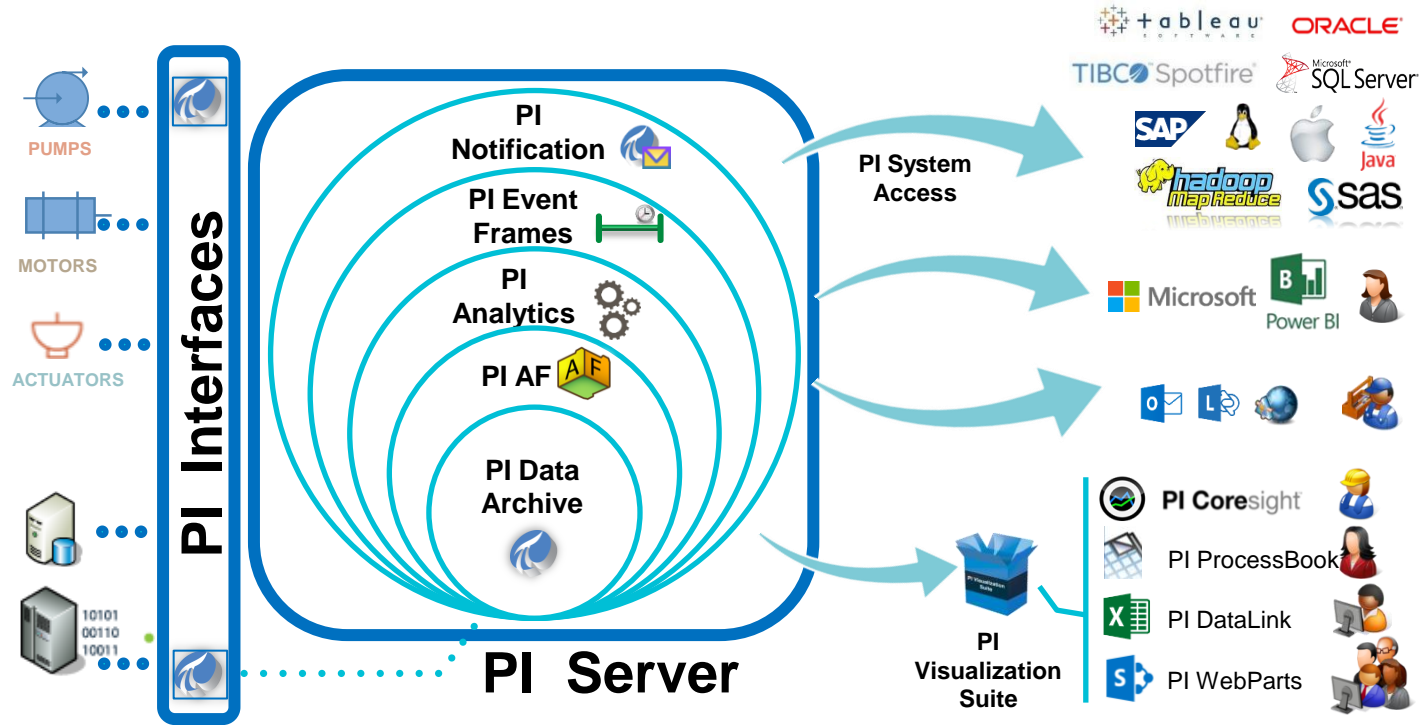
to Wherever your data needs to go



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



# The PI System Infrastructure



# PI Connectors are helping you transform your world

Mobility

Geospatial  
Insights

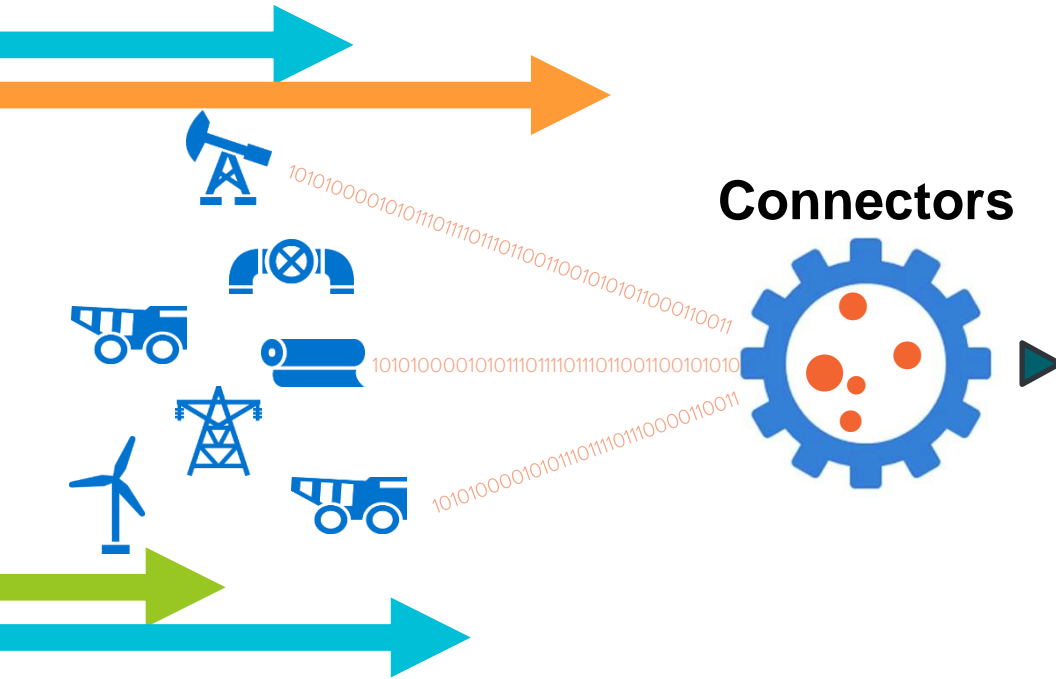
Actionable  
Information

Cross Company  
Collaboration

Forecasting





Enabling  
Analytics Systems

# 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 O&G companies

PI Connector	Market	Status
IPMI	Datacenters	
CygNet	Upstream Oil and Gas	
EtherNet/IP	High-speed discrete	
Kongsberg	Transportation	
HART-IP	Many. Wireless sensors	Beta
BACnet	Facilities	Beta
WITSML	Upstream, drilling	Beta
Siemens Simatic PCS 7	Many	Beta

Many others protocols in addition

# PI Cloud Connect is helping you transform your world

Mobility

Geospatial  
Insights

Actionable  
Information

Cross Company  
Collaboration

Forecasting

Enabling  
Analytics Systems



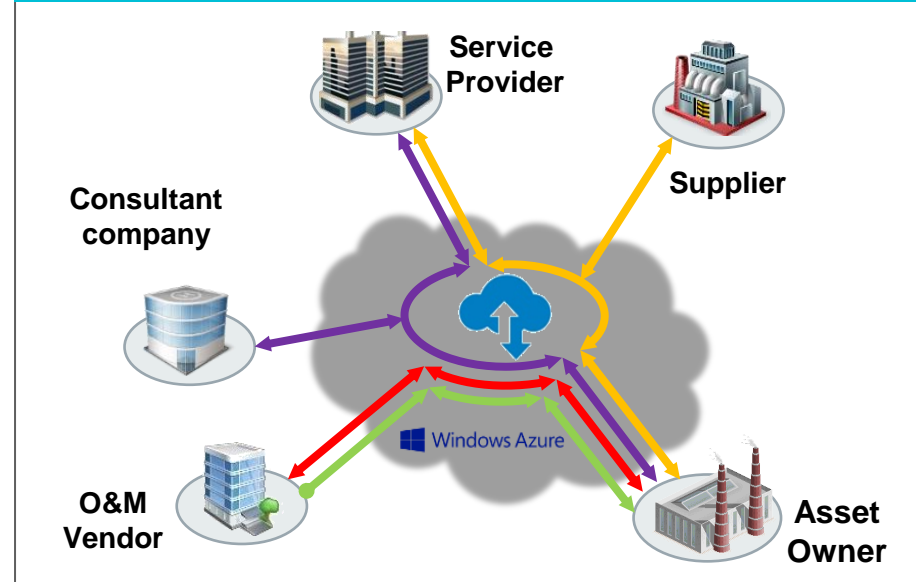
# PI Cloud Connect

Securely Share PI System Data Across Geographic & Organizational Boundaries

## Simply Publish and Subscribe

The screenshot shows the 'Create Publication' window. At the top, there is a progress bar with three steps: 'Data Source' (green dot), 'Publication Scope' (green dot), and 'Publication Name' (grey dot). Below the progress bar, the text 'Browse your AF asset hierarchy to select the AF element that you want to publish' is displayed. On the left, a tree view shows the asset hierarchy: Anacortes Refinery, Baton Rouge Refinery, E&P, Gas, Compressor Stations, Blain River, Brunswick Station, Levis Station, Newport Station, Oxnard, Powder River Basin (highlighted), Transwestern Station, Viking Station, Gas Plants, and Key Performance Indicators. On the right, the 'Data source:' is 'DFPIAF.Petrolux' and the 'Selected AF element to publish:' is '\\DFPIAF\Petrolux\Gas\Compressor Stations\Powder River Basin'. Navigation arrows are visible on the right side of the window.

## Supports Any Sharing Scenario



# Forecast data is helping you transform your world

Mobility

Geospatial  
Insights

Actionable  
Information

Cross Company  
Collaboration

Forecasting

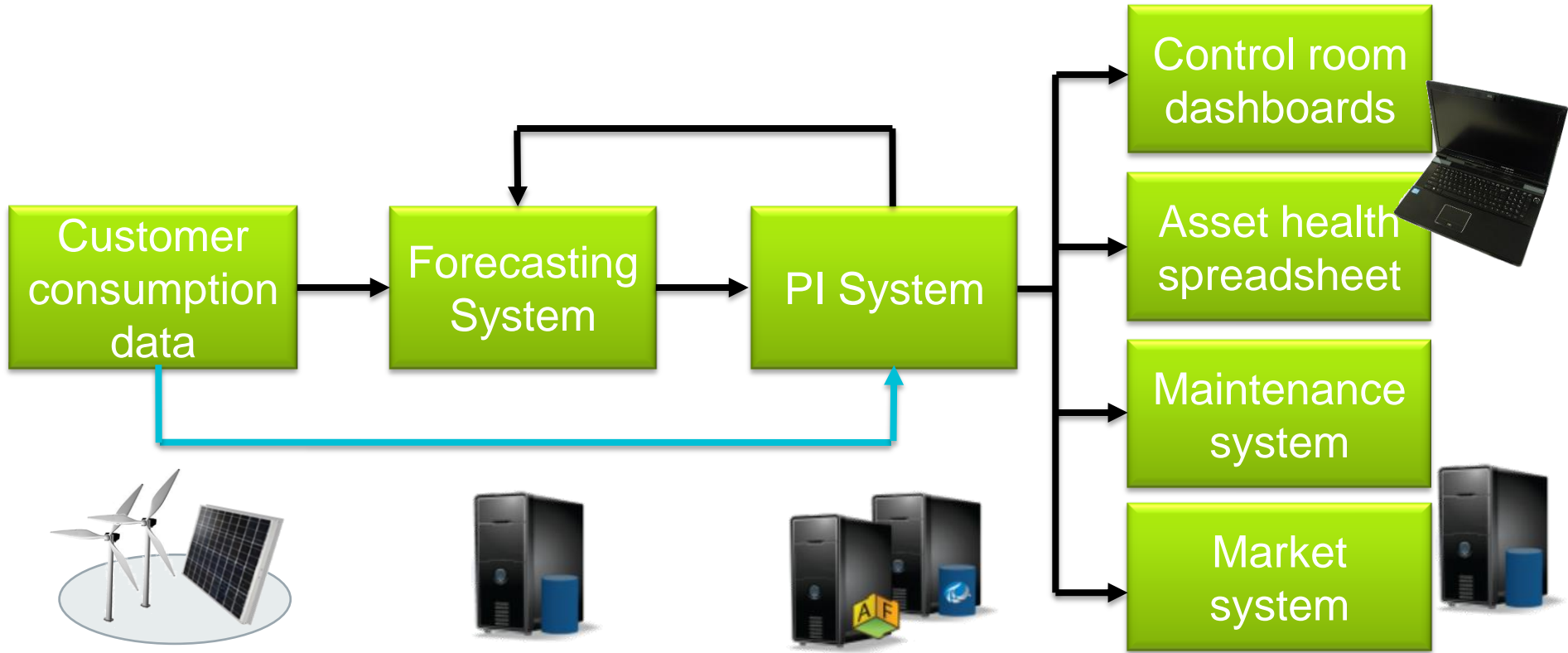
Enabling  
Analytics Systems

# Forecast data in the O&G industry

- Production predictions
- Consumers consumption prediction
- Model failures patterns for prediction



# Sample PI System for O&G



# PI Asset Framework is helping you transform your world

Mobility

Geospatial  
Insights

Actionable  
Information

Cross Company  
Collaboration

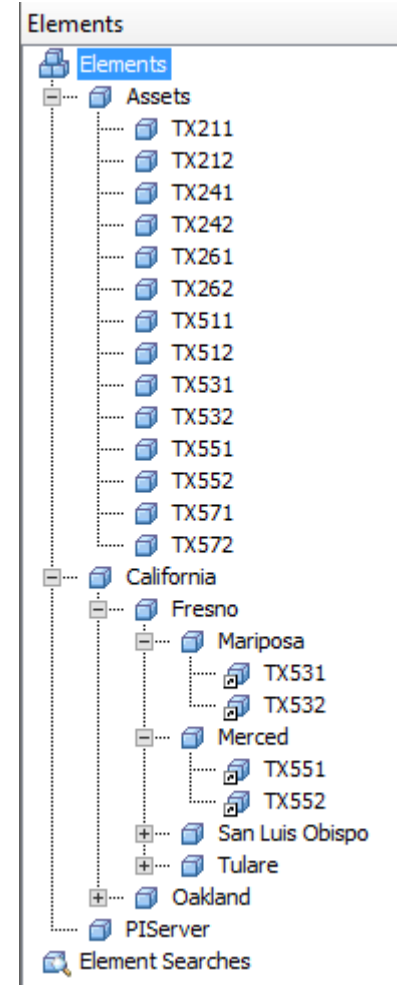
Forecasting

Enabling  
Analytics Systems

# PI Asset Framework

## The hierarchy

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



# PI Asset Framework

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

Well1

General Child Elements Attributes Ports Analyses Version

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

Gas distribution vehicles

Truck

Cars

Caterpillar

Manitex

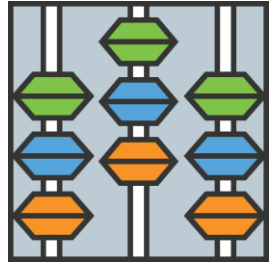




# PI Asset Framework

## 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



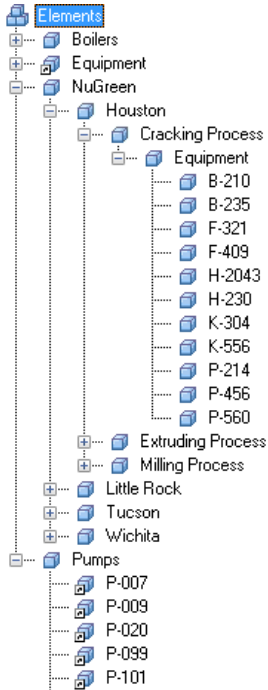
# PI Asset Framework



## Event Frames

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

Mobility

Geospatial  
Insights

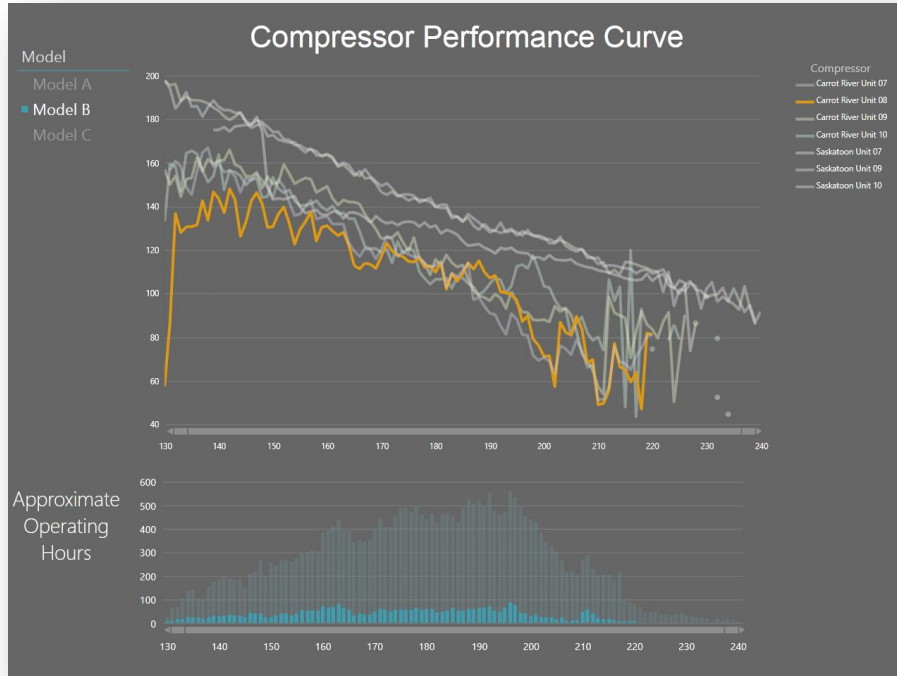
Actionable  
Information

Cross Company  
Collaboration

Forecasting

Enabling  
Analytics Systems

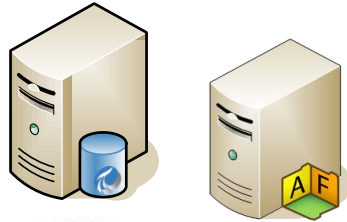
# Why do you need a PI Integrator?



## 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

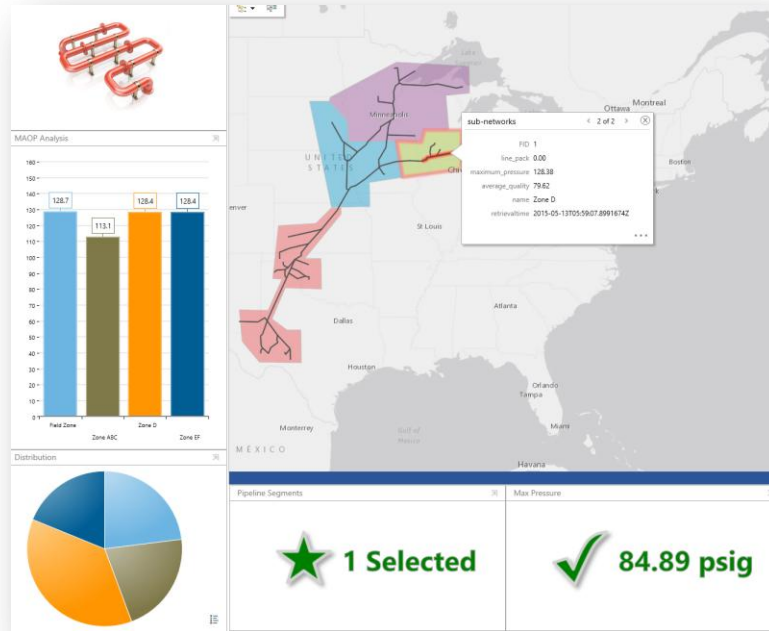
A screenshot of the OSIsoft software interface. The top part shows a tree view of a project structure with folders like "Addresses" and "Steps". The bottom part is a data table with the following columns: "Name", "CASTKey", "LocalTime", and "GMTTh". The table contains 19 rows of data, all with the same "Name" and "CASTKey" values, but varying "LocalTime" values from 08:30:00.000 to 12:45:00.000 on 2014-12-07.

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

Enabling  
Analytics Systems

PI Integrator for BI, Hana

# THANK YOU

Brought to you by  **OSIsoft.**