



Connectivity from A to Z – Roadmap for PI Connectors and PI Interfaces

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Xiaoli Tang, Software Developer

Technology



Control systems evolve

Register	Value
1	27
2	Off
3	53.89
4	3.2
...	...
2501	Running
2502	45.8
2503	1

- Chemical Plant
 - Line 1
 - Heat Exchangers
 - Heat Exchanger 1001
 - Area
 - Cold Side Inlet Temperature
 - Cold Side Outlet Temperature
 - Hot Side Inlet Temperature
 - Hot Side Outlet Temperature
 - Manufacturer
 - Heat Exchanger 1002
 - Pumps
 - SF Pump 001
 - SF Pump 002
 - Tanks
 - Line 2

Older data sources

Register	Value
1	27
2	Off
3	53.89
4	3.2
...	...
2501	Running
2502	45.8
2503	1

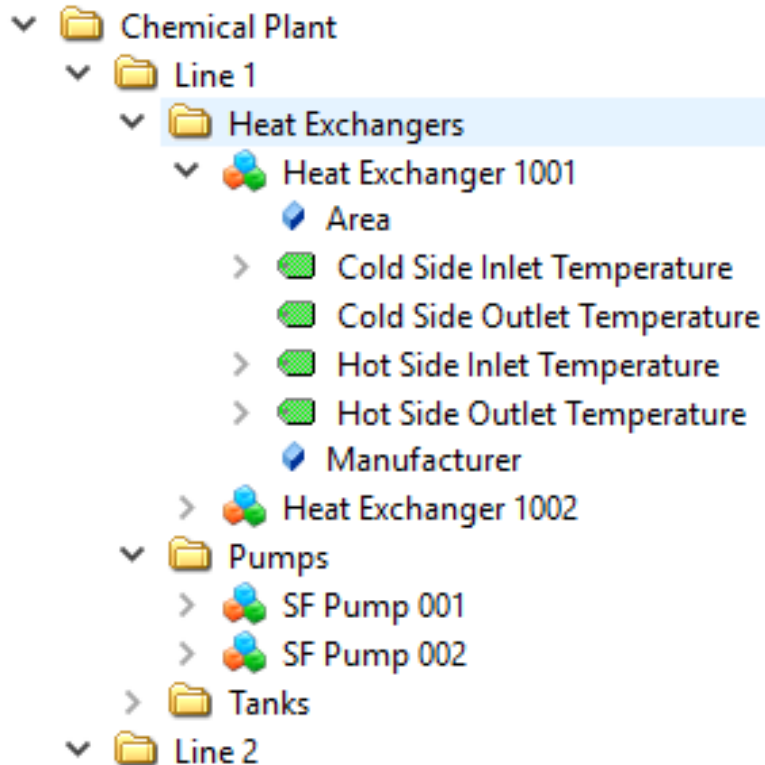
Older data sources:

- Data by polling
- Names of source sometimes just a number
- Not always discoverable
- Modbus even more limited

PI Interfaces work great for these

- Continued development adopting new security options announced in 2016
- See Product Expo for details on PI Interfaces and the latest releases

Example of a modern data source – OPC UA



- Information model – meta data
- Typed meta data – templates
- Data by exception
- Discoverable
- Supports:
 - Data Access (DA)
 - Historical Access (HA)
 - Alarms and Conditions (A&C)

PI Connectors help you to be Strategic



Streamlined Configuration

Auto create PI Points with rules-based data selection.

Auto discover data, now and later

PI Connectors monitor the source so you don't have to.

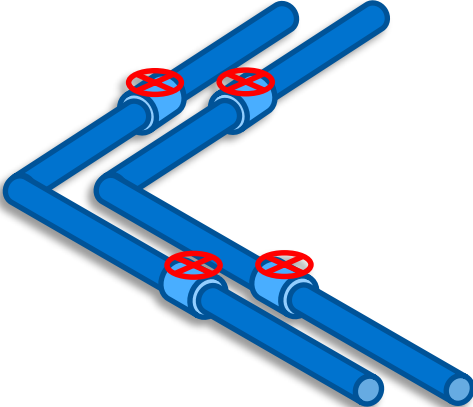
Unified Admin Experience

A one-stop shop to manage data collection across your sources.

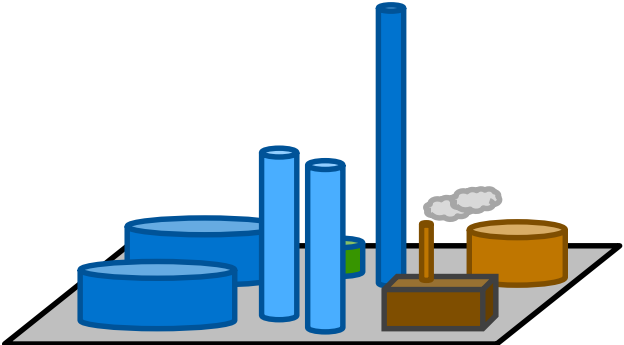
Secure & Flexible Architectures

Send data securely across diverse networks to multiple destinations.

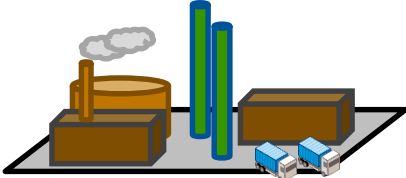
ChemiCo



Pipeline

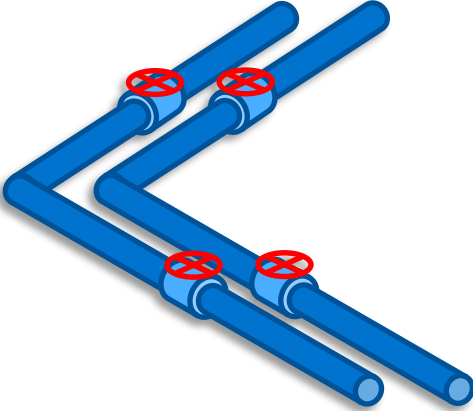


Feedstock plant

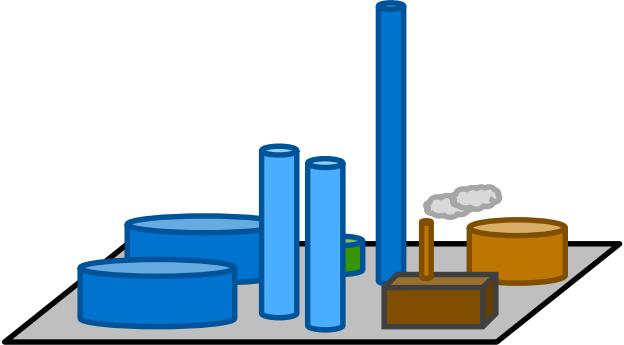


Chem 1

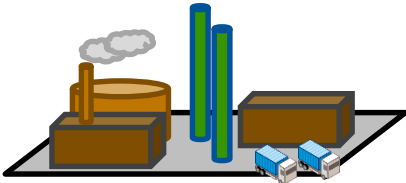
New plant added



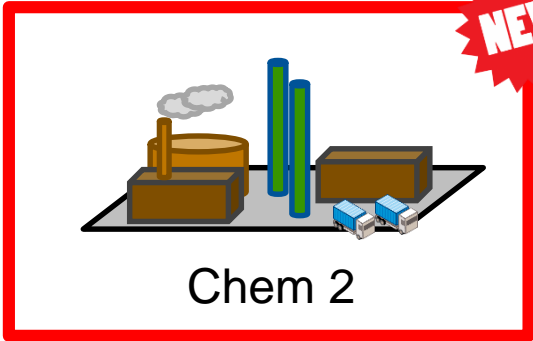
Pipeline



Feedstock plant



Chem 1



Chem 2

Auto discovery and rule-based data selection

NEW



- Chemical Plant
 - Line 1
 - Heat Exchangers
 - Heat Exchanger 1001
 - Area
 - Cold Side Inlet Temperature
 - Cold Side Outlet Temperature
 - Hot Side Inlet Temperature
 - Hot Side Outlet Temperature
 - Manufacturer
 - Heat Exchanger 1002
 - Pumps
 - SF Pump 001
 - SF Pump 002
 - Tanks
 - Line 2



Easy



Select by rules:

Every Pump – 2 of 5 tags

Every Tank – all data

Every Heat Exchanger – only *Temperature values



Automatic

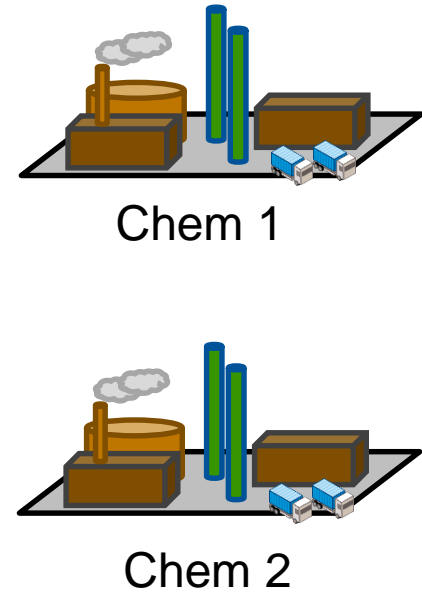
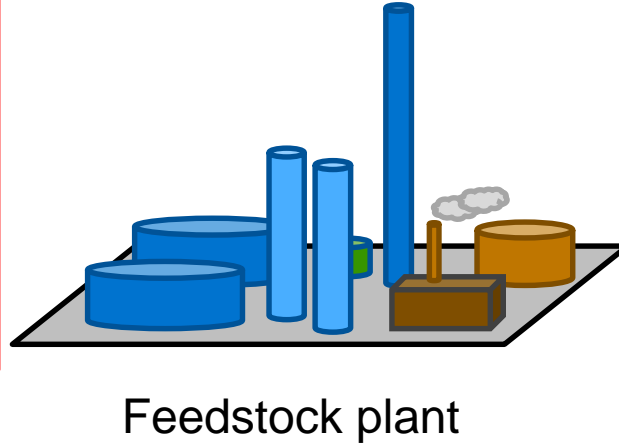
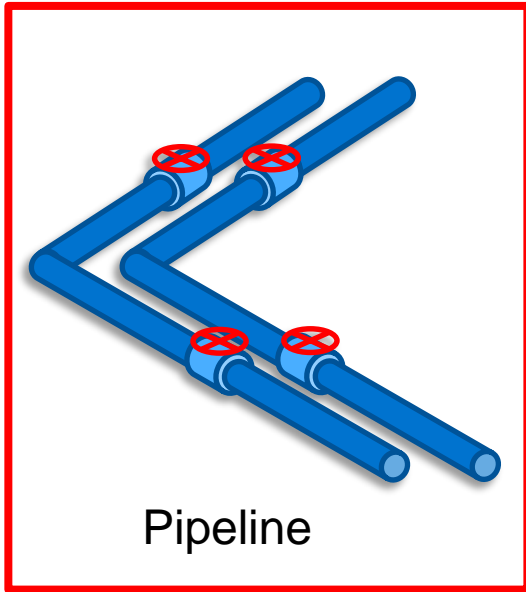


Collect the data you need

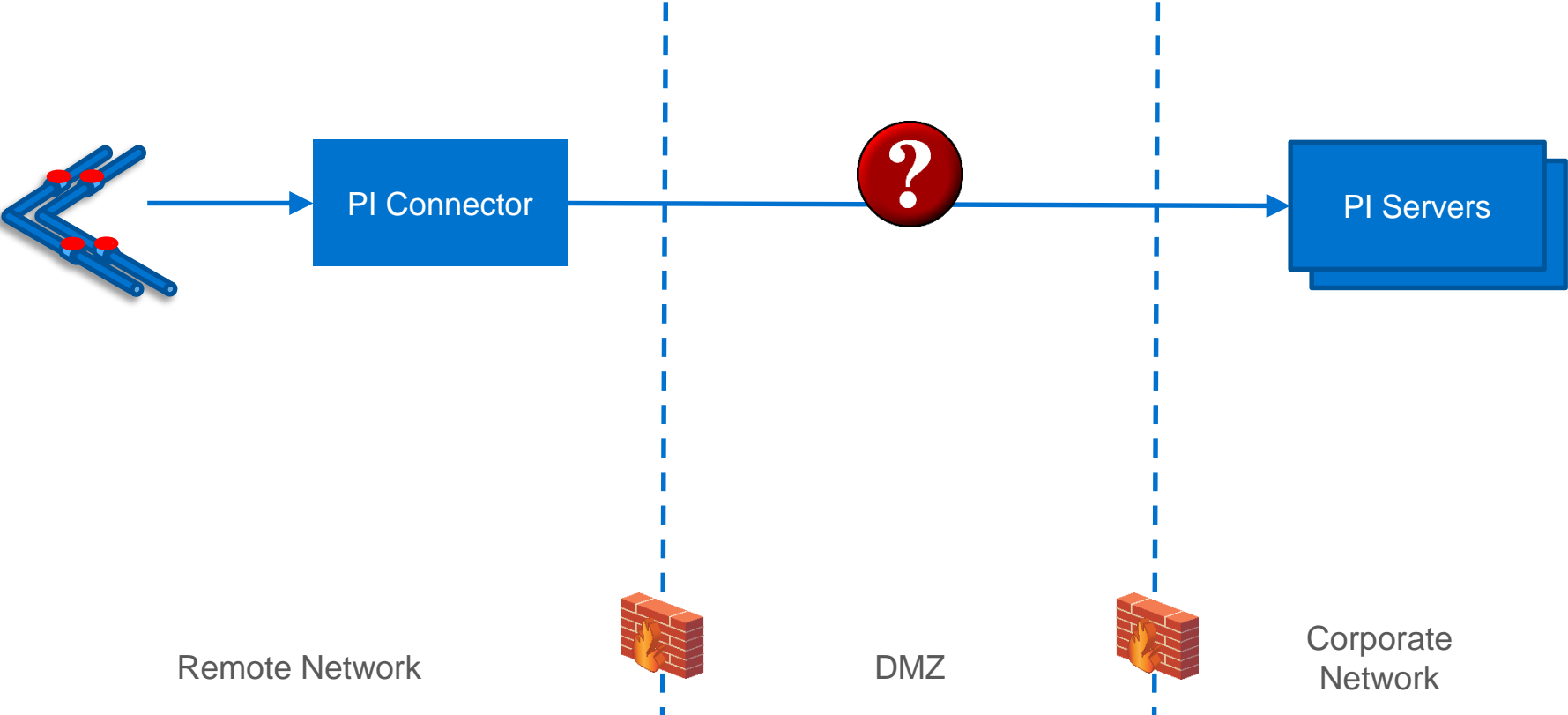
Build the tags & reference AF model with meta data you select

Updates – Auto or with Approval

Pipeline uses external network with limited bandwidth

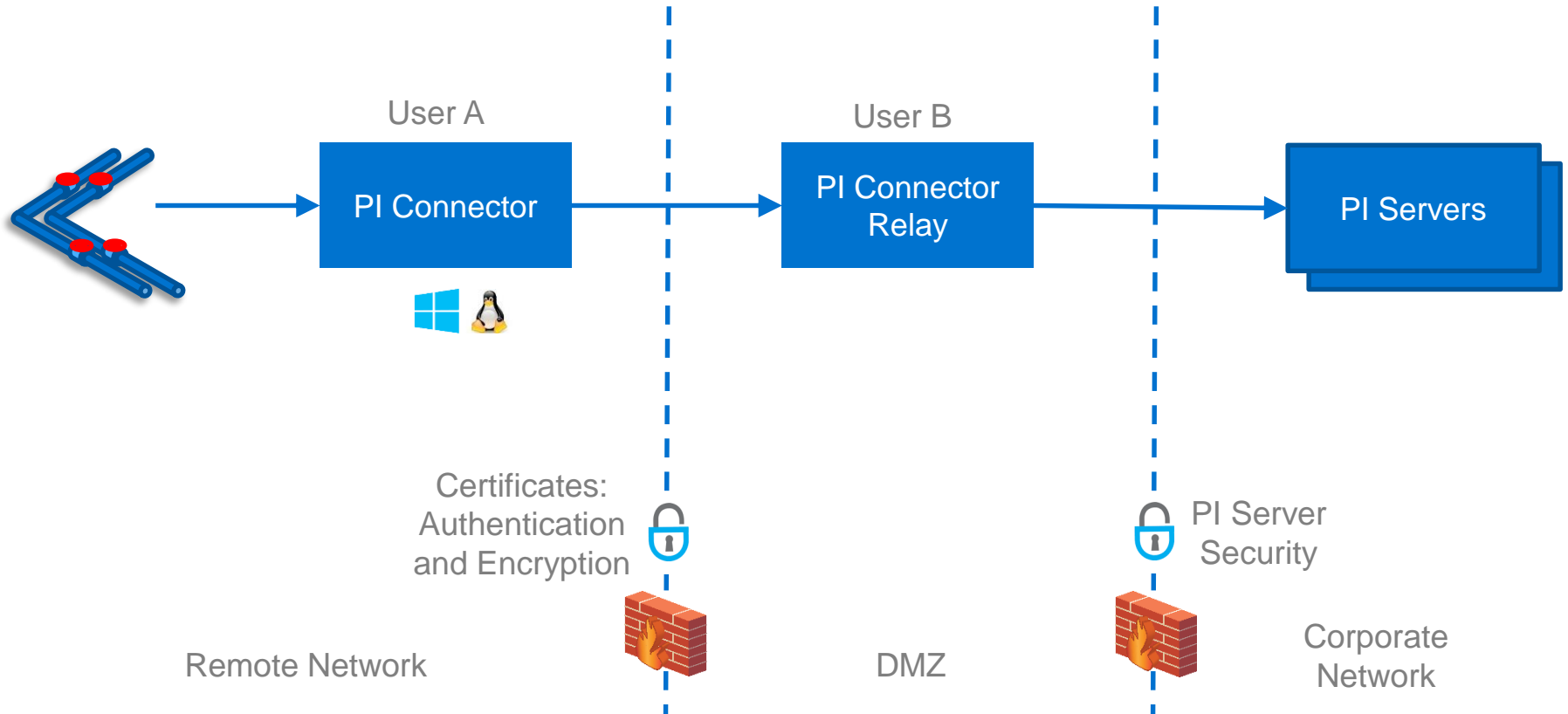


Challenges across networks



Security for remote networks

Secure and Flexible



Remote Network

Certificates:
Authentication
and Encryption

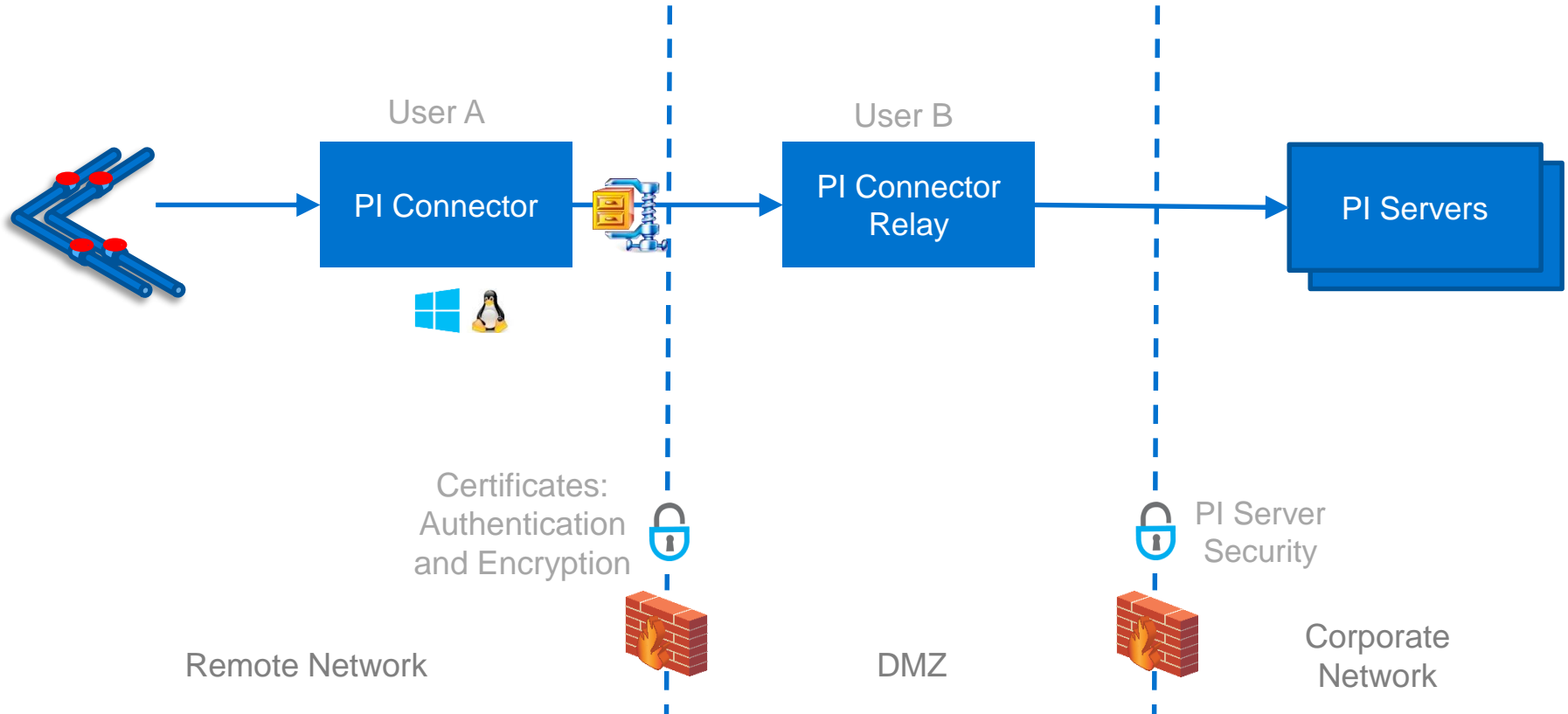
DMZ

PI Server
Security

Corporate
Network

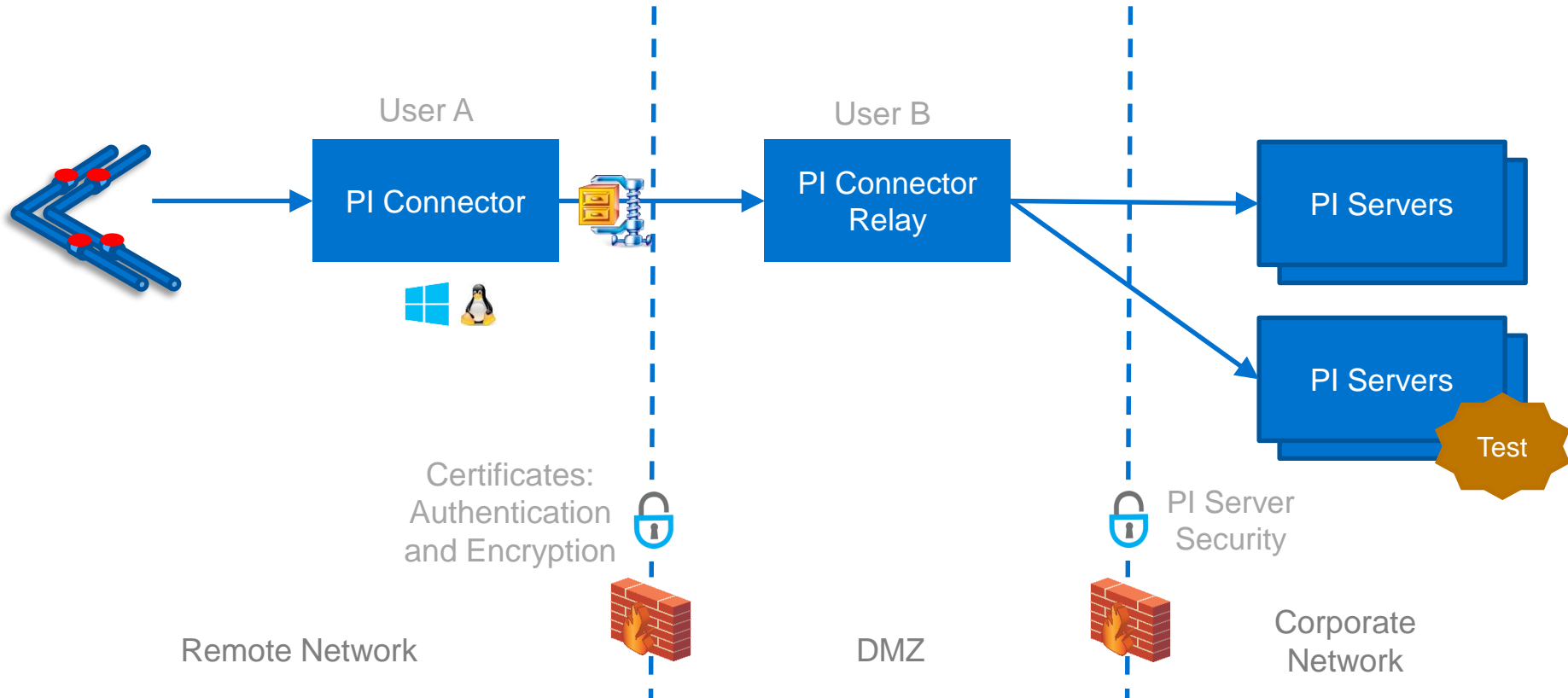
Compress data to limit bandwidth

Secure and Flexible



Flexible and secure routing

Secure and Flexible 



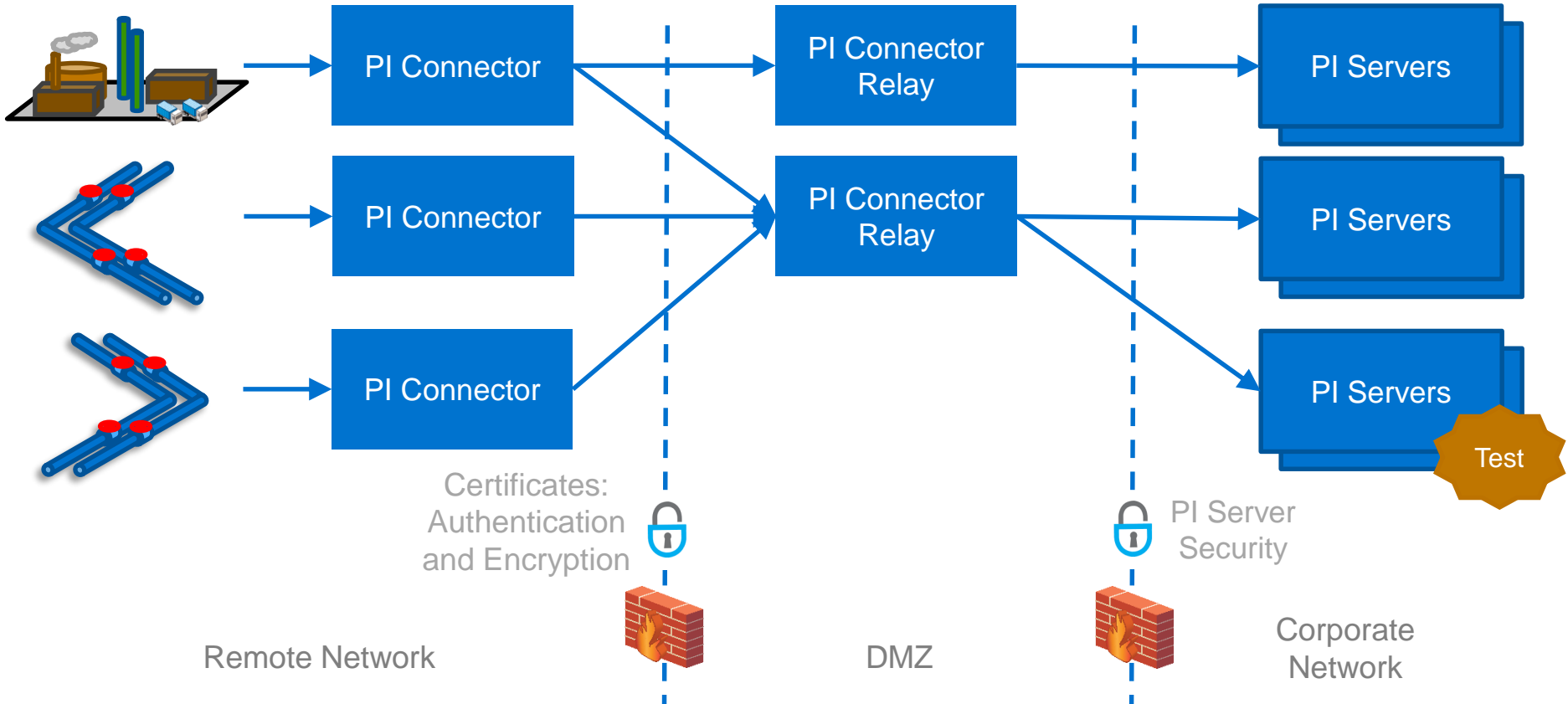
Remote Network

DMZ

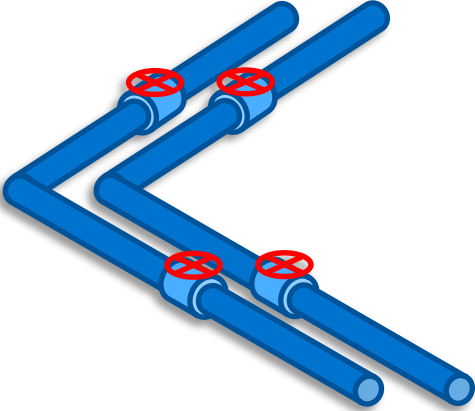
Corporate Network

Flexible and secure routing

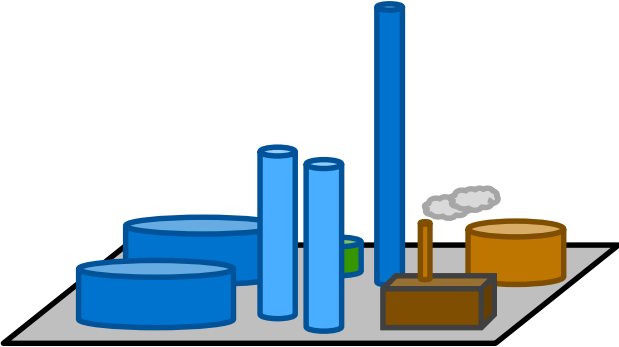
Secure and Flexible 



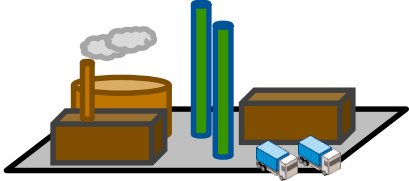
How do you configure and manage your data flow?



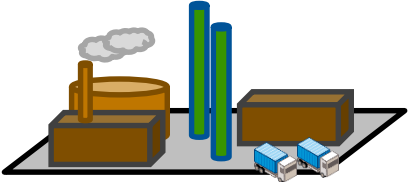
Pipeline



Feedstock plant

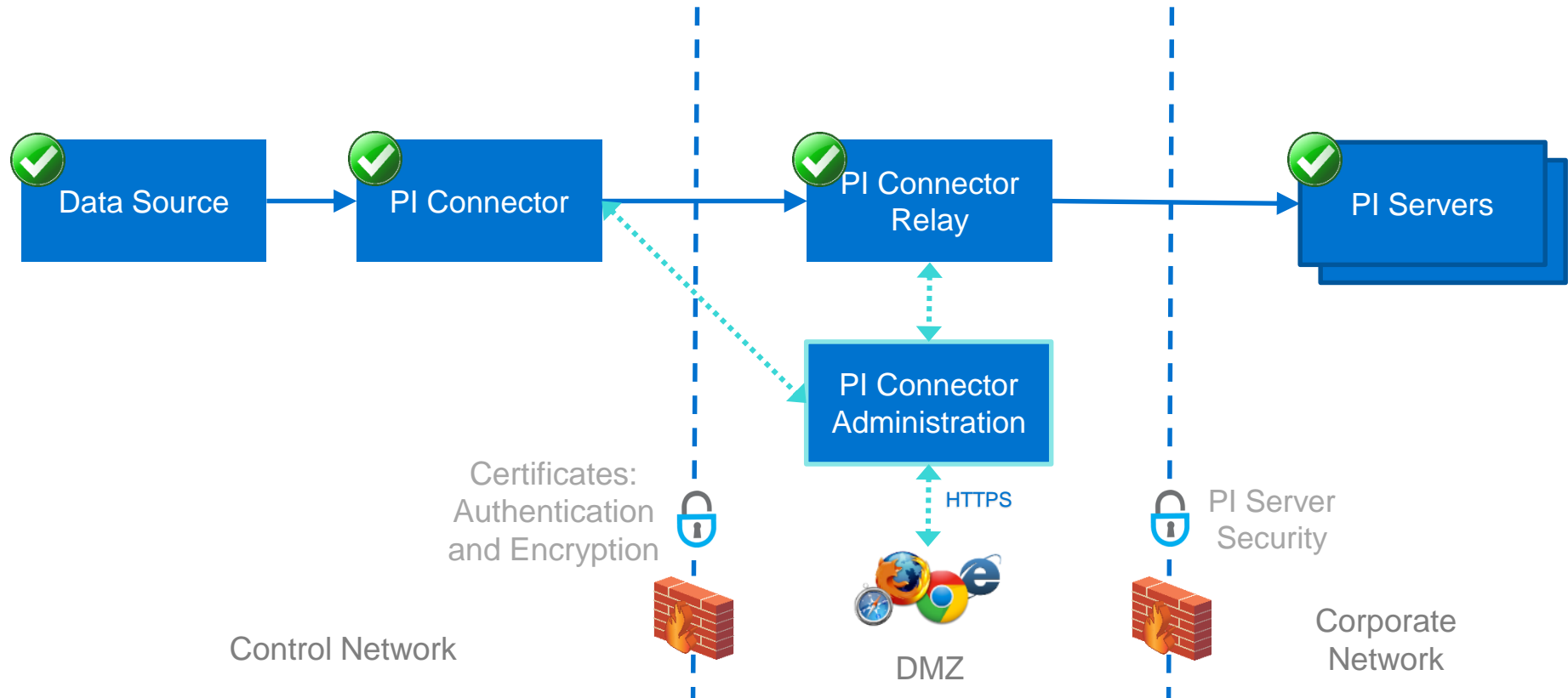


Chem 1

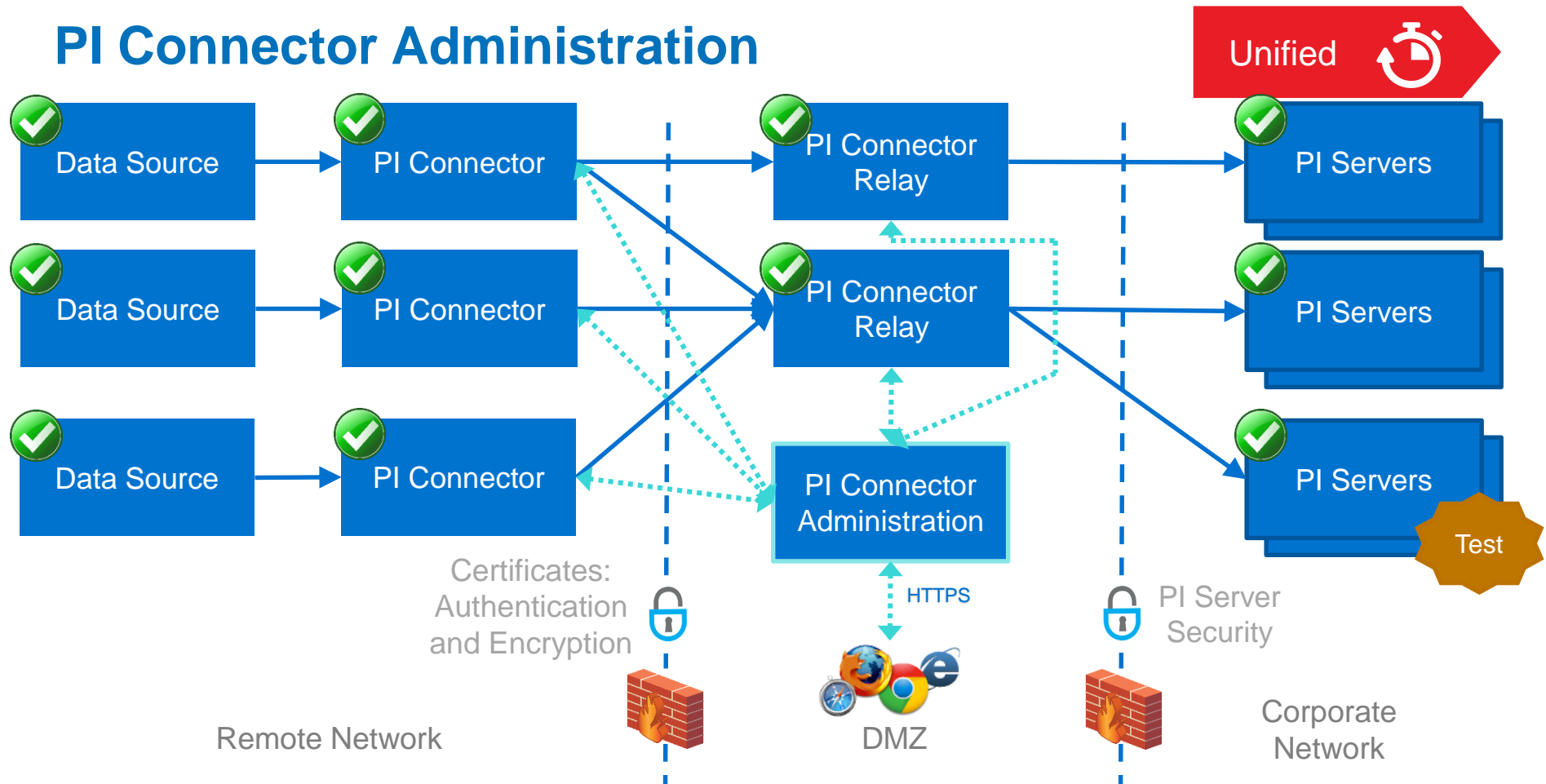


Chem 2

PI Connector Administration



PI Connector Administration



Available today



PI Connector	Market
BACnet	Facilities
CygNet	Upstream Oil and Gas
DC Systems RTscada	T&D
EtherNet/IP	High-speed PLC data
HART-IP	Many. Wireless sensors
IEC 60870-5-104	T&D Substations
IPMI	Datacenters
NOV WITSML	Upstream, drilling
OPC UA	Many
Ping	IT infrastructure
PI System Health	IT infrastructure
Siemens SIMATIC PCS 7	Many
UFL	Many
Wonderware Historian	Many

PI Connectors in development



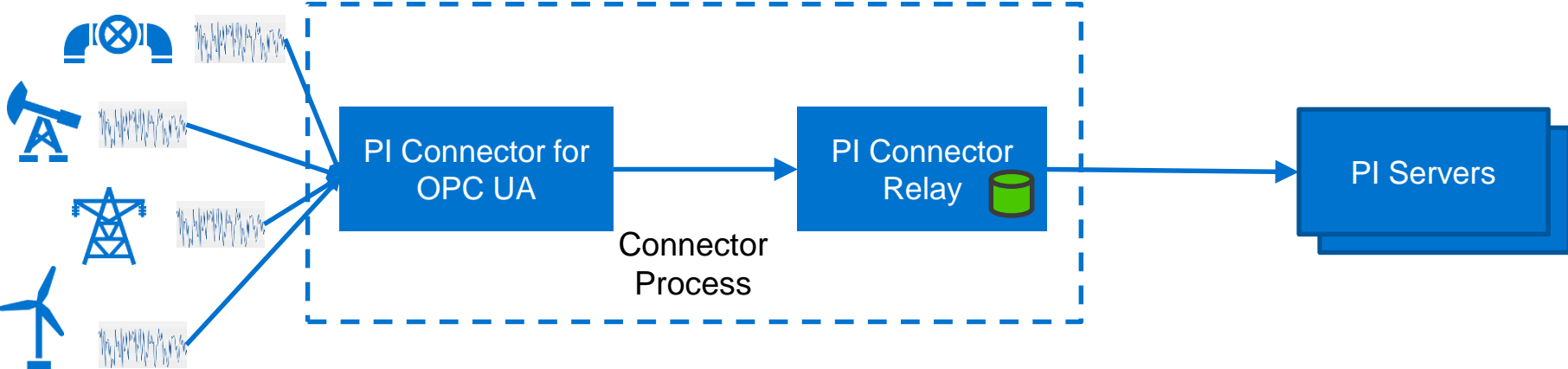
Demo

PI Connector	Market	Status
PI System Connector	All	Beta - early
Redfish	Datacenter	Development
Modbus for Cisco IOx	All	Limited release soon
IEC 61850	T&D	Development
GE Fanuc Focas	Discrete	Development
Siemens Sinumerik	Discrete	Development
MTConnect	Discrete	Development

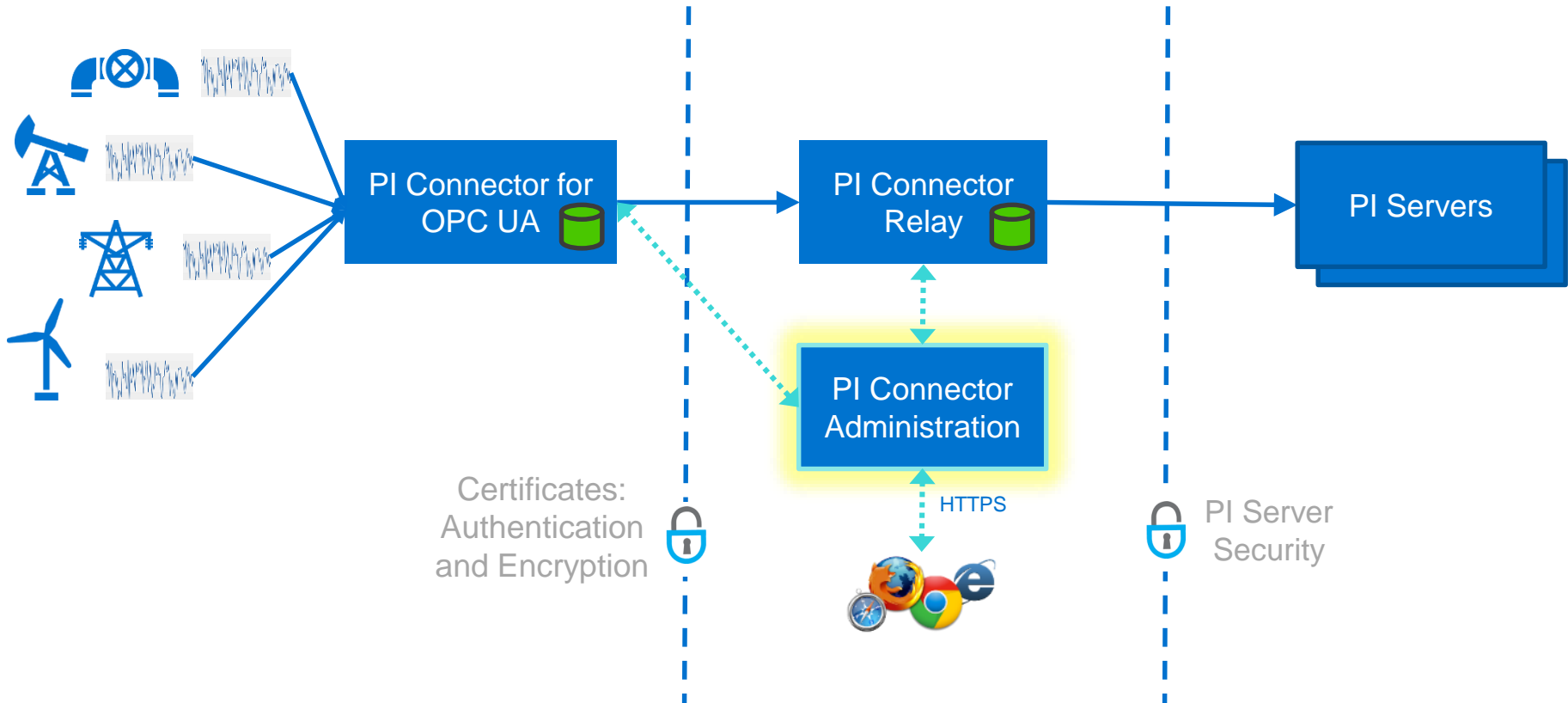
- ◆ See also: **“PI System Distributed Data Collection,”** Dmitriy Shvidchenko and Chris Felts, Thursday 4:30pm, Imperial B

PI Connector for OPC UA

PI Connector for OPC UA – v1



PI Connector for OPC UA – vNext



Scenario and Roles

Field Technician

- Installs the connector ✓
- Registers connector with Admin app ✓
- Configures data source



Process Engineer

- Discover what's available
- Selects what is needed



PI Administrator

- Installs
 - PI Servers ✓
 - PI Connector Relay and Admin app ✓
- Configures Data flow
- Monitors the health of Data flow



Demo

The screenshot shows a web browser window with the address bar displaying "https://taudemo:5500/ui/dda/config". The page title is "PI Connector Administration". The interface is divided into three main sections:

- Components:** A vertical sidebar on the left containing expandable sections for "Data Sources", "Connectors", "Relays", and "Destinations".
- Routing:** A central area with a header row containing "Data Sources", "Connectors", "Relays", and "Destinations", each with a vertical ellipsis menu icon. The main content area below is currently empty.
- Overview:** A right-hand panel with a "Welcome to PI Connector Administration" message, followed by instructions on how to use the application and manage components. It includes a "Less" button and a "Tasks" section.

At the bottom right of the Routing section, there is an "Edit Routing Configuration" button with a pencil icon.

Scenario and Roles

Field Technician

- Installs the connector ✓
- Registers connector with Admin app ✓
- Configures data source ✓



Process Engineer

- Discover what's available ✓
- Selects what is needed ✓




PI Administrator

- Installs
 - PI Servers ✓
 - PI Connector Relay and Admin app ✓
- Configures Data flow ✓
- Monitors the health of Data flow ✓



When can I get it?

- Beta in 2Q
 - PI Connector for OPC UA and Redfish with PI Connector Relay and Administration App
 - Interested? Contact us betaconnectors@osisoft.com
- Limited Release in 3Q
- More connectors coming
 - PI System Connector 
- Come and play with it live at the product expo!

PI System Connector

PI System evolves

Tag Name	Timestamp	Value
ChemiCo.Corn Process Centrifuge 1.Flow Out 1	3/13/2017 2:12:32 PM	167.0
ChemiCo.Corn Process Centrifuge 1.Flow Out 2	3/13/2017 2:12:32 PM	85.0
ChemiCo.Corn Process Centrifuge 1.Pressure In	3/13/2017 2:12:32 PM	122.0
ChemiCo.Corn Process Centrifuge 1.Pressure Out 1	3/13/2017 2:12:32 PM	22.0
ChemiCo.Corn Process Centrifuge 1.Pressure Out 2	3/13/2017 2:12:32 PM	77.0
ChemiCo.Corn Process Centrifuge 1.Temperature In	3/13/2017 2:12:32 PM	6.0
ChemiCo.Corn Process Centrifuge 1.Temperature Ou...	3/13/2017 2:12:32 PM	54.0
ChemiCo.Corn Process Centrifuge 1.Temperature Ou...	3/13/2017 2:12:32 PM	7.0
ChemiCo.Corn Process Centrifuge 2.Flow In	3/13/2017 2:12:32 PM	20.0
ChemiCo.Corn Process Centrifuge 2.Flow Out 1	3/13/2017 2:12:32 PM	182.0
ChemiCo.Corn Process Centrifuge 2.Flow Out 2	3/13/2017 2:12:32 PM	170.0
ChemiCo.Corn Process Centrifuge 2.Pressure In	3/13/2017 2:12:32 PM	120.0
ChemiCo.Corn Process Centrifuge 2.Pressure Out 1	3/13/2017 2:12:32 PM	24.0
ChemiCo.Corn Process Centrifuge 2.Pressure Out 2	3/13/2017 2:12:32 PM	219.0
ChemiCo.Corn Process Centrifuge 2.Temperature In	3/13/2017 2:12:32 PM	85.0
ChemiCo.Corn Process Centrifuge 2.Temperature Ou...	3/13/2017 2:12:32 PM	128.0
ChemiCo.Corn Process Centrifuge 2.Temperature Ou...	3/13/2017 2:12:32 PM	39.0
ChemiCo.Corn Process Centrifuge 3.Flow In	3/13/2017 2:12:32 PM	137.0
ChemiCo.Corn Process Centrifuge 3.Flow Out 1	3/13/2017 2:12:32 PM	193.0
ChemiCo.Corn Process Centrifuge 3.Flow Out 2	3/13/2017 2:12:32 PM	99.0
ChemiCo.Corn Process Centrifuge 3.Pressure In	3/13/2017 2:12:32 PM	26.0
ChemiCo.Corn Process Centrifuge 3.Pressure Out 1	3/13/2017 2:12:32 PM	90.0
ChemiCo.Corn Process Centrifuge 3.Pressure Out 2	3/13/2017 2:12:32 PM	110.0
ChemiCo.Corn Process Centrifuge 3.Temperature In	3/13/2017 2:12:32 PM	111.0
ChemiCo.Corn Process Centrifuge 3.Temperature Ou...	3/13/2017 2:12:32 PM	140.0
ChemiCo.Corn Process Centrifuge 3.Temperature Ou...	3/13/2017 2:12:32 PM	18.0



\\XTANGPISYSTEM1\ChemiCo - PI System Explorer

File Search View Go Tools Help

Database Query Date Back Check In Refresh New Element

Elements

- Elements
 - Chemical Plant
 - Corn Process Plant
 - Line 1
 - Corn Process Centrifuge 1
 - Corn Process Centrifuge 2
 - Corn Process Distillation System 1
 - Corn Process Drum Dryer 1
 - Corn Process Evaporator 1
 - Line 2
 - Corn Process Centrifuge 3
 - Corn Process Centrifuge 4
 - Corn Process Distillation System 2
 - Corn Process Drum Dryer 2
 - Corn Process Evaporator 2
 - Onsite Power Plant
 - Element Searches

Corn Process Plant

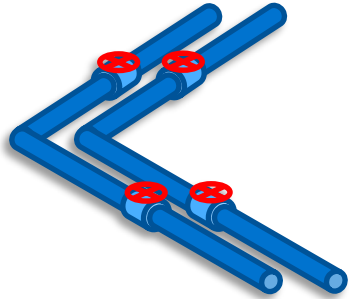
General Child Elements Attributes Ports Analyses

Filter

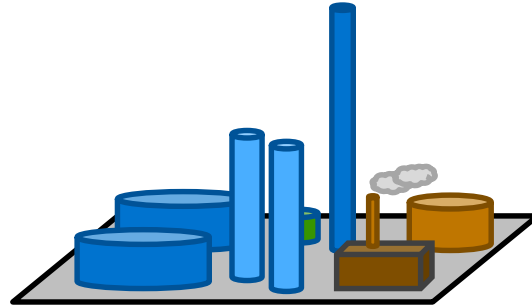
Name
Daily EtOH Production Cumulative
EtOH Production Rate
EtOH Storage
In Service Date
Market Price
Outside Temperature
Plant Schematic
Power Demand
Shift
Shift EtOH Production Cumulative

Moving data across network?

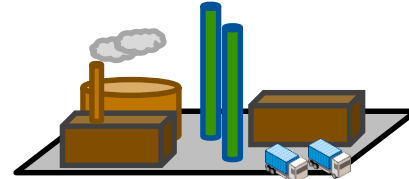
- PI System Connector



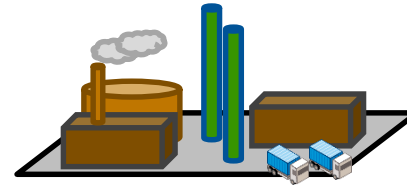
Pipeline



Feedstock plant



Chemical Plant



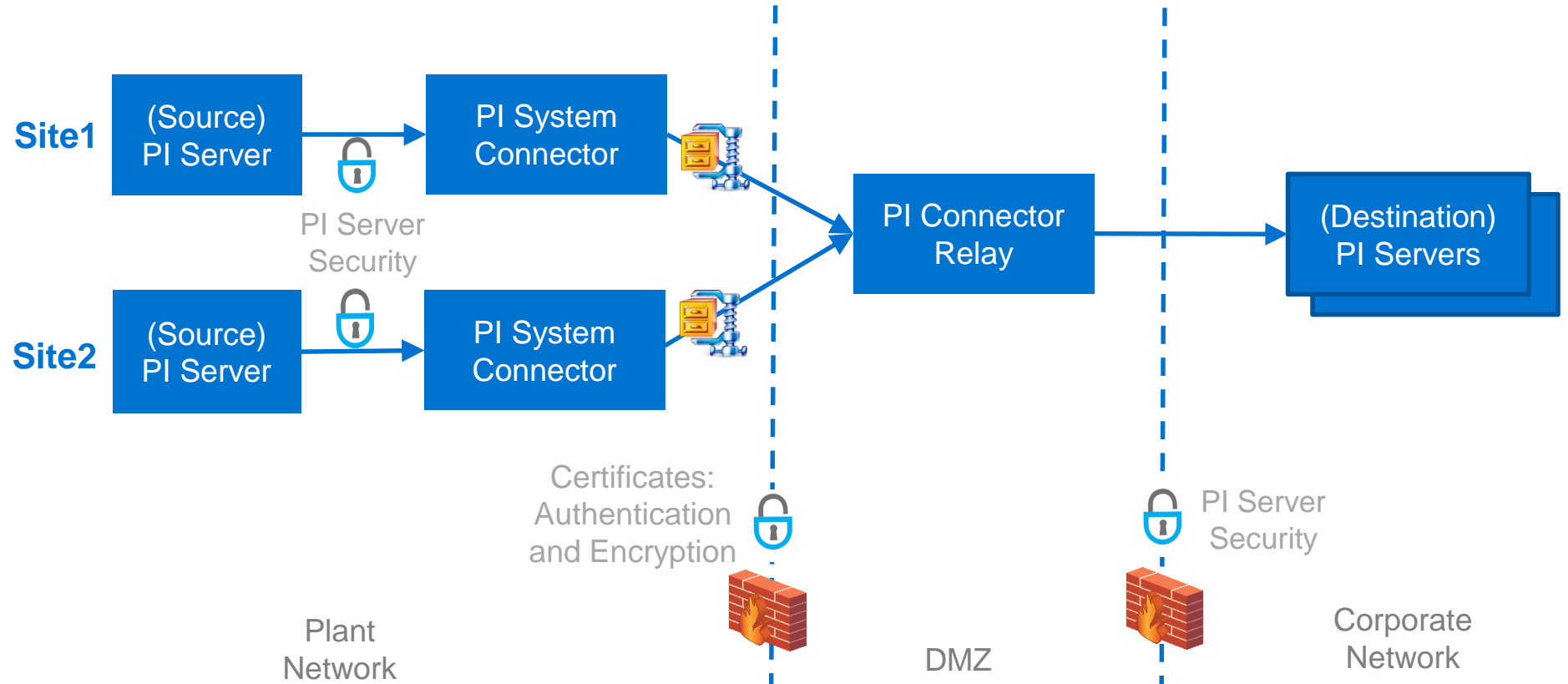
Corn Process Plant



Corporate

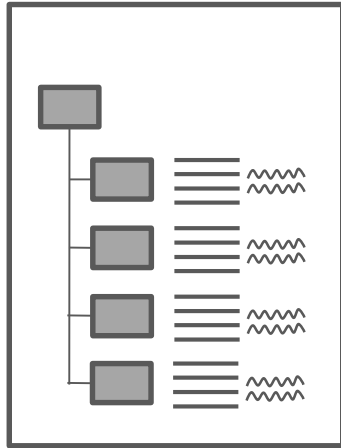


PI System Connector Architecture



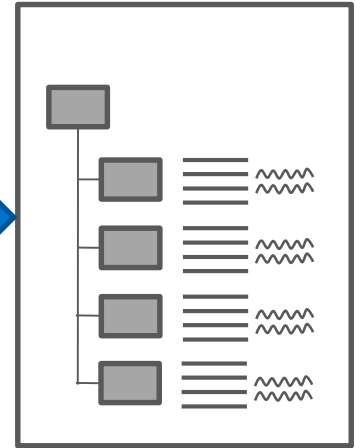
What data is PI System Connector moving?

Source



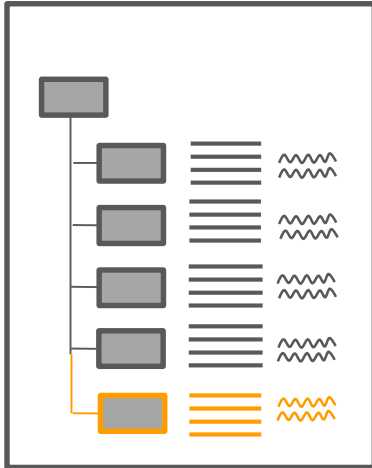
- PI AF Support
 - Elements/Element Templates
 - Units of Measure
 - Tables (excludes linked)
 - Other AF Library Objects
 - AF object updates
- PI Data Archive Support
 - PI Point Creation
 - Digital State Sets
 - Archive Data Replication

Destination



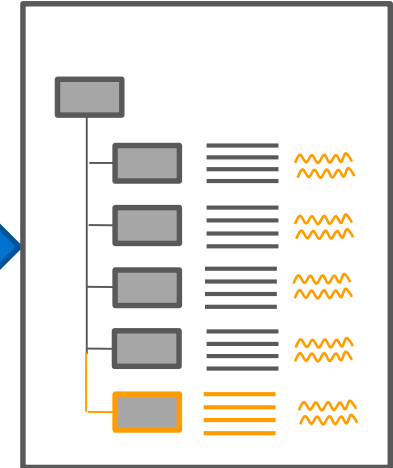
Outages? – PI System Connector recovers history

Source



- Recovers historical data
- Updates AF objects

Destination



\\XTANGR\SYSTEM1\Chemico - PI System Explorer (Administrator)

File Search View Go Tools Help

Database Query Date Back Refresh New Element New Attribute Search Elements

Elements

- Elements
 - Chemical Plant
 - Corn Process Plant
 - Line 1
 - Corn Process Centrifuge 1
 - Corn Process Centrifuge 2
 - Corn Process Distillation System 1
 - Corn Process Drum Dryer 1
 - Corn Process Evaporator 1
 - Line 2
 - Corn Process Centrifuge 3
 - Corn Process Centrifuge 4
 - Corn Process Distillation System 2
 - Corn Process Drum Dryer 2
 - Corn Process Evaporator 2
 - Onsite Power Plant
 - Element Searches

Corn Process Plant

General Child Elements Attributes Ports Analyses Notification Rules Version

Group by: Category Template

Filter

Name	Value
Daily EtOH Production Cumulative	143 kg
EtOH Production Rate	109 kg/h
EtOH Storage	0
In Service Date	2/25/2011 12:00:00 AM
Market Price	0
Outside Temperature	115 deg F
Plant Schematic	13113422426533.jpg
Power Demand	0
Shift	9
Shift EtOH Production Cumulative	131 kg

Elements

- Elements
- Event Frames
- Library

Corn Process Plant Modified: 3/2/2017 4:48:37 PM. Version: 1/1/1970 12:00:00 AM, Revision 13

\\XTANGR\SYSTEM2\CorporateAFDatabase - PI System Explorer (Administrator)

File Search View Go Tools Help

Database Query Date Back Refresh New Element Search Elements

Elements

Group by: Category Template

Search

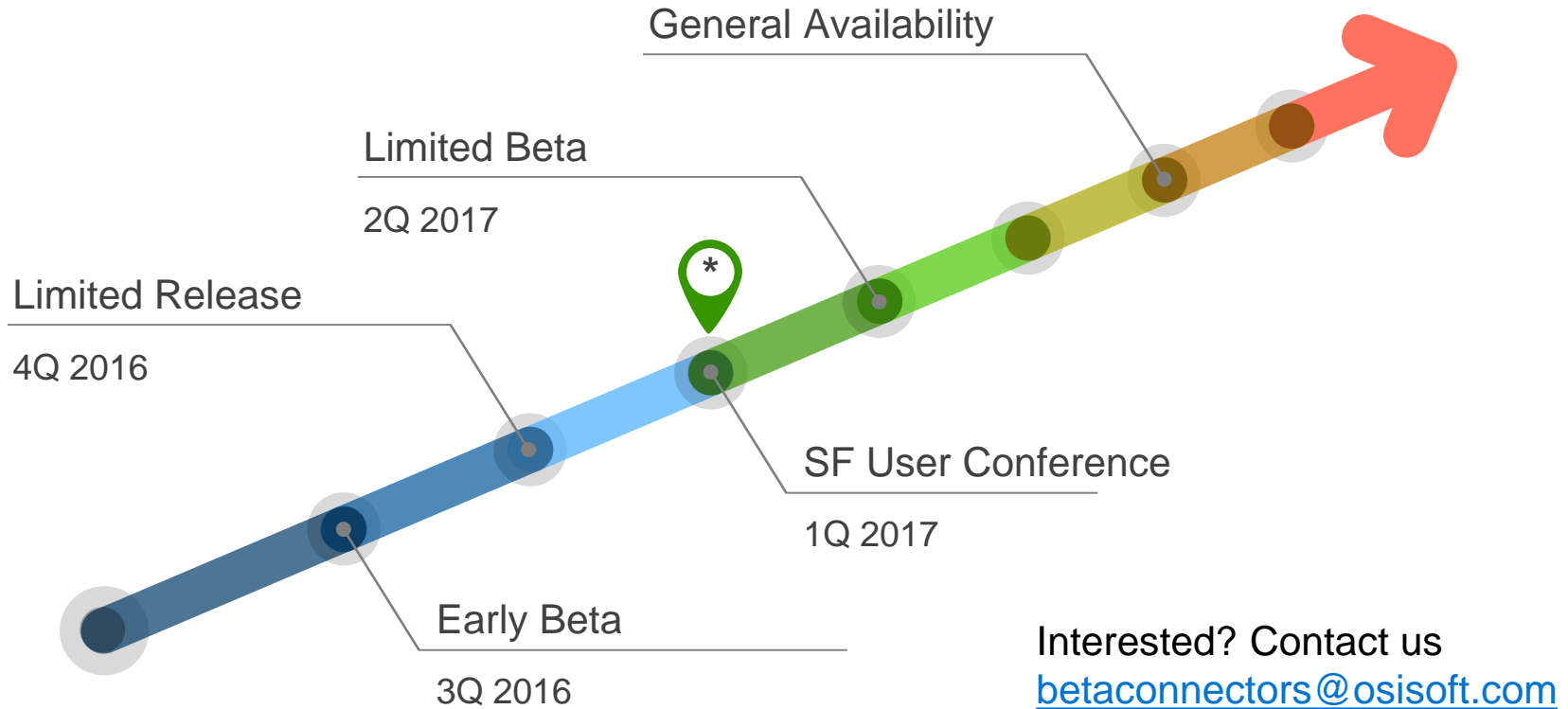
Name	Description	Category	Type	Template
There are no elements configured for this database. Elements are the fundamental organizational and object block of AF, typically used to represent an asset or group of assets.				
New Element				
New Model				
Add Element Reference				

Elements

- Elements
- Event Frames
- Library

0 Elements

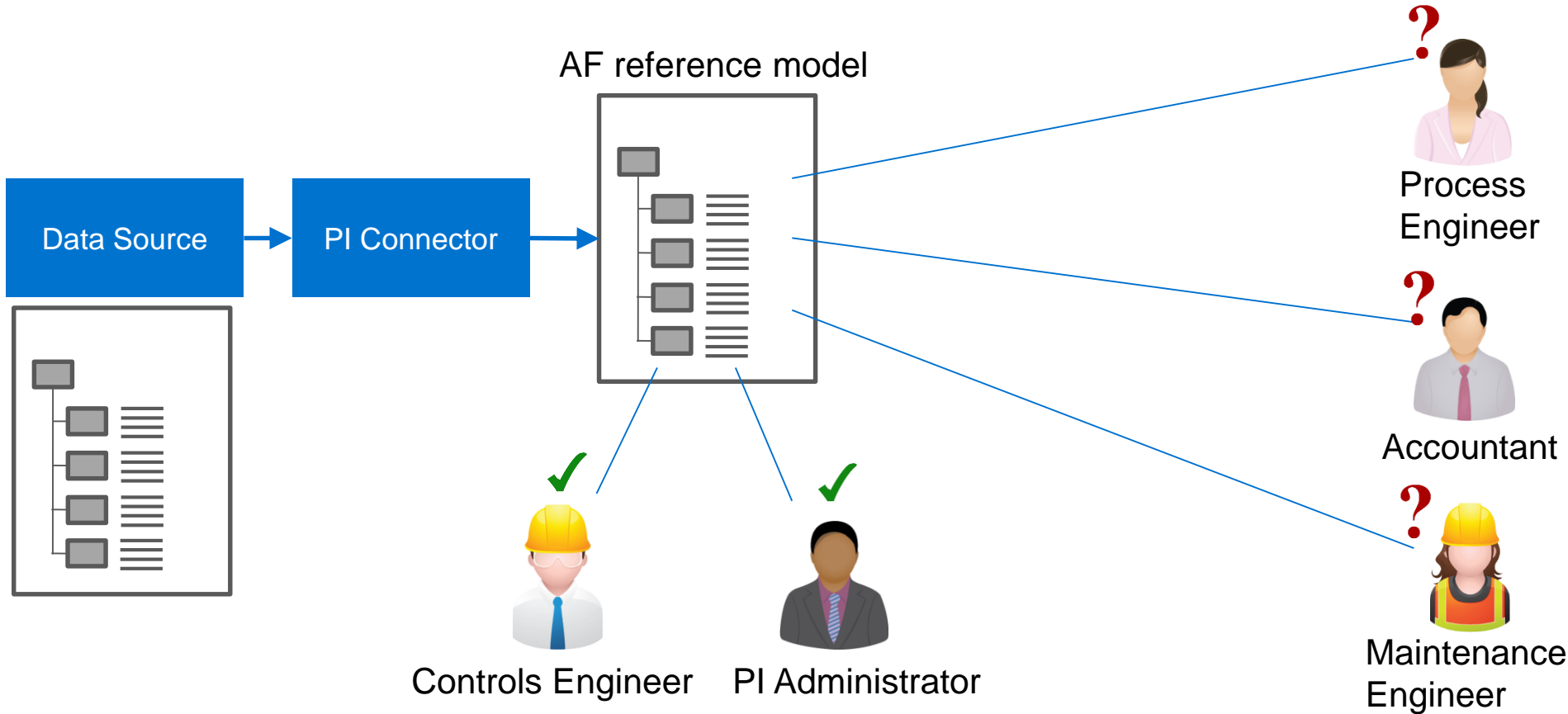
PI System Connector roadmap



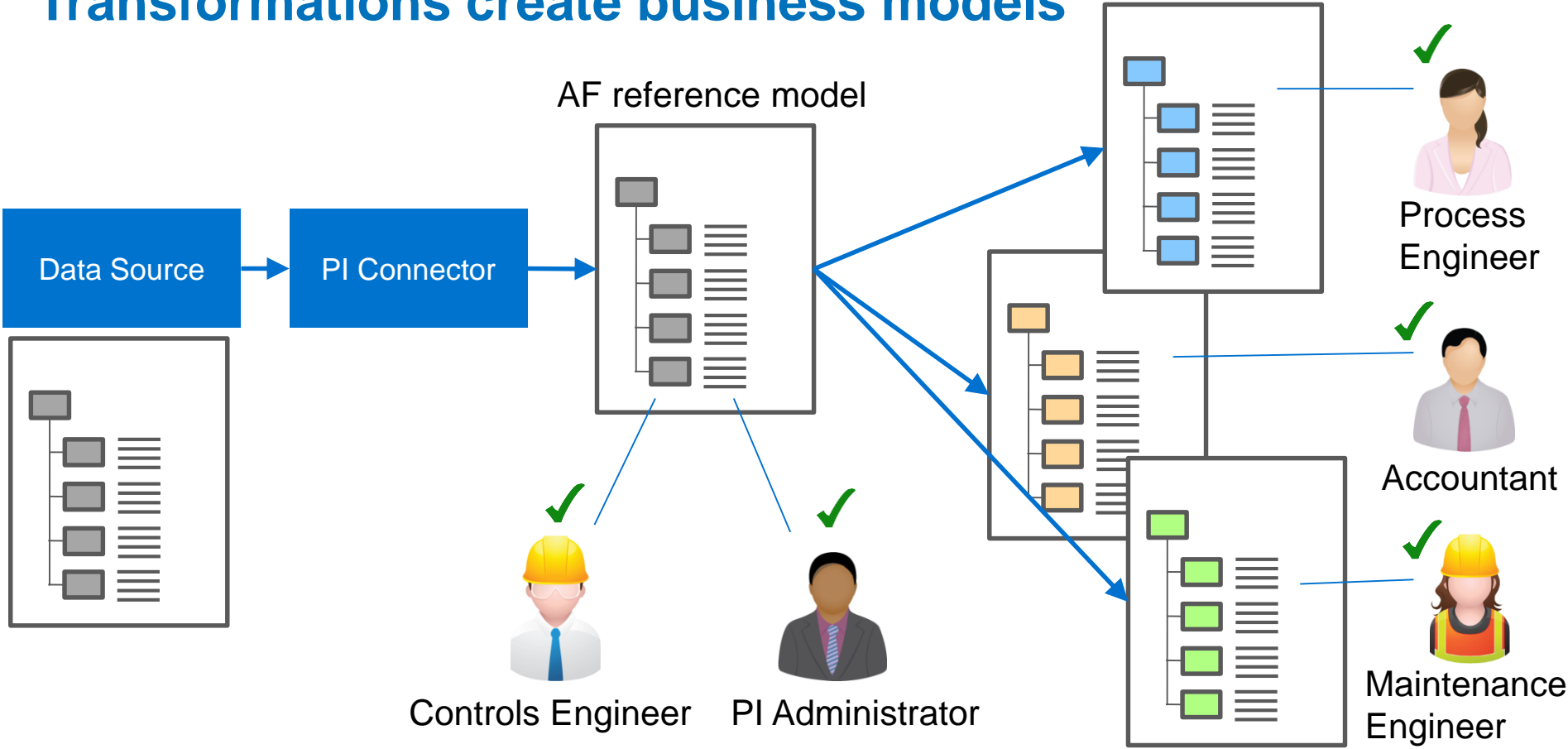


Asset Transformation

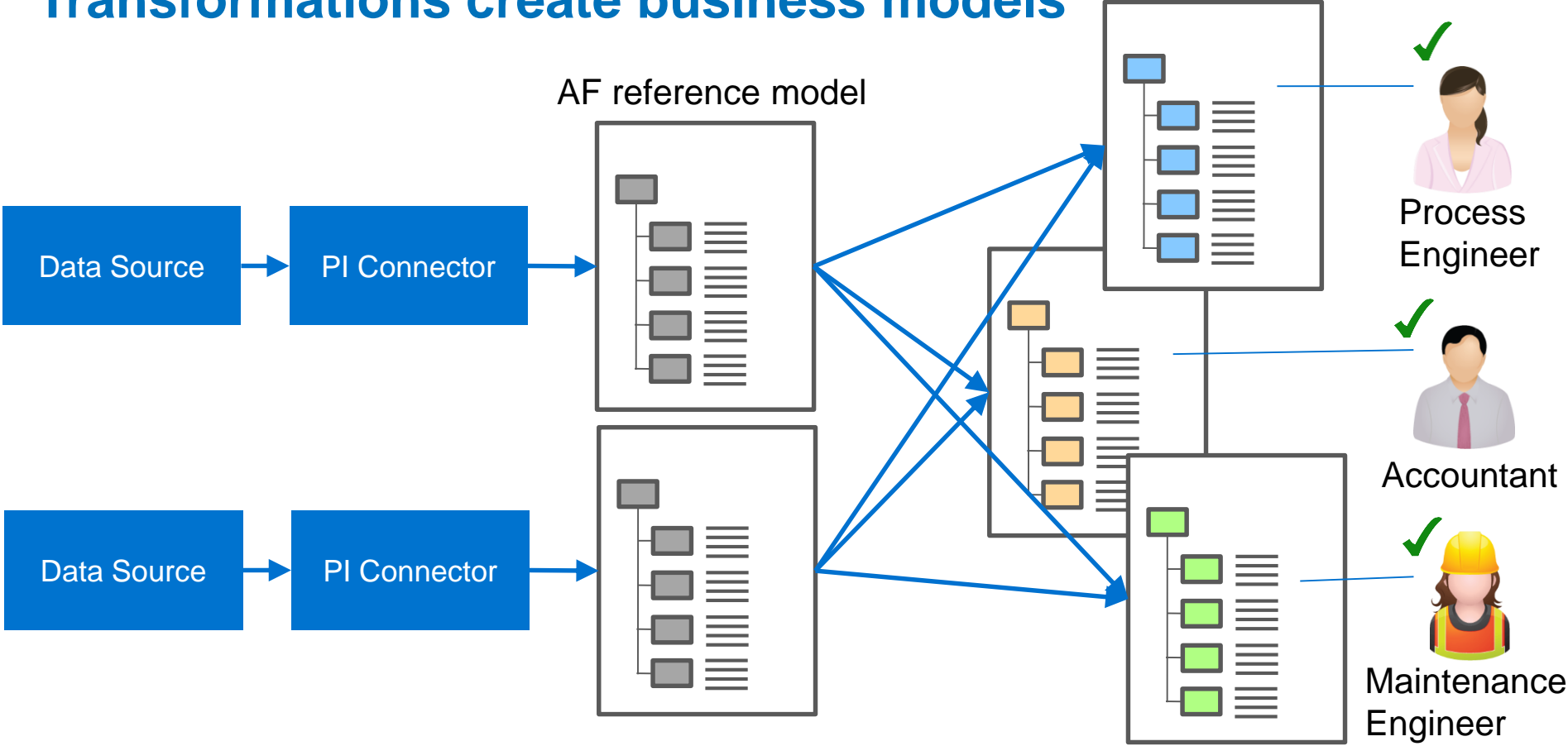
PI Connector creates reference model



Transformations create business models



Transformations create business models



PI Connectors can make you more strategic

- Beta in 2Q 2017, limited release 3Q 2017
 - PI Connector Administration app
 - PI Connector Relay
 - PI Connector for OPC UA and Redfish
- PI System Connector in beta
- Asset transformation – early prototype testing
- Come see us in the Product Expo!

Easy



Automatic



Unified



Secure and Flexible



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Software Developer



Questions

Please wait for the **microphone** before asking your questions



State your **name & company**

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谢谢

Danke

Merci

Gracias

Thank You

ありがとう

Спасибо

Obrigado

Backup slides

Easy



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