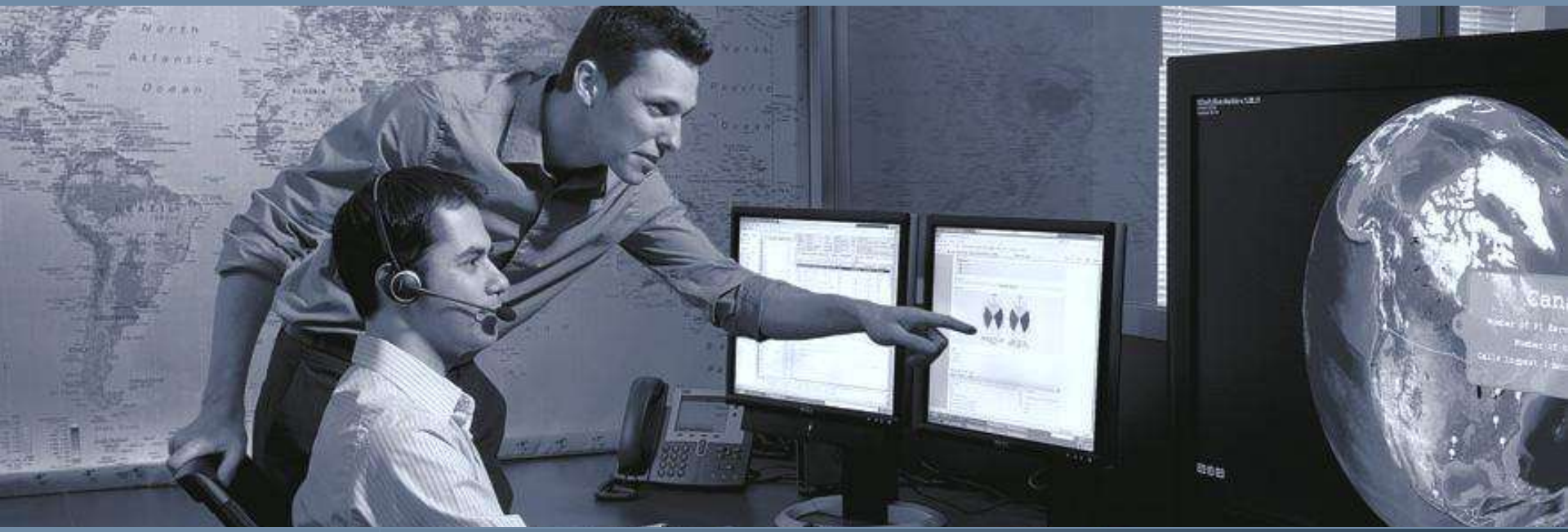

Using PI Data Access and PI Interfaces to Expand the PI System Infrastructure

Jay Lakumb
Product Manager

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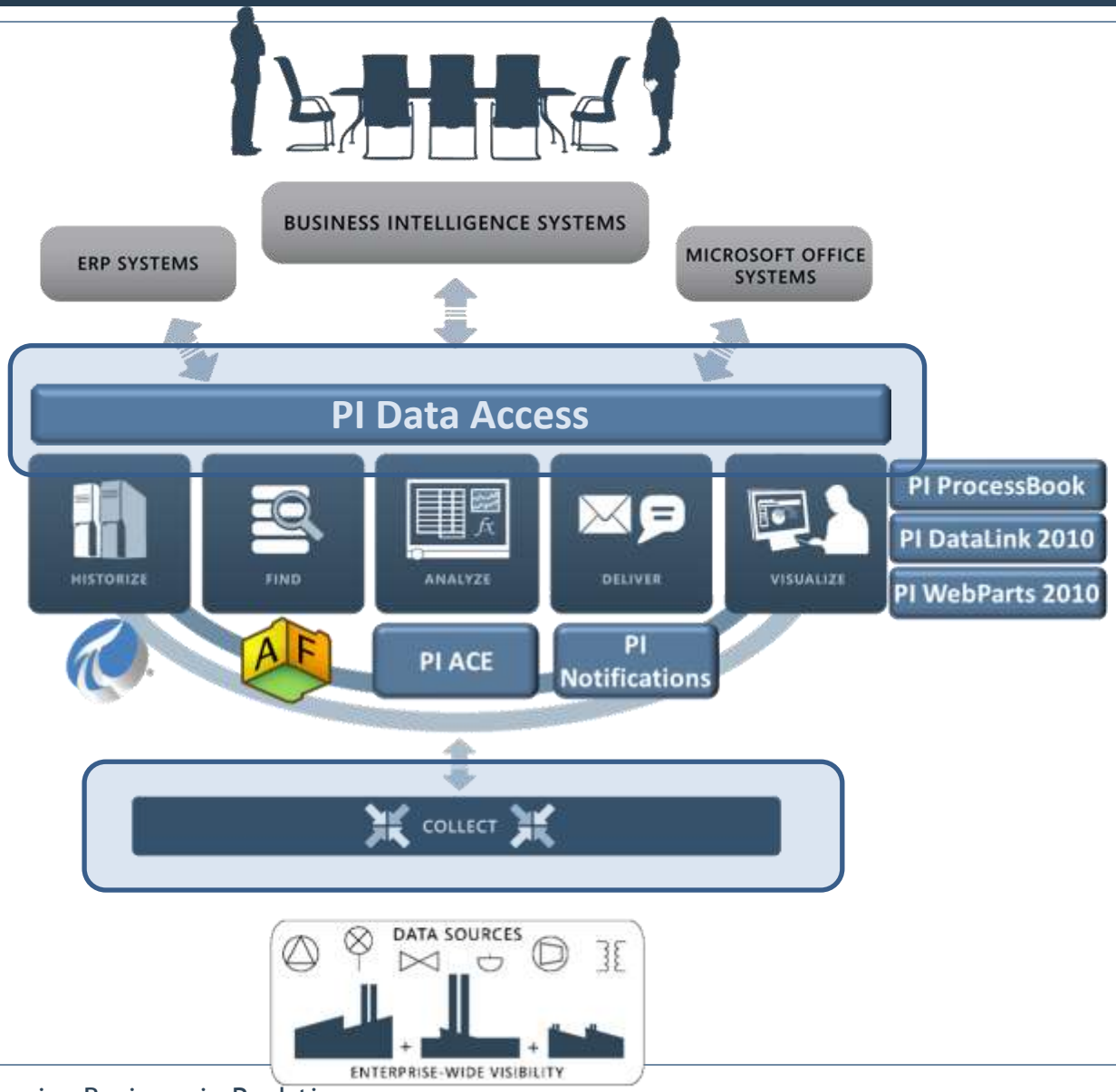
The PI System



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What are Interfaces?

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Getting Data Into PI

Over **400 PI Interfaces**, to collect data from:

- Devices
- Systems
- Standards
- Manually entered data
- IT assets
- Databases
- Internet

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OSIsoft Interface Development

- 25 developers and QA engineers
  - Czech Republic, Johnson City TN, New Zealand, Philadelphia, Phoenix, San Leandro, Savannah
- >425 years of development experience
- >225 years of PI System experience
- >400 PI Interfaces

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Features of PI Interfaces

- Collect real-time data
- Can startup disconnected from the PI Server
- Buffer data while disconnected
- Redundancy and failover
- Monitor the health of interfaces
- Consistent configuration and message logging

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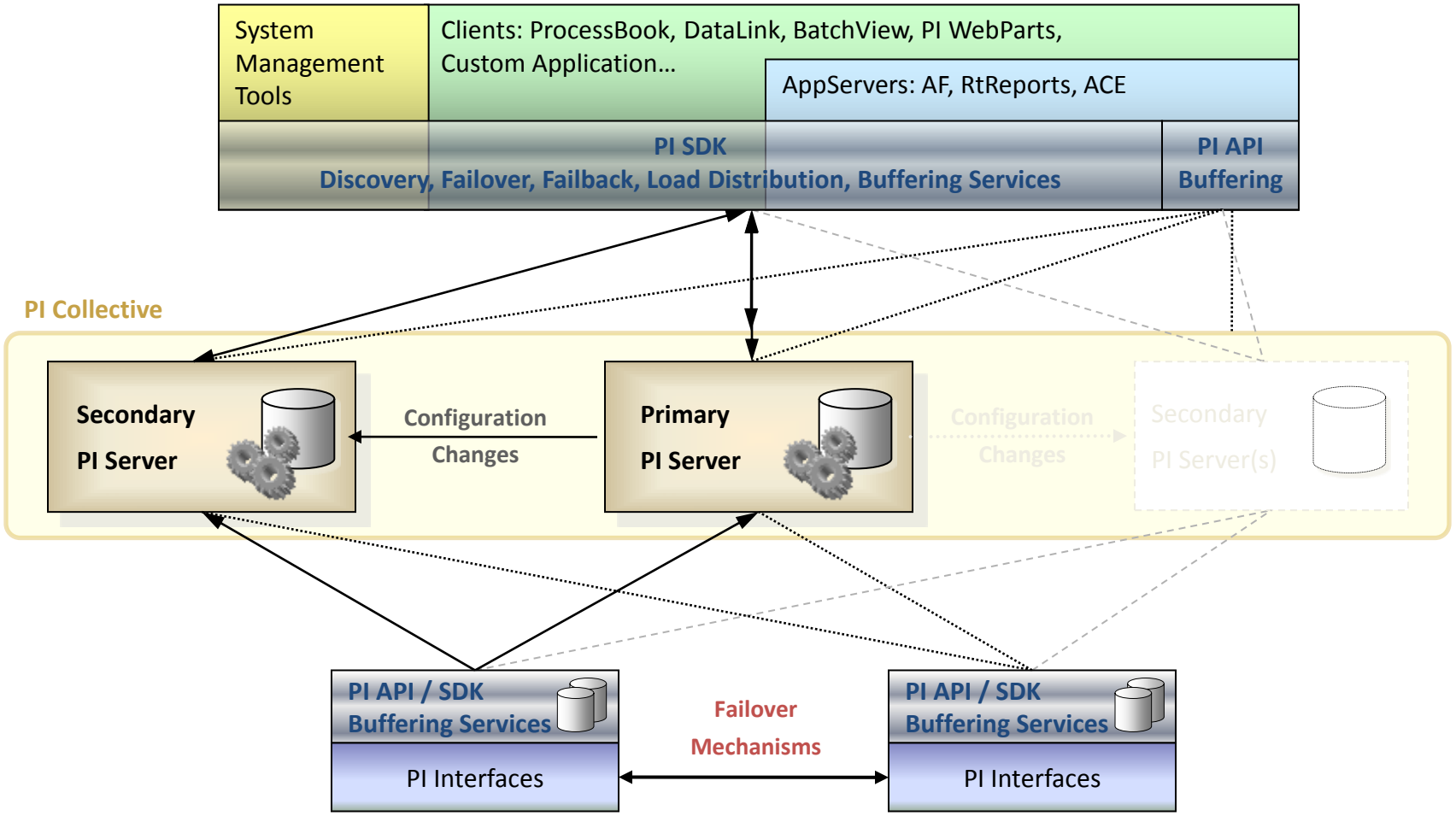
Architecture of a High Availability PI System



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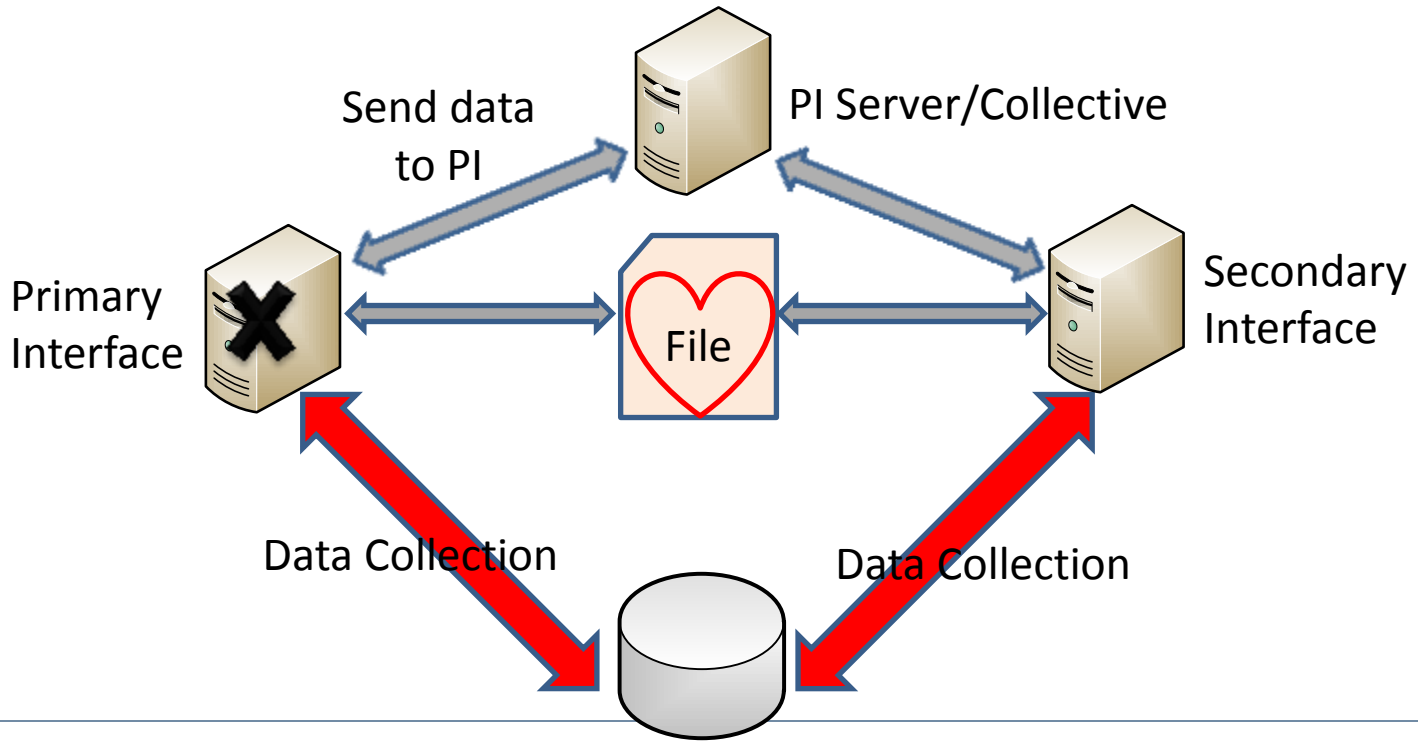
PI Interface Failover

- Two interfaces collect the same data from the data source or mirrored data sources
- Interfaces send a “heartbeat” to each other through a shared file and through the primary PI Server
- Primary node sends data to PI, while Secondary node is just collecting
- If Primary fails the other will recognize, wake up and start sending data to PI



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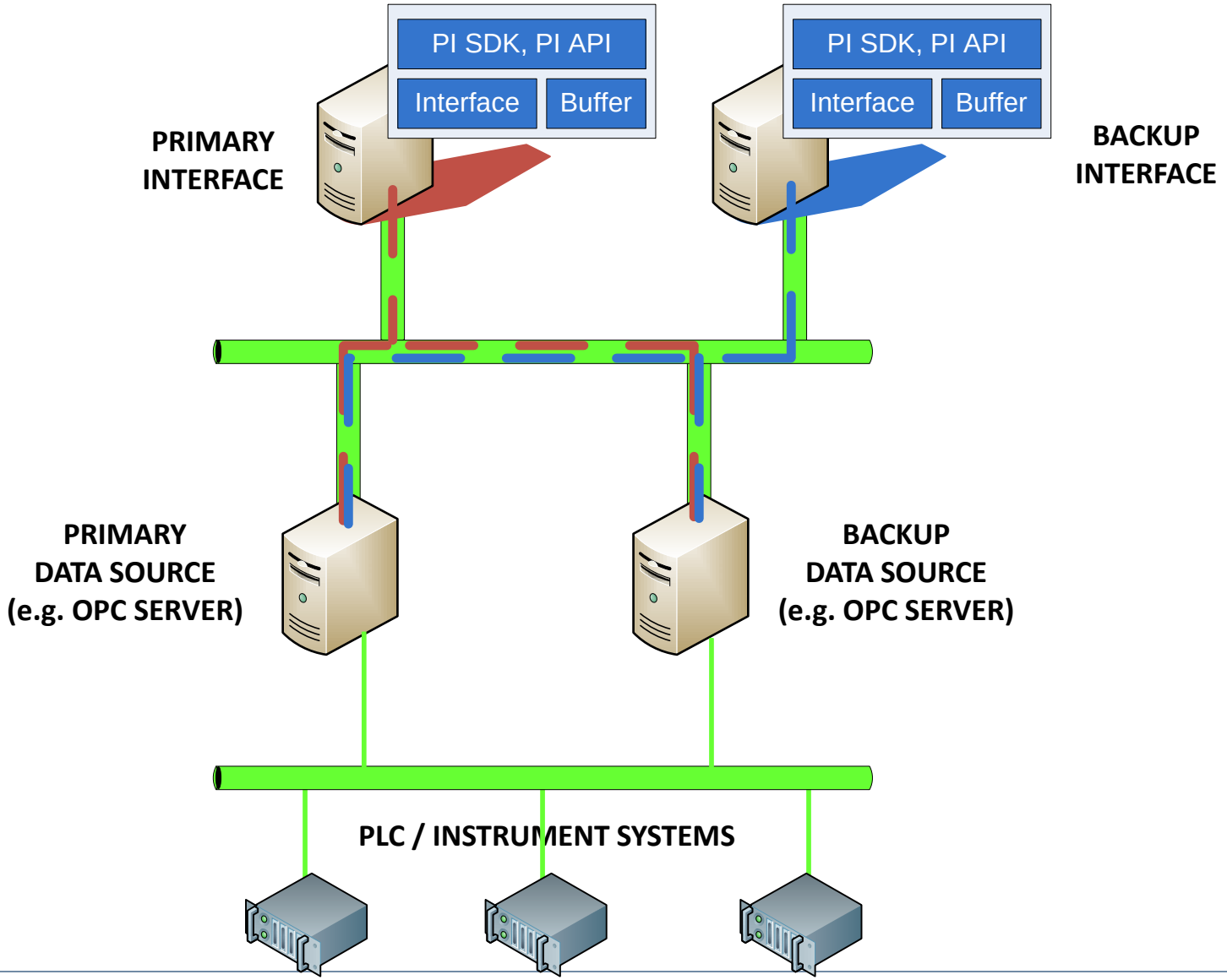
Server Level Failover



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Significant Recent Releases

- Silver Spring Networks UtilityIQ Interface (new, for AMI)
- Modbus Ethernet and Serial Interfaces (rewrite)
- Universal File Loader – replacement for Batch File Interface
- BACnet Interface – improvements to BACnet Query Tool
- Siemens SIMATIC Batch Interface (new)
- GE iBatch Batch Interface (new)
- Honeywell TotalPlant Batch Interface (new)
- PI OPC DA Interface Plug-In - REpower (new)

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Roadmap for PI Interfaces

- Exchange of asset information with PI Asset Framework
- Higher scalability and performance
- Simplify management, installation, and configuration

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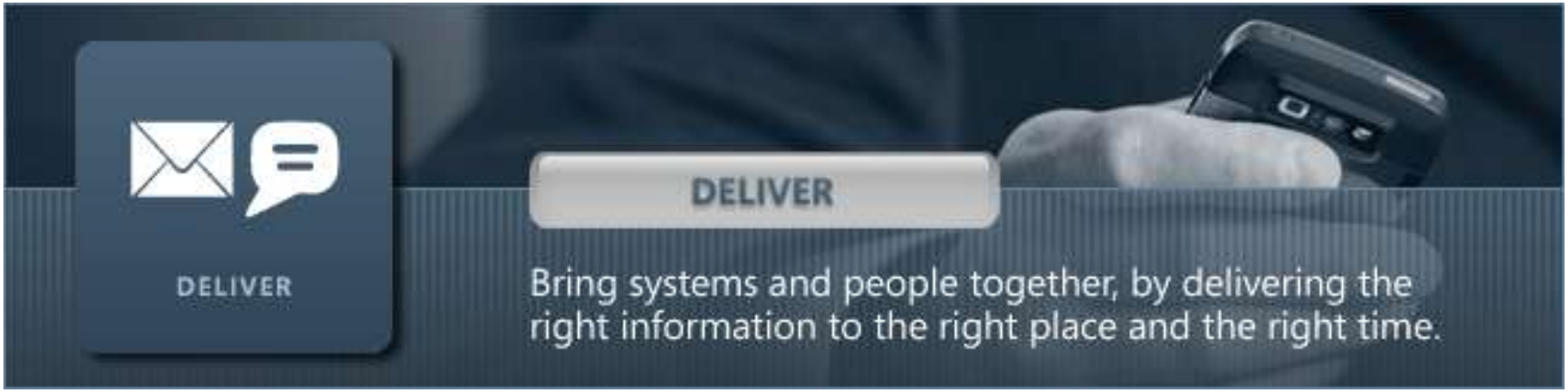
Getting Data Out of the PI System



PI Data Access	• Enables development of custom PI applications, as well as integration with enterprise systems
PI Notifications	• Deliver exceptions to people or push data to other systems

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PI Data Access: The Products

SQL Family

Web Services

OPC Servers

OSIsoft SDKs

Asset Information / Metadata

Notifications

Analytics

Relational / Non Time Series Data

PI Server

PI Server Collective

Time Series Data

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The SQL Family

- Set of drivers that expose PI System data in a relational database view
  - OLE DB, JDBC, ODBC
- Custom applications or integration scenarios

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Use cases

- Create reports and analysis cubes
  (SQL Server Reporting/Analysis Services)

- Perform Business Intelligence (BI)
  (Microsoft PowerPivot, IBM Cognos, SAS, SAP BO)

- Integrate PI System data in a
  Line-of-Business (LoB) System
  (LIMS, SAP PM)

- Visualize PI System data on the Web
  (Microsoft SharePoint, Apache Tomcat)

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Demo

- PI **OLEDB Enterprise** 2010
  in SQL Server **Reporting Services**

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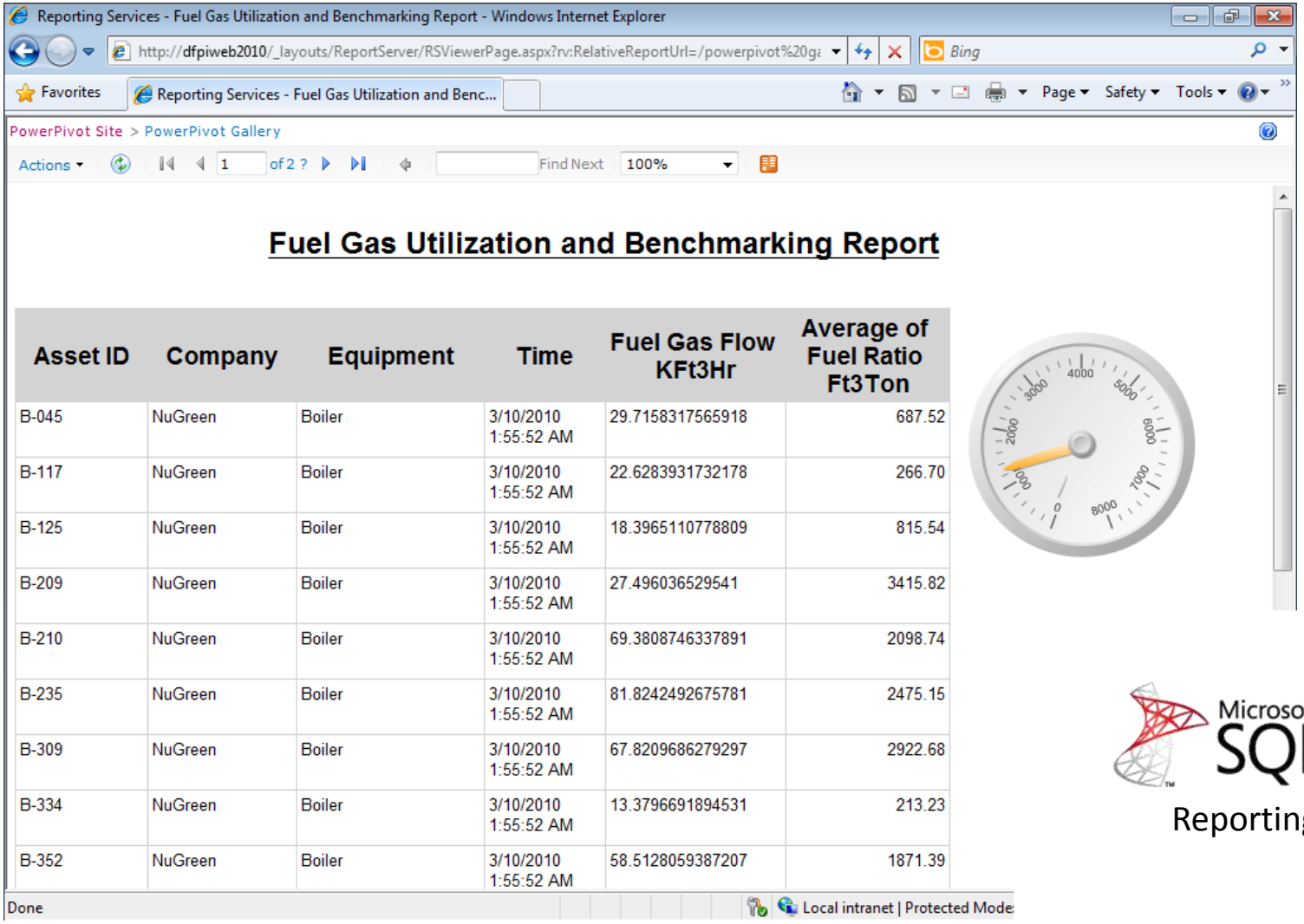
SQL Server Reporting Services



Asset ID	Company	Equipment	Time	Fuel Gas Flow KFt3Hr	Average of Fuel Ratio Ft3Ton
B-045	NuGreen	Boiler	3/10/2010 1:55:52 AM	29.7158317565918	687.52
B-117	NuGreen	Boiler	3/10/2010 1:55:52 AM	22.6283931732178	266.70
B-125	NuGreen	Boiler	3/10/2010 1:55:52 AM	18.3965110778809	815.54
B-209	NuGreen	Boiler	3/10/2010 1:55:52 AM	27.496036529541	3415.82
B-210	NuGreen	Boiler	3/10/2010 1:55:52 AM	69.3808746337891	2098.74
B-235	NuGreen	Boiler	3/10/2010 1:55:52 AM	81.8242492675781	2475.15
B-309	NuGreen	Boiler	3/10/2010 1:55:52 AM	67.8209686279297	2922.68
B-334	NuGreen	Boiler	3/10/2010 1:55:52 AM	13.3796691894531	213.23
B-352	NuGreen	Boiler	3/10/2010 1:55:52 AM	58.5128059387207	1871.39

Microsoft® SQL Server®

Reporting Services

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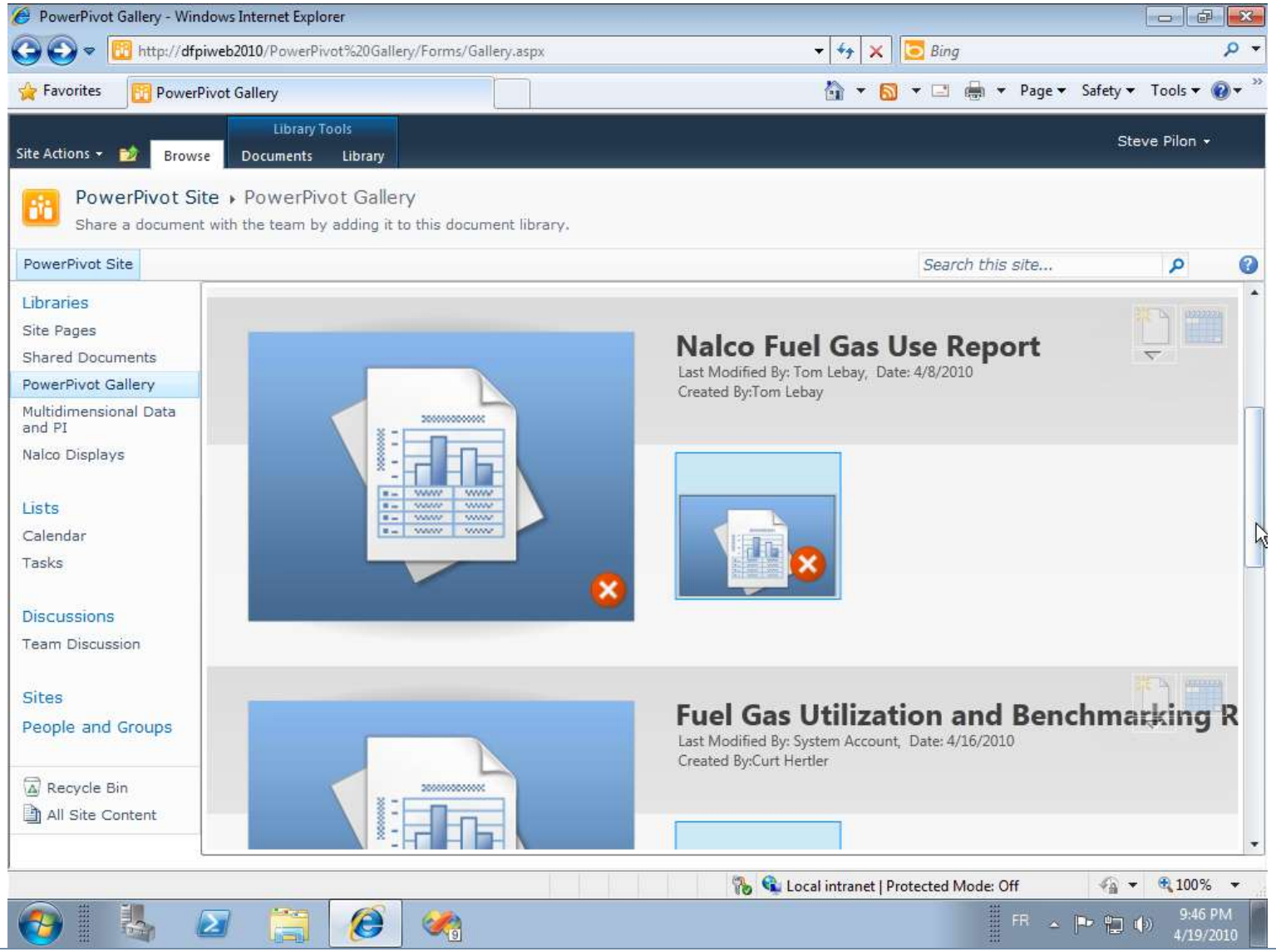

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Demo

- PI **OLEDB Enterprise** 2010
  in PI **WebParts** 2010

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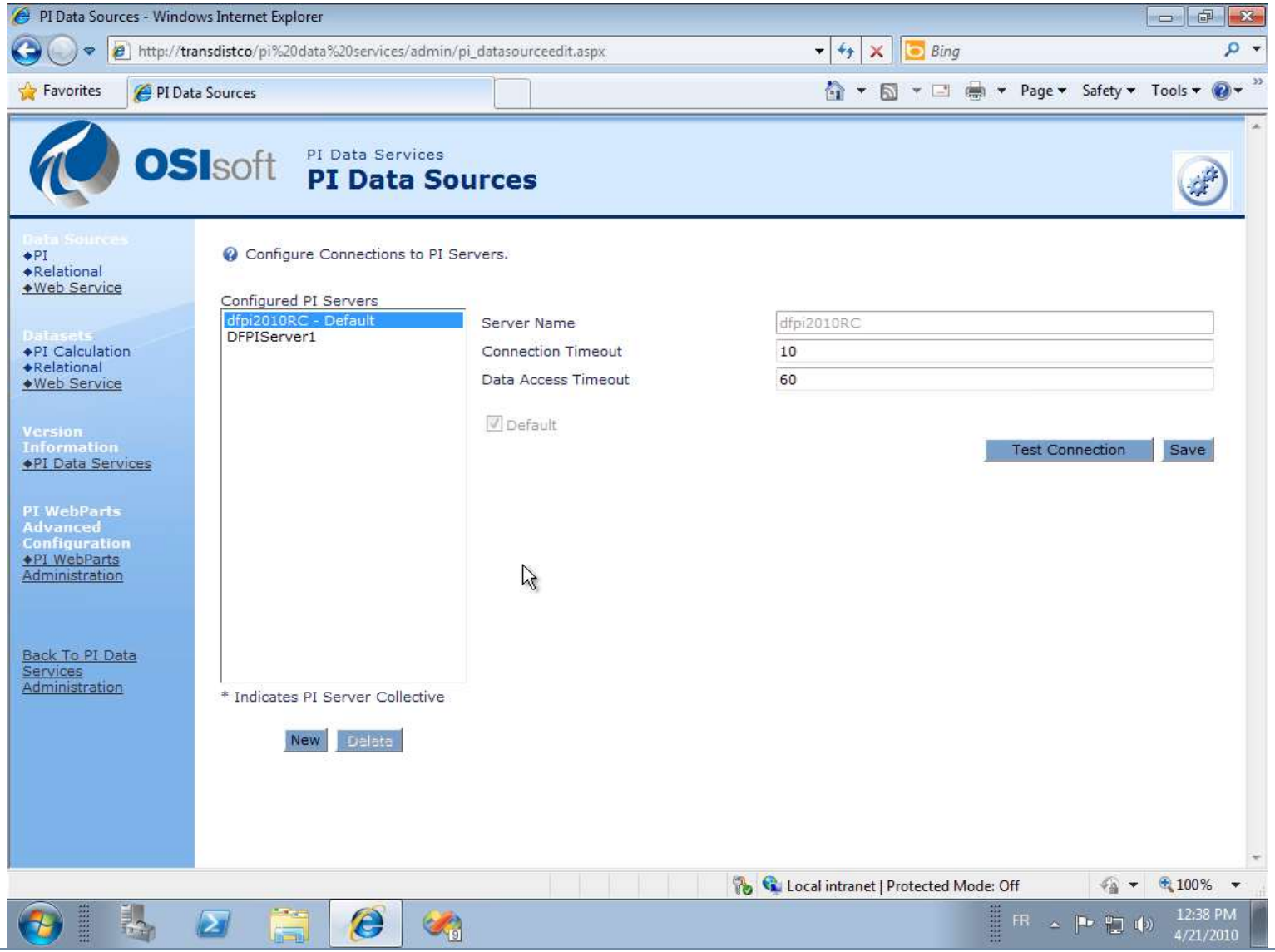

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Demo

- PI **JDBC** 2010
  in a **Linux/Apache** environment

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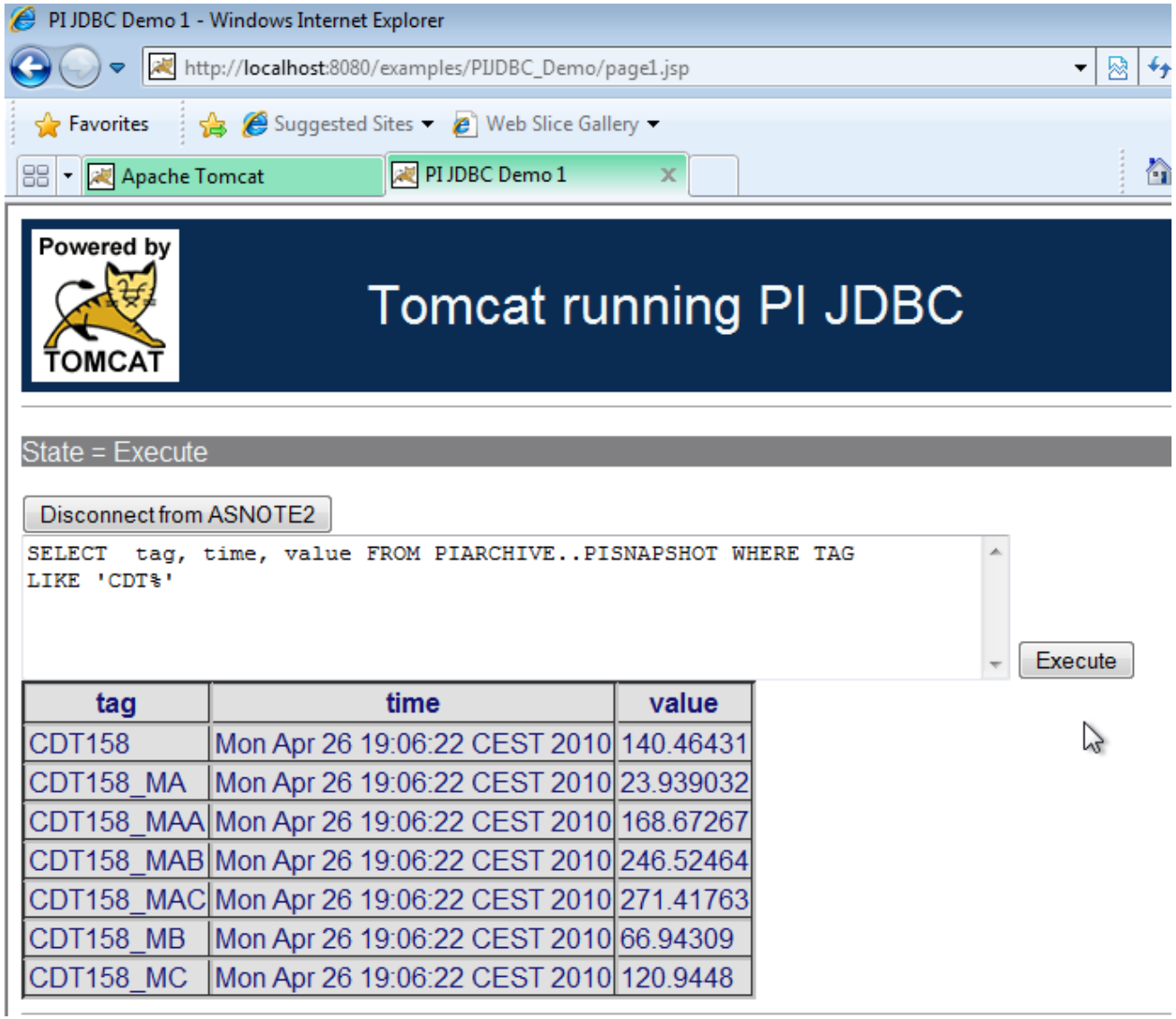

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PI Web Services 2010

- Provides access to the **PI** Data **and PI AF** Data through standard **web service** technologies
  - Many code-free integration scenarios
  - Any application, any language, any OS
- Facilitates data access over **secure** and **distributed** environments
  - Nothing required on the client machine
  - Lightweight and firewall-friendly

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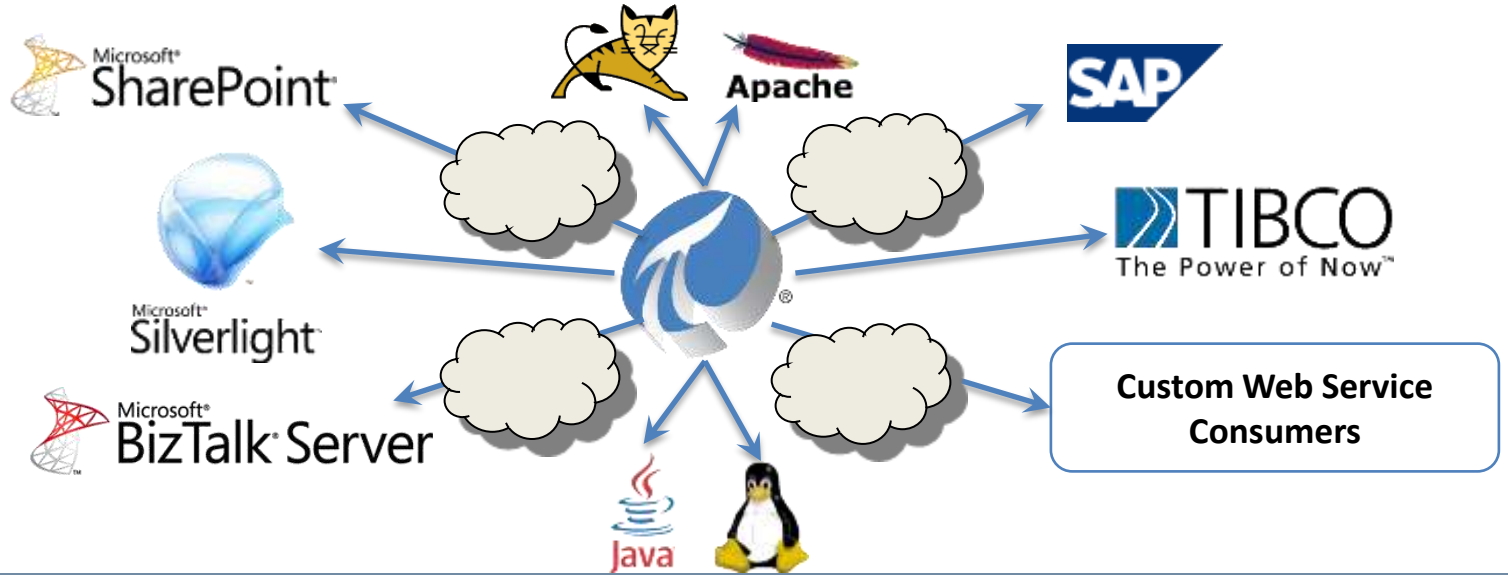
Use Cases

- Web-based visualization
- Integration scenarios
  - Line-of-Business (LoB) systems
  - Enterprise service bus
- Non-Windows environments



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Demo

- PI **Web Services** 2010
  in Microsoft **InfoPath** Form Services

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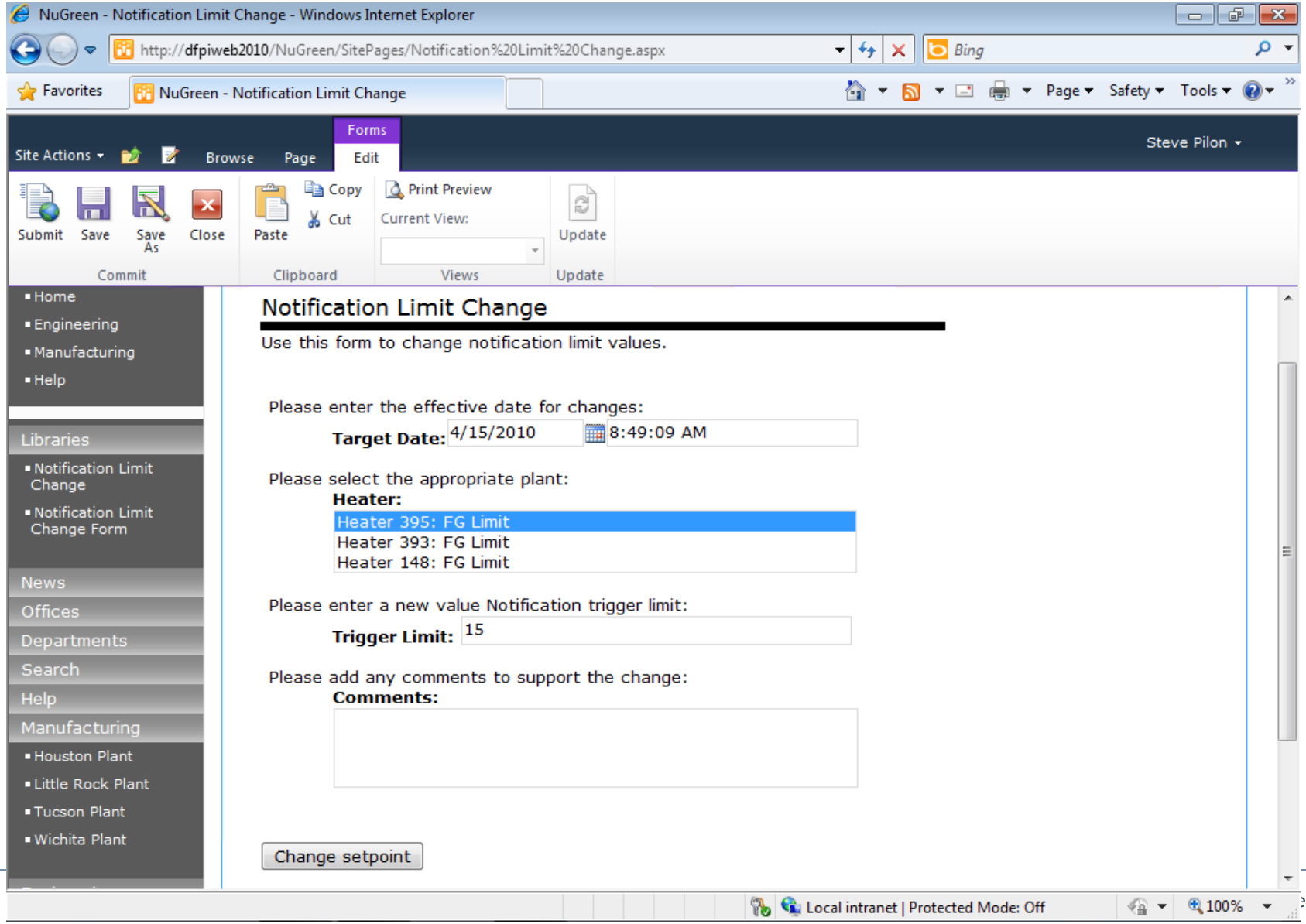
PI Web Services in InfoPath



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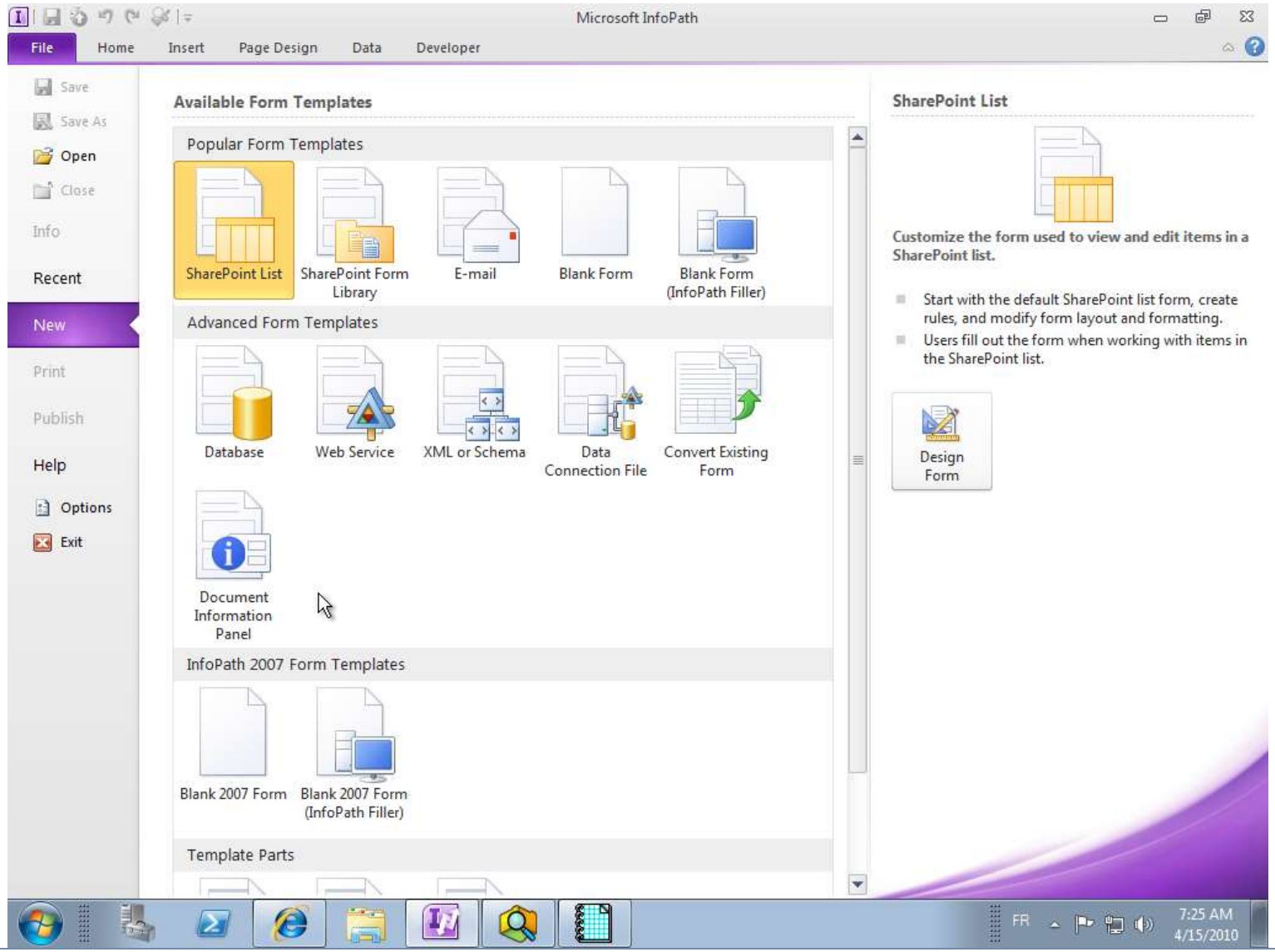

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Demo

- PI **Web Services** 2010 in Microsoft **Silverlight** (web browser)

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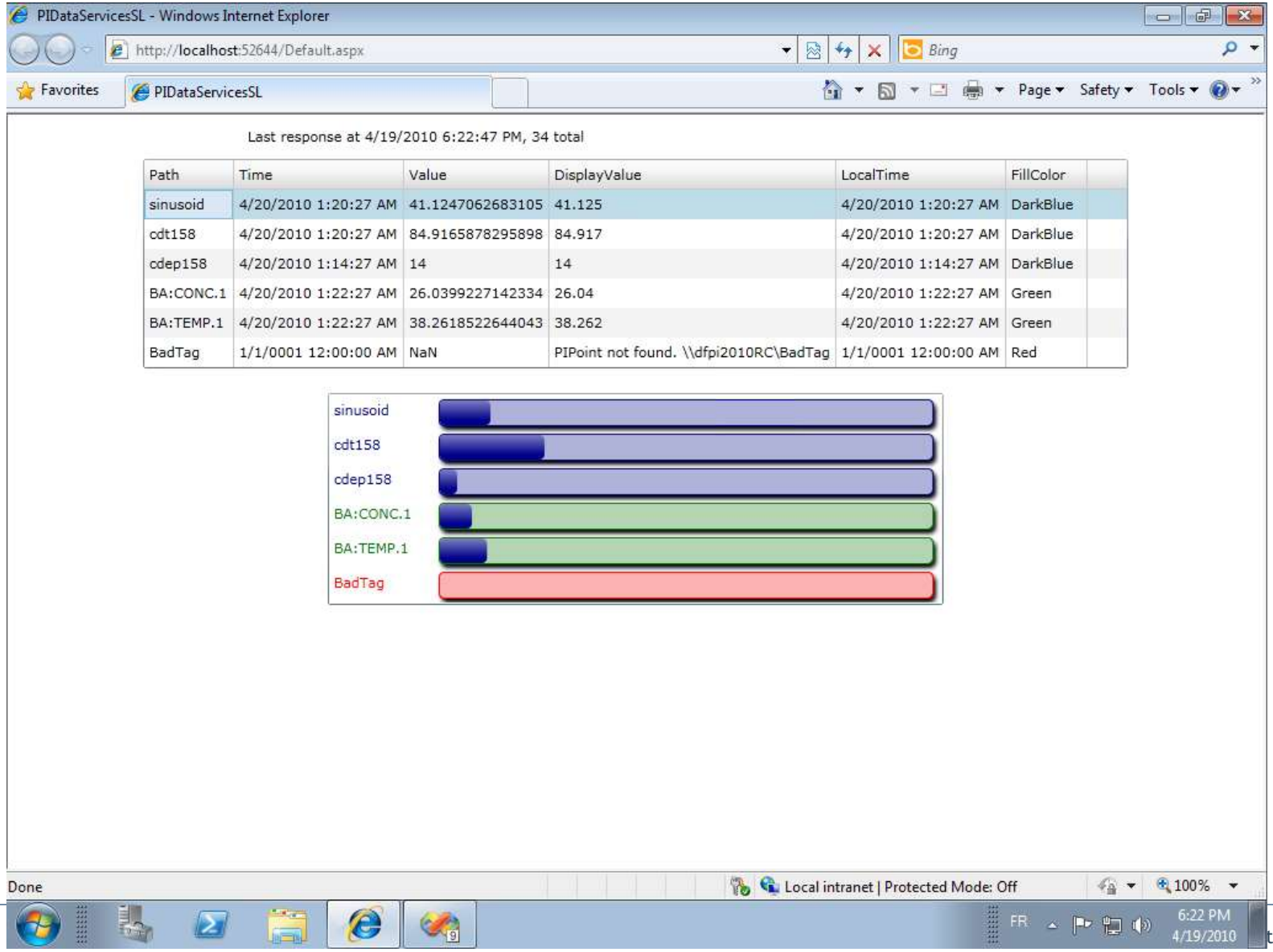
PI Web Services in Silverlight



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Demo

- PI **Web Services** 2010 in Microsoft **BizTalk**

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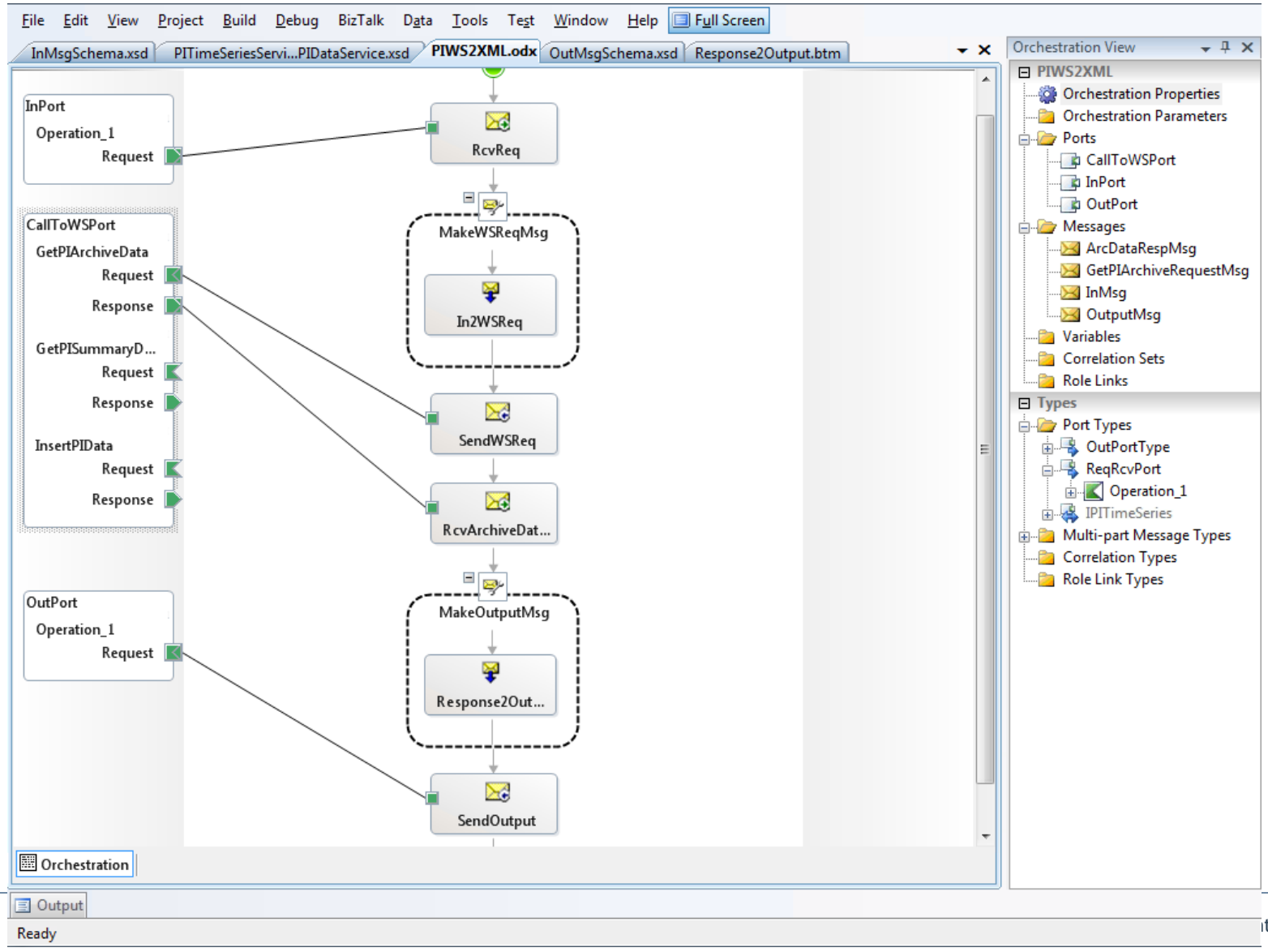
PI Web Services in Microsoft BizTalk



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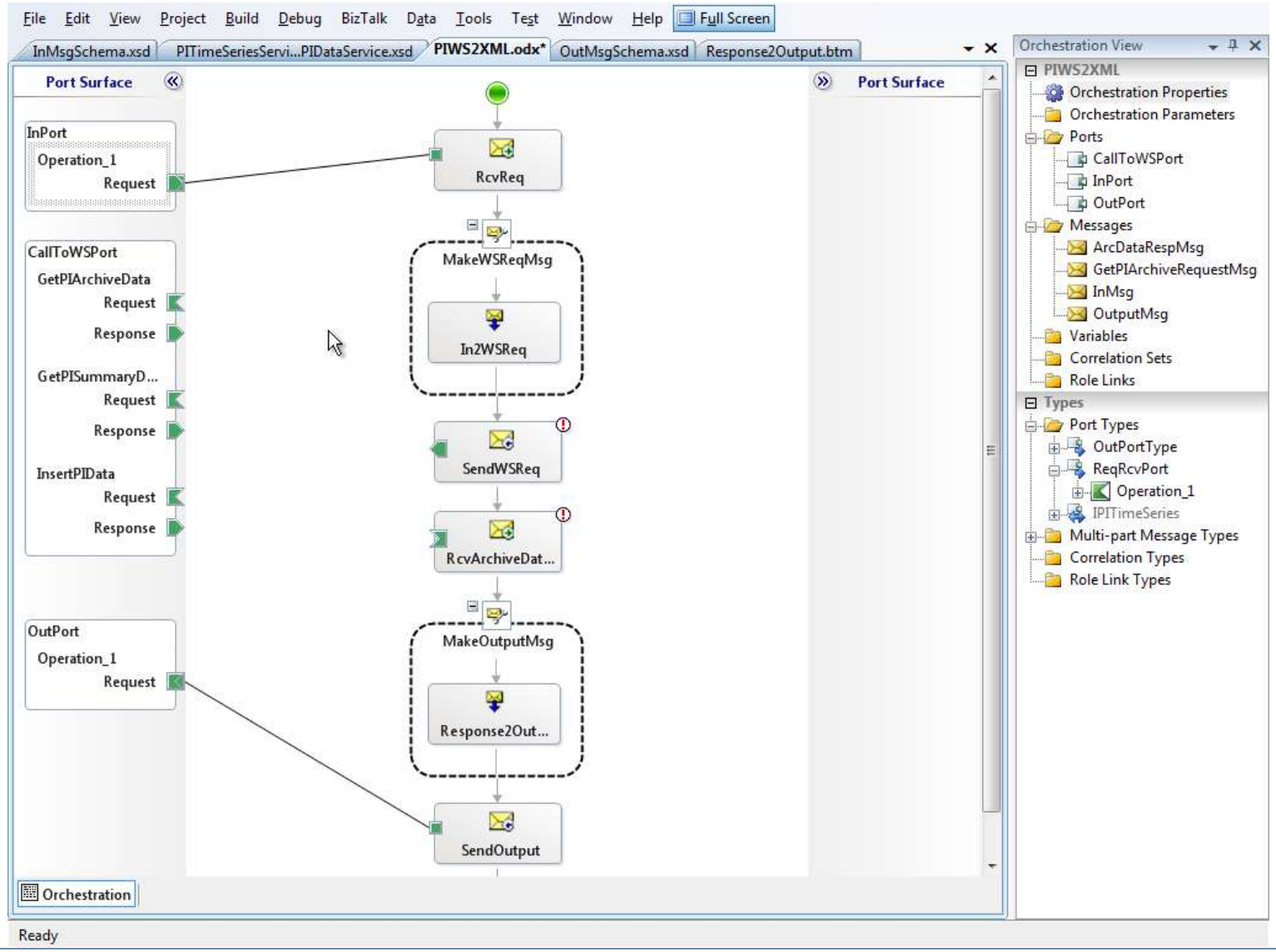

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The OPC Servers

- PI OPC DA/HDA Server 2010
  - Certified for Compliance
- Currently investigating
  - PI OPC UA Server (CTP on OSIsoft vCampus)
- Talk to the PI System via well-known, popular standards
- Integrate with 100's of existing OPC Clients
  - Process optimization engines
  - Process analysis, calculations
  - Visualization/reporting

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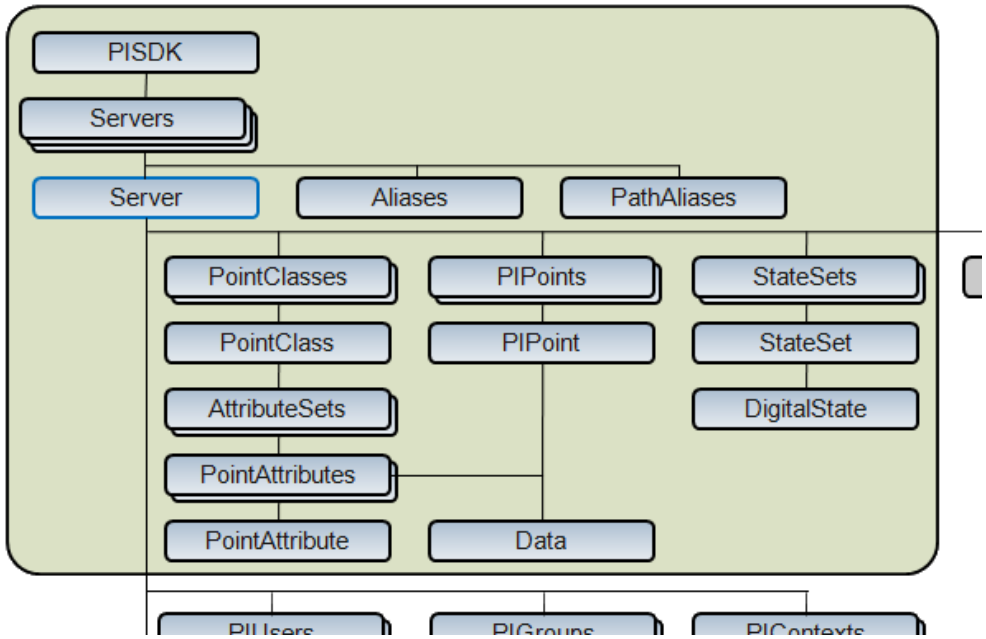
The OSIsoft SDKs

- Object-oriented SDKs
  - PI Server, PI AF, PI Notifications
- Custom applications
  - Visualization
  - Configuration
  - Calculations
  - Analyses
- Client-Side Buffering
  - PI SDK 2010 (CTP)



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Demo

- PI Data Access
  in **SAP MII** using **PCo**

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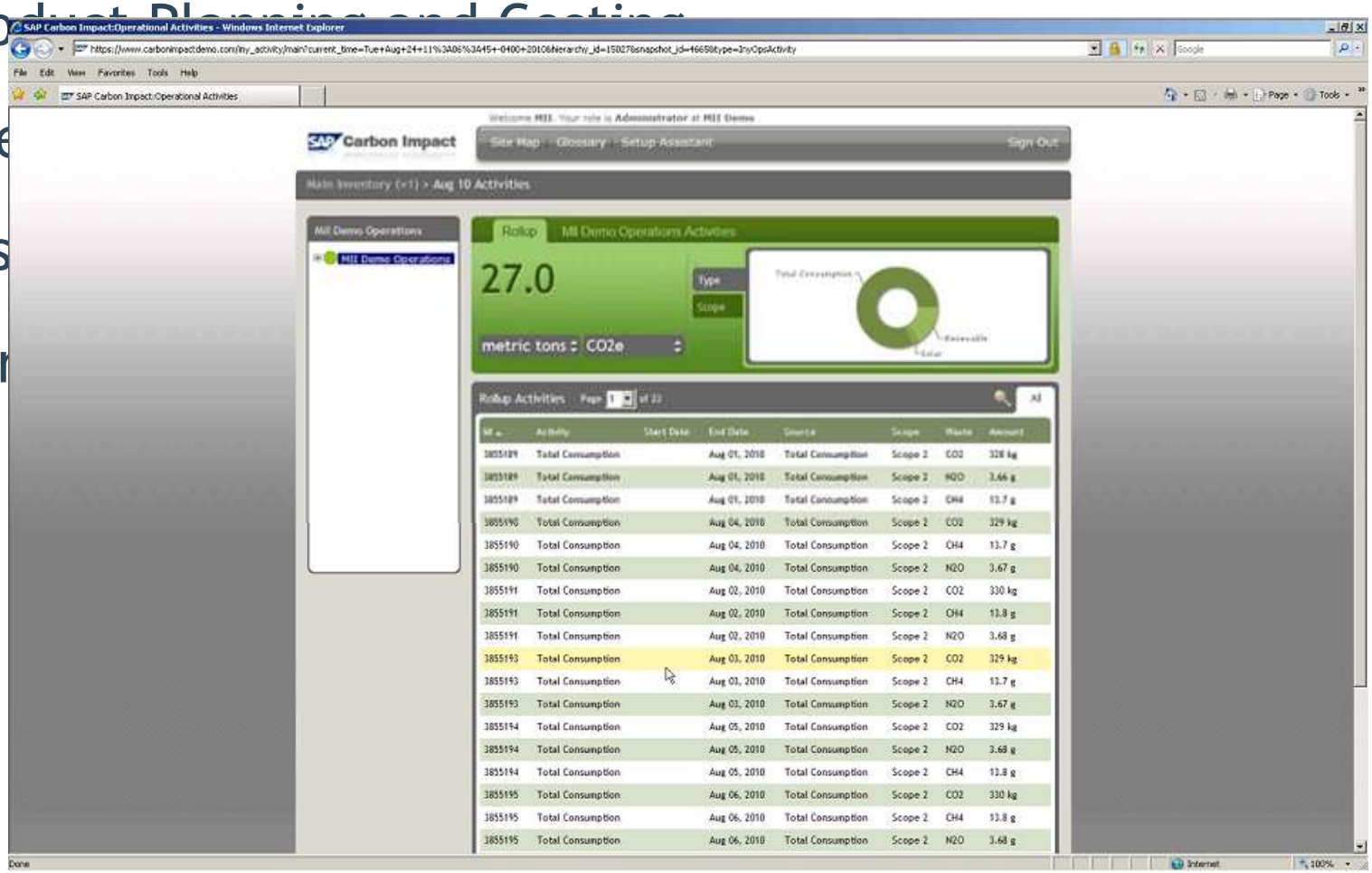
- Condition-Based Main
- Pro
- Ene
- Ass
- Car



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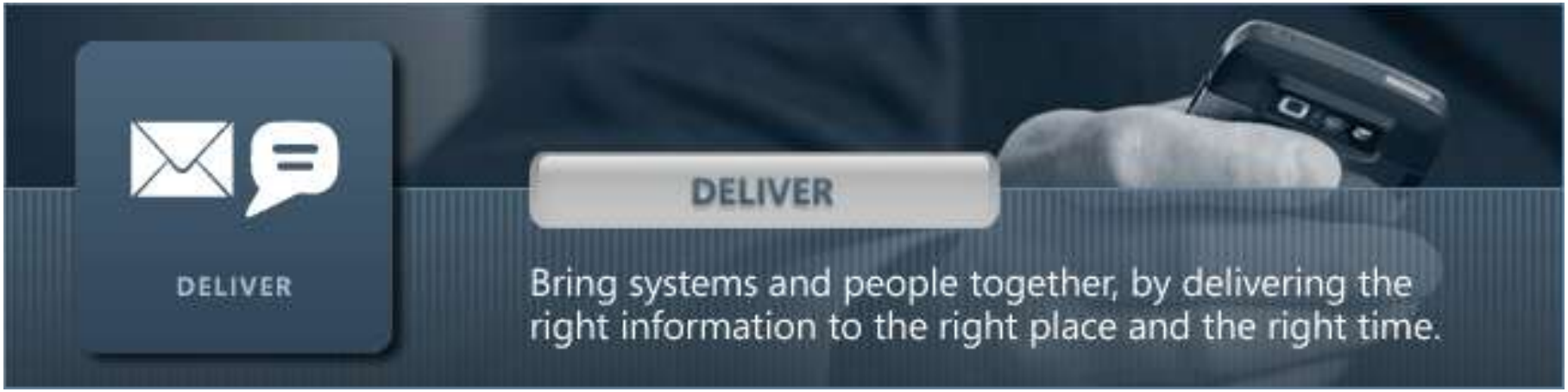
Getting Data Out of the PI System



PI Data Access	• Enables development of custom PI applications, as well as integration with enterprise systems
PI Notifications	• Deliver exceptions to people or push data to other systems

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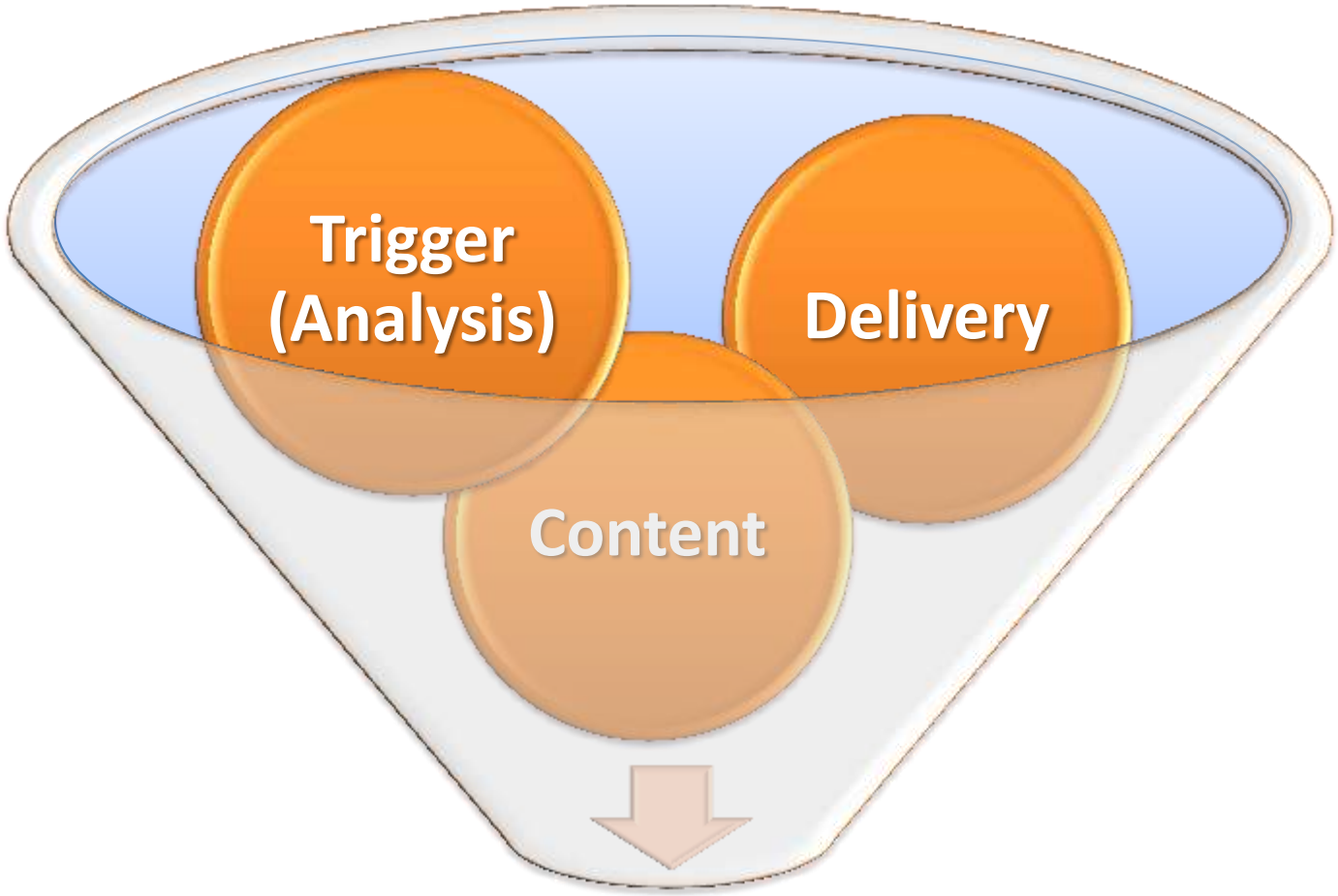
Basic Concepts of a Notification



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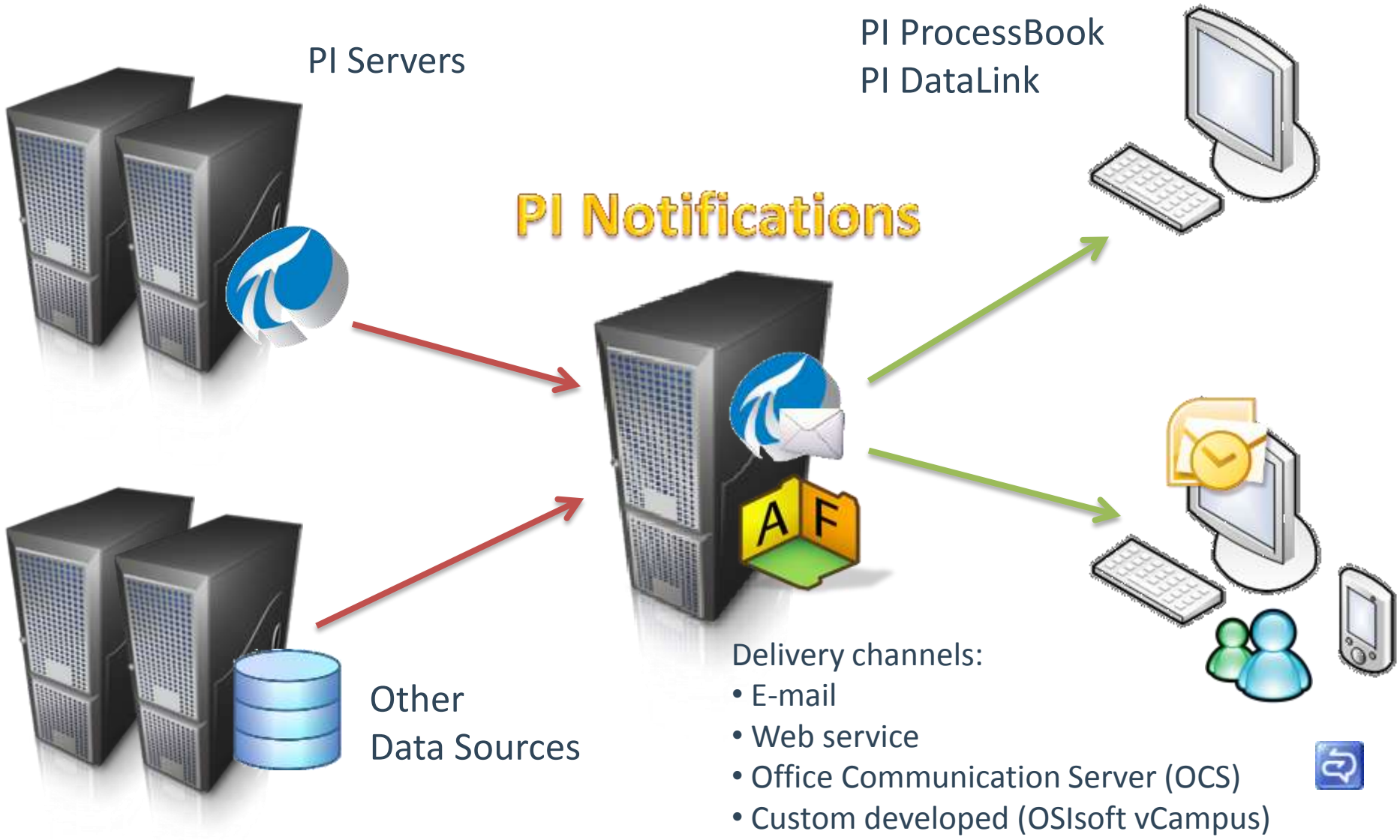
PI Notifications Architecture



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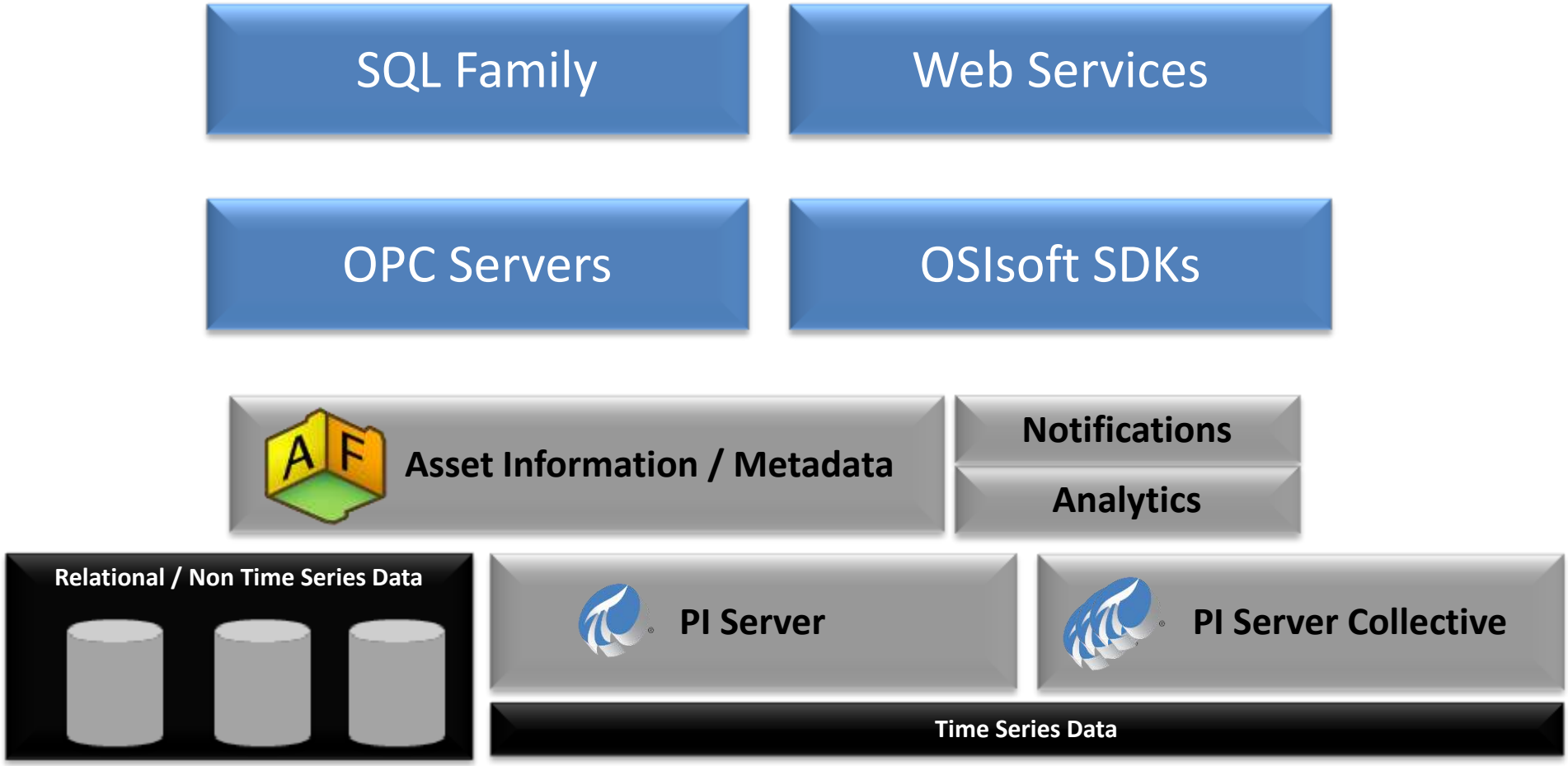
PI Data Access: The Products



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Enterprise Integration Use Cases

- Maintenance
  - Usage-based maintenance (as opposed to calendar-based maintenance)
  - Condition-based maintenance
- Production
  - Real-time Inventory
- Implementation
  - Machine runhours (PI Totalizer Tag) is posted to CMMS
  - PI Alert posted to CMMS as a Work Request
  - Raw material consumption (PI Tag value) posted to SAP

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Push vs. Pull + Optional Middleware

- PI Data/Events
  - Push
  - Pull

- Middleware
  - Microsoft BizTalk
  - SAP MII (and PCo)
  - IBM WebSphere ESB
  - Oracle Fusion
  - TIBCO

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PI Totalizer reading to Maximo

- PI Notifications (with XML Delivery Channel)
- Push data from the PI System
- Transaction Objects in PI AF for mapping
- No middleware required
- Live Demo

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Bearing temperature high alert to Maximo Work Request

- Condition assessment using the PI System
- PI Web Services
- Middleware: Microsoft BizTalk
- Live Demo

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Development → Runtime

```
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() +
}
```

PI System Access (PSA)

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OSIsoft vCampus

- Online, community-oriented program
  - Software + Resources + Collaboration
  - Focus on development and integration
  - Partners, customers and OSIsoft
  - Exclusive contents (CTPs, Betas, technical papers)

- Personal development PI System
  - Development licenses for PI Data Access products (for developers and integrators)

- http://vCampus.osisoft.com
  vCampus@osisoft.com

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Questions?

"OSIsoft vCampus helps my mind run a thousand miles an hour with ideas, keep the material coming !!!"

Kenneth Rice, Las Vegas Valley Water District

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Thank you

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