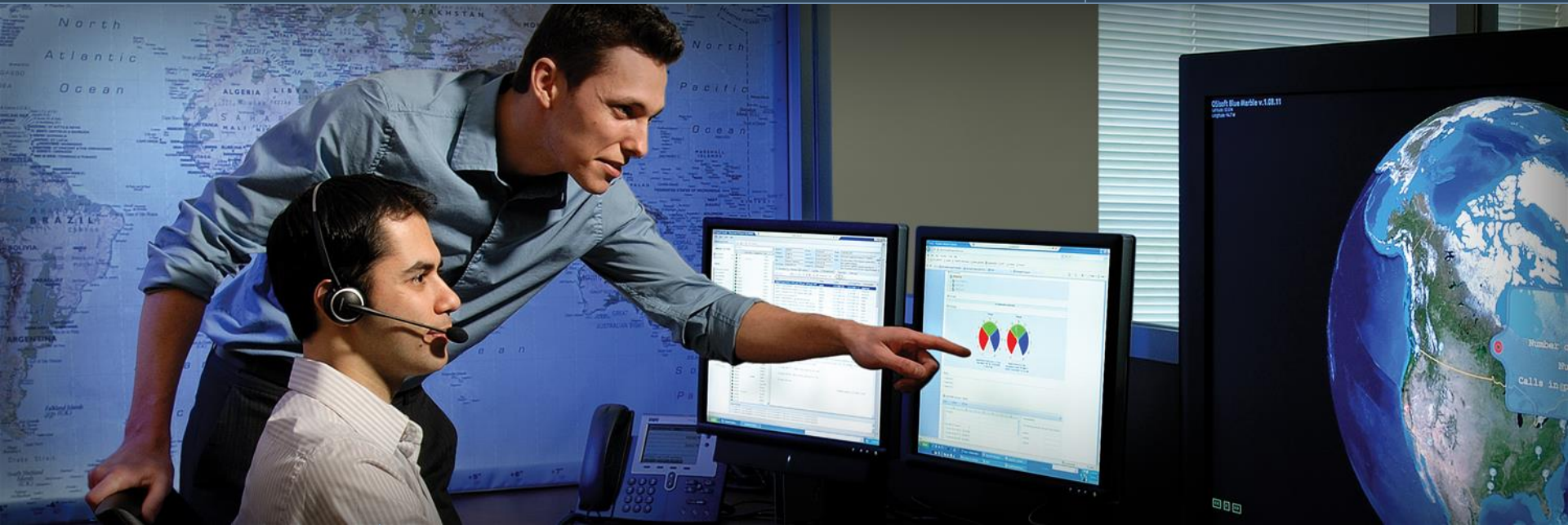




Regional Seminars Series Roma



PI System Products Overview

Hans Otto Weinhold, Customer Support

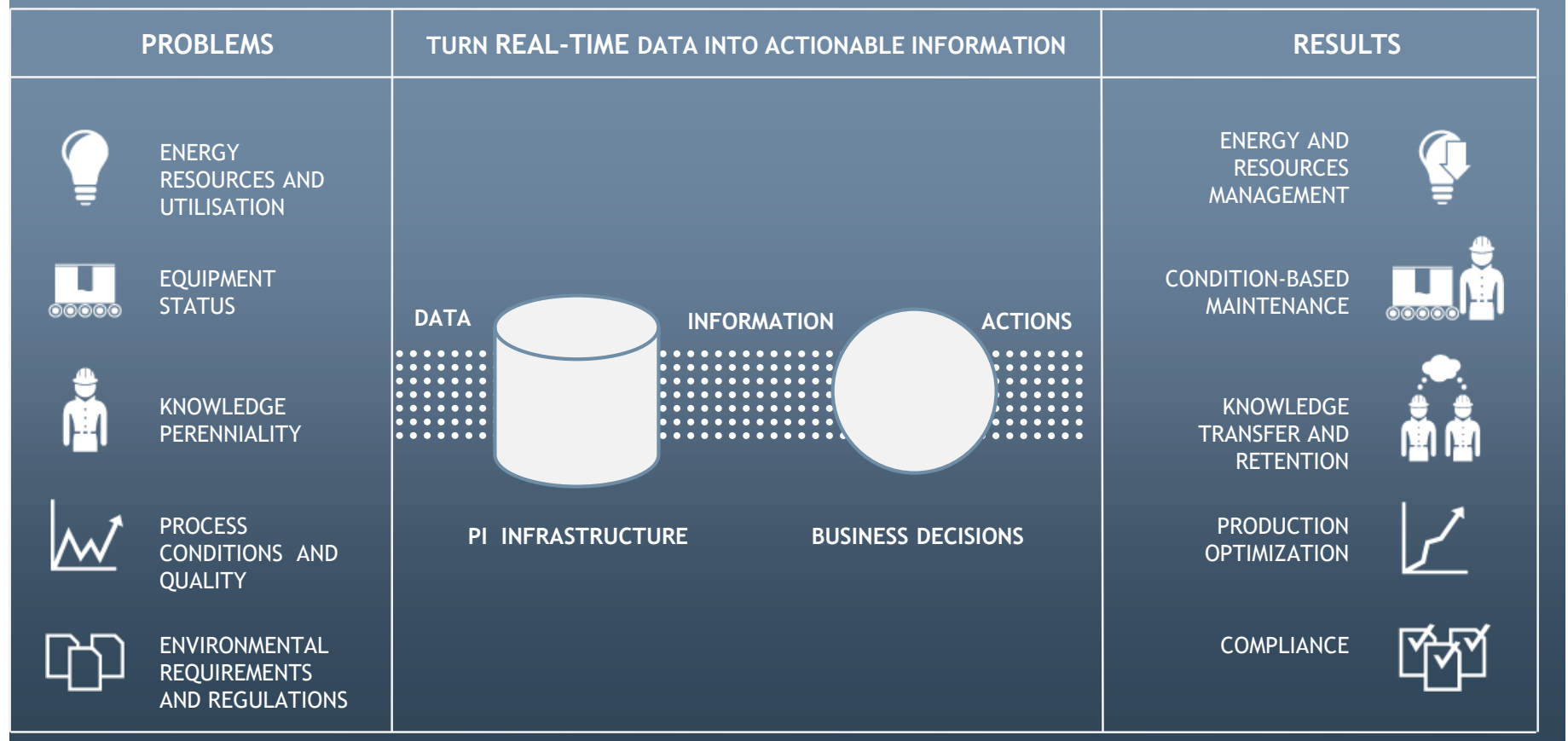
hans-otto@osisoft.com

3-Feb-10

Empowering Business in Real Time.

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THE PI TECHNOLOGY GIVES THE POSSIBILITY TO PUT IN PLACE BUSINESS SOLUTIONS





Connect

Acquire data from any time series data source

The Interfaces



Integrate

Aggregate, normalize and archive a large amount of information that can be scaled to your growing business requirements

The Server



Analyze

Ad-hoc or automated advanced data post-processing. Notify users and systems of significant events.

The Analytics

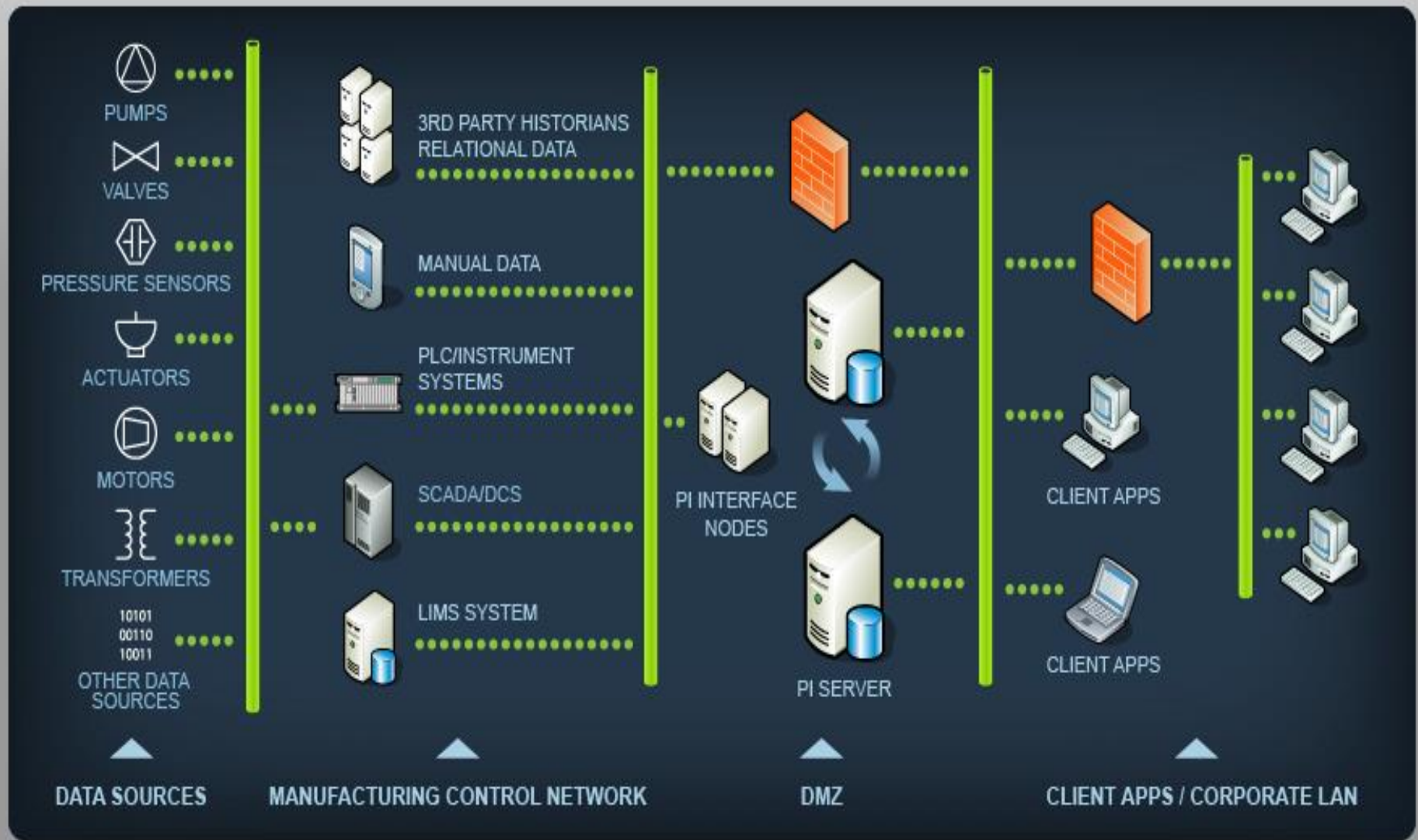


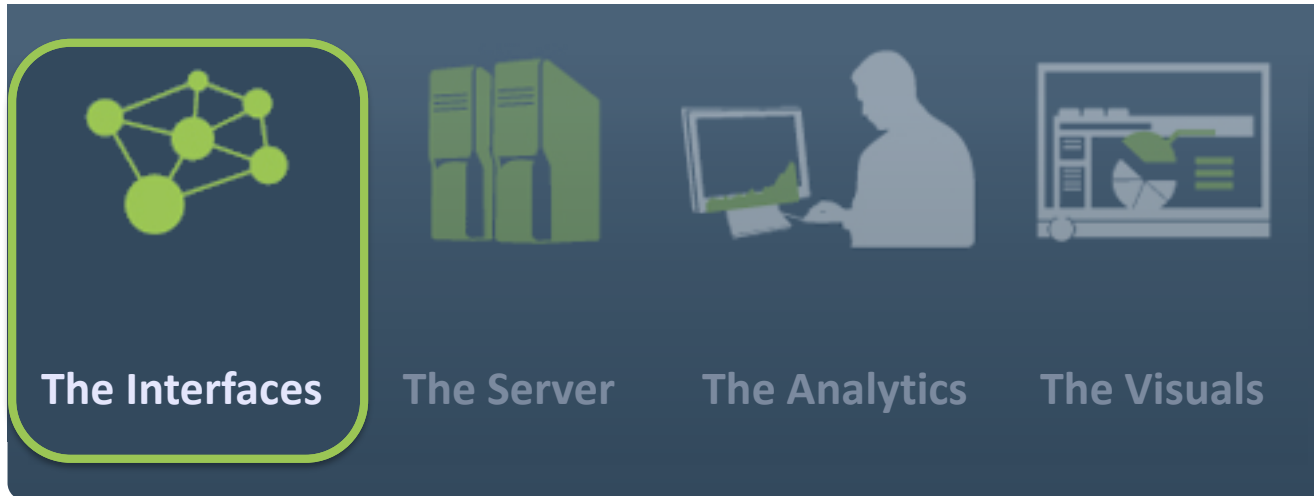
Visualize

Display information, identify problems and perform corrective actions with the help of simple to use and intuitive graphical and analytical tools

The Visuals

The PI System: Generic Architecture



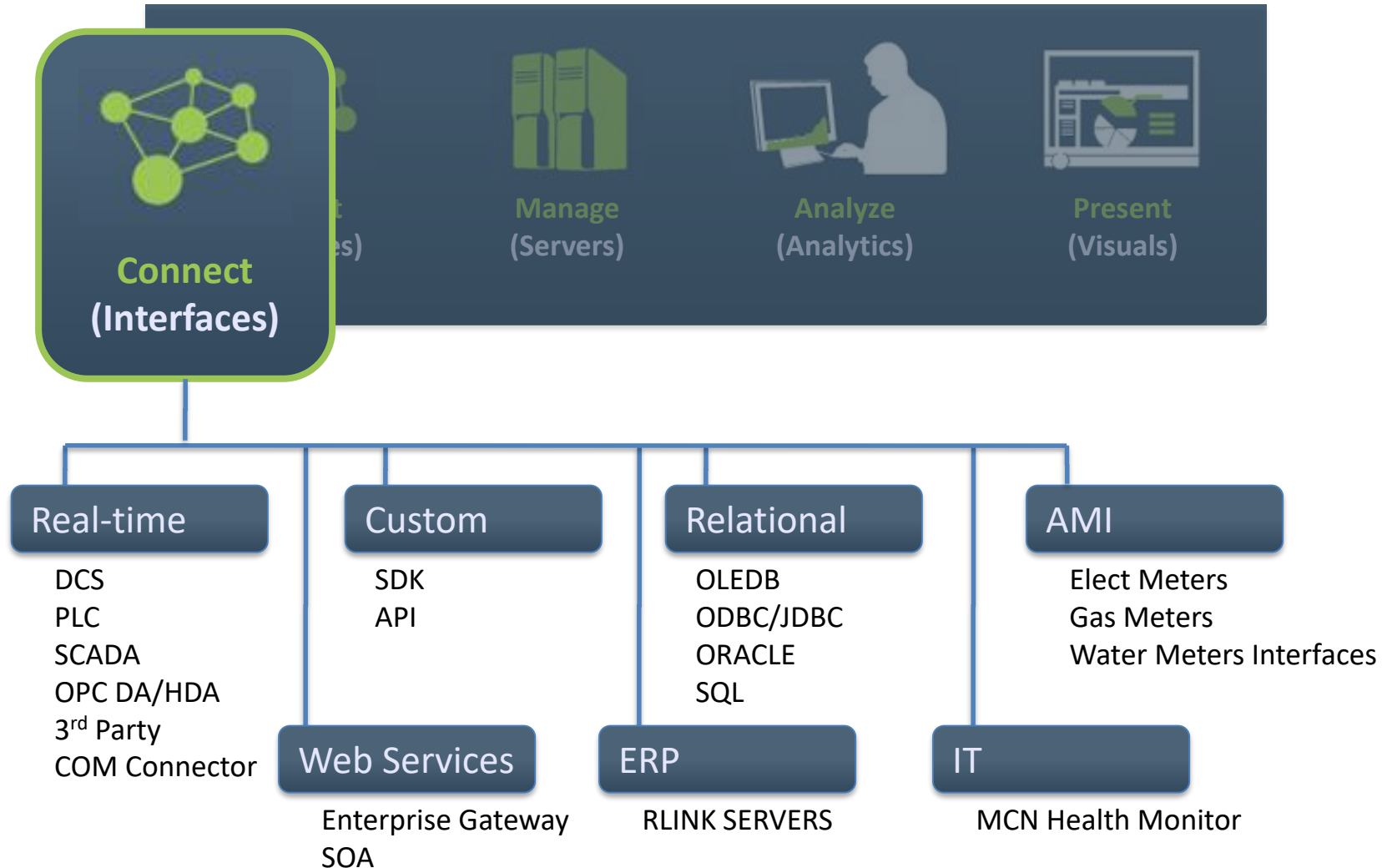


The PI System connects with real-time data sources every second, minute or day and stores the values forever

- Measures and aggregates a broad range of data types
- Handle either or both time-series data and events
- Secures the access and transmission of the data
- Data collection redundancy and high availability

The PI System can connect to more than 400 different systems

The PI System: Connect

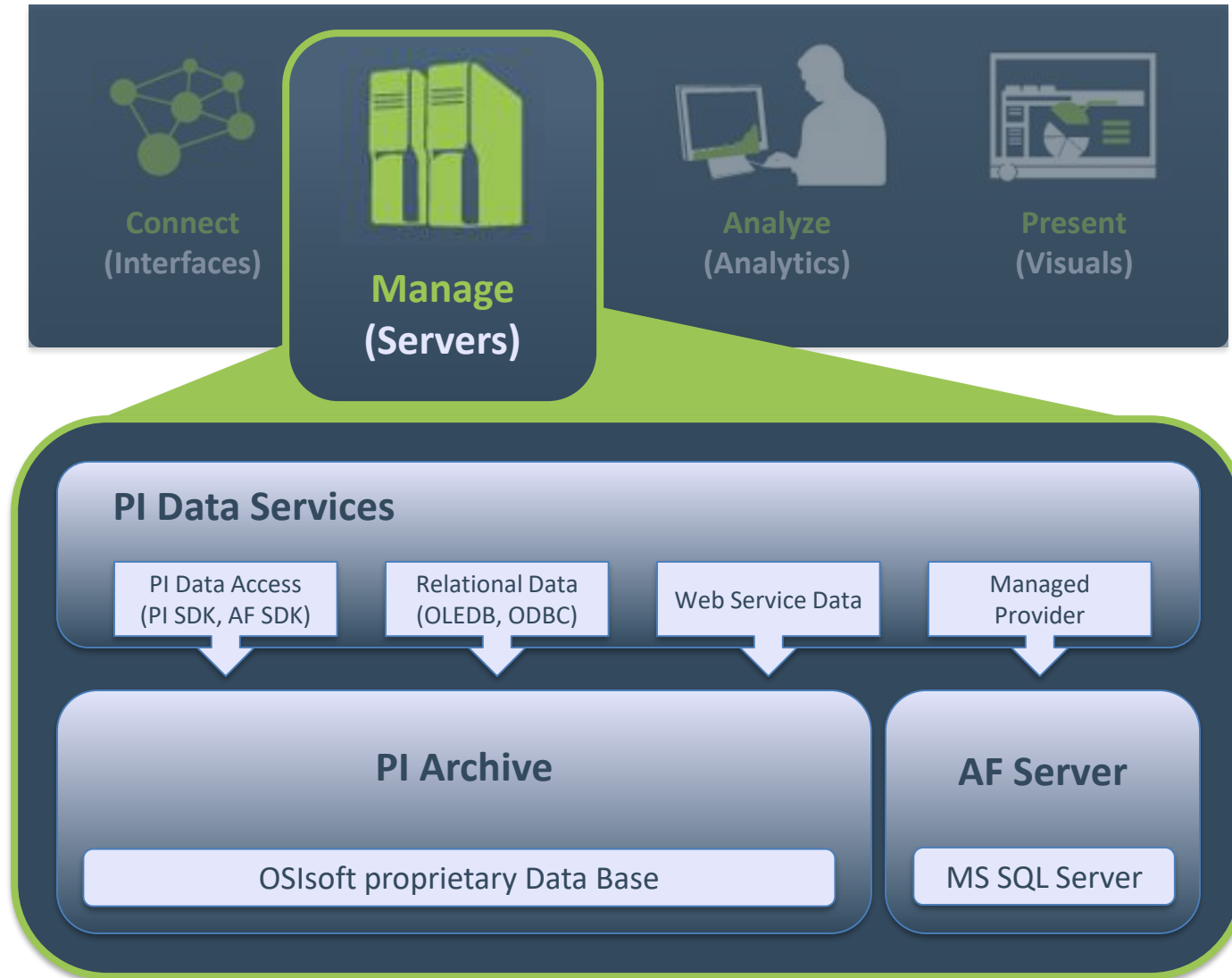




Within the PI System, the server components ...

- Archive the data and keep it online for decades
- Contextualize and enrich the values from the plant floor
- Distribute the data to clients application
- Expose the data supporting standard communication protocols

The PI System: Manage

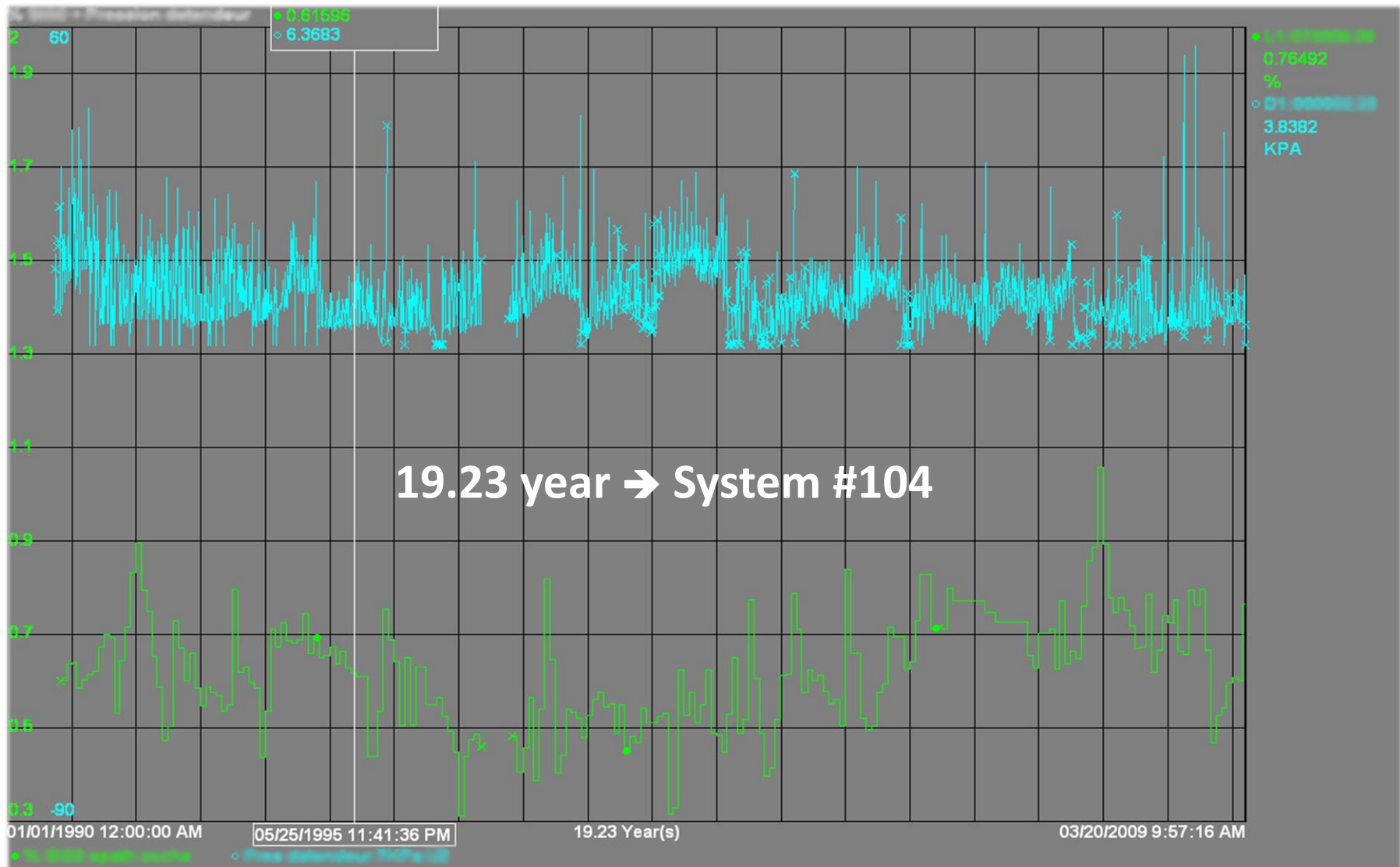


The PI Server



The PI Server: Historize!

RioTintoAlcan

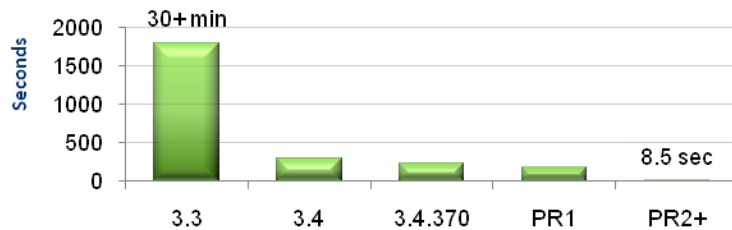


The PI Server Performance Over Time



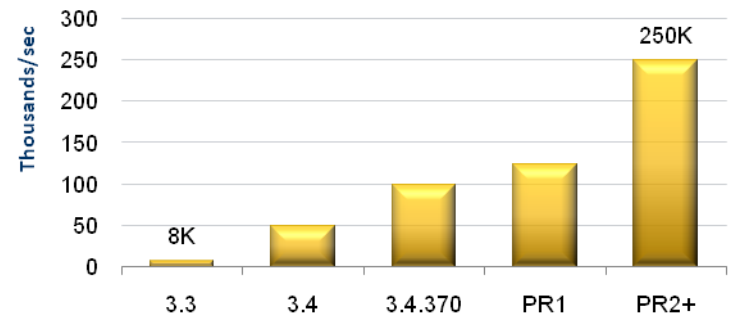
Startup Time

Initialization Time per Million of Points



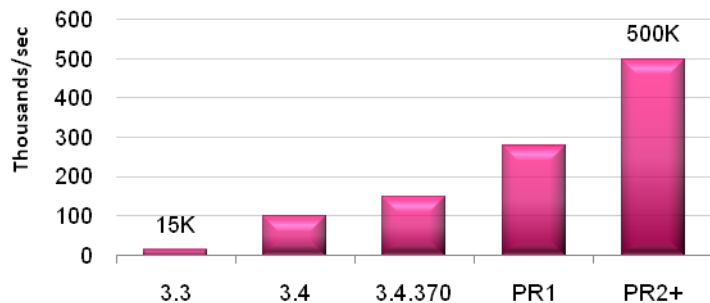
Archiving Rate

Events Stored to Disk



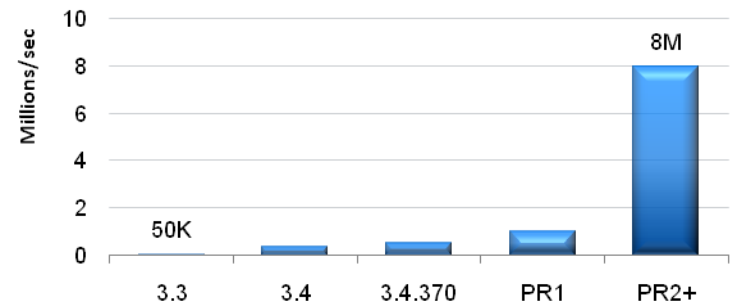
Snapshot Rate

Events Processed in Memory



Archive Query Rate

Events Served to Clients



The PI AF Server



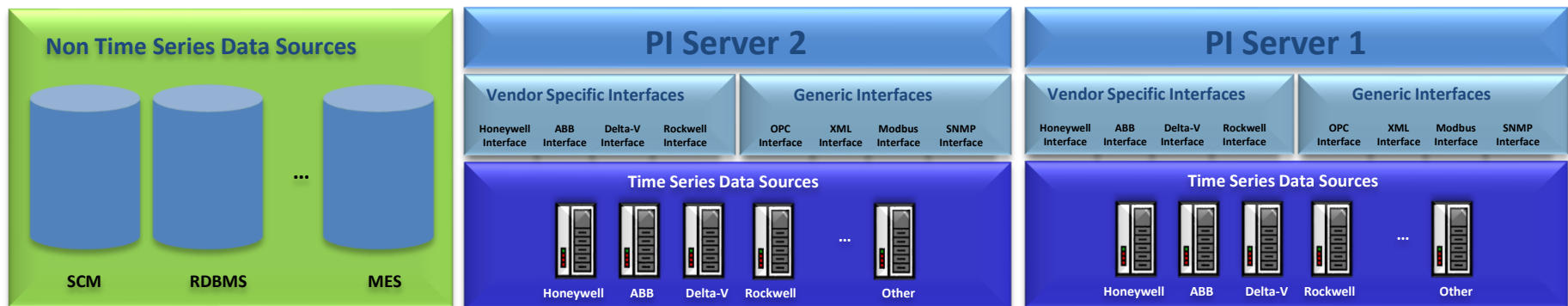
The PI AF Server in the PI System



- Structures and organizes the real time data by asset/equipment
- Store static information
- Reach to non time series data
- Spans multiple PI Servers



Asset/Equipment centric access to information



The PI AF Server



Xcel - PI System Explorer

File Edit View Go Tools Help

Database Query Date Back Check In New Element New Attribute Search

Elements

- Elements
 - PSCo
 - BTERM TA
 - BTERM (BTER)
 - LEGGETT TA
 - LEGGETT (LGT)
 - NCAR TA
 - NCAR (NCA)
 - TransformerBank1
 - CircuitBreaker1554
 - Feeder1554
 - ACLineSegment 105_36900
 - ACLineSegment 121_12100
 - ACLineSegment 123_5100
 - Dist Transformer XFM_OH_09-29
 - Dist Transformer XFM_OH_171-530
 - 300179F80002158D**
 - 30017A4800021F87
 - 30017A5800022229
 - 30017A58000223BC

300179F80002158D

General Child Elements Attributes Ports Version

Group by: ☐ Category

Search

| Name | Unit Of Measure | Value Type | Data Reference |
|------------------------------|-----------------|------------|----------------|
| SDPLocation | <None> | String | <None> |
| Type | <None> | String | <None> |
| +kWhPulses | <None> | Double | PI Point |
| kWhPulses | <None> | Double | PI Point |
| ClockDriftAdjustTime | second | Double | PI Point |
| ClockDriftAlarmCount | <None> | Double | PI Point |
| ClockDriftSeconds | second | Double | PI Point |
| ClockDriftThresholdSeconds | second | Double | PI Point |
| Current240VVoltage | volt | Double | PI Point |
| LastOutageTime | second | Double | PI Point |
| MeterKh | <None> | Double | PI Point |
| NetkWh | kilowatt hour | Double | PI Point |
| NetkWh-ErrorCode | <None> | String | PI Point |
| NetkWh-Validated | kilowatt hour | Double | PI Point |
| NumberPowerOutages | <None> | Double | PI Point |
| PhaseAVoltage | volt | Double | PI Point |
| PhaseCVoltage | volt | Double | PI Point |
| Register+kWhPulses | <None> | Double | PI Point |
| Register+kWhPulses | <None> | Double | PI Point |
| RegisterClockDriftAdjustTime | second | Double | PI Point |

300179F80002158D Modified: 7/9/2009 8:52:49 PM. Version: 1/1/1970 12:00:00 AM, Revision 1

The PI Data Access layer



- PI ODBC Client
- PI OLEDB Provider
- PI JDBC Driver
- OPC
 - OPC DA/HDA Server
 - OPC UA Server
- Web Services
 - PI Web Services
- SDKs AF SDK



Convert real-time data into actionable information

- CEP (Complex Event Processing) & Post processing
- Equations, calculations, aggregations, filters, business rules
- Reports, Notifications and Alerts

Monitor business & operational performance in real time



- Pump daily uptime

```
TimeEQ('04:123PUMP_STAT.DC','t','*', "ON")/3600
```

- High/Low alarm on tank level with alarm reset every shift

```
If ( Hour('*') = 6 or Hour('*') = 18 ) and Minute('*') = 1 Then
    If (TagMIN('DC1-LI-005.PV','*', '*-5m') >= 'UO-Niveau-Reservoir-Floculent-max'
    or TagMax('DC1-LI-005.PV','*', '*-5m') <= 'UO-Niveau-Reservoir-Floculent-min') then
        1
    else 0
else Max(PrevVal('DC1-LI-005.PV.Alarme.RQ','*-5s'),
    If (TagMIN('DC1-LI-005.PV','*', '*-5m') >= 'UO-Niveau-Reservoir-Floculent-max'
    or TagMax('DC1-LI-005.PV','*', '*-5m') <= 'UO-Niveau-Reservoir-Floculent-min') then
        1
    else 0)
```

The PI Analytics :PI Totalizer



Name & Type | Sampling | Results | Archive | Security | System | Options | Summary

Name: Pump_Starts
Description: Number of start
SourceTag: Statut_Pompe
Eng Units: Starts
Point Type: Int32

Totalizer Type
☐ Summary Calculation ☒ Count Events
☐ All Events ☒ Events where value changes

Name & Type | Sampling | Results | Archive | Security | System | Options | Summary

Write final results
☒ after a time period elapses ☐ after a number of source events
☐ based on a trigger event ☐ continue forever (interim results ONLY)

Details
Start schedule at: 0 Minute(s) after midnight
Results every: 2 Minute(s) ☒ Vary w/ DST

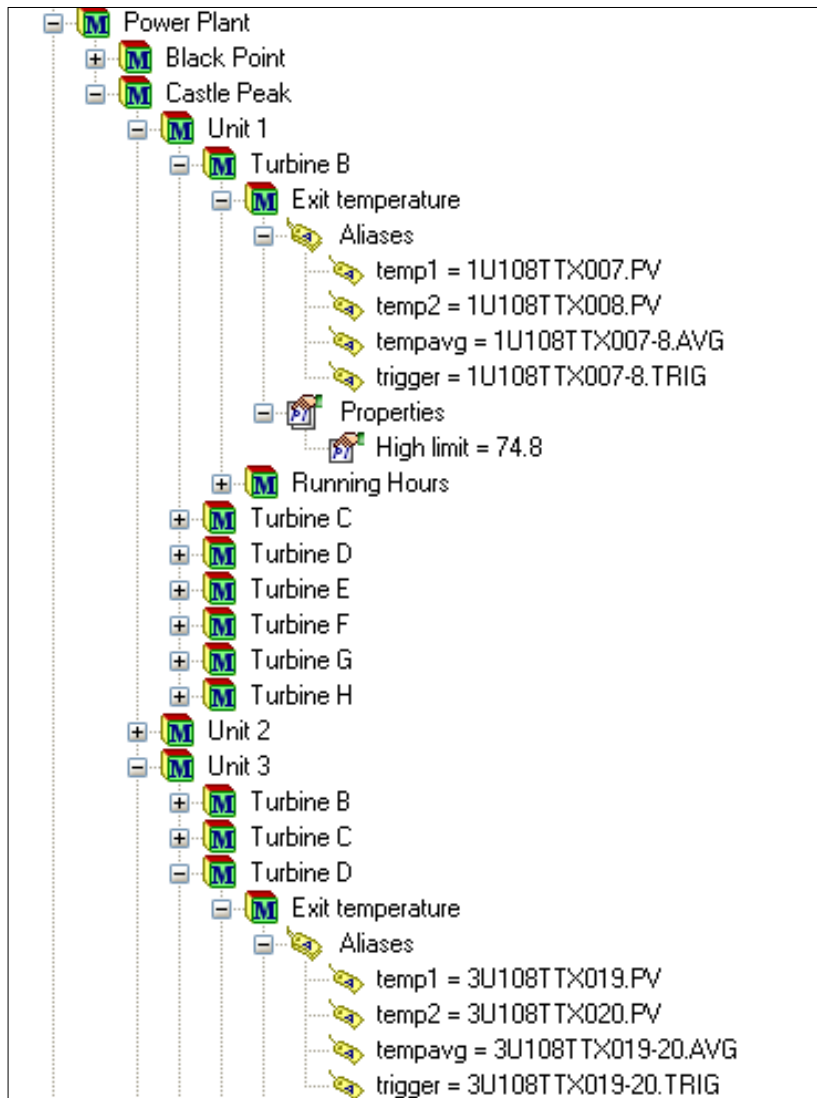
Name & Type | Sampling | Results | Archive | Security | System | Options | Summary

Write final results
☒ whenever a new source tag event occurs
☐ Periodically ☒ Interpolate ☐ Event
Start schedule at: 0
Sample every: 2
☐ Whenever the event expression changes
☐ Filter the source data with the following expression

Name & Type | Sampling | Results | Archive | Security | System | Options | Summary

Options
☐ Allow external reset
☐ Use negative source values
☐ Source tag is a DCS integrator
☐ Close at end of the Sampling Period
☐ Source OverRange is ZERO + SPAN
☐ Use Source Tag BAD in place of "Bad Total"
Source UnderRange is: ☐ zero ☐ bad
Final result at: ☐ start ☐ end ☒ both
Conversion Factor: 1
Source = Zero below 0
Pct good values needed 85

PI ACE (Advanced Computing Engine)



Test

Context: Wocallhost\Power Plant\Castle Peak\Unit 1\Turb Reference Time *

Input Aliases

| Tag Name | Test Value Type | Current Value | Clamping | Bad Value |
|----------|-----------------|---------------|-------------|-----------------|
| temp1 | Current Value | 76.15458 | No Clamping | No Substitution |
| temp2 | Current Value | 74.56452 | No Clamping | No Substitution |

exit_temp (Declarations)

```
Public dblLimit As Double

' Tag Name/VB Variable Name Correspondence Table
' Tag Name                                VB Variable Name
' -----
' temp1                                temp1
' temp2                                temp2
' tempavg                              tempavg
' trigger                              trigger

Public Overrides Sub ACECalculations()
    tempavg.Value = (temp1.Value + temp2.Value) / 2
    If tempavg.PrevVal() < dblLimit And tempavg.Value > dblLimit Then
        trigger.Value = 1
    Else
        trigger.Value = 0
    End If
End Sub

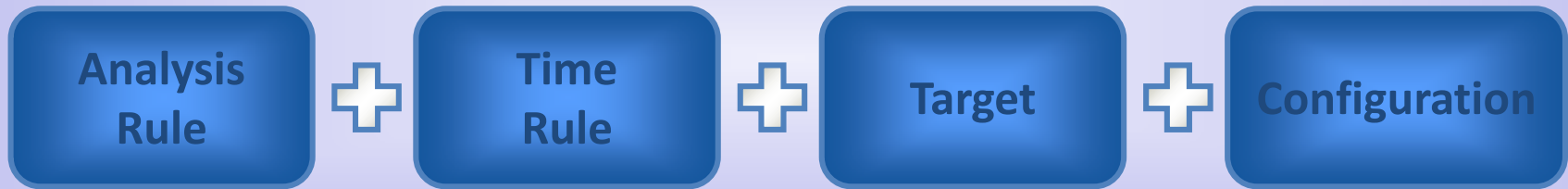
Protected Overrides Sub InitializePIACEPoints()...

' User-written module dependent initialization code

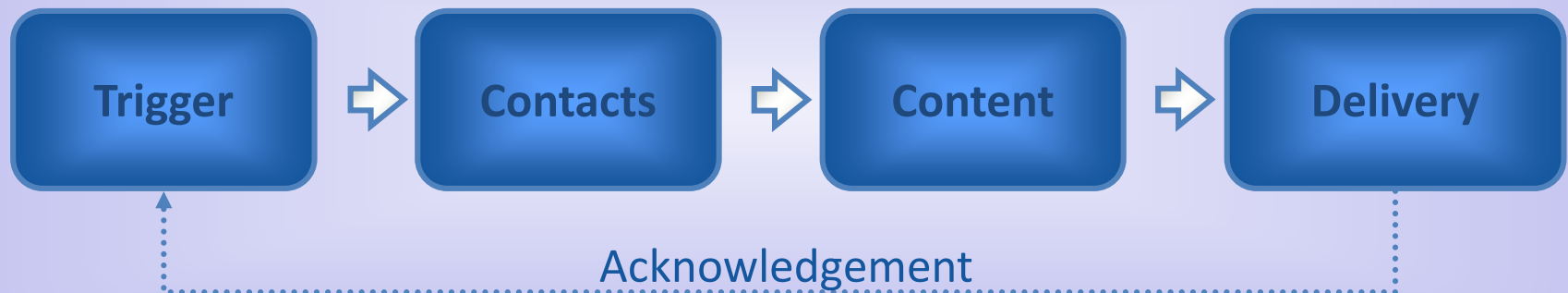
Protected Overrides Sub ModuleDependentInitialization()...

' ...
Protected Overrides Sub ModuleDependentTermination()
End Sub
End Class
```

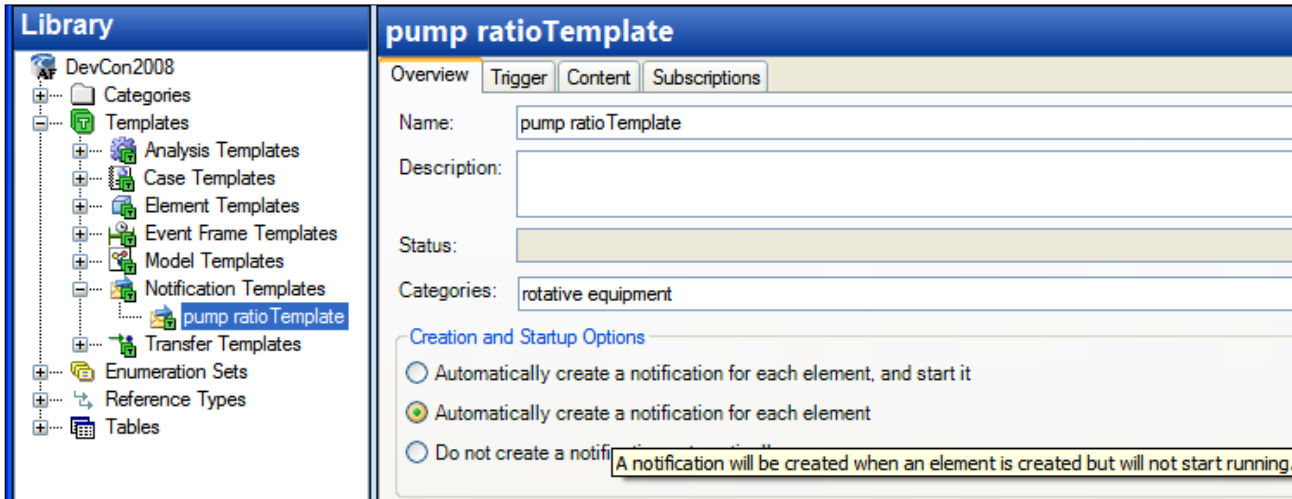
Business Logic



Notification Emission



- Notification Templates



The screenshot shows the 'pump ratioTemplate' configuration window. The left pane shows the 'Library' tree with 'Notification Templates' expanded. The right pane shows the 'Overview' tab with the following fields:


- Name: pump ratioTemplate
- Description: (empty)
- Status: (empty)
- Categories: rotative equipment

Below these fields is the 'Creation and Startup Options' section with three radio buttons:

- ☐ Automatically create a notification for each element, and start it
- ☒ Automatically create a notification for each element
- ☐ Do not create a notification

A tooltip is visible over the third option, stating: 'A notification will be created when an element is created but will not start running.'

- Notifications Rules

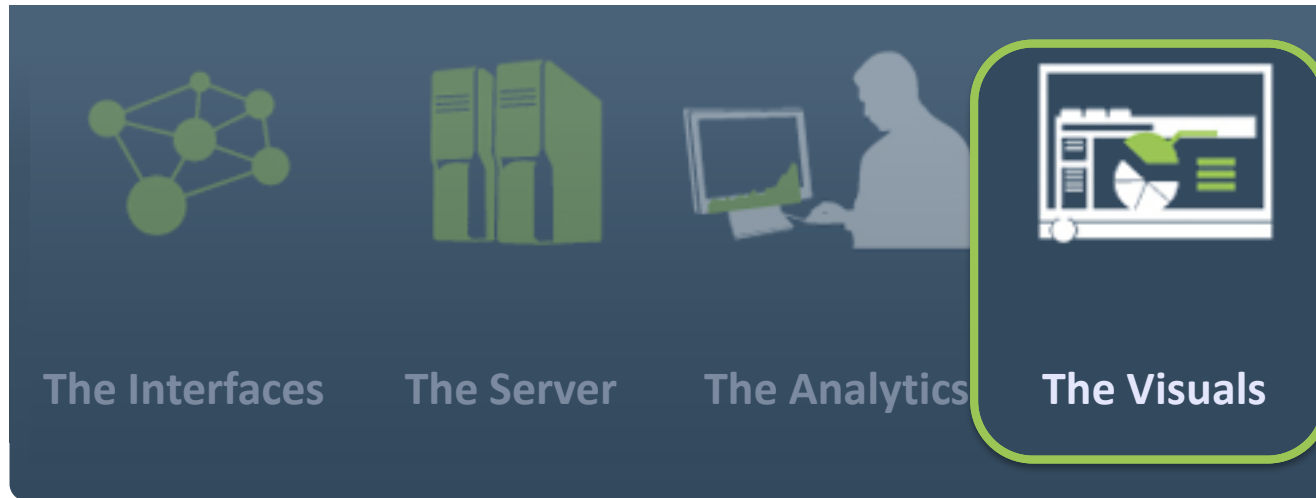


The screenshot shows the 'tank level' notification rule configuration window. The left pane shows the 'Notifications' tree with 'tank level (my tank)' selected. The right pane shows the 'Trigger' tab with the following fields:

- Target: \\DELLAURENT\DevCon2008\My Plant\Unit 1\Section A\Line 1\my tank

Below the target field is the 'Conditions' section with a 'New Condition' button and a list of conditions:

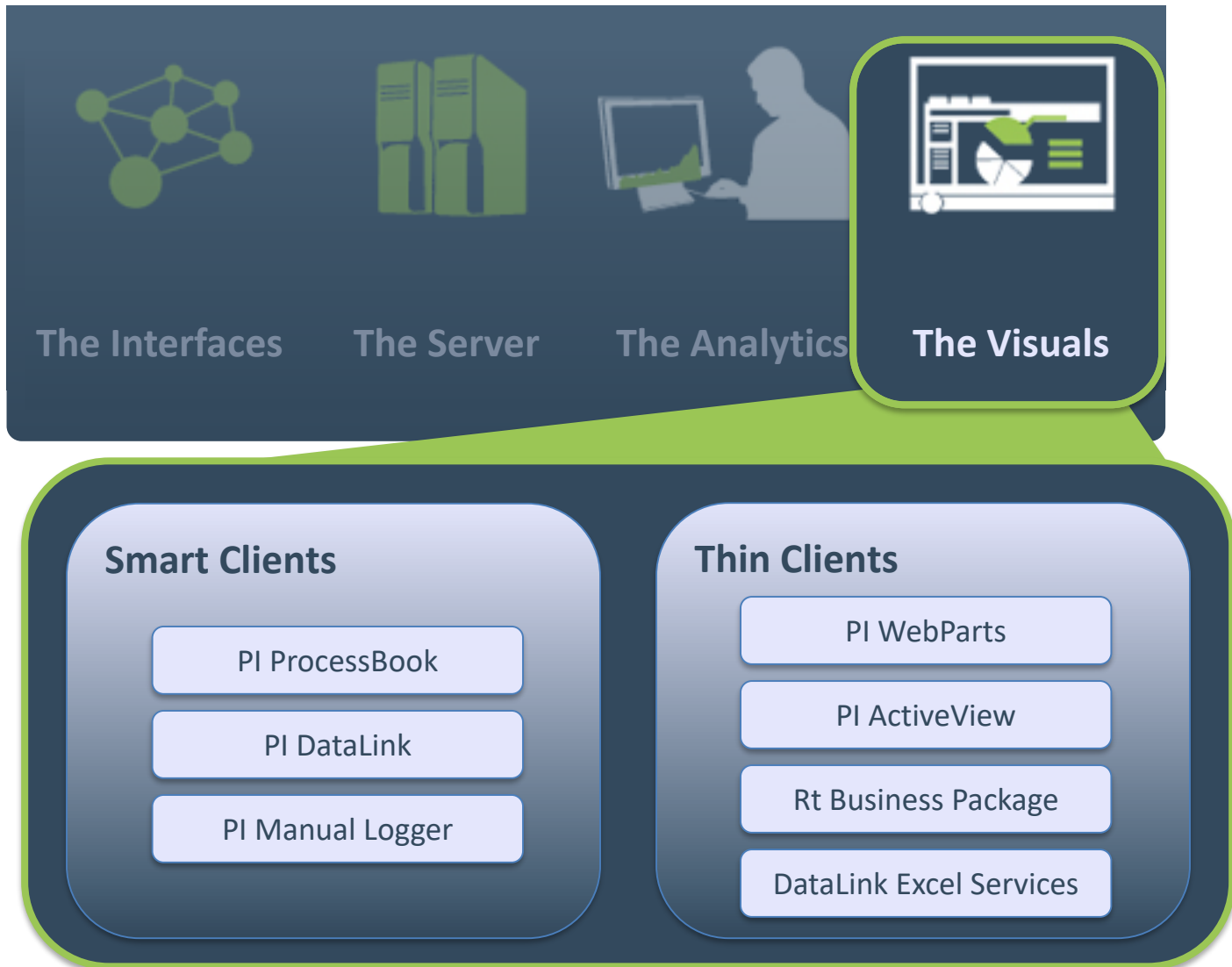
| Rule | Configuration | Time True | Result When True | Priority |
|------------|-----------------------|-----------|------------------|----------|
| Comparison | Level < Level Minimum | 60 | 1-Low | Normal |
| Comparison | Level > Level Maximum | 60 | 3-High | Normal |



The decision makers can use the well-known tools like:

- OSIsoft PI ProcessBook
- Microsoft Office Excel or Microsoft Office SharePoint
- SAP Enterprise Portal

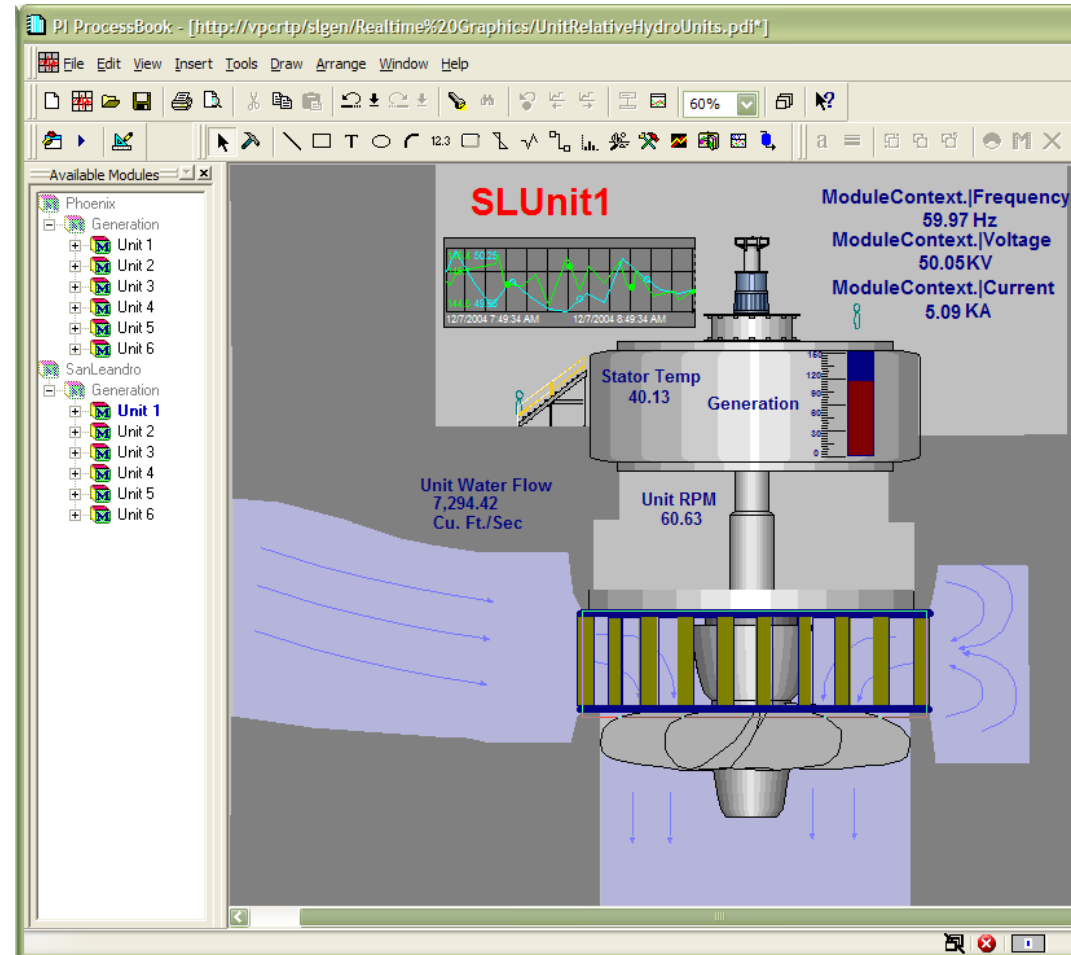
The Visuals stimulates the creativity and gives solutions to end-users for solving business problems.



The Smart Clients

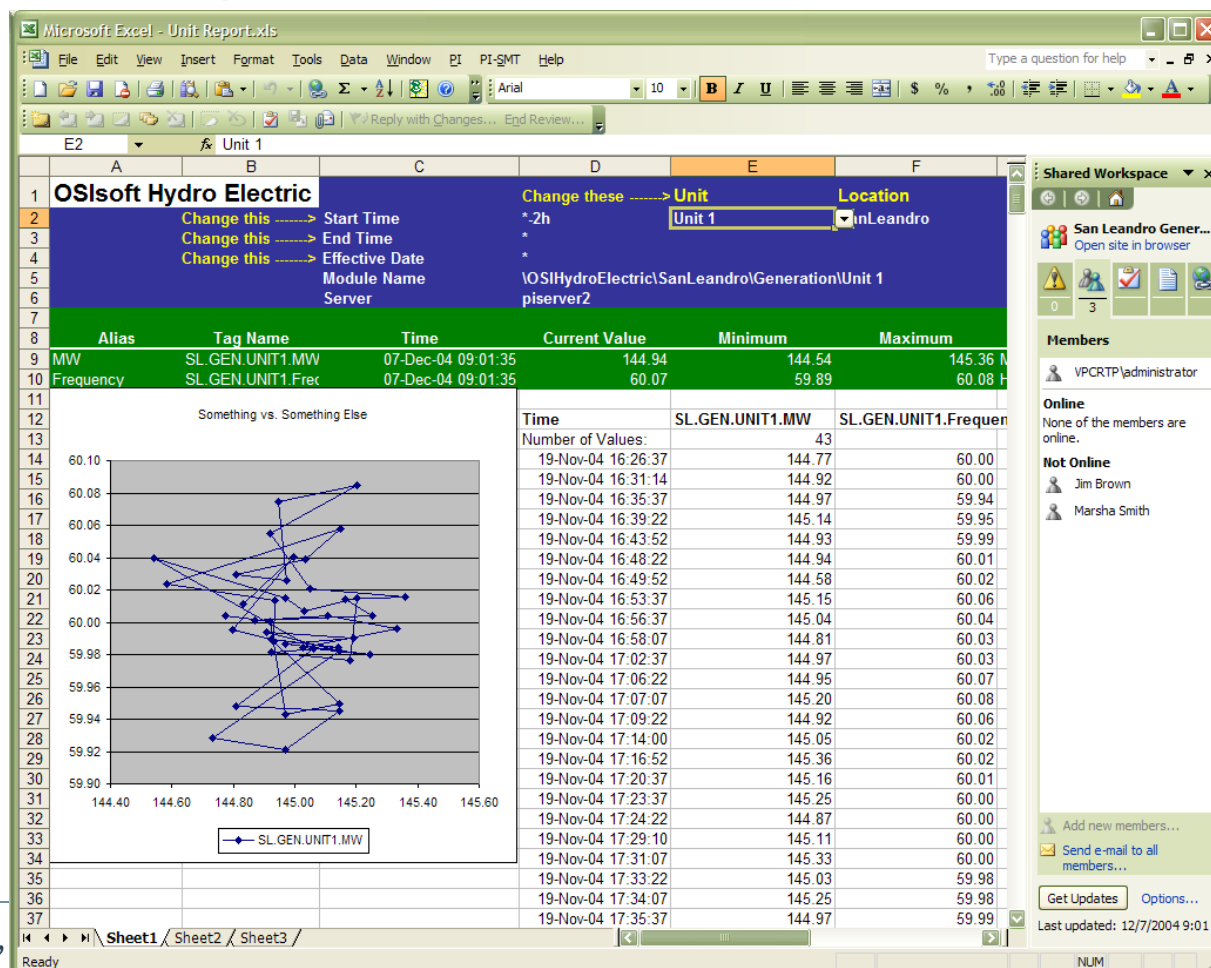


- Draw intuitive graphical diagrams and include live data
- Make one diagram refer to many similar units or assets
- Easily trend data
- View annotations to data points
- Intuitive “status” indicator displays health of data on the display
- Large symbol library included to make drawings quickly

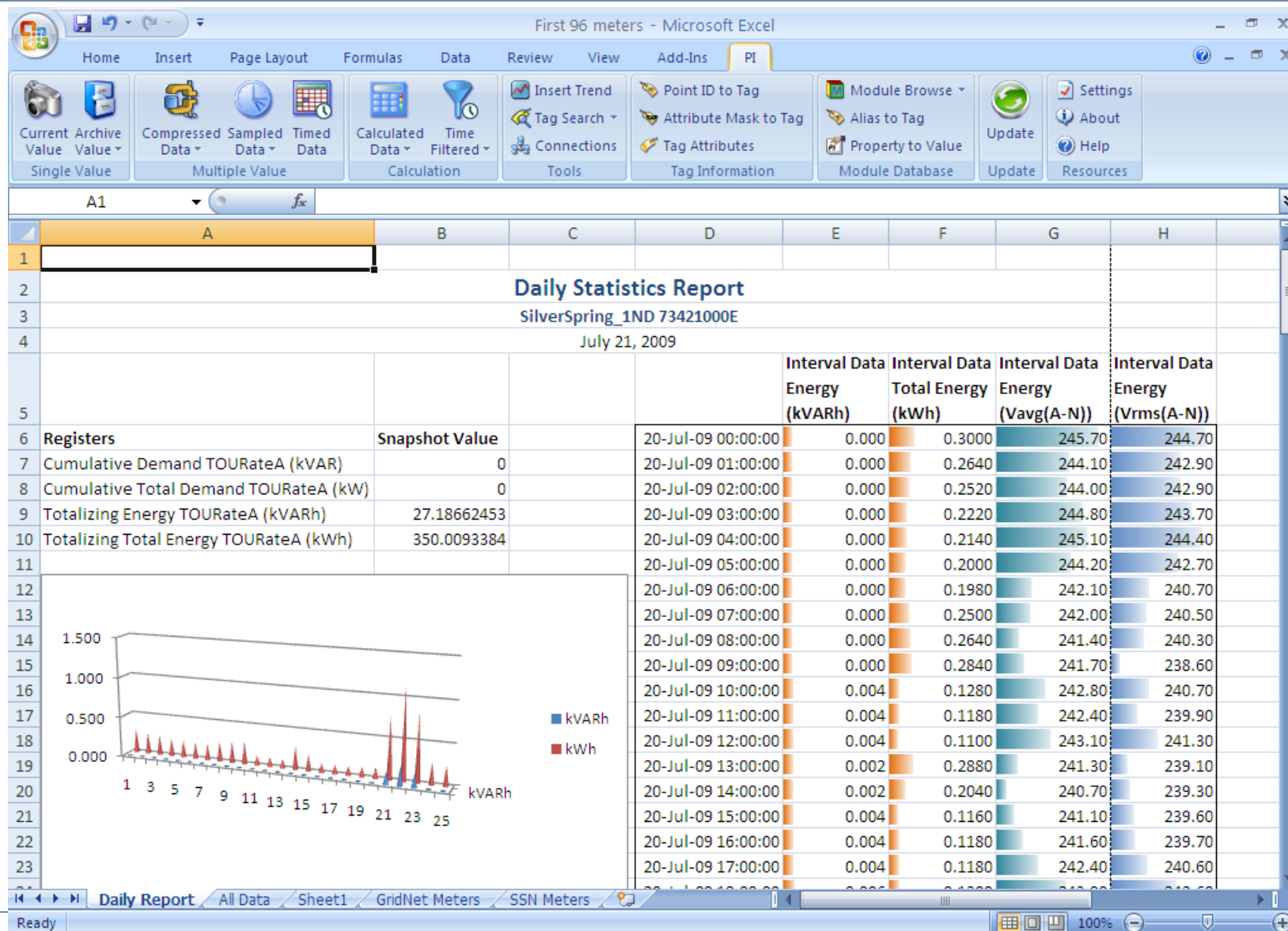




- PI Add-In for Microsoft Excel and Lotus
- Create interactive reports and analyses in a spreadsheet
- Worksheets update each time the user adjusts a time range
- Worksheets can also be integrated with contexts



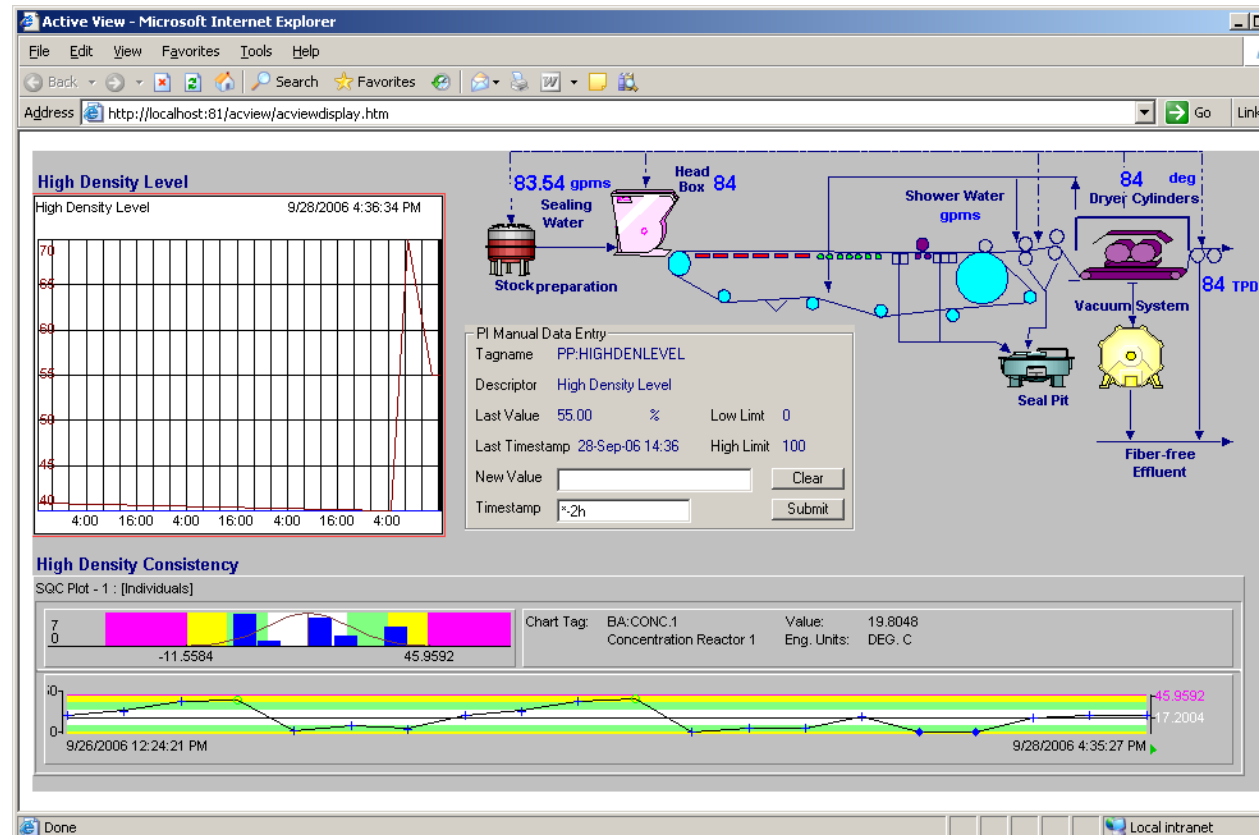
PI DataLink with Excel 2007

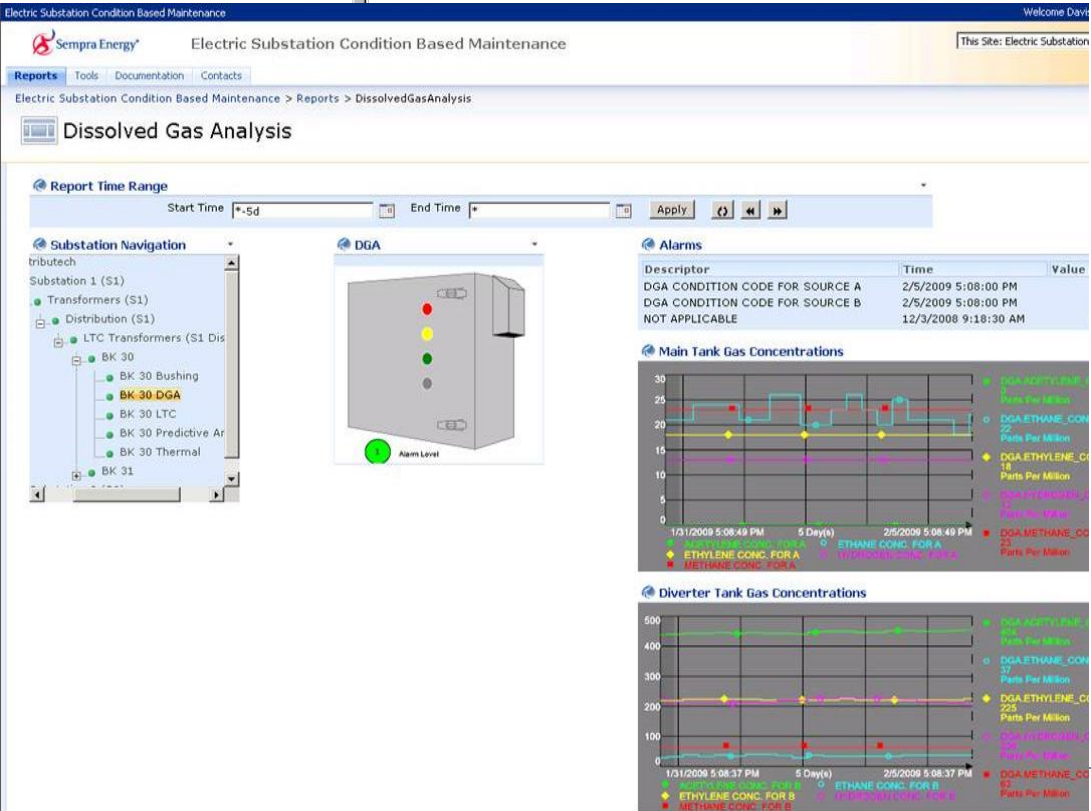
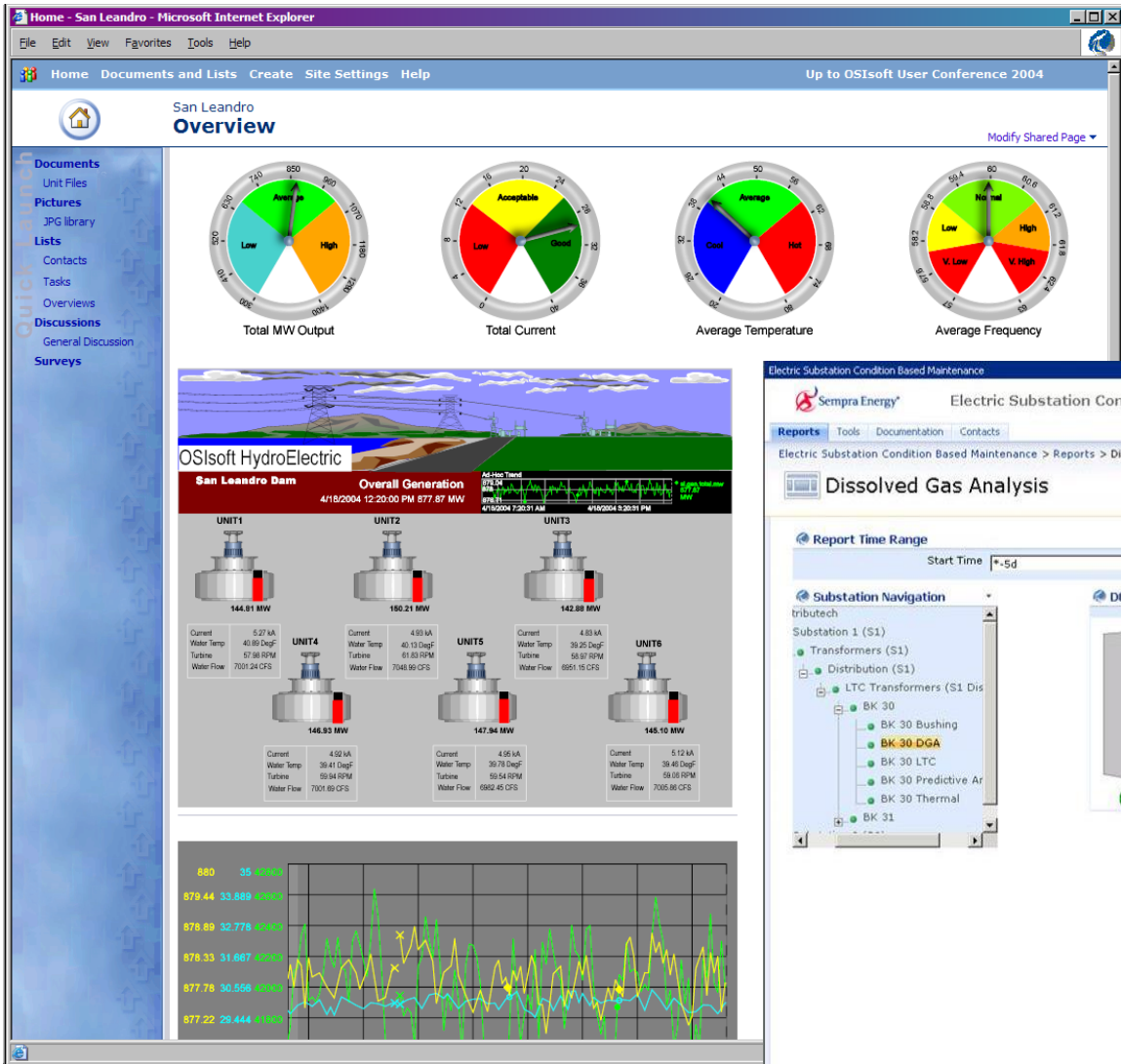


The Thin Clients



- PI ActiveView is a 'run time' version of PI ProcessBook
- Can be deployed easily and automatically
- ActiveView ActiveX can be added easily to web pages or any ActiveX container
- ActiveView displays preserve all functionalities from the source ProcessBook displays including VBA code

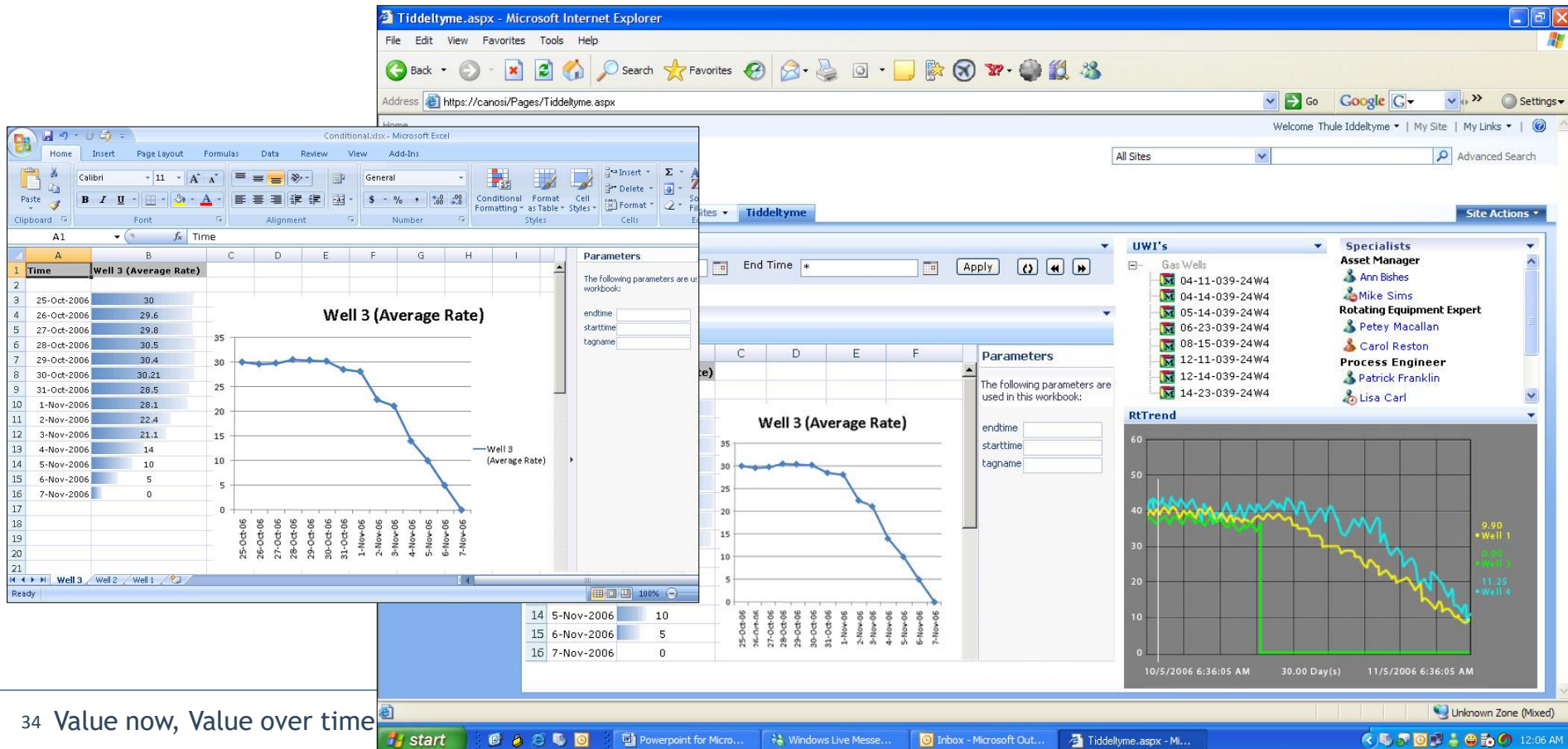




PI DataLink for Excel Services (DLES)



- Deploy DataLink functions across the enterprise
- Existing reports directly usable through the Portal
- No PI DataLink or Excel installation required on client
- Less PI data traffic on the WAN



Power - SAP Enterprise Portal 6.0 - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Home Search Favorites

Address http://earth:50000/inj/portal

Welcome gretchen schwenzer

Search Advanced Search

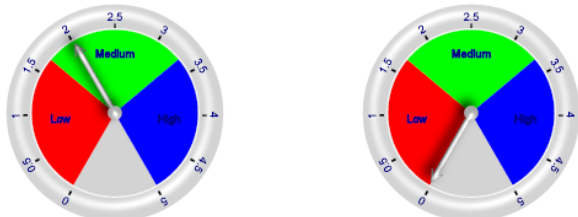
Java Development Home Plant Management Content Administration User Administration System Administration PeoplesPages RlReports Collaboration Content Management Delegated User Administration Java Developer

RLINK-PM | Johns Page | Multi | RLINK-PPPI | Table | Release_1_1 | TableTemplate | Power | FirstEnergy

Power

History Back Forward

Gauge for Real Time Data



NOX - Number of Emission Excursions

SOX - Number of Emission Excursions

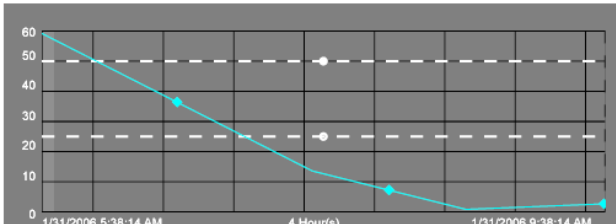
KPI for Real Time Data

RtKPI

Display Group All KPI Groups

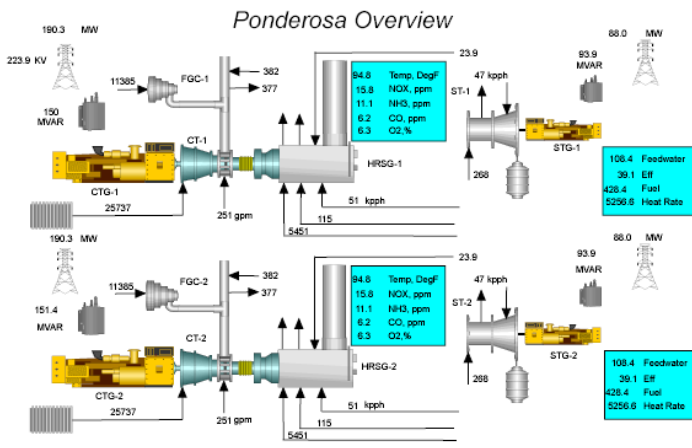
| Status | Description | Current Value | EngUnits | Target Value | % Diff | Date/Time | Action |
|--------|-------------|---------------|----------|--------------|----------|----------------------|--------|
| Red | Total Price | 606.3 | MMBtu | 800 | -24.213% | 1/31/2006 9:33:00 AM | |
| Green | Fuel Price | 15.201 | \$/MMBtu | 15 | 1.34% | 1/31/2006 9:38:00 AM | |
| Red | Power Price | 88.329 | \$/MWh | 300 | -70.557% | 1/31/2006 9:33:00 AM | |
| Red | Heat Rate | 15731 | MMBtu | 9500 | 65.589% | 1/31/2006 9:28:30 AM | |
| Green | Production | 1353.1 | MWh | 900 | 50.344% | 1/31/2006 9:37:00 AM | |
| Red | Contracts | 2199.2 | MWh | 0 | 2199.2% | 1/31/2006 9:32:30 AM | |

Trend for Real Time Data



Graphic for Real Time Data

Ponderosa Overview



TreeView for Real Time Data

- PowerGeneration
 - RtGraphic
 - FossilFuel
 - Ponderosa
 - Active power
 - Ambient Air Pressure
 - Ambient Air Relative Humidity
 - Ambient Air Temperature
 - Heat rate
 - RtGraphic
 - HRSG-1
 - HRSG-2
 - Turbine 1



Thank you

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777 Davis St., Suite 250 San Leandro, CA 94577

Strategic Alliances - Overview



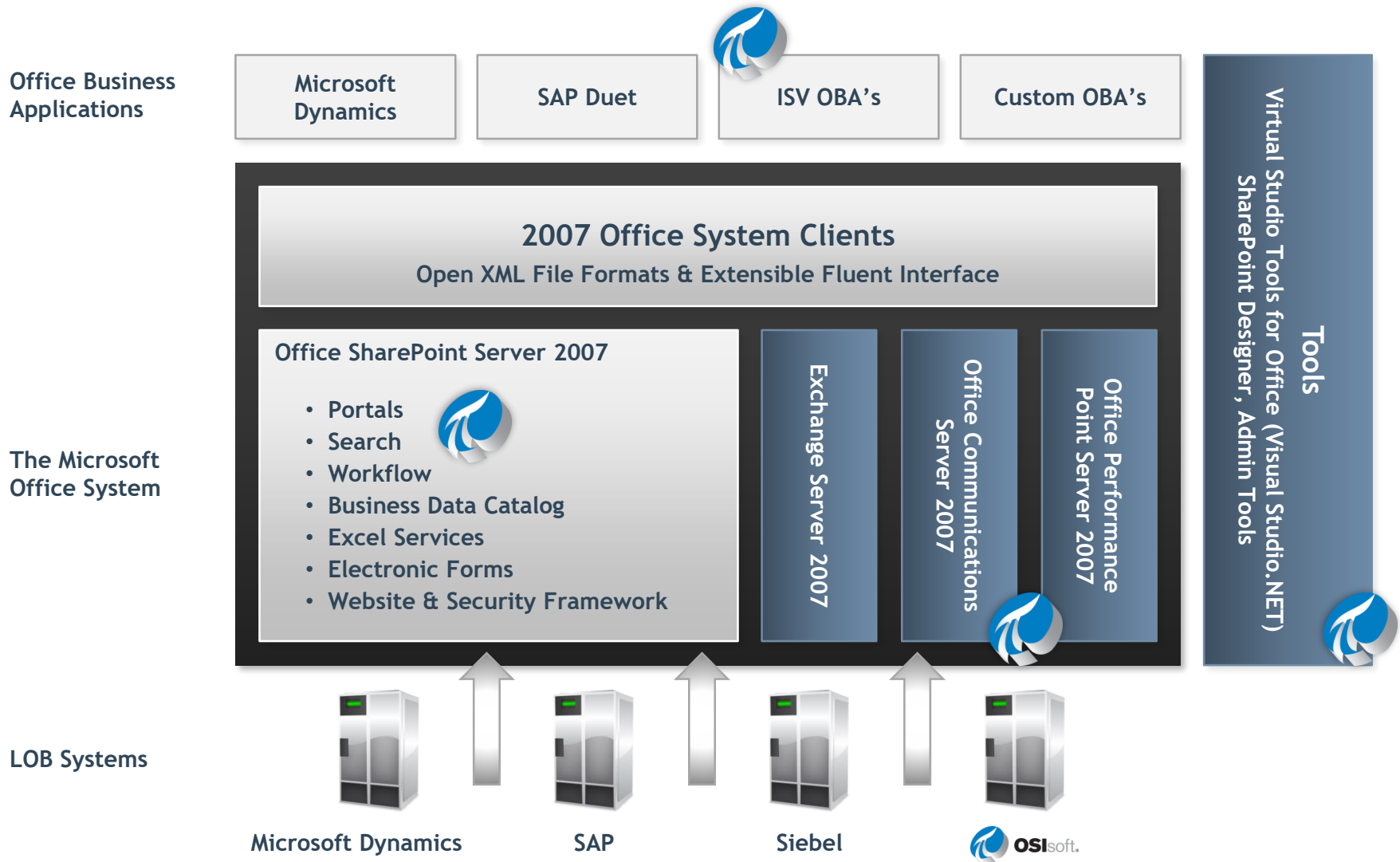
Real-Time Data
Infrastructure

Microsoft

Productivity &
Infrastructure



Line of Business
Connectivity





SAP Certified
Powered by SAP NetWeaver

- **OSIsoft Partner Since 1996:**
- SAP Production Planning-Process Industries (SAP PP-PI) module
- SAP Plant Maintenance (SAP-PM) module
- SAP Quality Management (SAP-QM) module
- The OSIsoft Business Package for SAP Portal
- Member of ES Community
- Member of Value Network for Chemicals, Mining, and Utilities
- Enterprise Services for SAP Enterprise Service Repository
- AMI MDUS Solution and participant in SAP Lighthouse Council