OSIsoft® VALUE NOW, VALUE OVER TIME

OSIsoft Product Roadmap

The Server

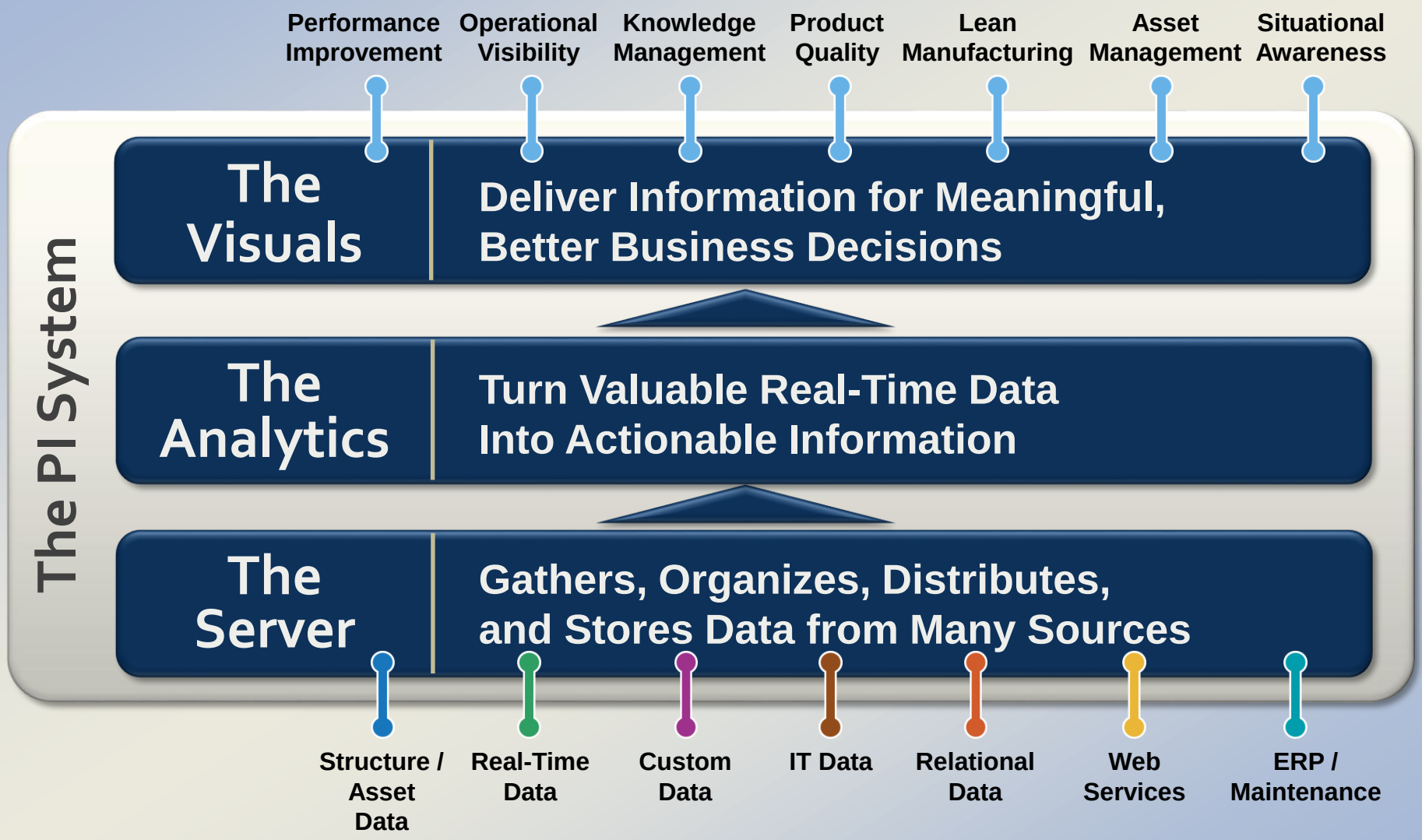
Tom Hosea

Director of Product Marketing

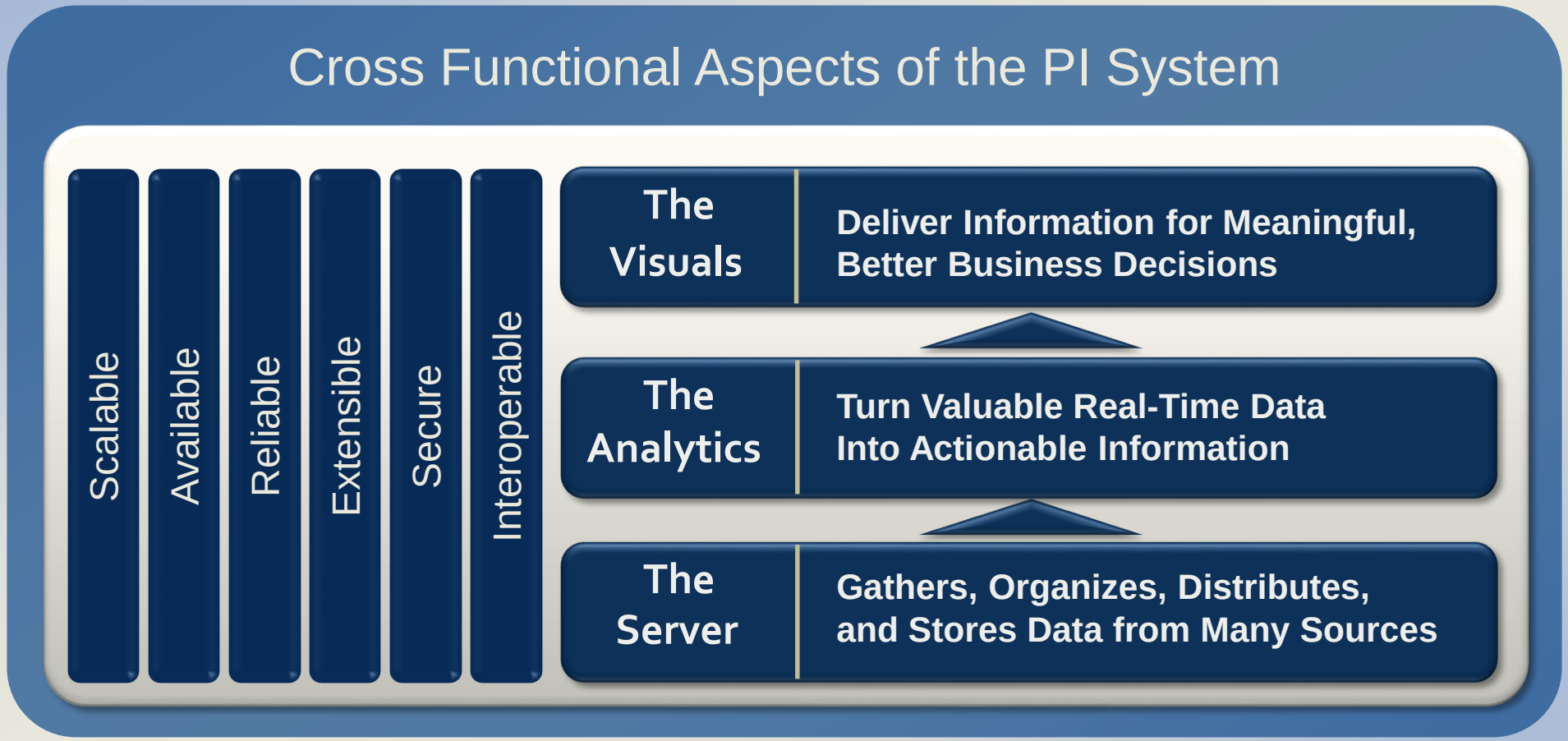
Intrinsic Values of the PI System

- Scalable (asset, site and enterprise)
- Available (independent of system faults)
- Reliable (believable, auditable)
- Extensible (open feature set)
- Secure (multiple security models)
- Interoperable (open to multiple systems)

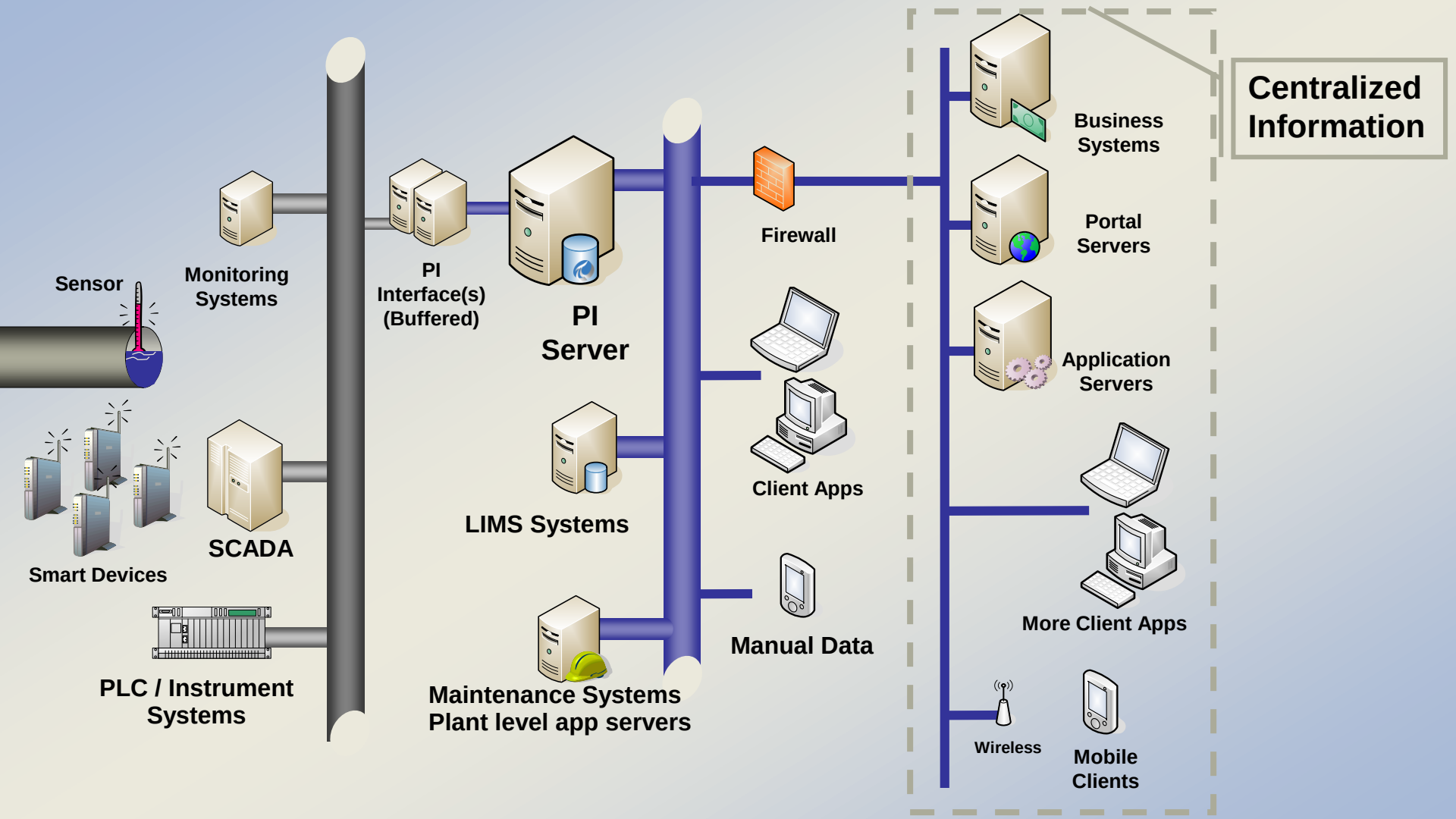
Functional Groups of The PI System



Aspects of The PI System



System Architecture



The PI System

The Server

- PI Archive
- PI AF
- Real-Time Interfaces
- Data Access
- MCN Health Monitor

The Analytics

The Visuals

The PI System

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The Analytics

- ACE
- PI Analytics
- RtReports
- PI Notifications
- Sigmafine

The Visuals

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The Visuals

Smart Clients

- PI ProcessBook
- PI DataLink
- PI Activeview
- PI BatchView

Thin Clients

- RtWebParts
- RtPortal iViews
- RtReports Clients

The PI System

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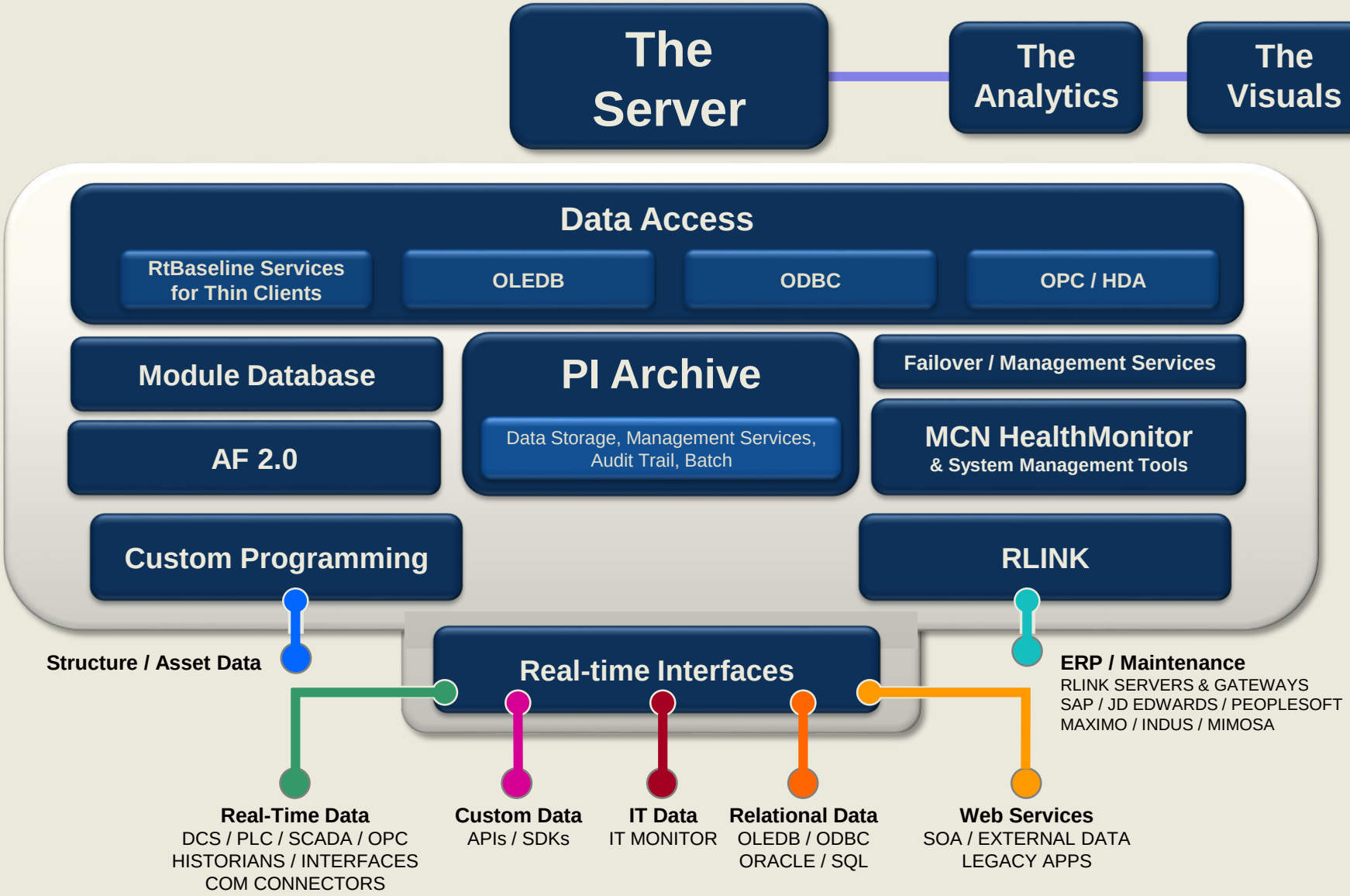
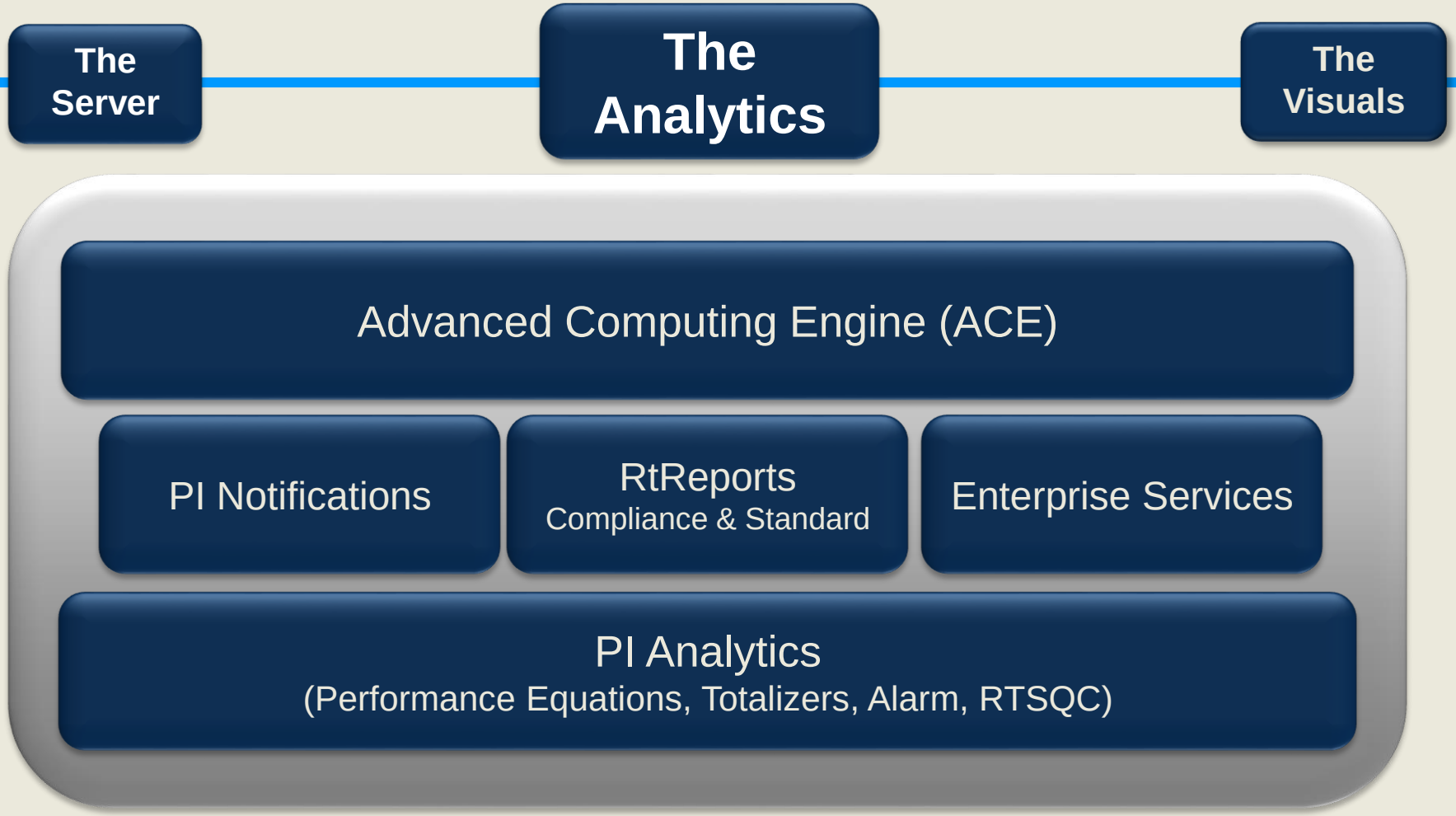
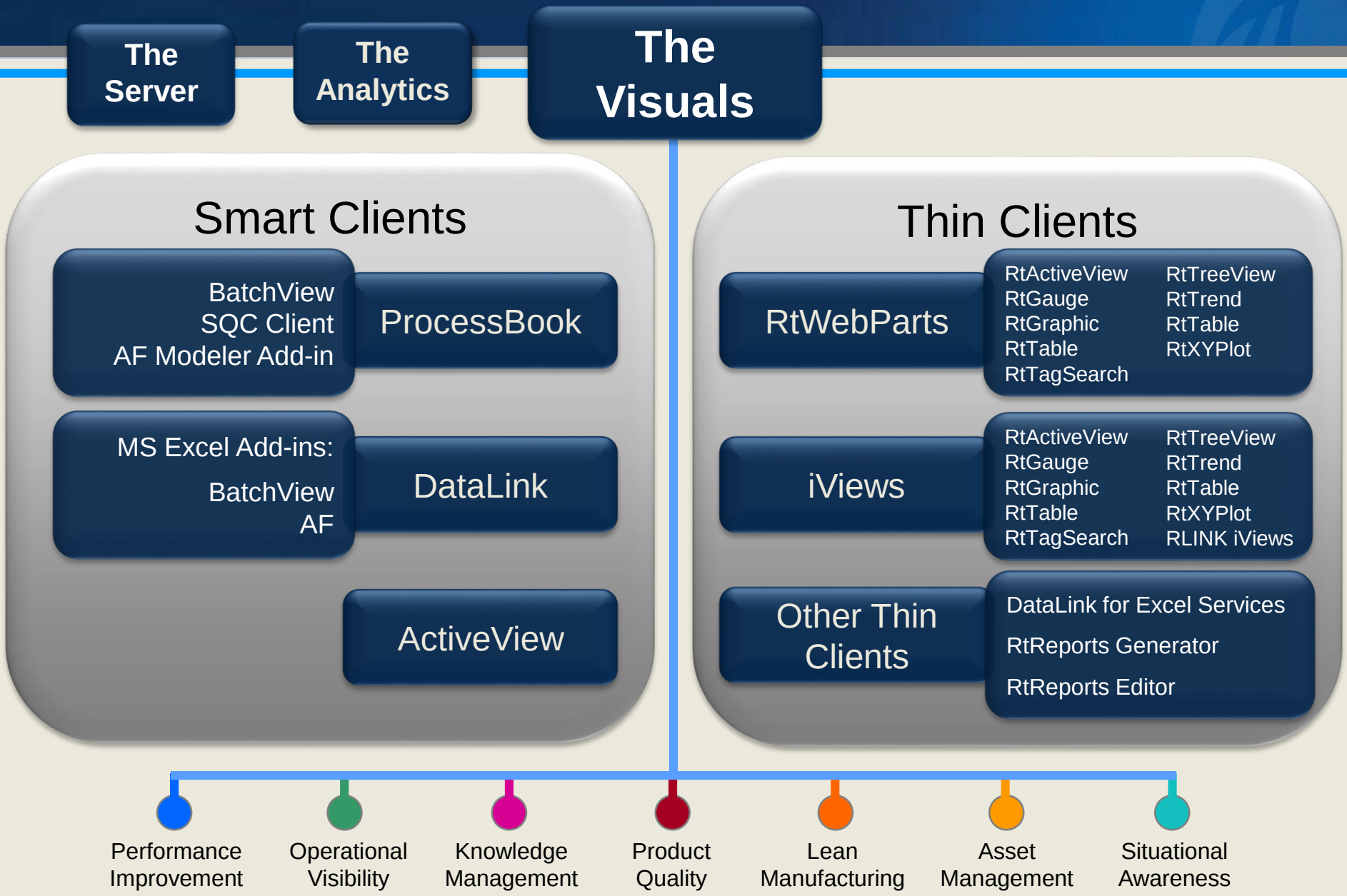
The PI Server Today



The Analytics within the PI System Today




The Server
The Analytics
The Visuals
Smart Clients
BatchView
SQC Client
AF Modeler Add-in
ProcessBook
MS Excel Add-ins:
BatchView
AF
DataLink
ActiveView
Thin Clients
RtWebParts
RtActiveView
RtGauge
RtGraphic
RtTable
RtTagSearch
RtTreeView
RtTrend
RtTable
RtXYPlot
iViews
RtActiveView
RtGauge
RtGraphic
RtTable
RtTagSearch
RtTreeView
RtTrend
RtTable
RtXYPlot
RLINK iViews
Other Thin Clients
DataLink for Excel Services
RtReports Generator
RtReports Editor
Performance Improvement
Operational Visibility
Knowledge Management
Product Quality
Lean Manufacturing
Asset Management
Situational Awareness

The Server

The Analytics

The Visuals

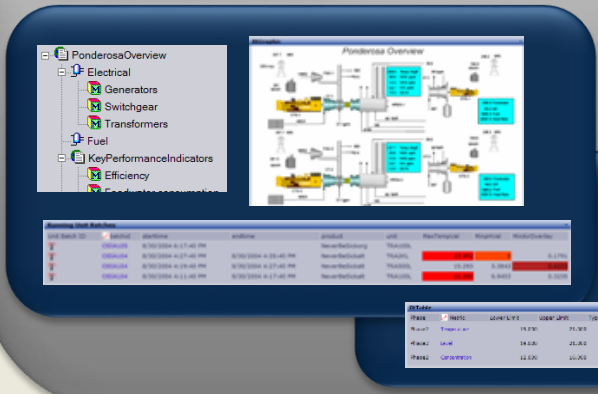
Smart Clients

Visualization
Root Cause Analysis
Planning
Content Authoring

Seamless Interaction Between Smart Clients & Portal Environment

Thin Clients

Structured Portal Environment Allows Users to Build Displays Without IT Training



- Performance Improvement
- Operational Visibility
- Knowledge Management
- Product Quality
- Lean Manufacturing
- Asset Management
- Situational Awareness

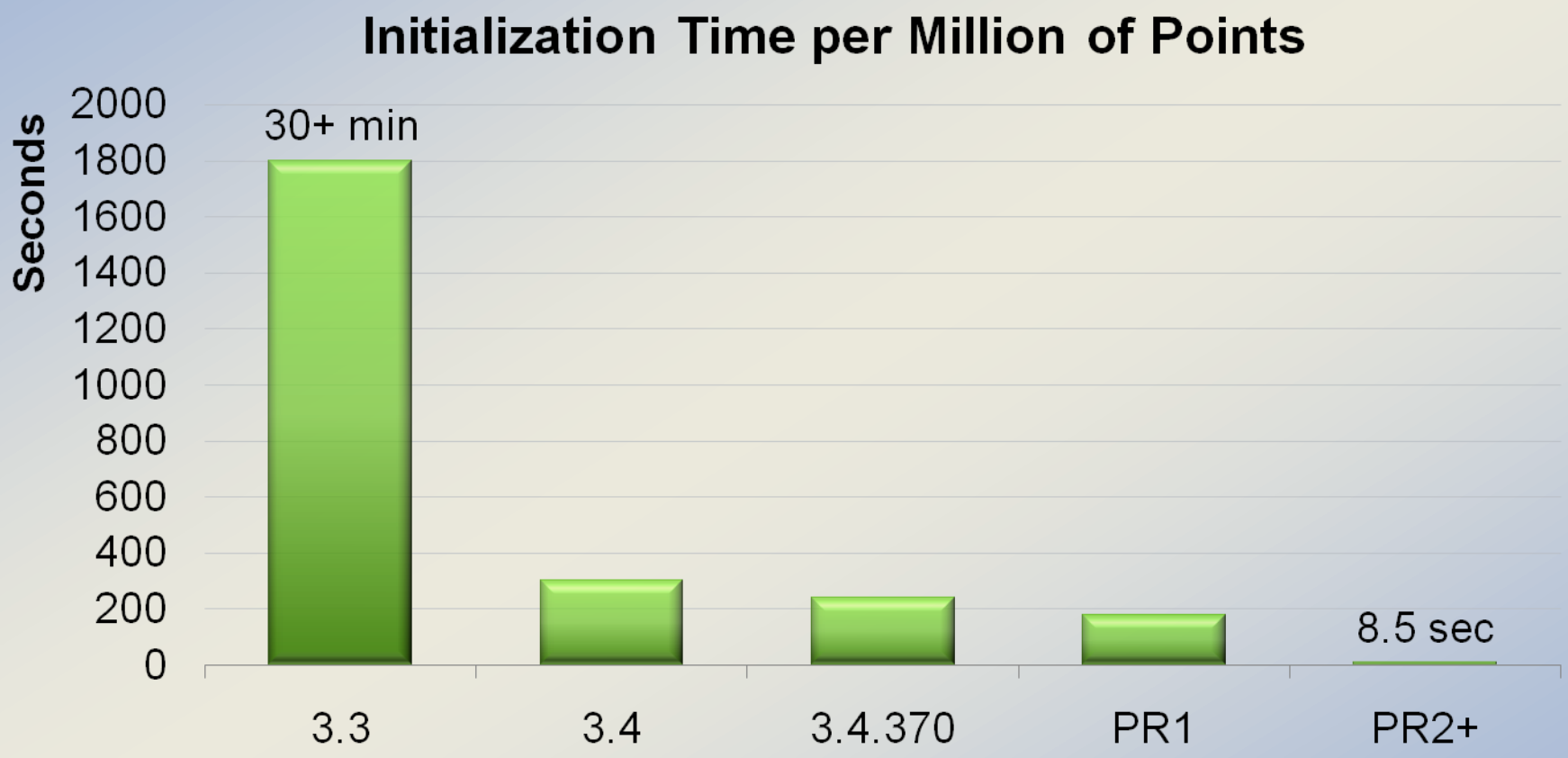
Point Count

In Other Words…

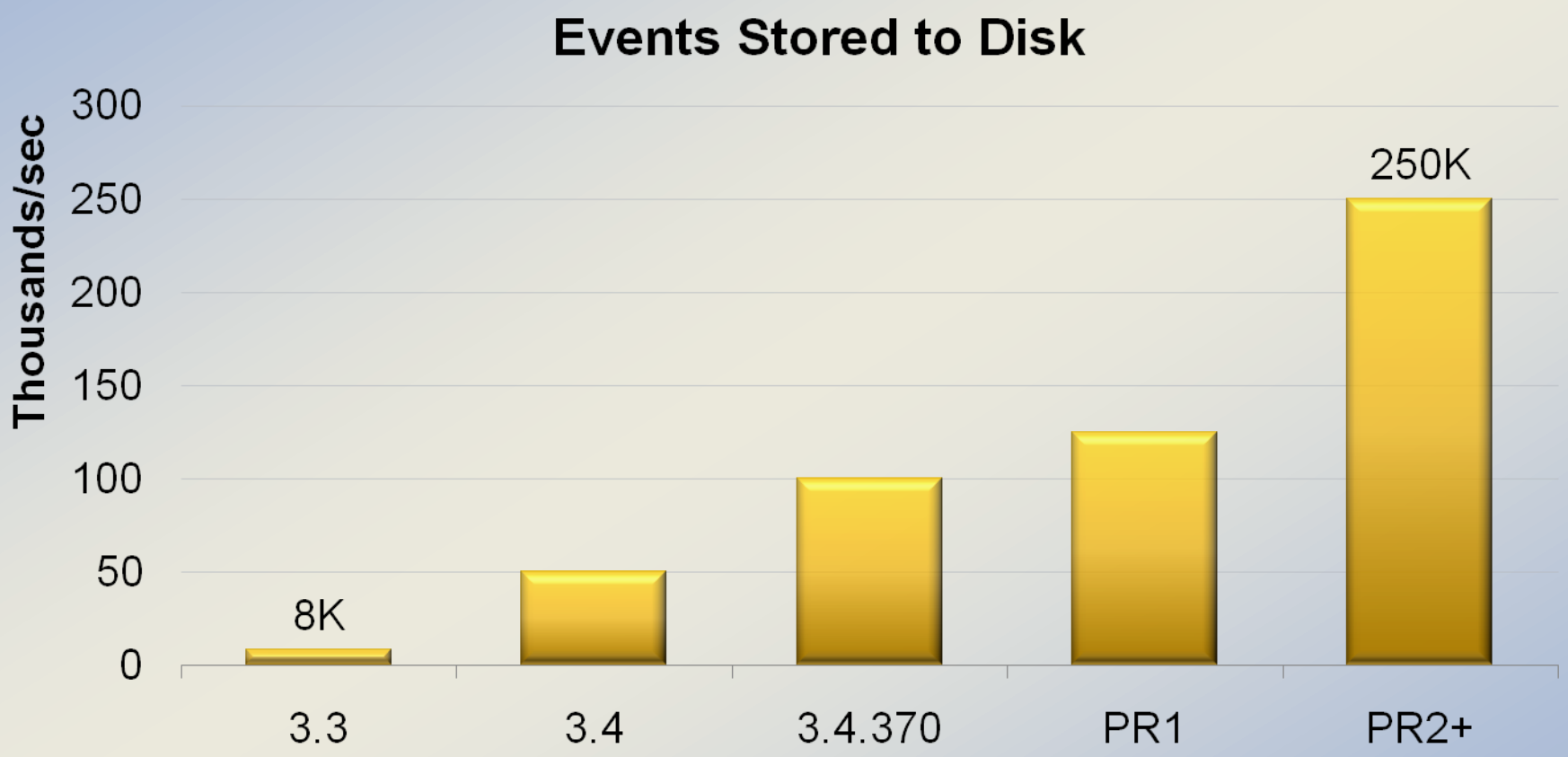
PI 3.3 ➡ 3.4 ➡ 3.5

> 100X

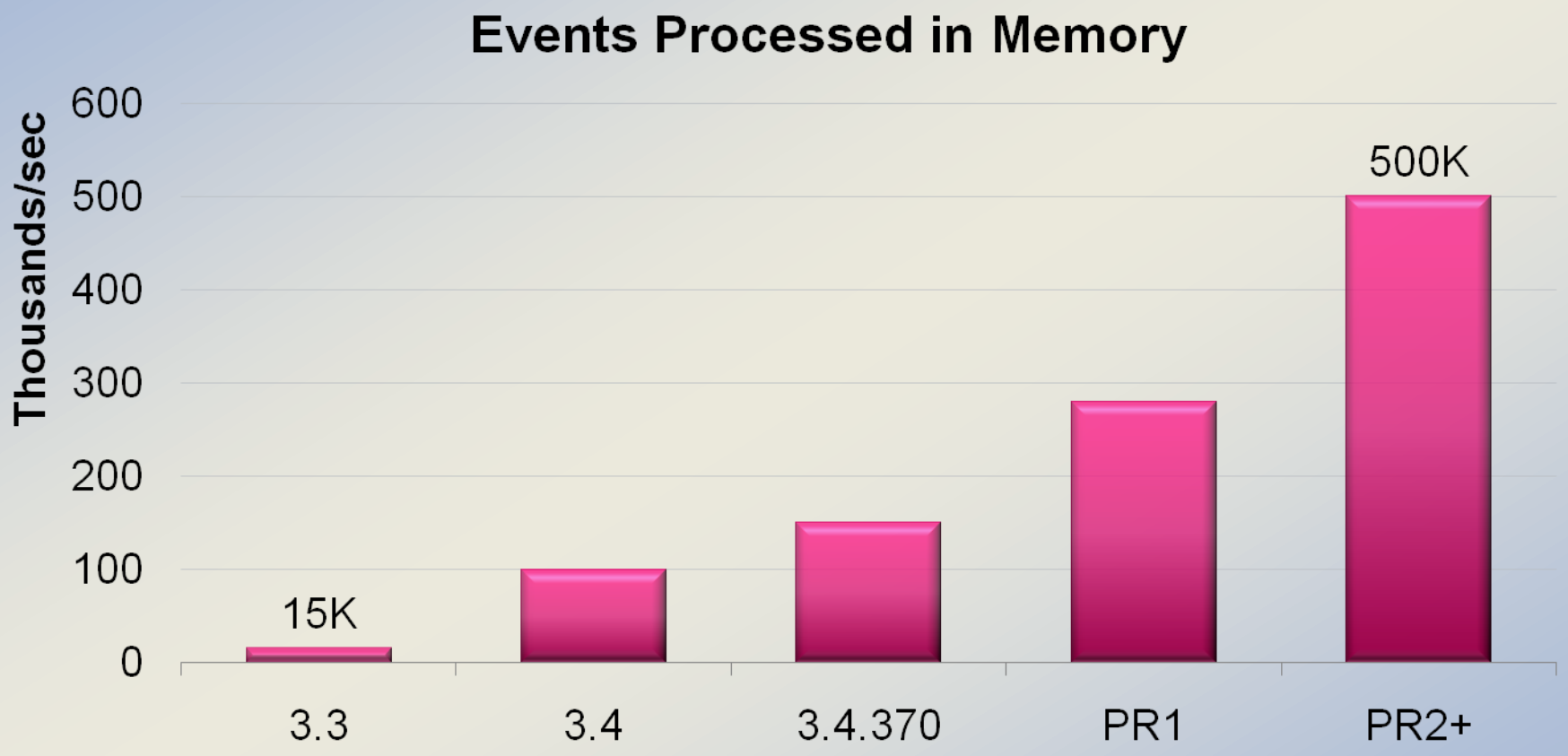
Startup Time



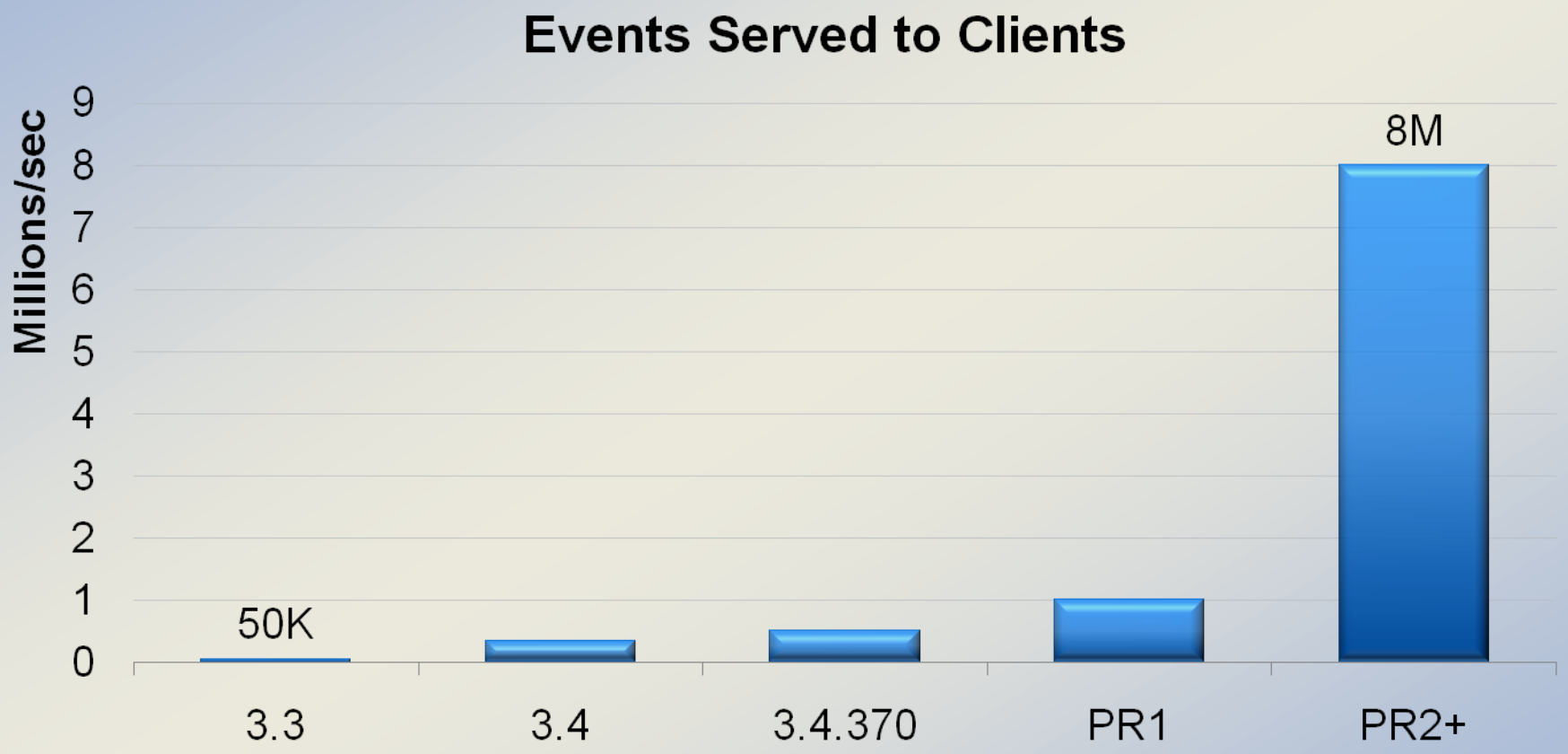
Archiving Rate



Snapshot Rate



Archive Query Rate



OSIsoft® VALUE NOW, VALUE OVER TIME

PI High Availability

Motivations: Why High Availability?

- Network Failure
- Administrative/User Failure
- Upgrades and Migrations
  - Hardware
  - Operating System Software (Patches)
  - Applications Software

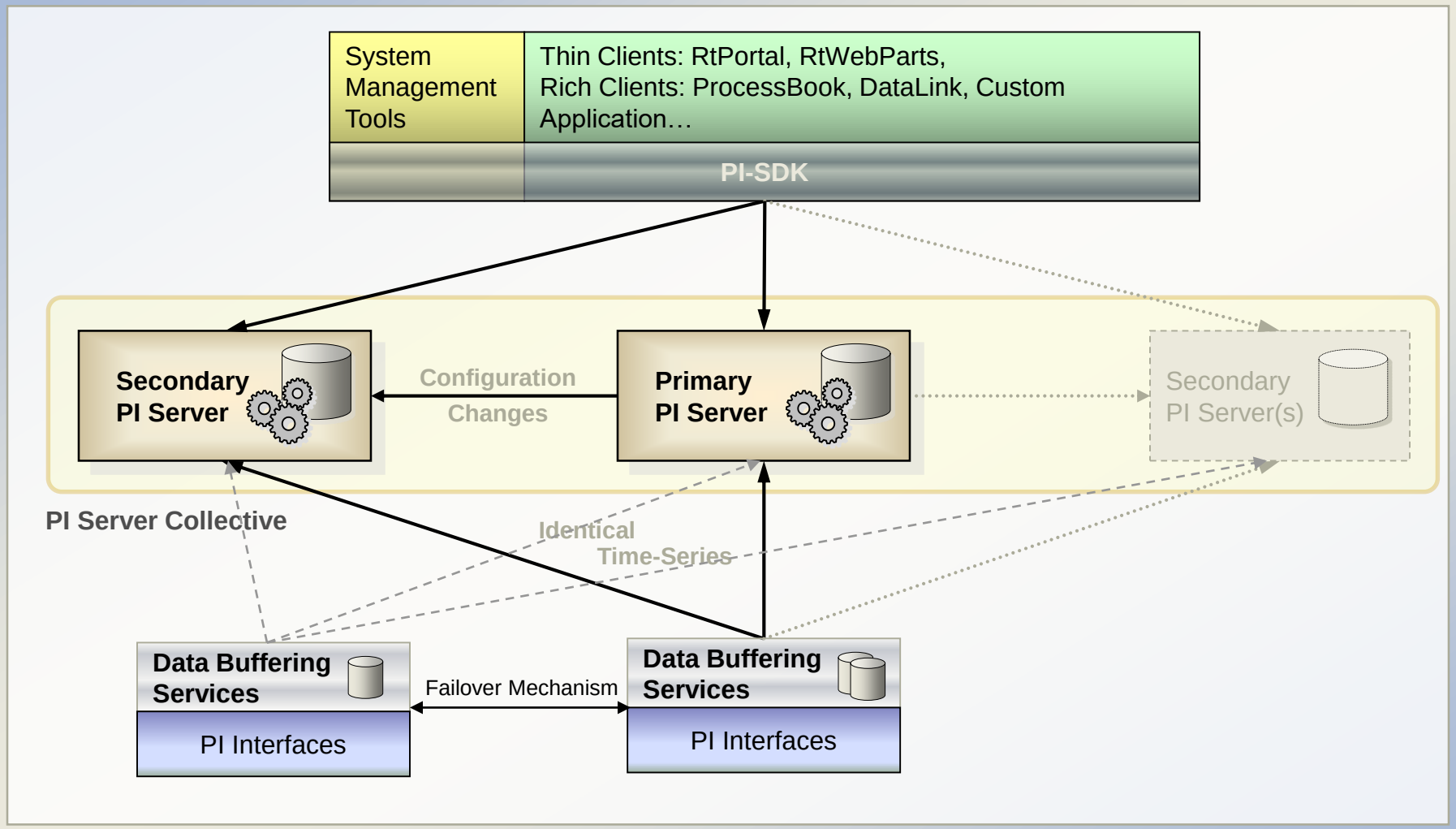
The Business Case for HA

- How much downtime can you afford?
  - 365 Days X 24 Hours = 8760 Hours/year
  - 99.7% uptime = 26.3 hours of downtime/year
  - 99.9% uptime = 8.7 hours of downtime/year

The Value of High Availability today

- More uptime during server outages
  - Planned
  - Unplanned
- Automatic failover for data consumers
- Automatically publish changes from a primary to secondary servers
  - Multiple configurations possible

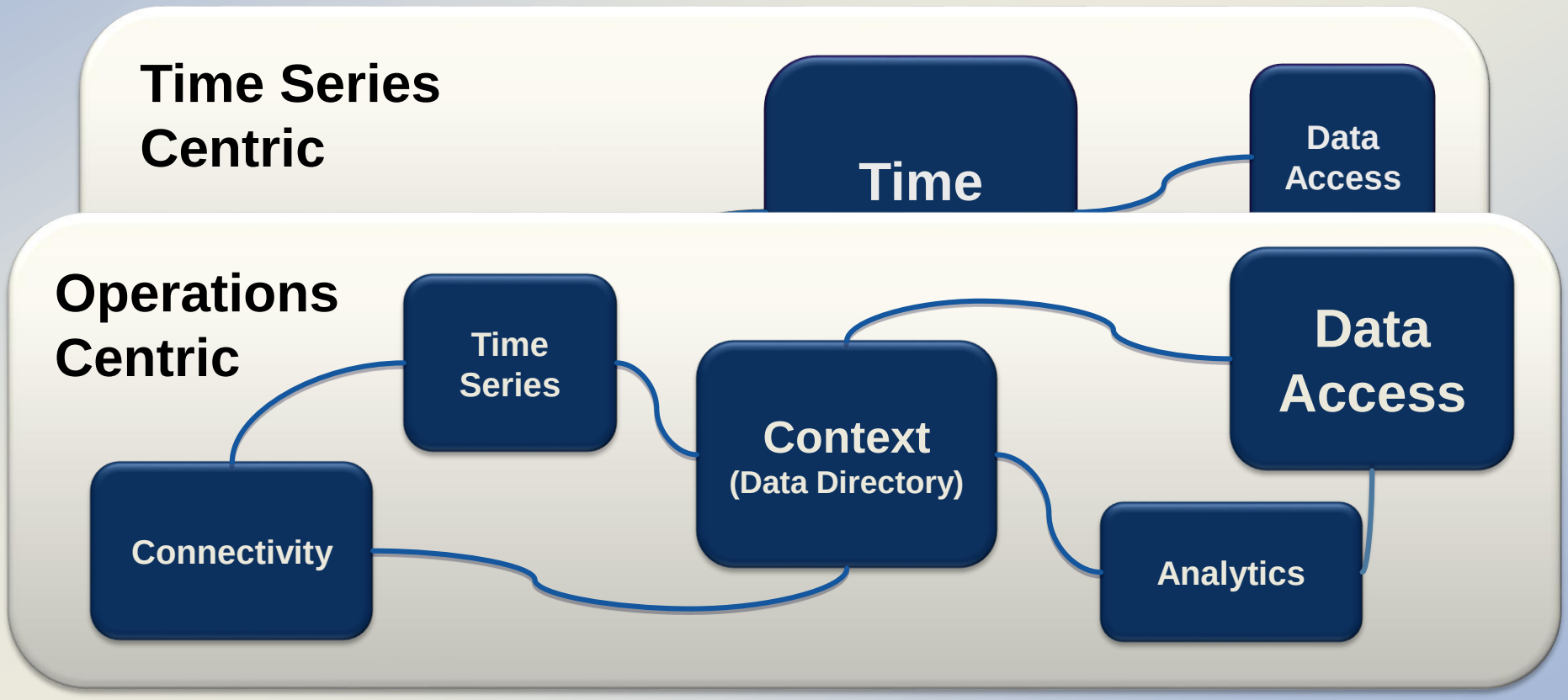
PI Replication Architecture



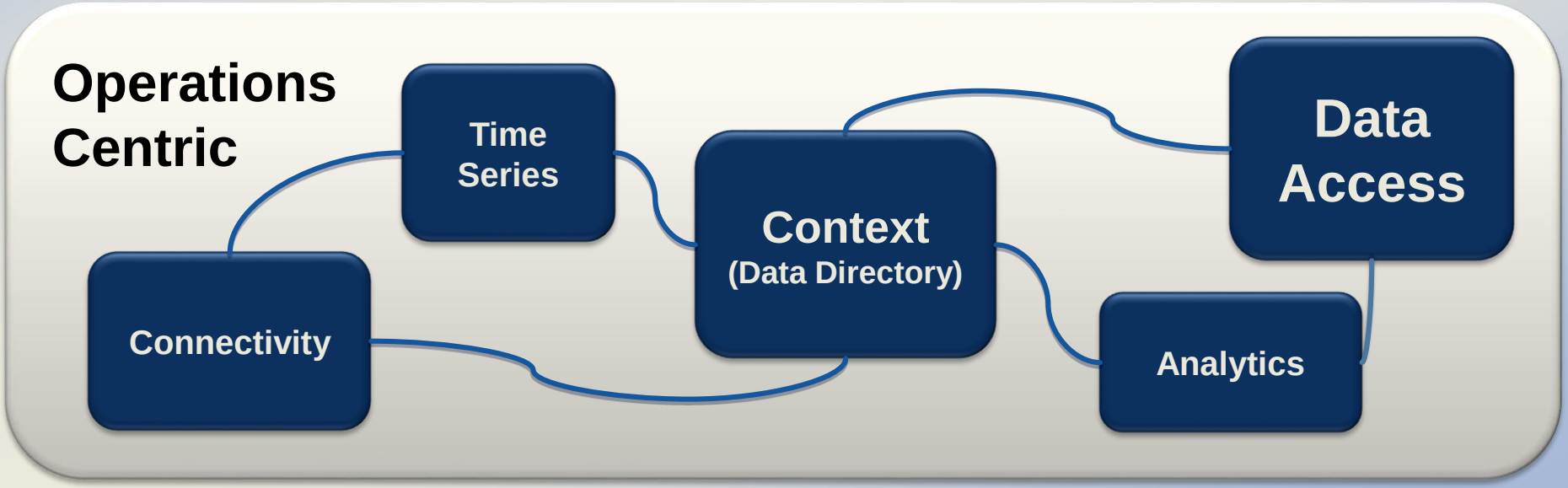
PI Replication Summary

- Features
  - Synchronization of PI Server configuration
  - Transparent client failover, simple load balancing
  - Fanning of real-time data to multiple servers
- Value
  - High Availability to your PI System
  - Peace of mind for Administrators
  - Direct support for existing PI Clients
  - Simple, scalable and flexible architecture

Shifting Platform Usage



Shifting Platform Usage



Migration from PI MDB

- PI AF 2.0 succeeds PI Module Database
- OSIsoft is committed to moving customers and partners forward to AF 2.0…
- …While preserving value of existing applications

What is PI AF 2.0?

PI AF 2.0 Is …

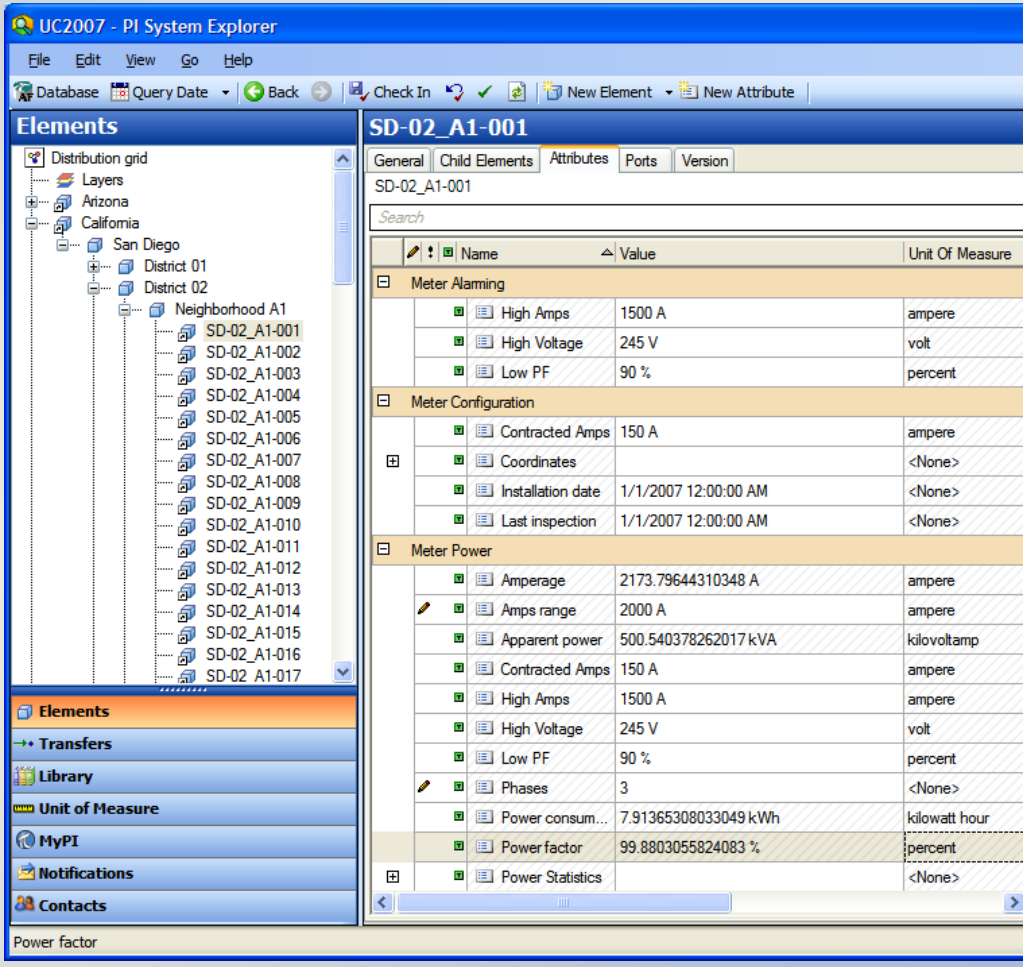
A set of tools for organizing data around your processes, operations, facilities and organization.

Helping You To …

structure your data in a meaningful way to search and view it in the right context so problems can be solved faster.

AF 2.0 Assists Users

- Search your data more intuitively
- Access more than PI data
- Define generic calculations
- Create display and report Templates
- Scale to the Enterprise



AF Features

- Attributes can be:
  - From Relational Databases
  - Calculated
  - Inherited from a Template
- Assets can be:
  - Classified
  - Connected
  - Versioned
  - Hierarchical and Linked
  - From an existing Asset Model – “Smart Connectors”
- XML Compatible (import and export)

PI AF 2.0 Benefits

- Visibility
  - Information about data, assets and models is available to visualization suite of tools
- Single Version of the Truth
  - Creates unified assets and relationships
  - Assets and models become basis for consistent visualization and analyses
- Communication & Collaboration
  - People use the same asset and model reference for their visualization and analyses

PI AF 2.0 Benefits

- Search and Find information
  - Expose a more intuitive, equipment centric view of our data so everybody in the corporation can quickly access the data relevant to their jobs
- Knowledge Management
  - Synchronize and eliminate disparate assets, models and analysis to improve traceability and accountability

PI AF 2.0 – New Features

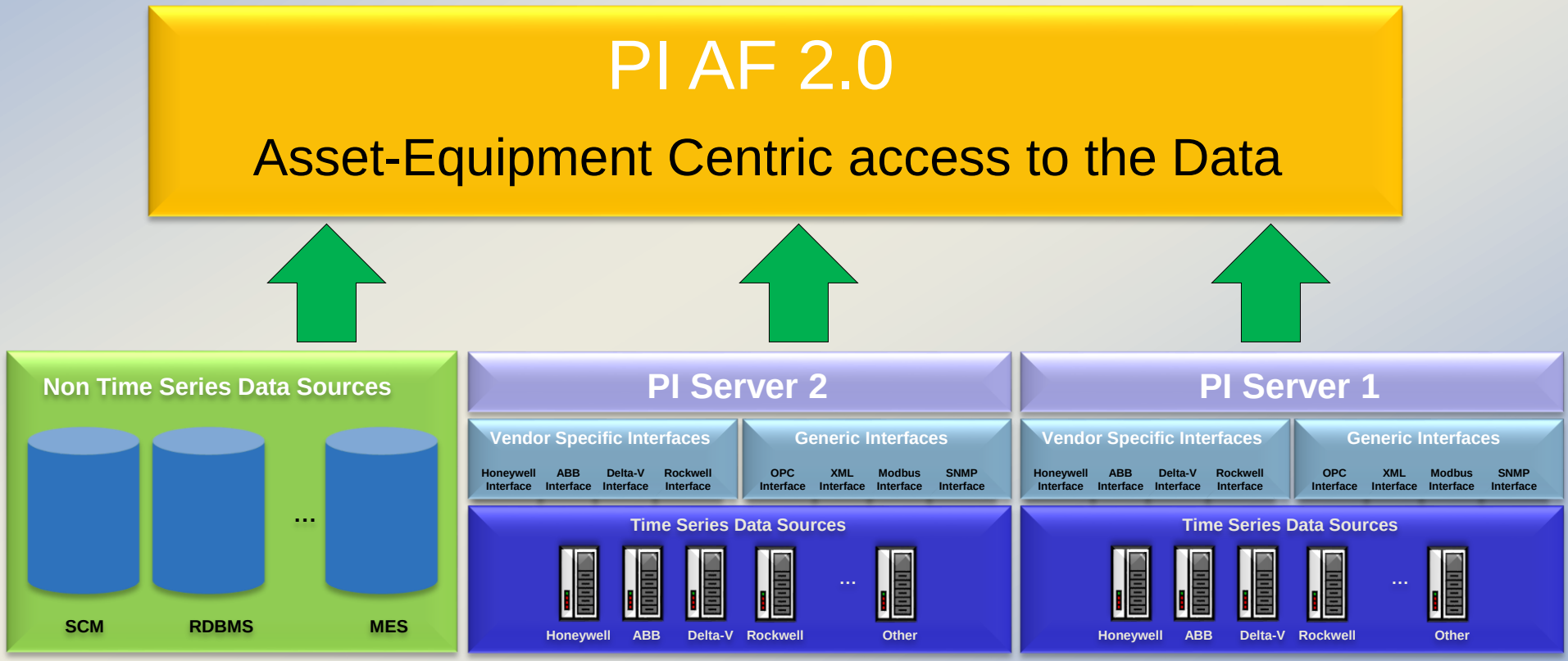
- AF 2.0 provides a great deal of performance and scalability
  - Millions of assets mapping multi-millions of PI points
- Provides a world class application layer
- Fully functional SDK
- Multiple PI Server Support
- Improved Element Hierarchy

PI AF 2.0 – New Features

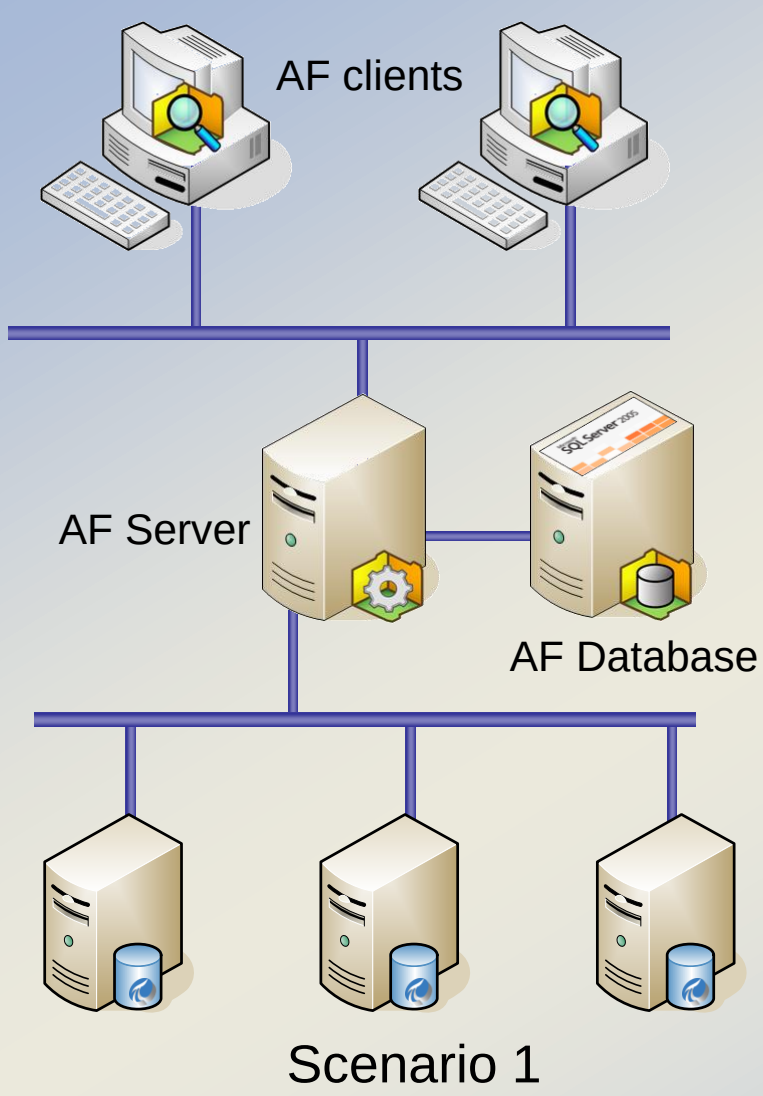
- Object History (versioning)
  - Keeps track of configuration changes over time
- Hierarchical Attributes and Categories
- Advanced Attributes Types
  - Files, Arrays, Tables
- Enumeration Sets
- Object Level Security
  - Windows Integrated Security

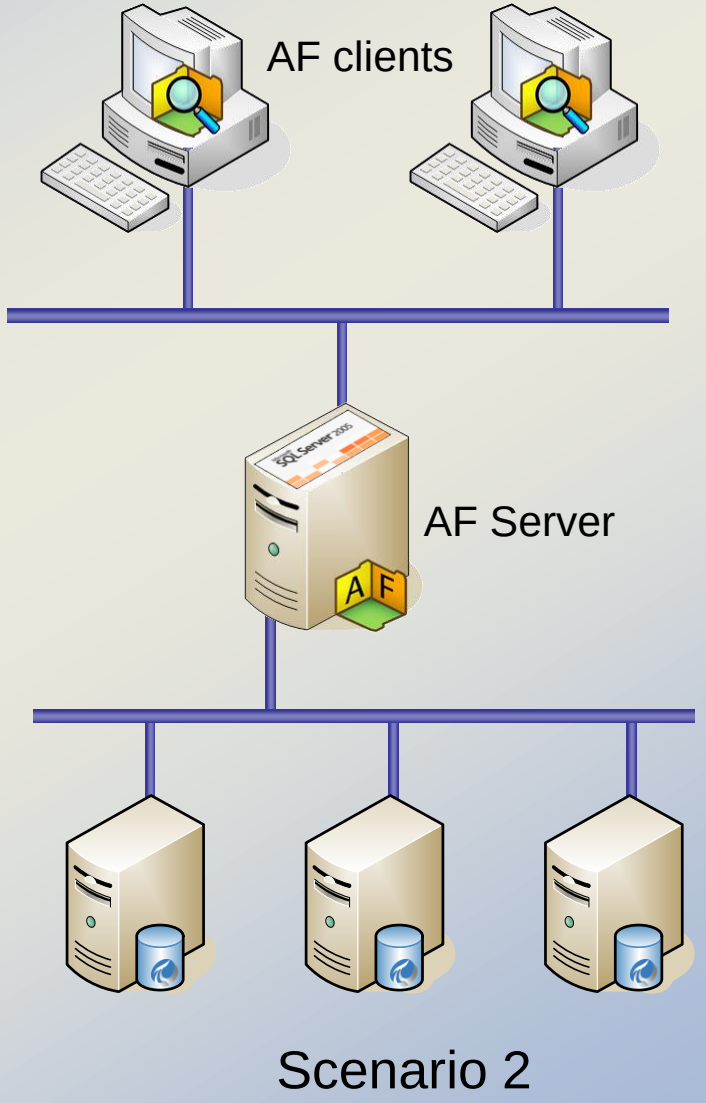
PI AF 2.0 in the PI System

- Data structured and organized by asset
- Spans multiple PI Systems
- Incorporates non time series data



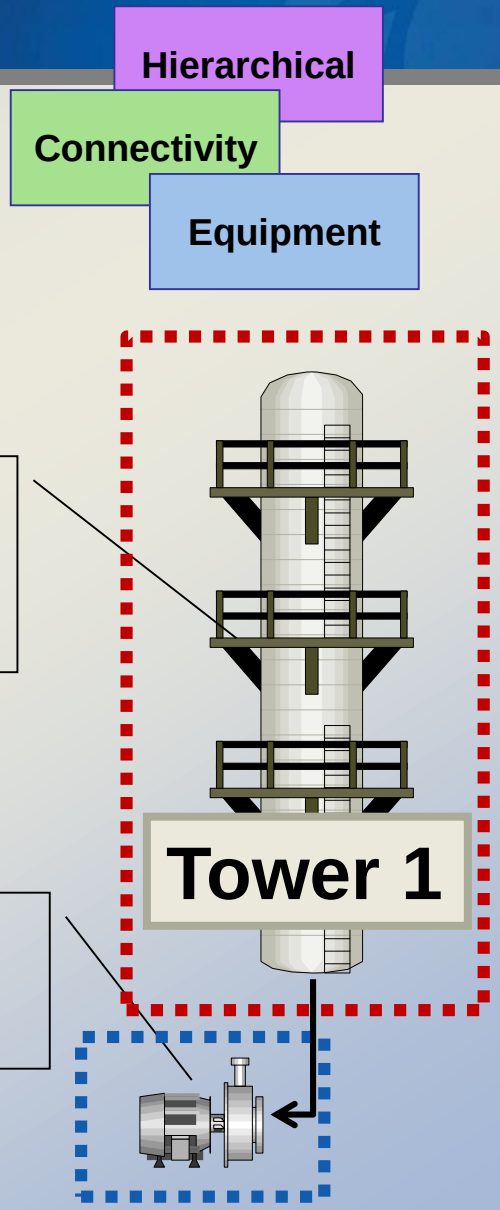
PI AF 2.0 Architecture





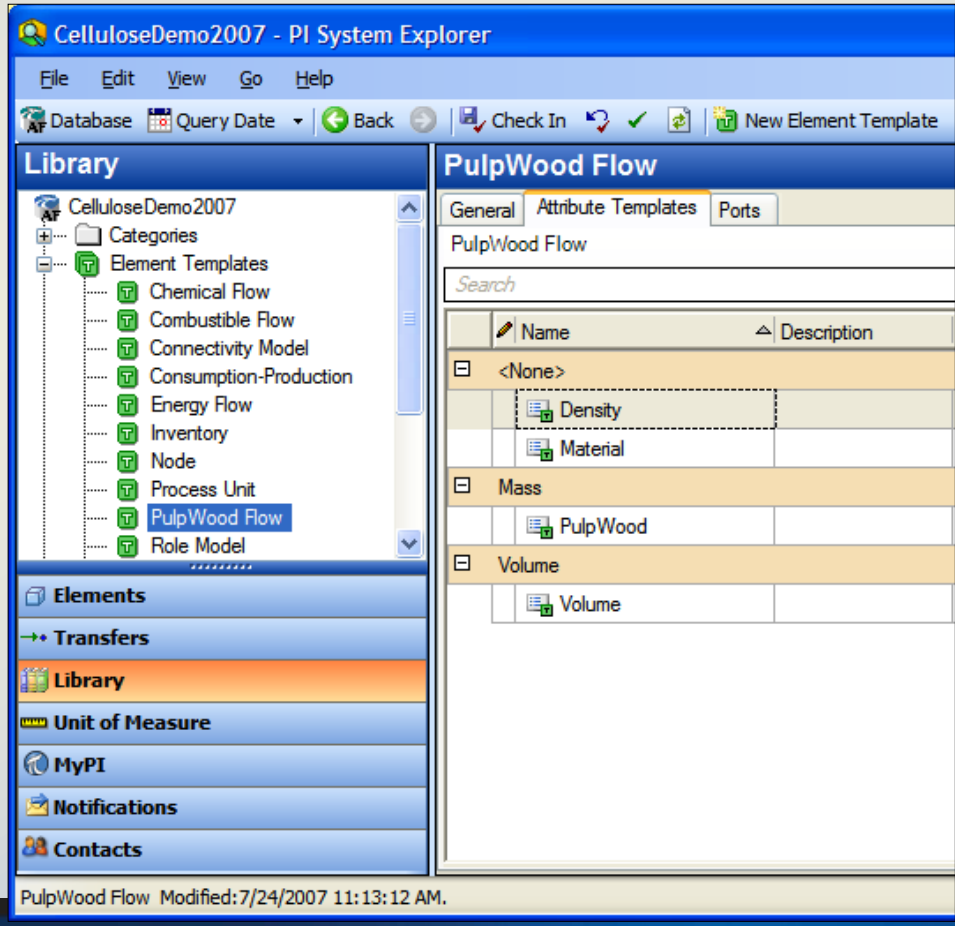
Putting AF into practice

- Start with a collection of assets
- Associate data with the assets
- New assets are based on templates
- Assets can be connected
- Assets can be grouped
  - By function
  - By location
- Relationships are sourced from assets
- Apply and run analyses
- Visualize results



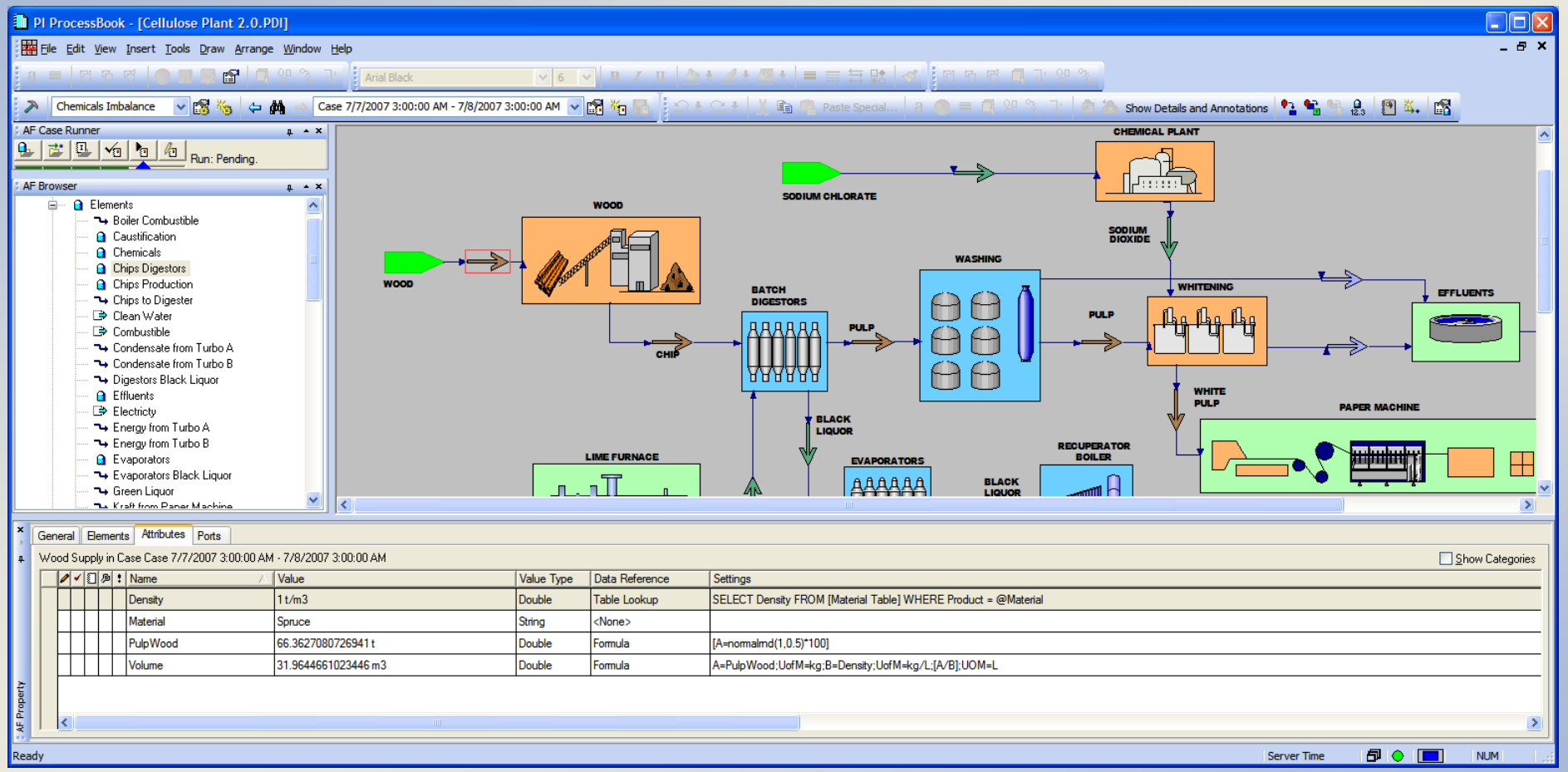
Features: PI System Explorer

- View the structure of the database
  - Templates, Elements, Relationships, Tables, Notifications
- Create new content
  - All AF objects
- Configure items
  - assign data references
- Create structures
  - Hierarchies, models



Features: ProcessBook Modeler

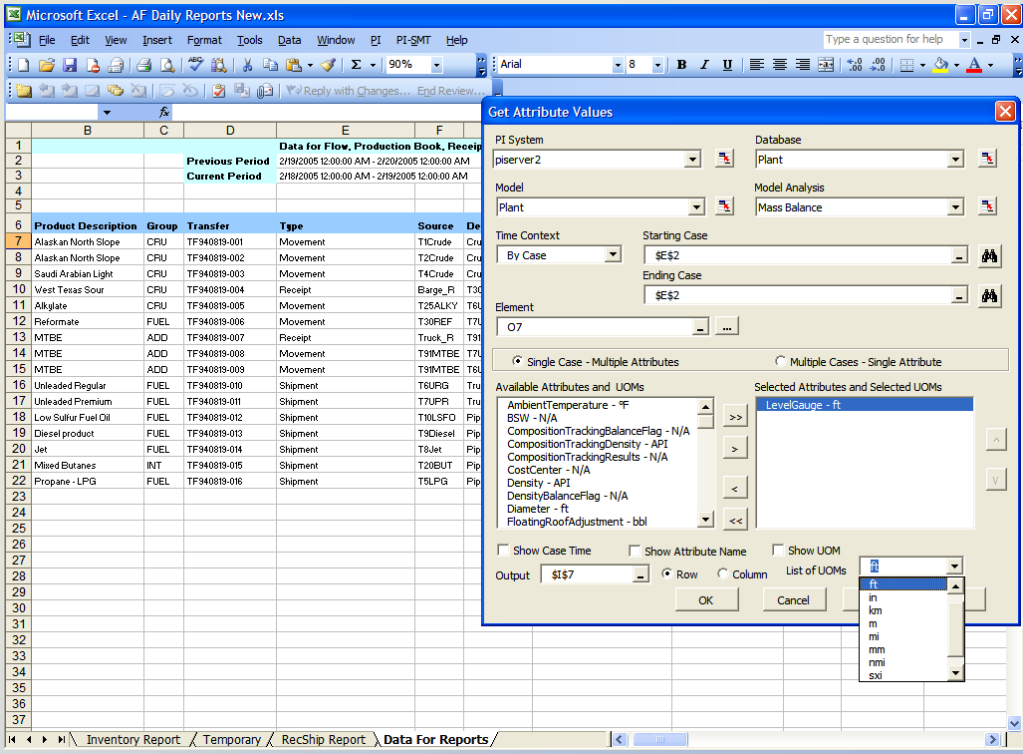
- Provides a visual representation of AF



Features: Excel Add-in

- Manage configuration
  - Specify data references for attributes that will override the template definition
- Report information
  - Create report templates similar

    to using DataLink
  - Retrieve information regarding model connectivity and context



Features: AF SDK

- Comprehensive Managed Code Class Library
  - .Net based
  - Access to AF Database
- Common UI Components
  - Rich library of controls
- Extensive User Guide and Programmer Reference
  - Tutorial Guiding Developer Through AF Programming Experience

PI AF 2.0 Advantages

- Allows organization of all of your data -millions of points - in a meaningful way
  - According to an equipment model
  - According to the way you would use it in calculations
- Create relationships between collections or organizations (e.g., assets)
- Allows you to bring in relational and complex data into the same context as your real-time data

PI AF 2.0 Advantages

- Custom domain knowledge can be re-used in new analyses because it's in one central place (not in an Excel spreadsheet)
- Replaces programming with configuration
- Protects your investments in your displays, reports, and business logic

Summary

- AF is
  - A framework that organizes data around assets and their relationships
  - A set of tools for modeling your process
  - A framework for analysis, visualization and reporting
- AF
  - Allows you to bring in relational and complex data into the same context as your real-time data
  - Replace programming with configuration
  - Protect your investments in your displays, reports, and business logic
- AF is extensible with the AF SDK as a programmatic interface to the PI System
- AF is shipping today

Break

PI Notifications (Bridge) & PI Analytics (PR 3)

- RtAlerts -> PI Notifications
- ACE, Analysis Rules -> Best practices for PI Analytics
  - Single metadata and structure basis
  - Uses any data referenced in The PI System
- Smart Connectors
- DataLink for Excel Services
- PI Security
- PI Batch
- PI Reporting

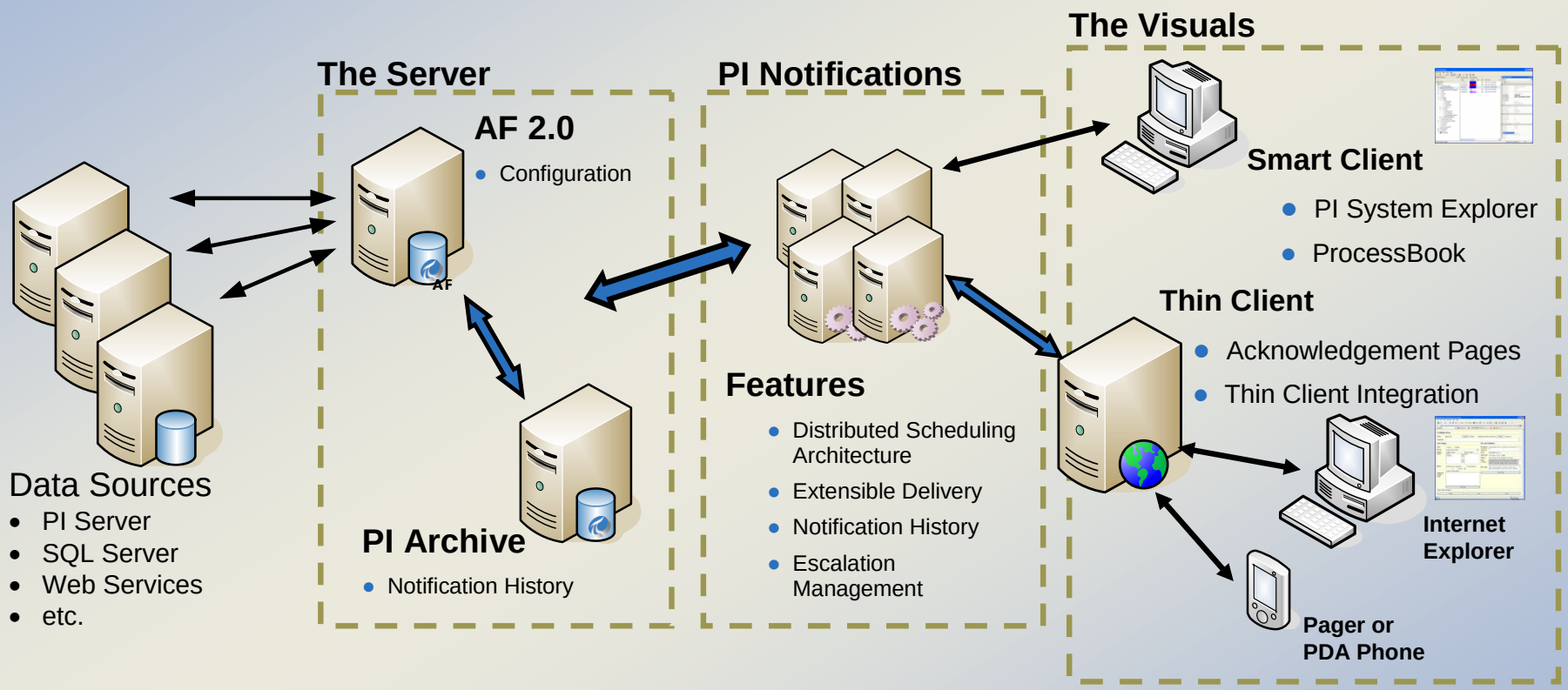
What is PI Notifications?

- A scalable, highly available, notification and alarming infrastructure
- Why infrastructure?
  - Extensible
    - Users can customize notification rules and scheduling
  - Integral part of the PI System
    - Real-time event delivery
    - PI System Client integration
  - Consistent with Enterprise Message of PI

PI Notifications: The Value

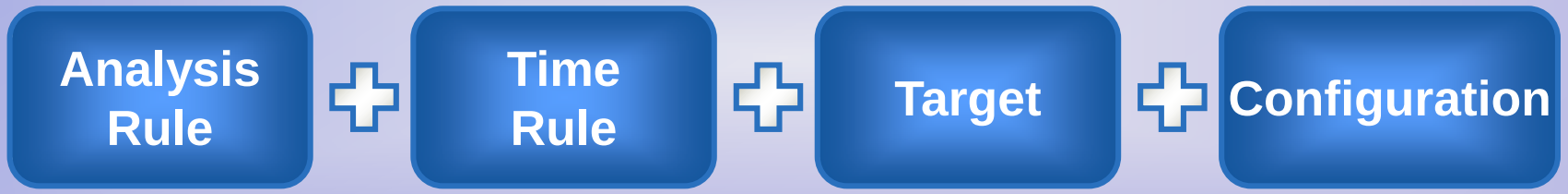
- Alerting “out of band” – anywhere, anytime
- Escalation
- Notification history (including acknowledgements and other actions) maintained forever
- No programming required
- Extensible delivery channels that can integrate with 3rd party systems and applications

PI Notifications Topology

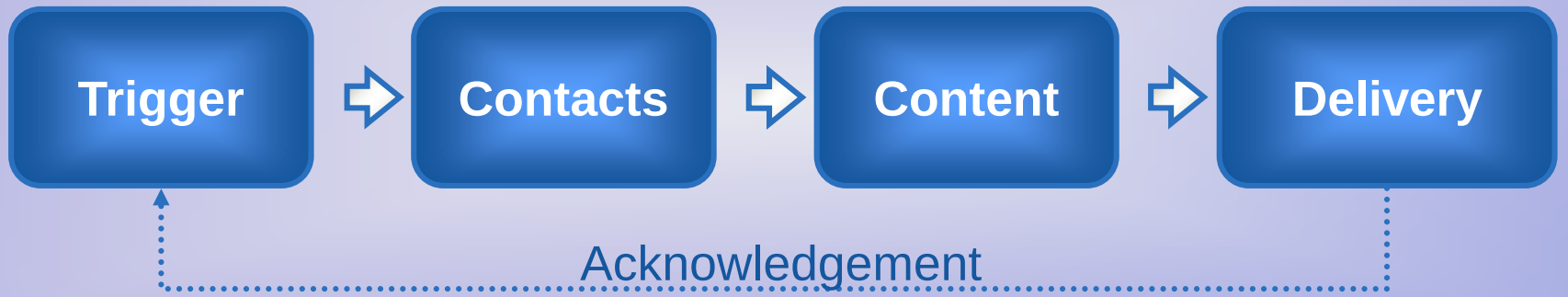


PI Notifications

Business Logic



Notification Emission



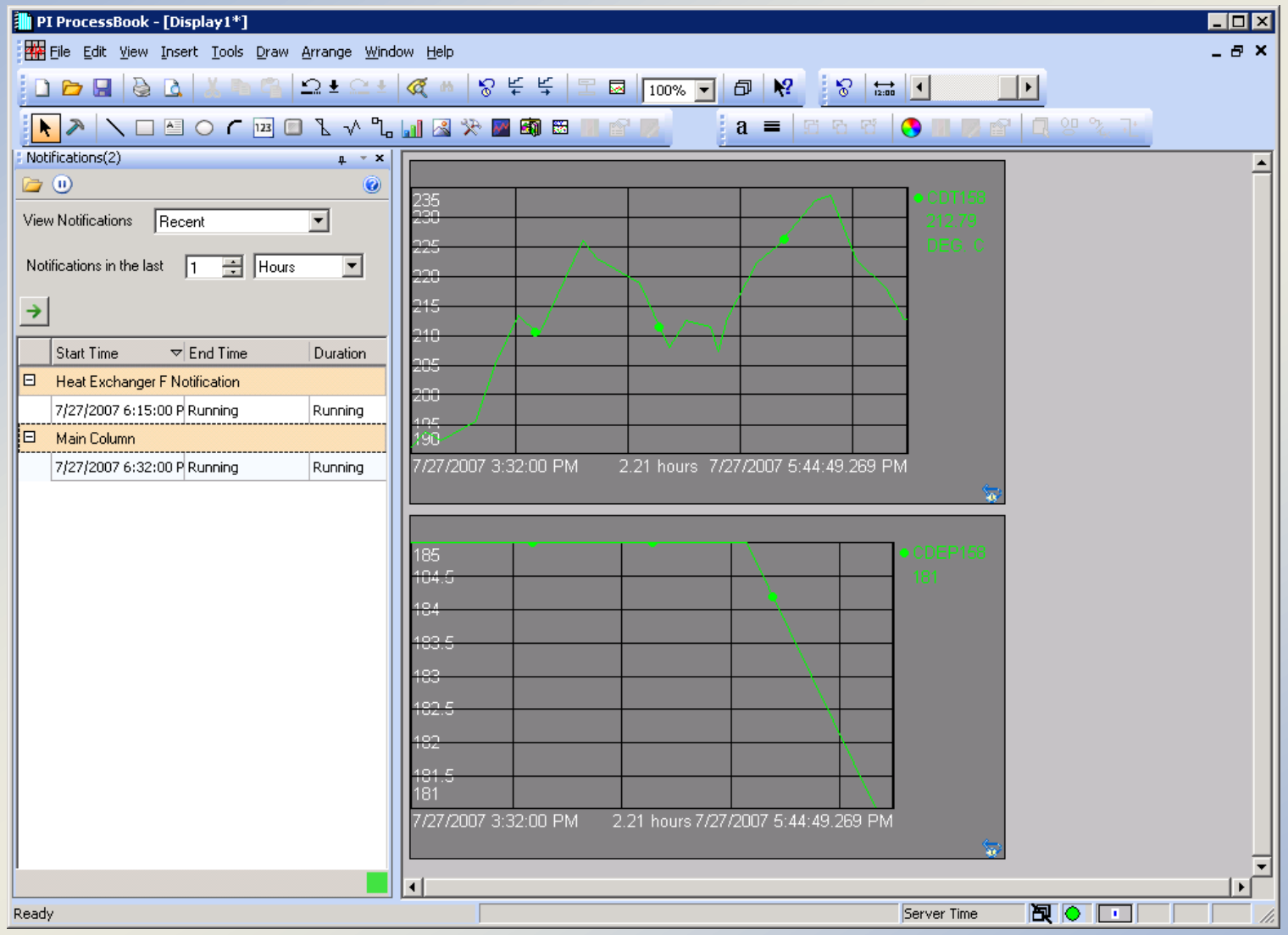
The PI Notification Process

1. PI Notification Service collects inputs and evaluates the Trigger condition(s).
2. Subscriptions are evaluated for the correct Contact(s).
3. Content is added to the Notification.
4. Subscriptions are filled via delivery channels.
5. Subscribers can acknowledge the Notification.

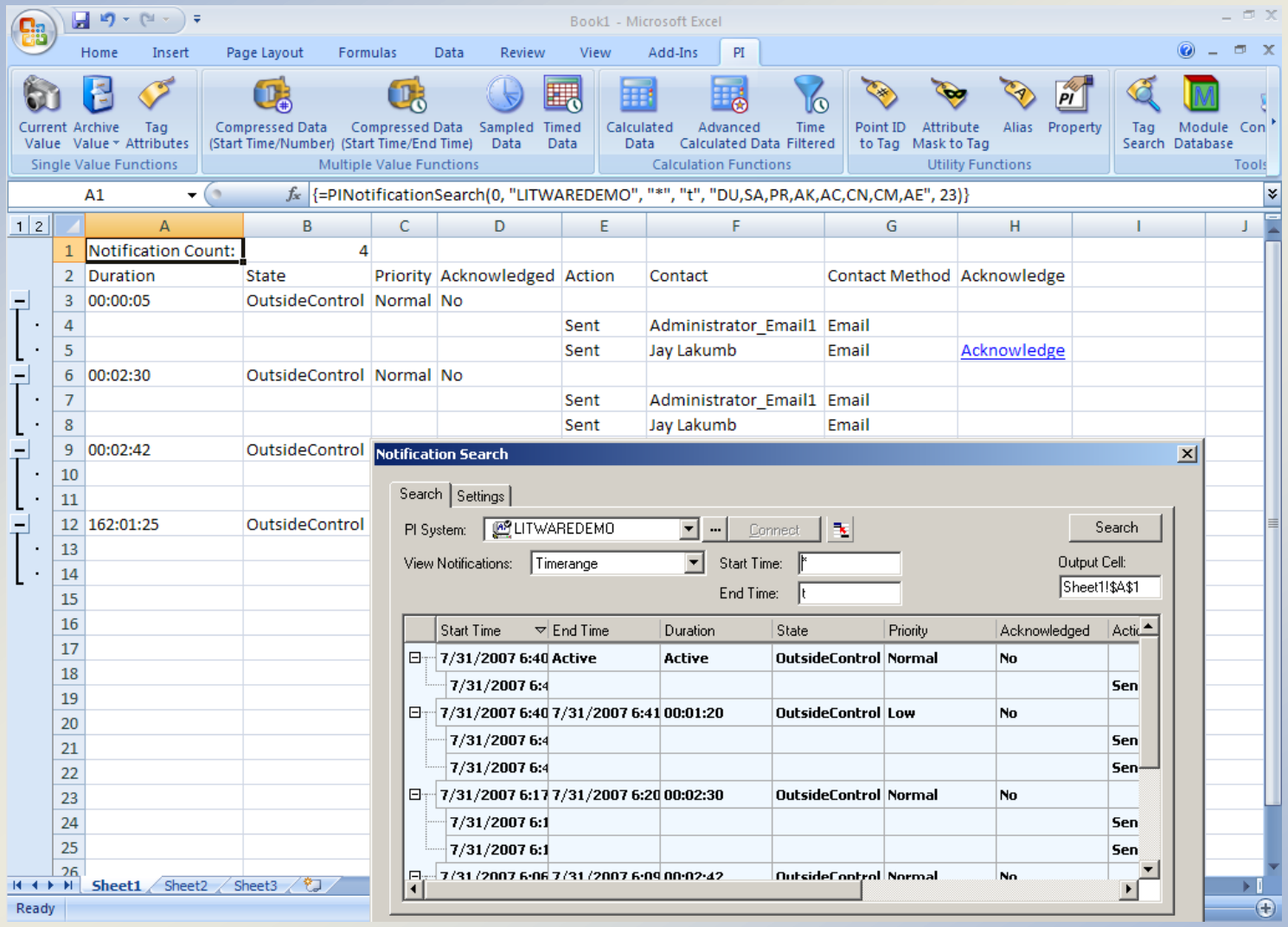
Notifications

- Once a Trigger condition is satisfied, a historical record is created for that condition.
- Only the Trigger is required to create a PI Notification - Content and Subscriptions are optional.

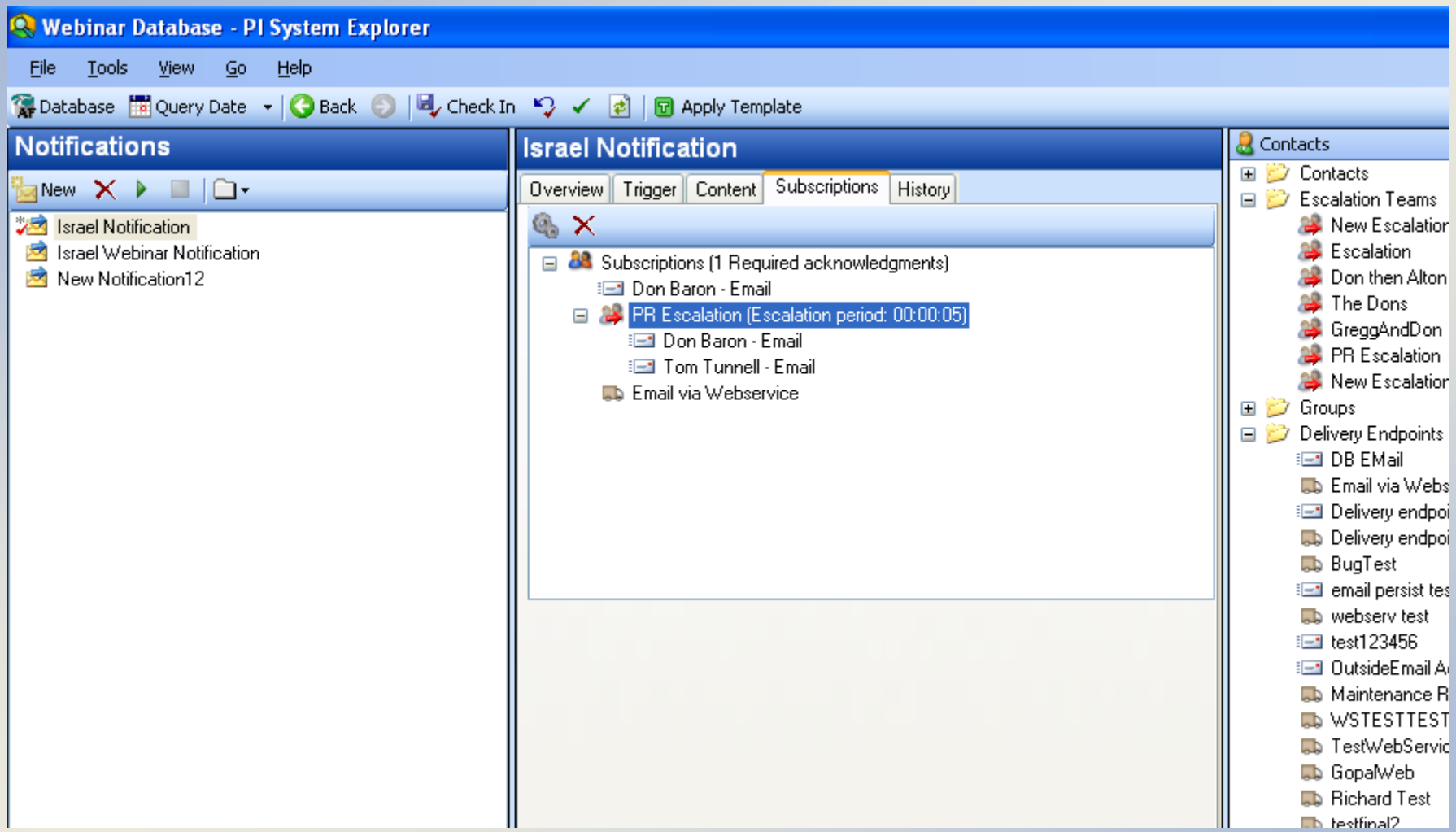
PI ProcessBook Integration



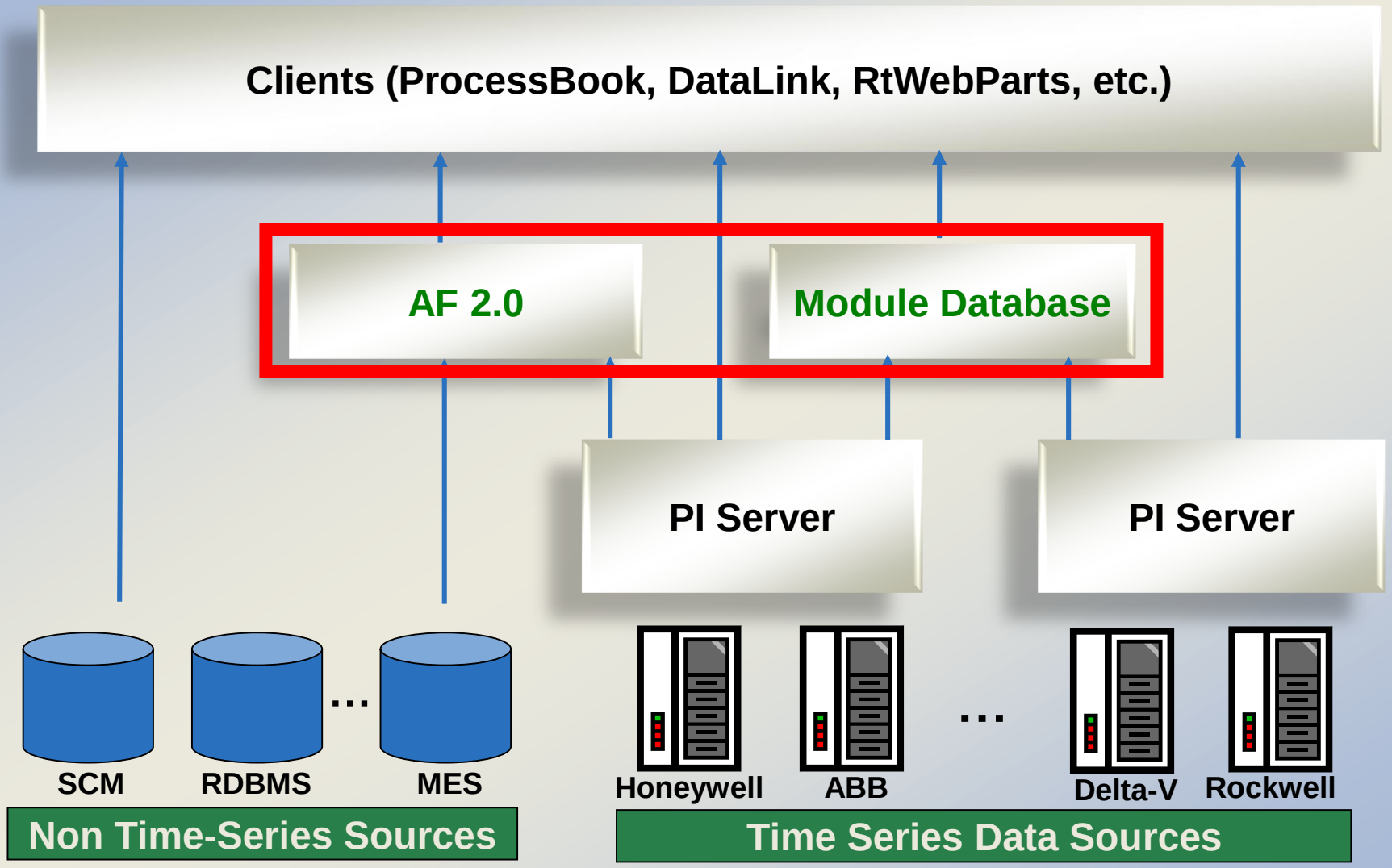
PI DataLink Integration



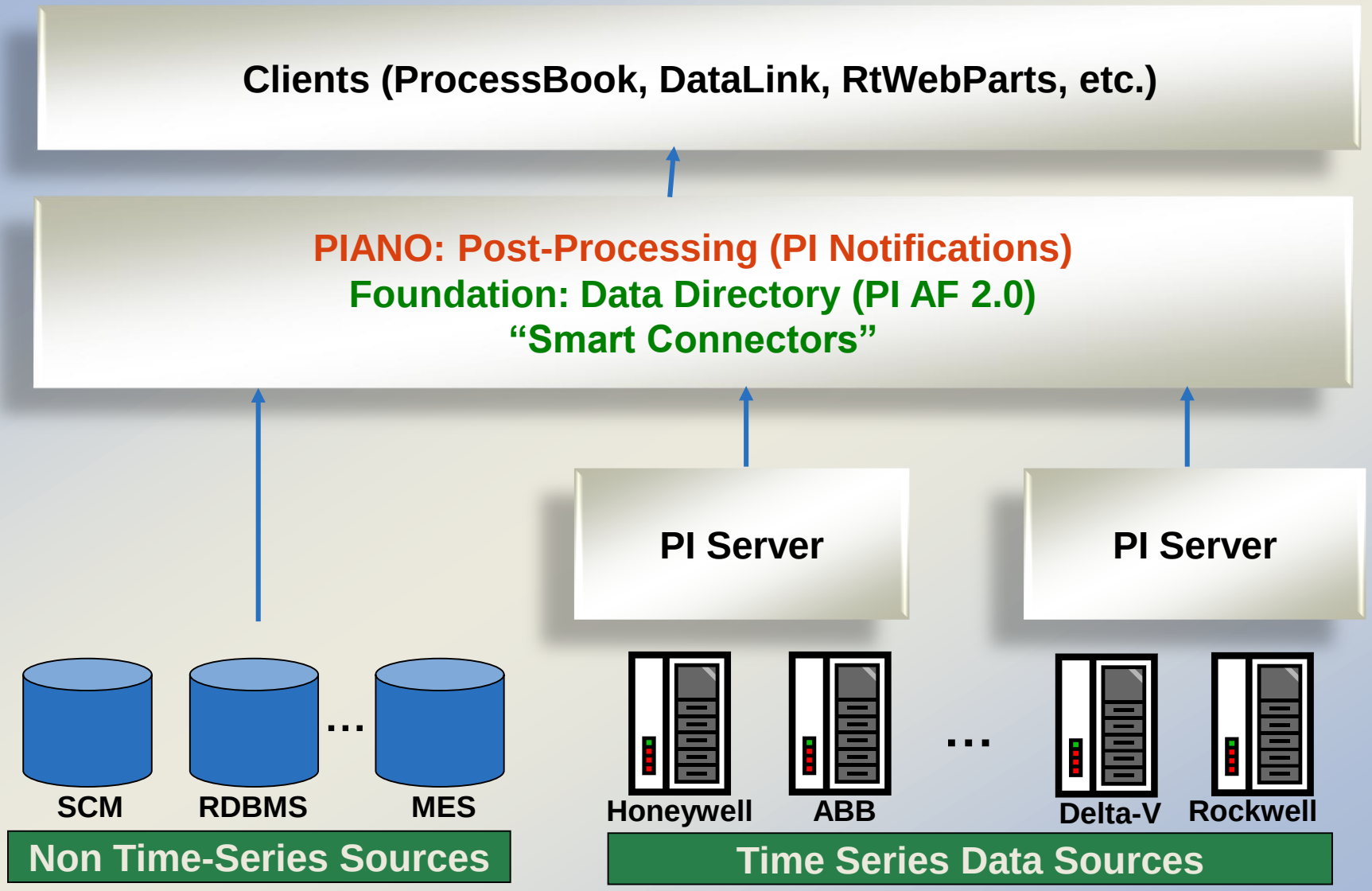
PI System Explorer Integration



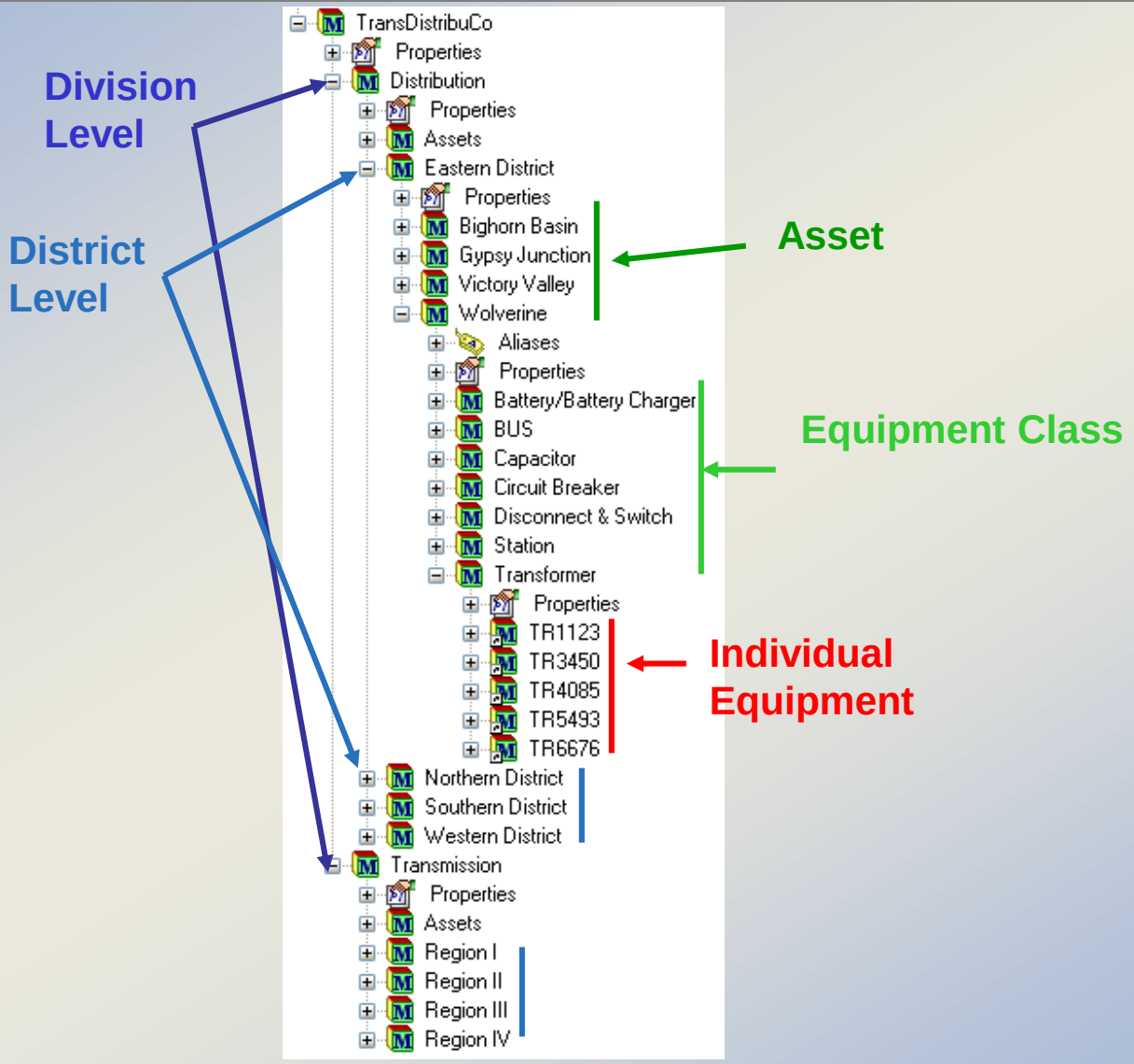
PI Analytics – Today



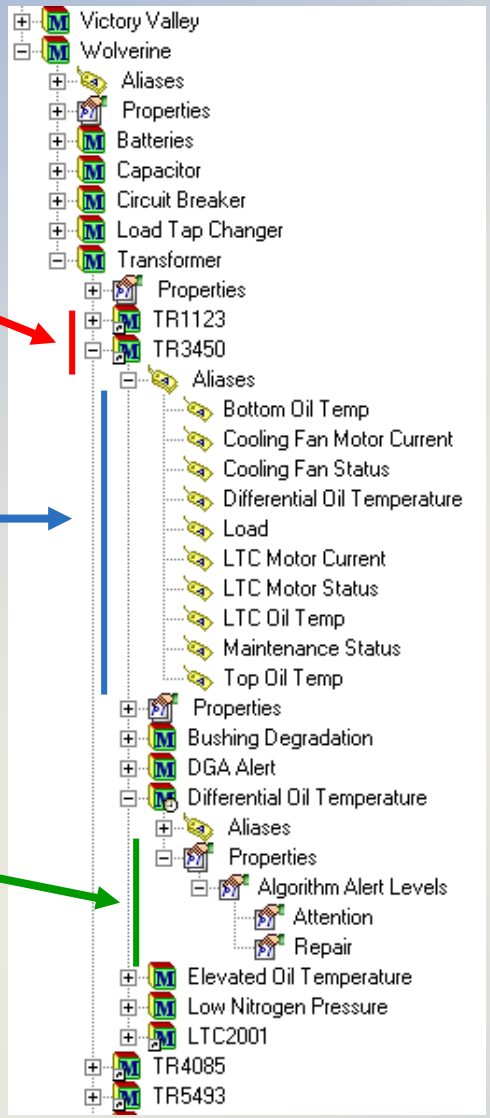
The Analytics – Bridge Release



PI Module Database – Asset Hierarchy



PI Module Database – Attributes

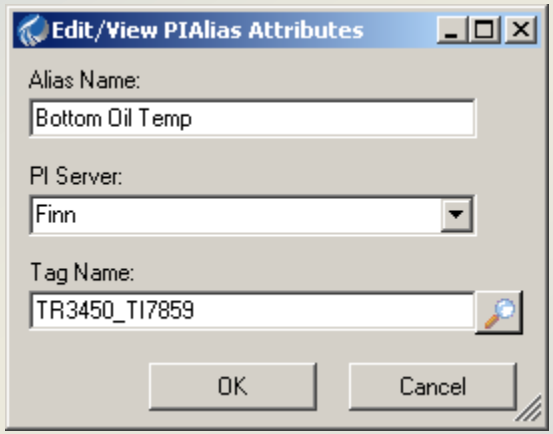


Individual Equipment

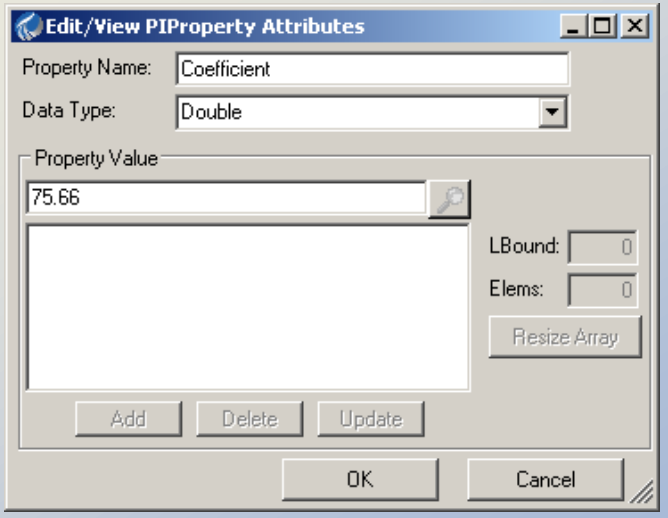
Aliases

Properties

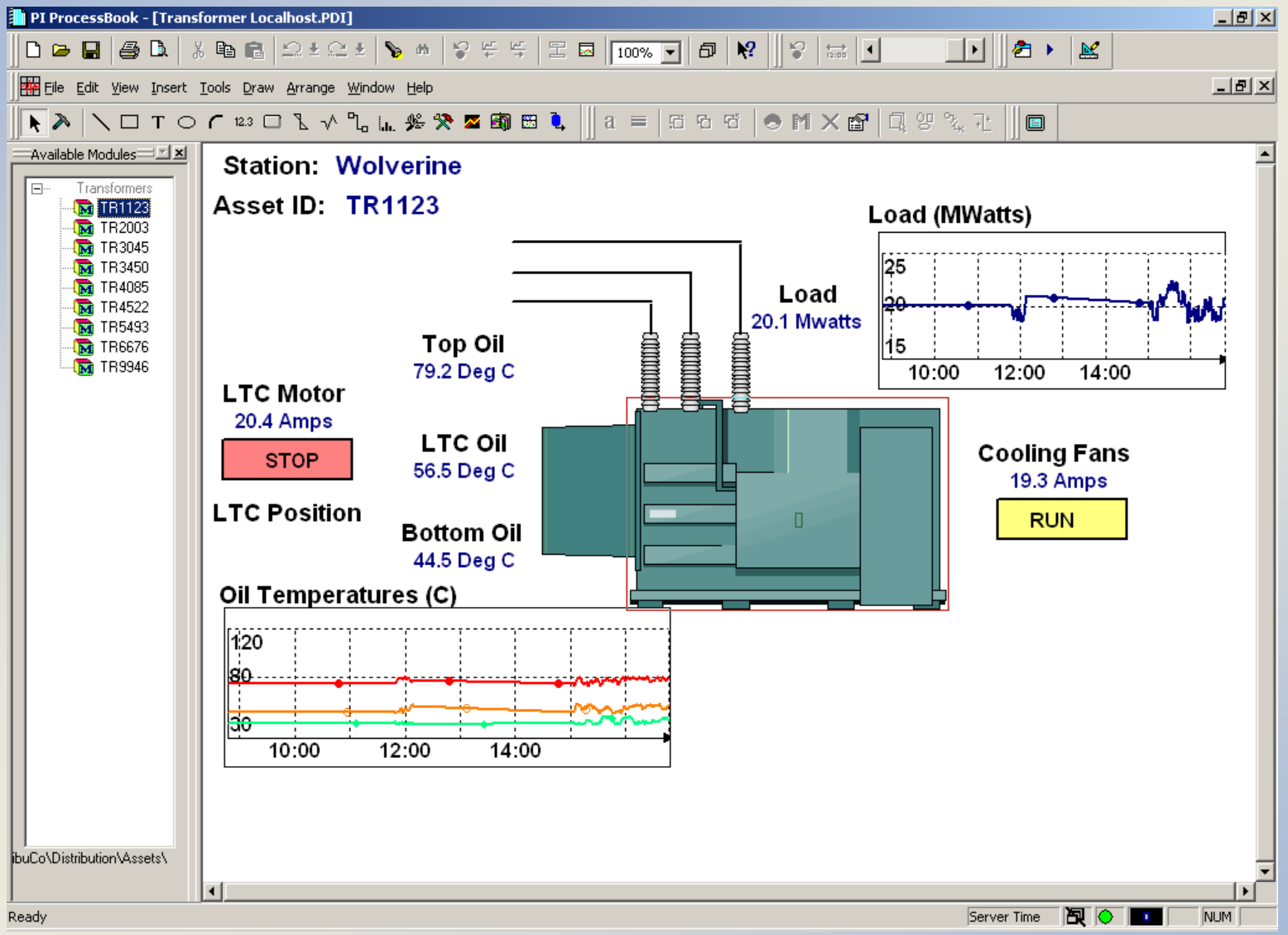
Alias Configuration



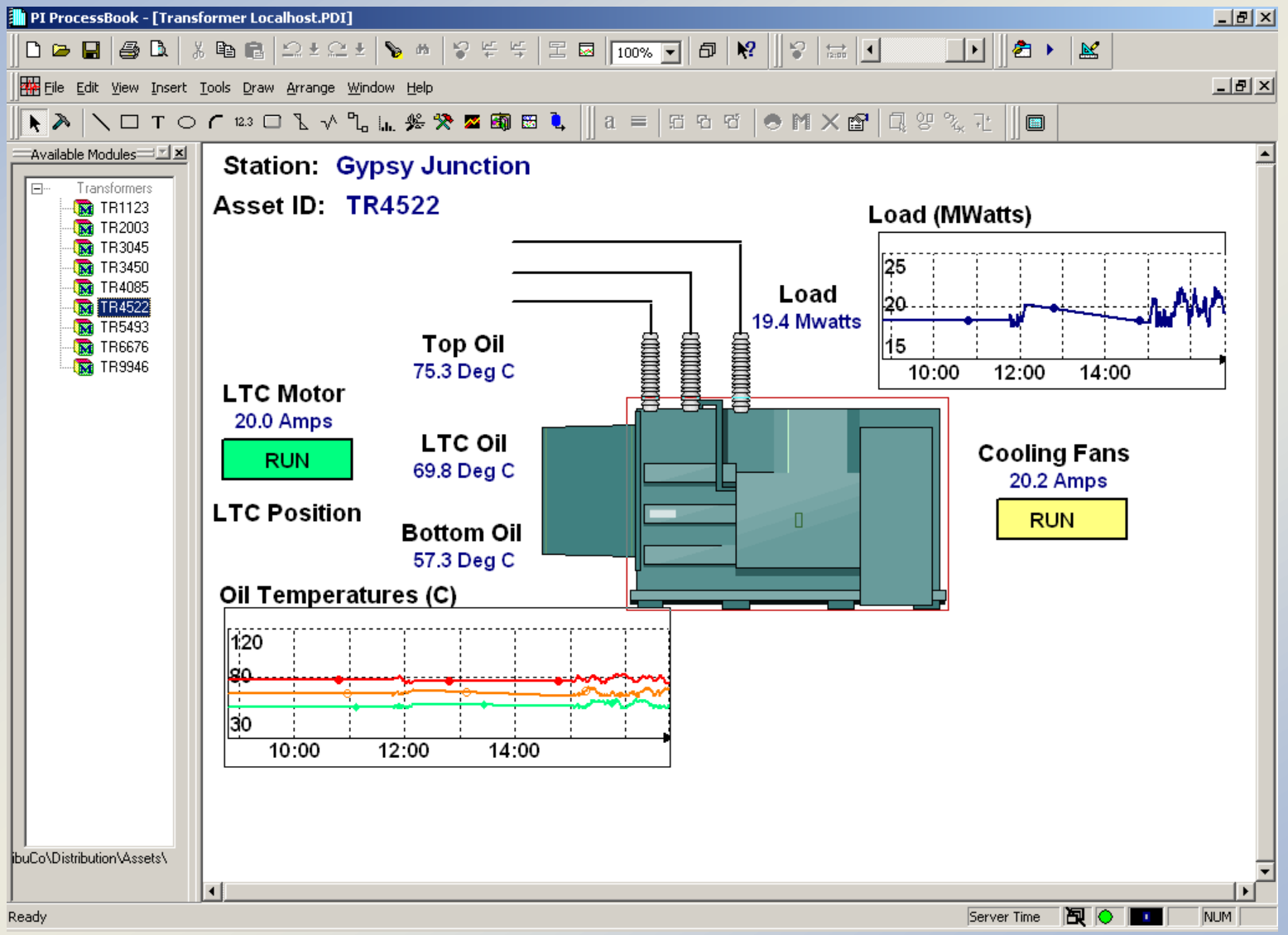
Property Configuration



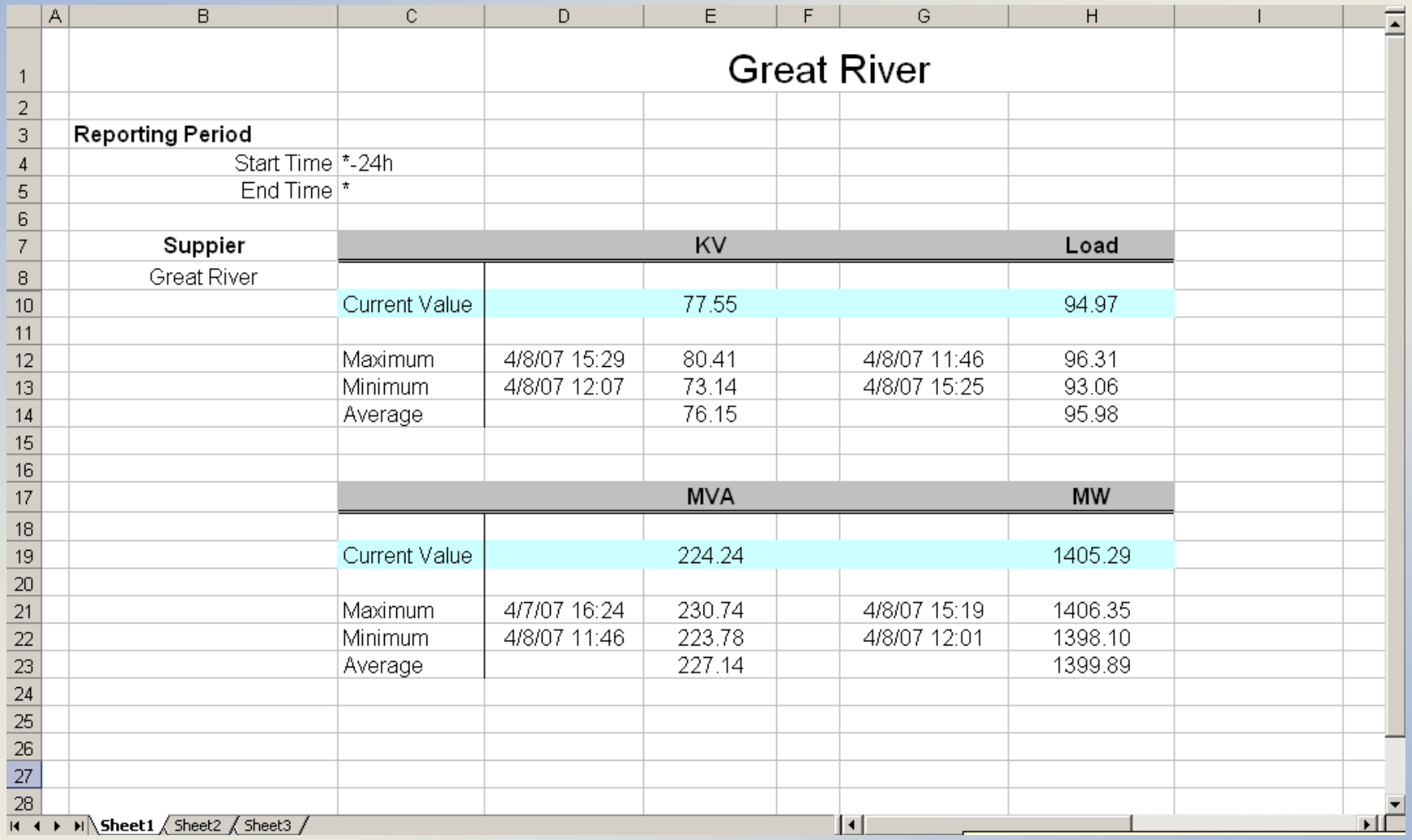
PI Module Database – Asset Relative Displays



PI Module Database – Asset Relative Displays



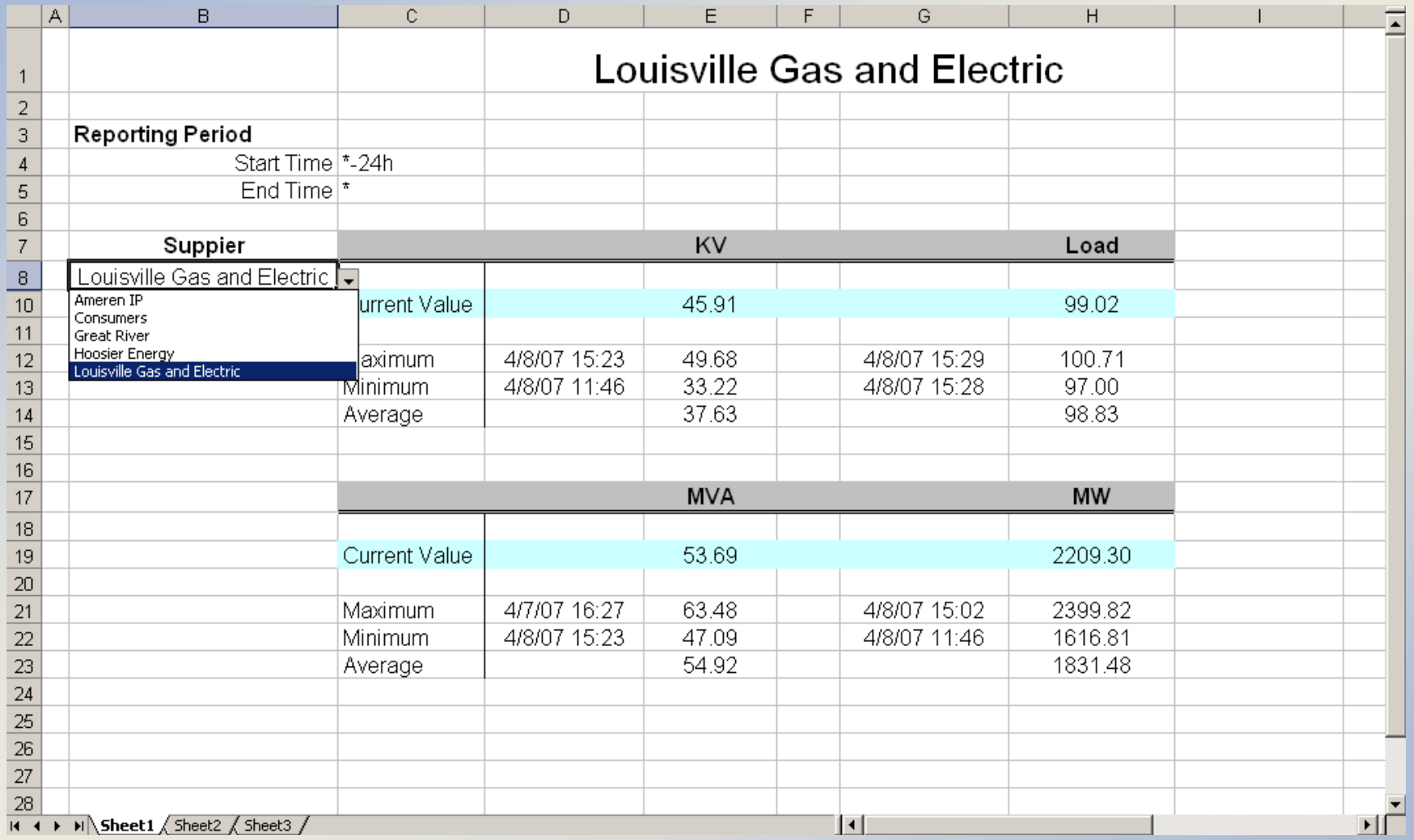
PI DataLink – Asset Relative Reports



			Great River				
	Reporting Period						
	Start Time	*-24h					
	End Time	*					
	Suppier		KV				Load
	Great River						
		Current Value		77.55			94.97
		Maximum	4/8/07 15:29	80.41		4/8/07 11:46	96.31
		Minimum	4/8/07 12:07	73.14		4/8/07 15:25	93.06
		Average		76.15			95.98
				MVA			MW
		Current Value		224.24			1405.29
		Maximum	4/7/07 16:24	230.74		4/8/07 15:19	1406.35
		Minimum	4/8/07 11:46	223.78		4/8/07 12:01	1398.10
		Average		227.14			1399.89

Sheet1 Sheet2 Sheet3

PI DataLink – Asset Relative Reports



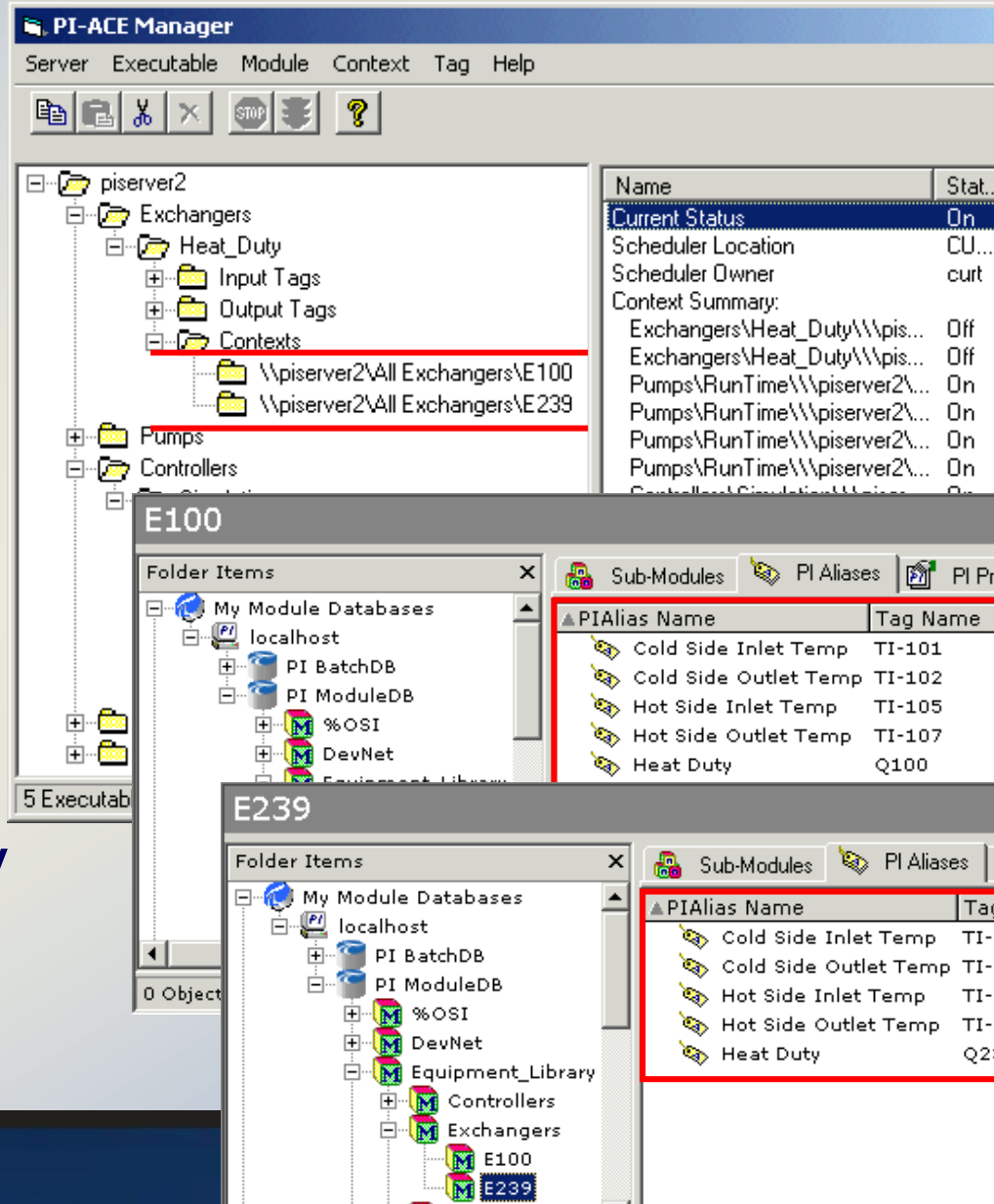
Louisville Gas and Electric

Reporting Period						
Start Time	*-24h					
End Time	*					
Suppier		KV				Load
Louisville Gas and Electric						
Ameren IP						
Consumers						
Great River						
Hoosier Energy						
Louisville Gas and Electric						
	urrent Value		45.91			99.02
	aximum	4/8/07 15:23	49.68		4/8/07 15:29	100.71
	Minimum	4/8/07 11:46	33.22		4/8/07 15:28	97.00
	Average		37.63			98.83
			MVA			MW
	Current Value		53.69			2209.30
	Maximum	4/7/07 16:27	63.48		4/8/07 15:02	2399.82
	Minimum	4/8/07 15:23	47.09		4/8/07 11:46	1616.81
	Average		54.92			1831.48

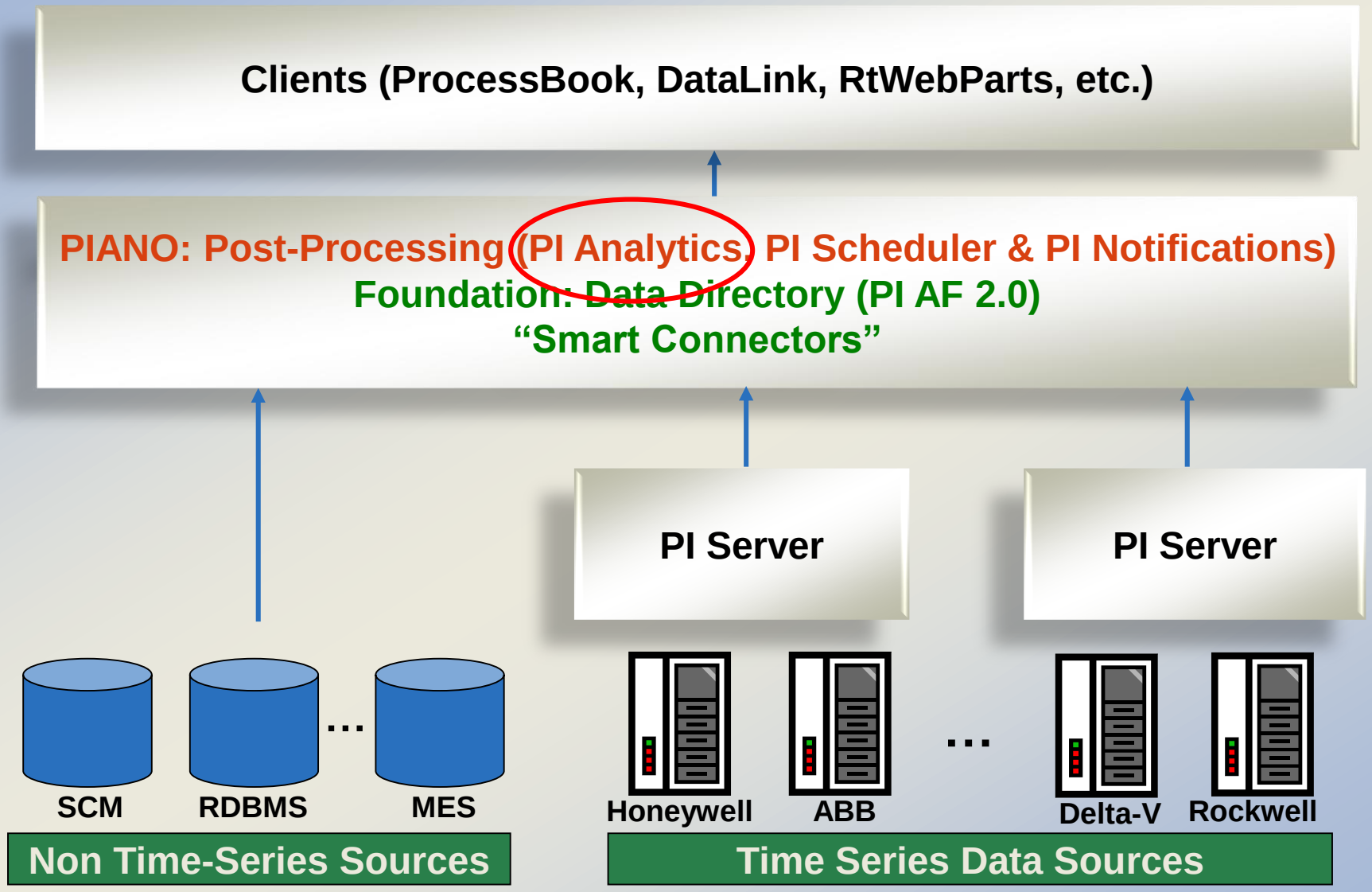
Sheet1 Sheet2 Sheet3

PI ACE – Consistent Performance Metrics

- Scalable application development environment
- One, consistent calculation can be used for all similar processes or equipment
- Integrates access to data and functionality from other systems



PI Analytics - Future



Highlights of Smart Connectors

- Family of Products
  - Interfaces (today and beyond)
  - Asset Connectors (Bridge Release and beyond)
  - Business Gateways (~PR 3)
- Asset Connectors
  - Use Windows Communication Foundation
  - Re-use lessons from 25+ years of interface dev.

Smart Connectors

- Establish and maintain relationship between PI System and Foreign System
  - Configuration
  - Sensor
  - Meta-data
- Goal of Smart Connectors:
  - “Zero” management
  - “Near-Zero” installation & configuration

PI and the Smart Grid

- Press Release May 5, 2008

"OSIsoft … announces the addition of two products for their Advanced Metering Infrastructure (AMI) and Smart Grid initiatives: "PI Smart Connectors" and "PI Business Gateways".

OSIsoft has developed "Smart Connectors" that will interface metering systems (AMI) to the PI System in order to unify, validate, rationalize, store and synchronize the metering data at the speeds necessary to support next generation grid management applications."

Benefits of the PI Infrastructure

- PI High Availability (HA)
  - Fault tolerant Mission Critical environment
  - Split architecture security
  - Interface failover, buffering, data replication and a service interface
- PI AF – a template framework that supports
  - Simultaneous models
    - network connectivity,
    - correlative, or
    - process (CBM)
  - Meta-data store

Benefits of the PI Infrastructure

- Infrastructure stays in place while the systems it collects data from, or the systems it presents data to, evolve
  - Secure, Robust, Information rich
- Industry standard web and desktop environments
  - Analytics
  - Notifications
  - Alarms

Benefits for The Smart Grid

- Integration of meter information
  - End-to-end view of a utility
  - Generation to the meter
  - Event-oriented environment
- Easy integration
  - Geographic Information Systems,
  - Power Modeling Applications and
  - Outage Management Systems.

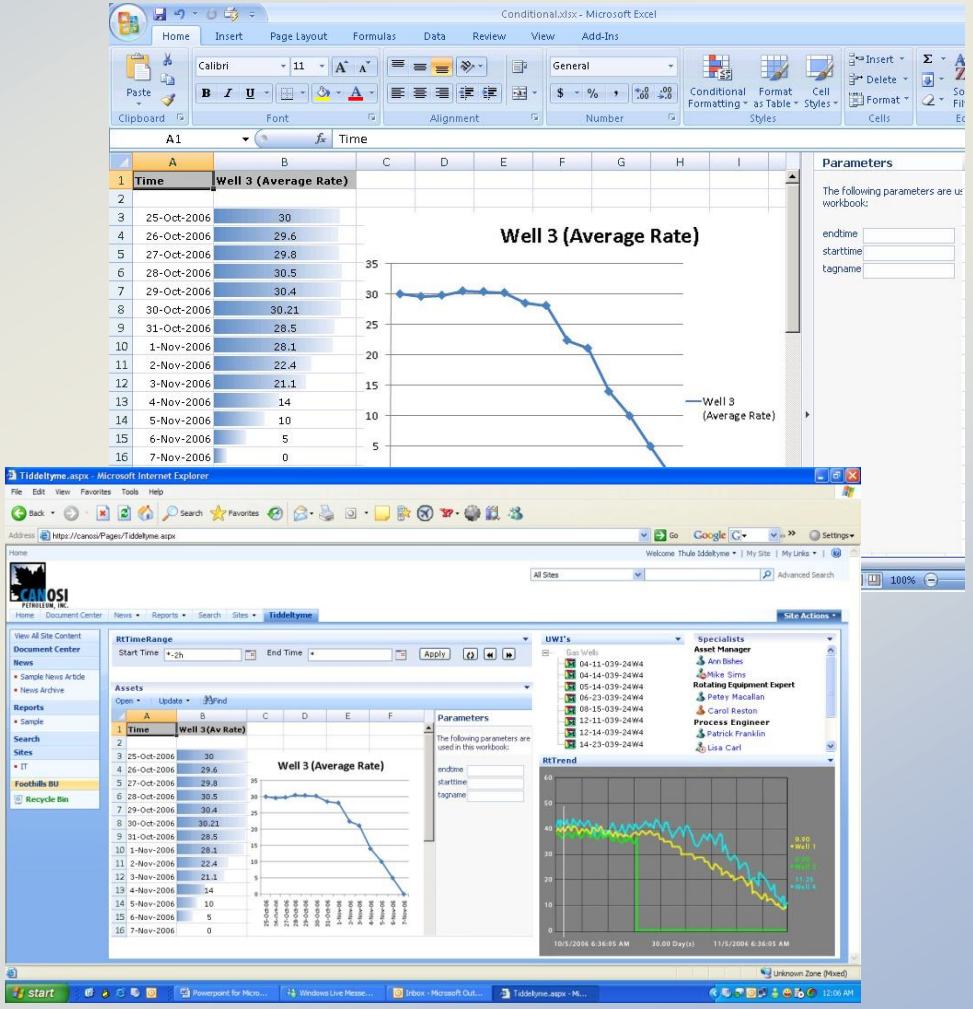
Benefits for The Smart Grid

- Standard capabilities allow users to
  - Determine circuit profiles and feeder efficiencies
  - Optimize load
  - Evaluate grid and asset health
  - Within an actionable environment
- Positioning for more advanced integration involving the interplay of
  - Market dynamics
  - Distributed energy resources
  - Smart homes

DataLink for Excel Services (DLES)

- ***PI DataLink on the Web***

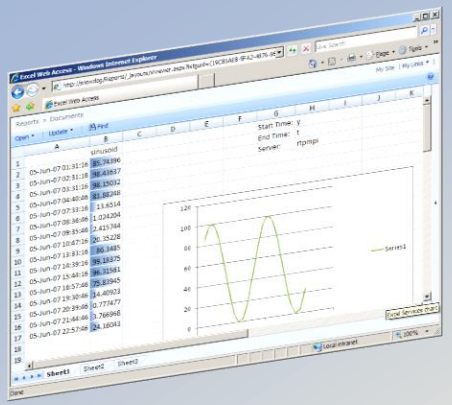
- Only requirement is a Web Browser
  - No DataLink or Excel installation on client
- Move existing spreadsheets to the SharePoint portal
- Deploy DataLink functions at the Enterprise level:
  - Install SharePoint 2007 on the server machine
  - Install DataLink functions on the server machine

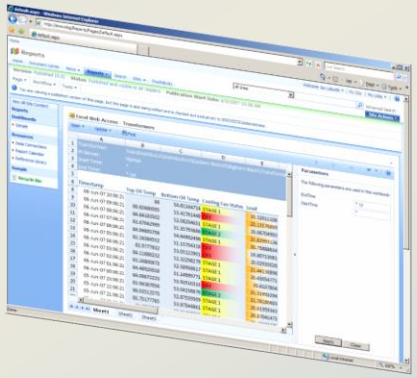


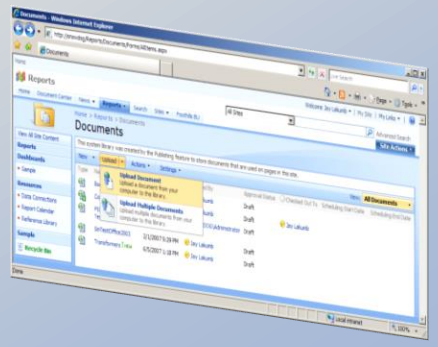
DLES – The Value

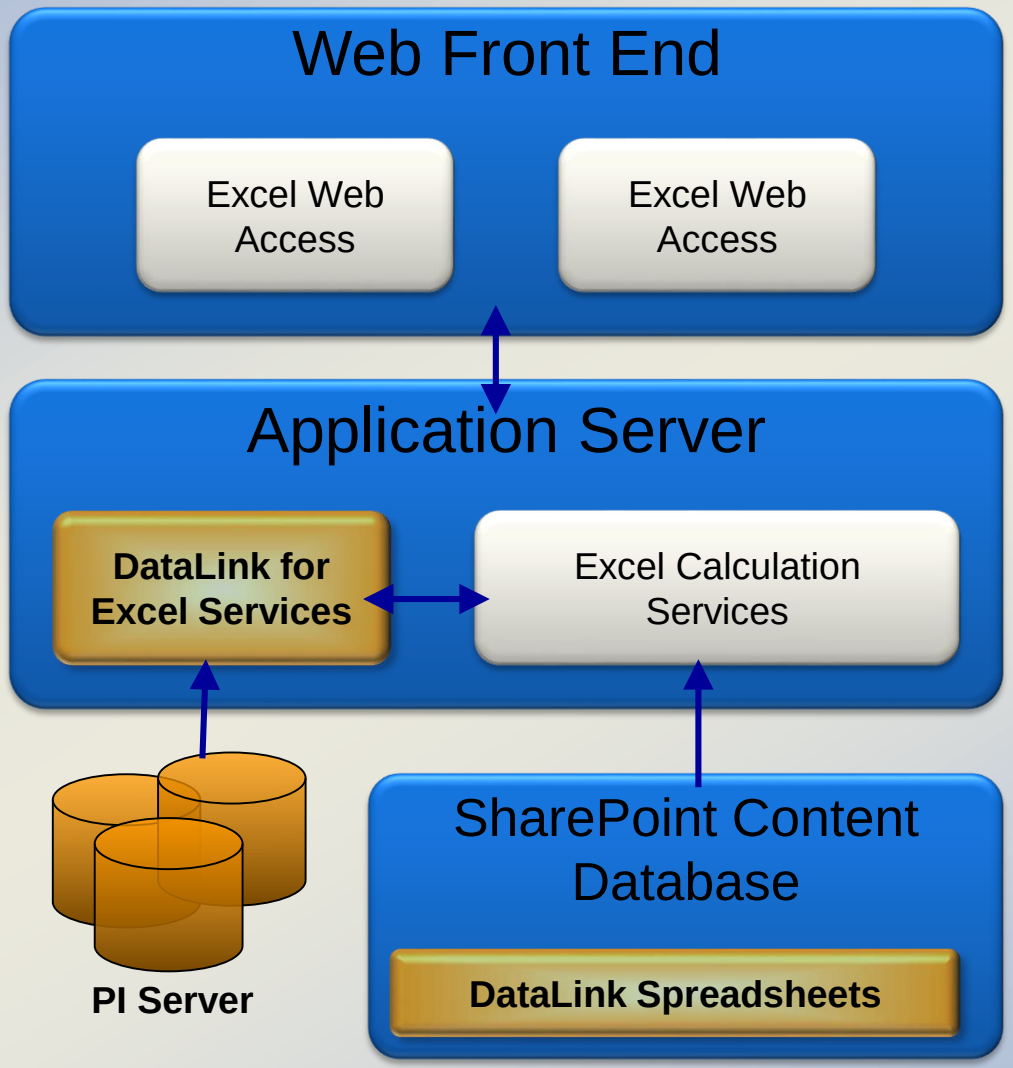
- Shows “one version of the truth”
  - Simplify collaboration around spreadsheets
- Provides enterprise content management
  - Make spreadsheets accessible and manageable
  - Allow dynamic spreadsheets, but keep them secure
  - Not able to directly edit cells on spreadsheet
- Enables business intelligence in real-time
  - Improve business insight into PI data on demand
  - Display graphical, interactive pages using context

DLES – Architecture

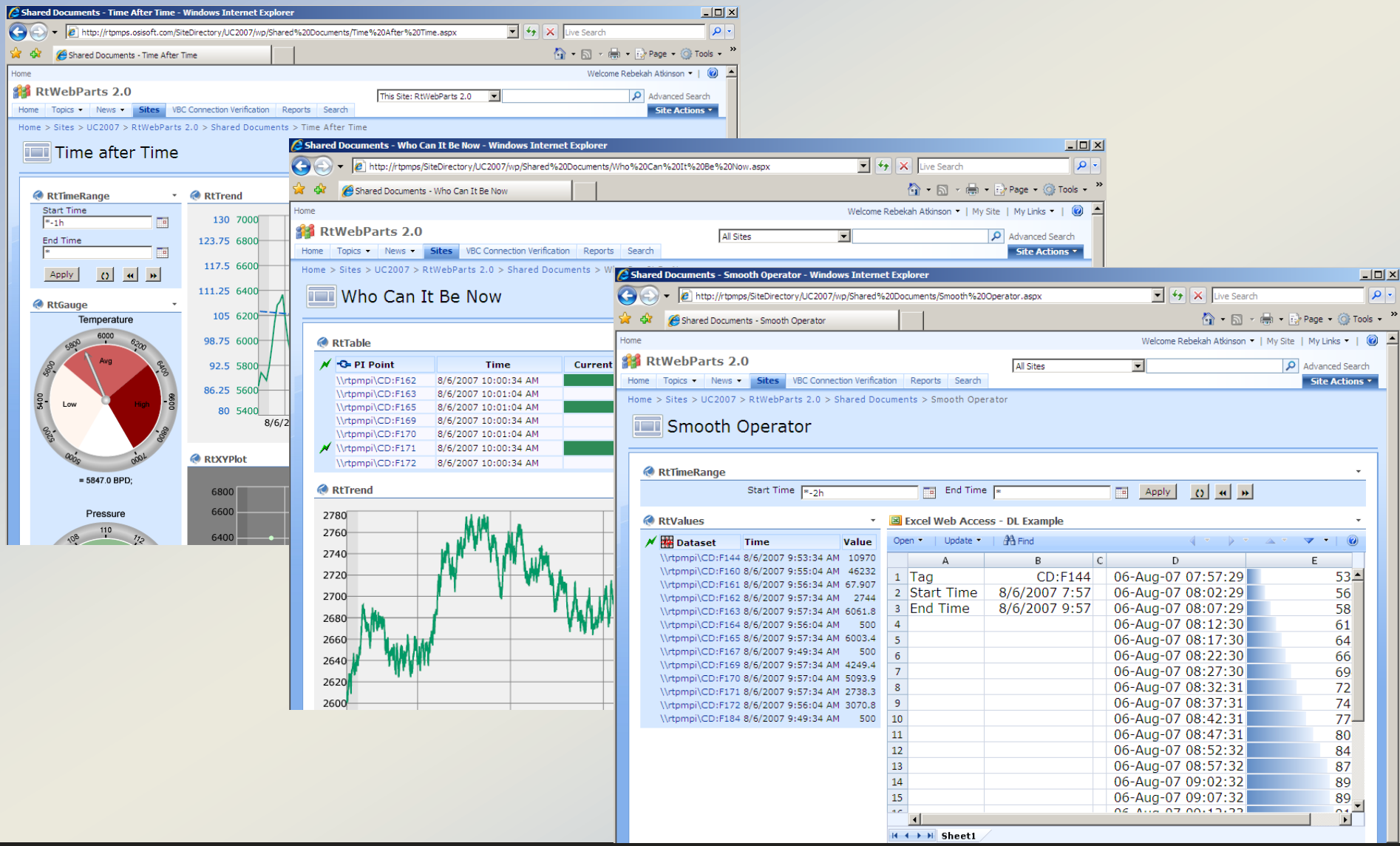








DLES – Examples

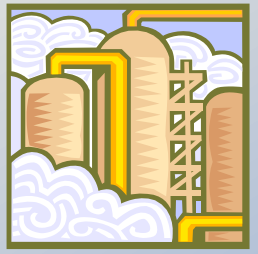


Batch and Event Analysis

Every process has some kind of repeatable event

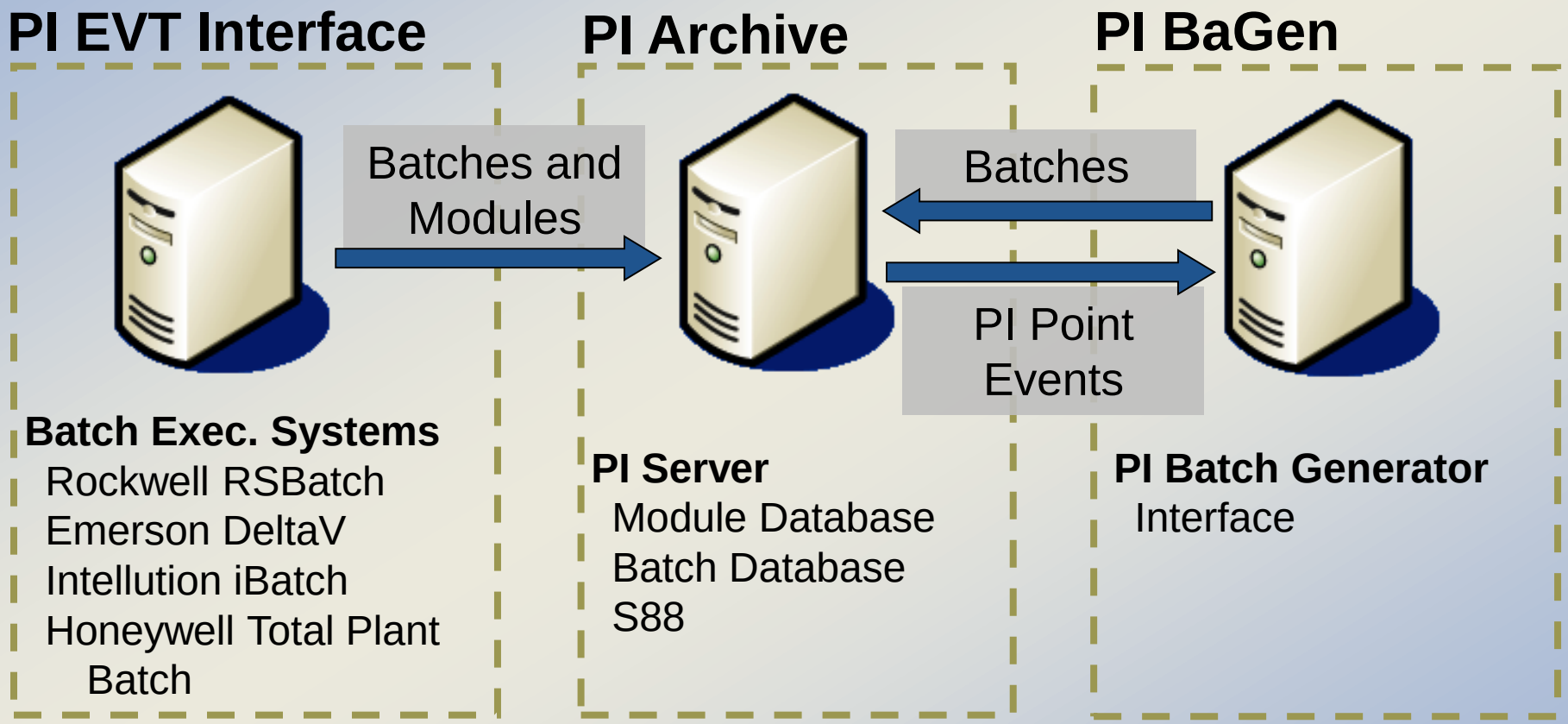
- Batch process
  - Am I making it the same way as yesterday?
  - How do I make the best product?
  - How can I reduce cycle times?

- Continuous process
  - What causes downtime?
  - Can I improve my startup or grade change times?
  - How can I track and study environmental excursions?

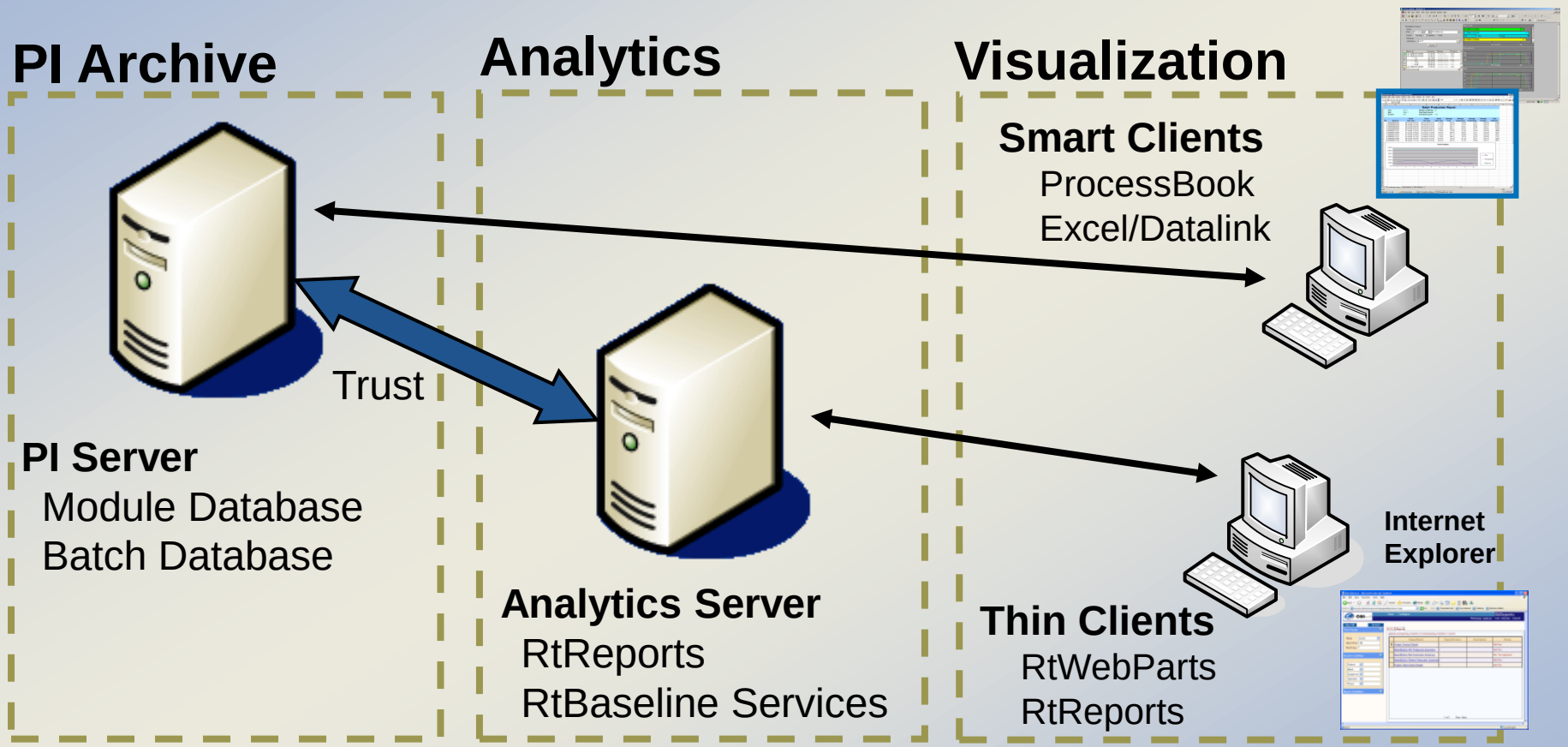


- Discrete process
  - What is my Overall Equipment Effectiveness?
  - What are my top 10 causes of downtime?

PI Batch Architecture



PI Batch Architecture



RtReports Editions

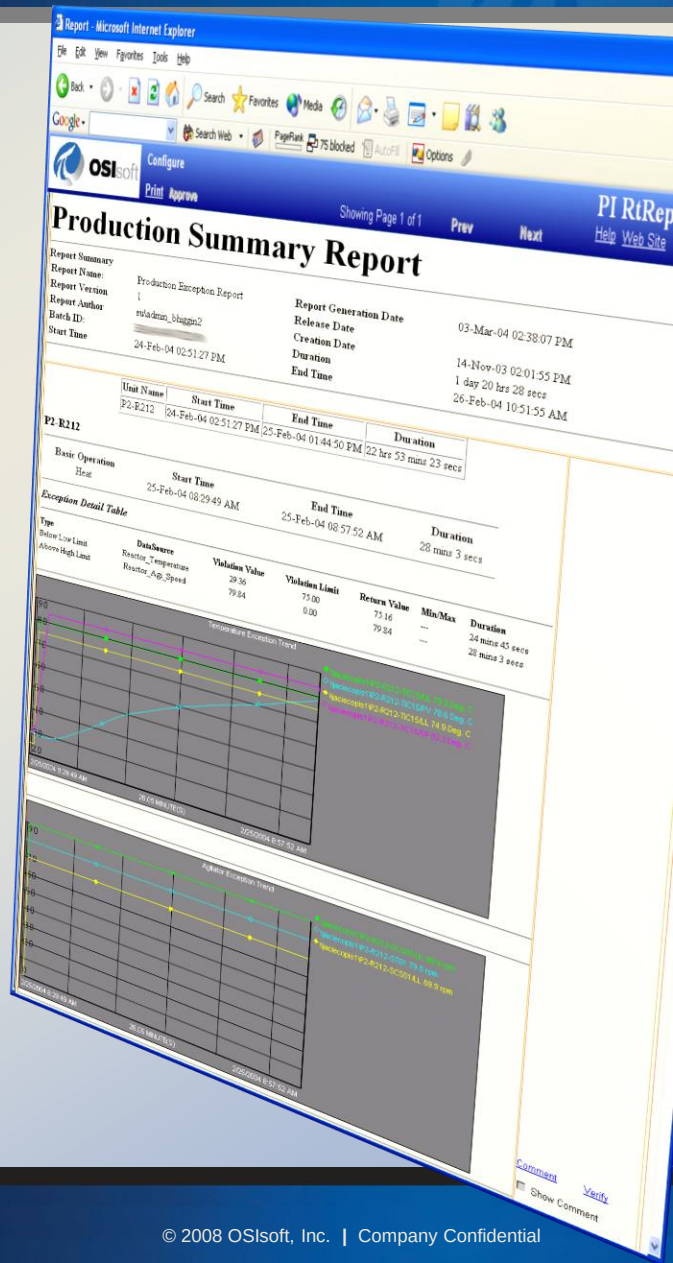
- *Standard Edition*
  - Intended for customers that need web-based, real-time reporting who are not constrained by regulatory requirements
- *Compliance Edition*
  - Complies with government regulations to meet electronic signatures
  - Suitable for customers constrained by FDA or EPA

RtReports Benefits

- Improve employee efficiency
  - Reports built and regenerated without programming
  - Library of processing rules and formatting rules allow for rapid report generation
- Enhance knowledge management and collaboration
  - Reports available on-demand, via the Web
- Reduce variability in reporting
  - Information workers retrieve information from the same source
  - Generate tamper-proof reports
- Improve manufacturing agility
  - Accelerate product release
  - Automate environmental reports

RtReports

- Standardized enterprise reporting
  - Templates for repeatable reports and data retrieval
  - Import/Export utilities for moving report templates between locations
  - Configuration – no programming
- Manage change through versioning
  - Versioned Report templates
  - Review and Release workflow for report templates
    - Comment print, verify report sections, and approve final report
- Tracks report output
  - No need to store output
    - Regenerated on demand
    - Print to paper, PDF, SharePoint DL
  - Who printed, how many, when last printed?

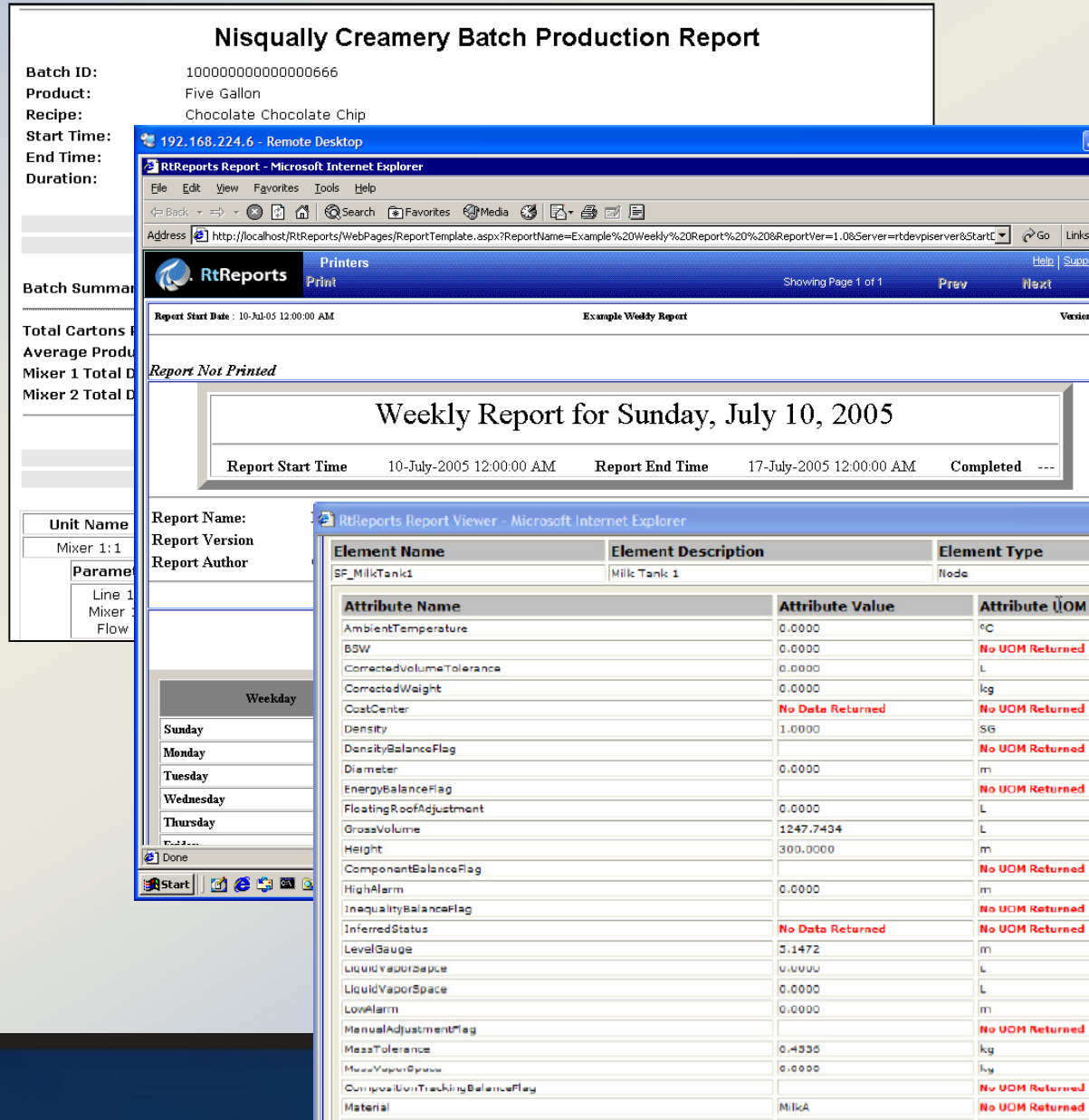


RtReports Differentiators

- Comprehensive reporting tool
  - Specify the format, content and management of reports
- Integrates internal and external data sources
  - Relational and web services data
- Report Template Versioning
- Flexible context meta-data
- Compliance Edition Workflow

RtReports Capabilities

- Batch Based
- Time Based
- AF Case Based

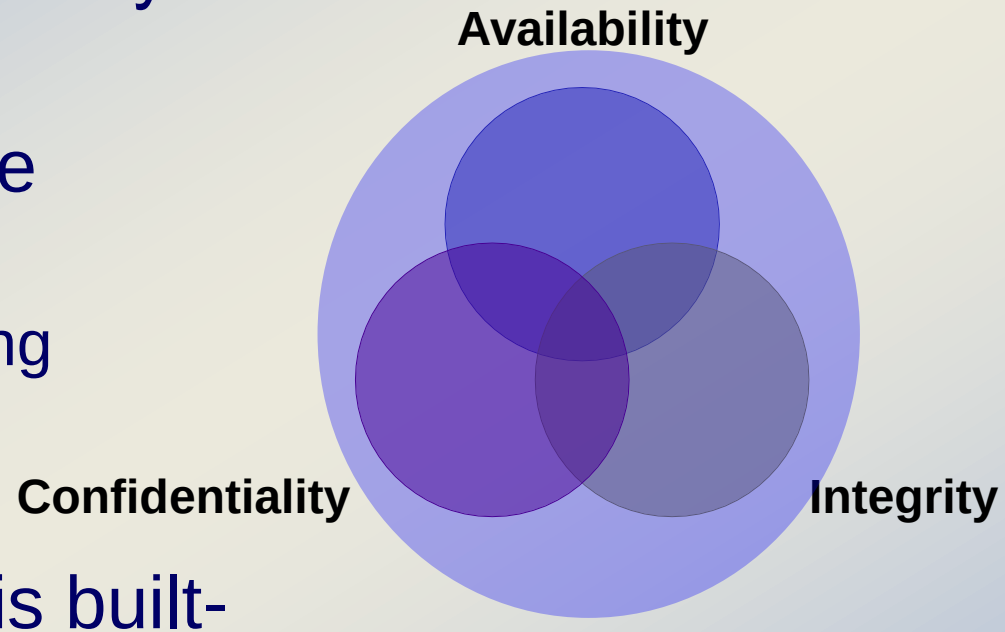


OSIsoft® VALUE NOW, VALUE OVER TIME

PI Security

The C.I.A. Security Model for PI

- It's really about Quality!
- Core Infrastructure
  - High Availability
  - Integrity Monitoring
  - Modern Platform
- Security lifecycle is built-in and serviceable.



PI Feature Map for C.I.A.

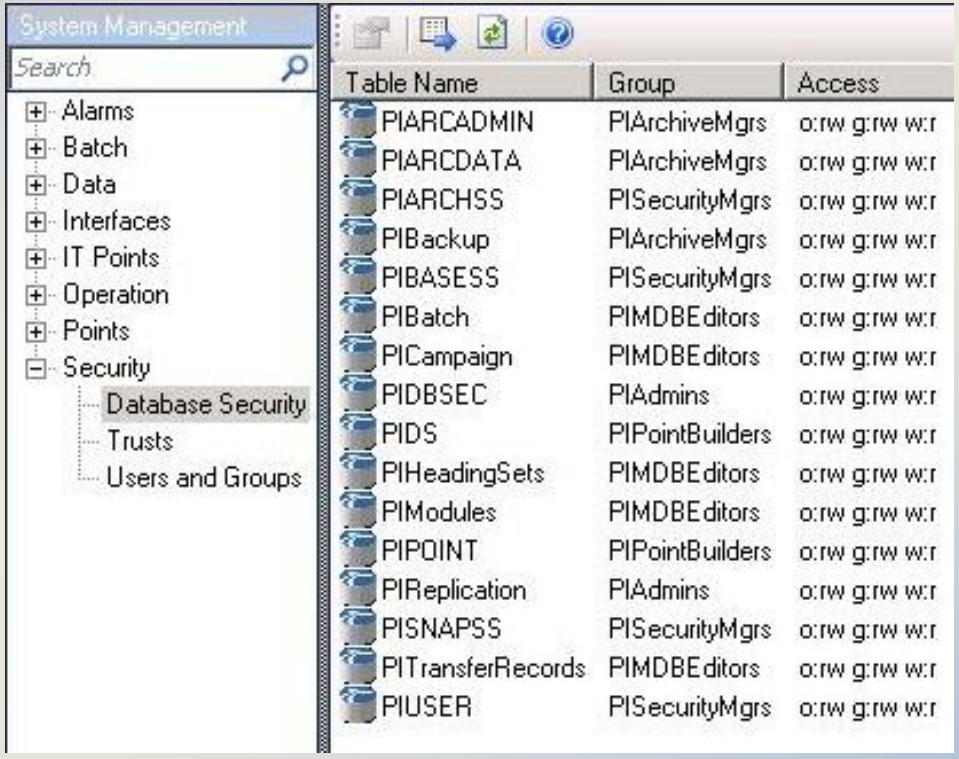
- High Availability
  - PR1 Collectives and Interface Failover (HA)
  - mPI Software Update Service
- Integrity
  - Audit Trail and Logging
  - Quality of Service Monitoring (ITM & NOC)
- Confidentiality
  - Integrated Authentication and Authorization
  - Object Oriented Security Policy
  - Best Practices (CoE)

Is the PI System Data Encrypted?

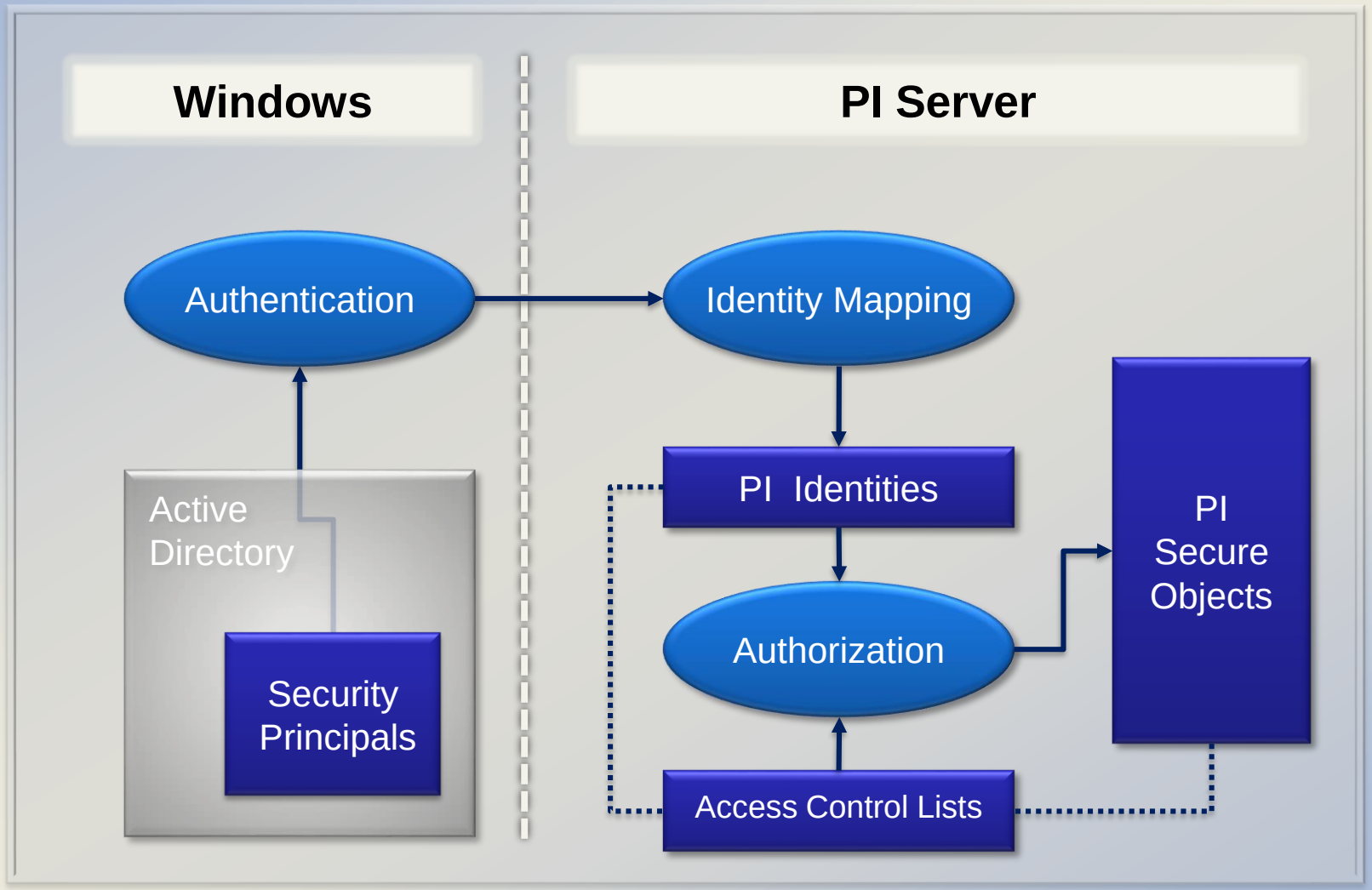
- PI data is transmitted in the clear with binary encoding for performance
  - Secondary characteristic is “security by obscurity”
  - Transmits on exception, not deterministic polling [eg. Modbus]
  - Normally acceptable for data privacy inside a trust boundary
- PI is compatible with encryption policy deployment
  - RtWebParts\RtReports\DLES (via MS Sharepoint) [TLS/SSL]
  - Thick Clients (via Terminal Services) [RSA/RC4]
  - Any PINET TCP/IP connection [VPN/IPSEC]
- PI is not usually the driver for encryption policy
  - Align with privacy for MS Office user files
  - Often required across public infrastructure and wireless media
  - Performance is an issue in legacy environments

Recent Security Changes in PI

- DBSecurity Roles
- PI Trust Attributes
  - Host name
  - Application name
- PI Module
  - Permission Inheritance
- Interfaces
  - New Buffer Subsystem
  - Disconnected Startup

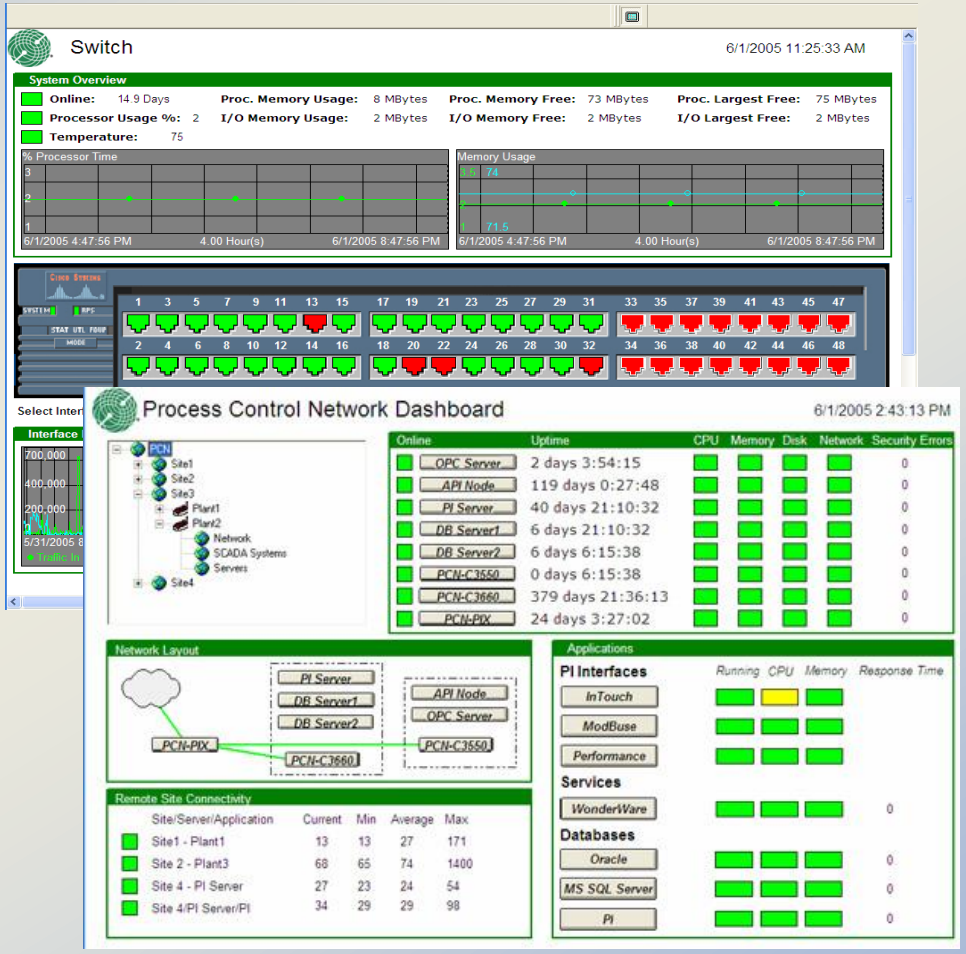


WIS: Simplified Diagram



MCN Health Monitor

- Management Console enables proactive network monitoring and informed decision-making
  - Capacity Planning
  - Critical Application Performance Monitoring
  - Root Cause Analysis
    - Applications
    - Hardware
    - Devices
- Immediate and tangible benefits
  - Increases profitability
    - Identifies manufacturing system operational bottlenecks
    - Reduces system downtime and maintenance costs
  - Improves IT system management
  - Leverages the PI System core technology and maximizes system ROI



Thank You

Questions?