
REAL-TIME PERFORMANCE MANAGEMENT FOR THE ENTERPRISE
RtPM
SAN FRANCISCO PHILADELPHIA HOUSTON FRANKFURT
OSISOFT USER CONFERENCES 2005
REAL-TIME PERFORMANCE MANAGEMENT FOR THE ENTERPRISE
RtPM

Tony Fenn

Industry Analyst

Creating a Compliant Software Environment

The Bottom Line:

As business and IT recognize the overlapping requirements of individual compliance mandates, leaders are taking steps to build out a sustainable architecture that minimizes time and cost while maximizing future reuse.

John Hagerty, AMR Research Staff

Today's Regulated Environment

- Compliance is a corporate imperative
- Now corporations must be both profitable and accountable
- Companies today may have to comply with multiple regulations or requirements
  - FDA 21 CFR Part 11
  - Sarbanes Oxley
  - NERC 1300
  - Environmental Title V
  - HACCP

Visibility* and a *single version of the truth
are required to demonstrate compliance

OSIsoft's Role in Compliance

- What areas does Compliance cover?
- What is a Compliance Architecture?
- What is the role of OSIsoft's RTPM in Compliance?
- What new components are we working on?
- What are our customers doing now?

Compliance Area Matrix 1 - Mandated

Mandate	Description	Business Requirement	Industry
EPA Clean Air Act (1990)	**Sets limits on air pollutants.**	Sets limits on how much of a pollutant can be in the air anywhere in the United States. The law allows individual states to have stronger pollution controls than those set for the whole country.	**All**
EPA Clean Water Act (1972)	**Set limits on water discharged to waterways.**	Employs regulatory and non-regulatory tools to reduce direct pollutant discharges into waterways, finance municipal wastewater treatment facilities, and manage polluted runoff.	**All**
EPA Title V	**Regulation of chemical substances whose manufacture may present risk to health or the environment**	Various acts requiring registration, reporting, and conformance.	**Oil & Gas** **Chemicals** **Pulp & Paper**
FDA 21 CFR Part 11	**Electronic records and signature**	Technical and procedural requirements for electronically maintained records and electronic signature used in manufacturing transactions.	**Pharmaceutical** **Food**
FDA – GMP	**Finished Drugs or Medical Devices**	Requires manufacturers to have a quality system for the design, manufacture, packaging, labeling, storage, installation, and servicing of finished medical devices intended for commercial distribution in the United States.	**Pharmaceutical**
NERC Critical Infrastructure Protection	**Cyber security standards**	Reduces risks to the reliability of the bulk electric systems from any compromise of critical cyber assets (computers, software and communication networks) that support those systems.	**Power Generation** **Transmission & Distribution**

Compliance Area Matrix 2 - Standards

Mandate	Description	Business Requirement	Industry
QS 9000	**Quality Management**	Provides requirements that, if they are effectively implemented, will provide confidence that a supplier can consistently provide goods and services that: •Meet your needs and expectations and •Comply with applicable regulations	**All**
ISA-SP95	**Enterprise – Control System Integration**	Defines the interface between control functions and other enterprise functions.	**All**
ISA-SP99	**Manufacturing and Control Systems Security**	Define procedures for implementing electronically secure manufacturing and control systems and security practices and assessing electronic security performance.	**All**
ISA-SP88	**Batch Control System Standards**	Recommends practices for the design and specification of batch control systems as used in the process control industries.	**Pharmaceutical**
NERC GADS	**Generating Availability Data System (GADS)**	Manages the collection of operating information for improving the performance of electric generating equipment. The information is used to support equipment reliability and availability analyses and decision-making by GADS data users.	**Power Generation**
HACCP	**Hazard Analysis and Critical Control Point Principles**	Establishes critical limits, monitoring procedures, corrective actions, verification procedures, and record-keeping to assure that potentially hazardous products do not reach the consumer.	**Food**

Compliance Area Matrix 3 – Best Practices

Mandate	Description	Business Requirement	Industry
KPI	**Key Performance Indicators**	Establish and continuously monitor key manufacturing metrics against targets.	**All**
CBM	**Condition Based Maintenance**	Proactive maintenance approach, which requires monitoring of critical equipment periodically. CBM is just-in-time maintenance that ensures "the right work, at the right time."	**All**
FDA - PAT	**Ensure Final Product Quality**	Controlling manufacturing through timely measurements (i.e., during processing) of critical quality and performance attributes of raw and in-process materials and processes.	**Pharmaceutical**
OEE	**Overall Equipment Effectiveness**	Evaluate performance of a single piece of equipment or even an entire factory, as governed by the cumulative impact of the three OEE factors: Availability, Performance Rate and Quality Rate.	**Chemicals** **Food**
Six Sigma	**Continuous Quality Improvement**	Methodology for eliminating defects (driving towards six standard deviations between the mean and the nearest specification limit) in any process -- from manufacturing to transactional and from product to service.	**Metals & Mining**

Compliance Challenges

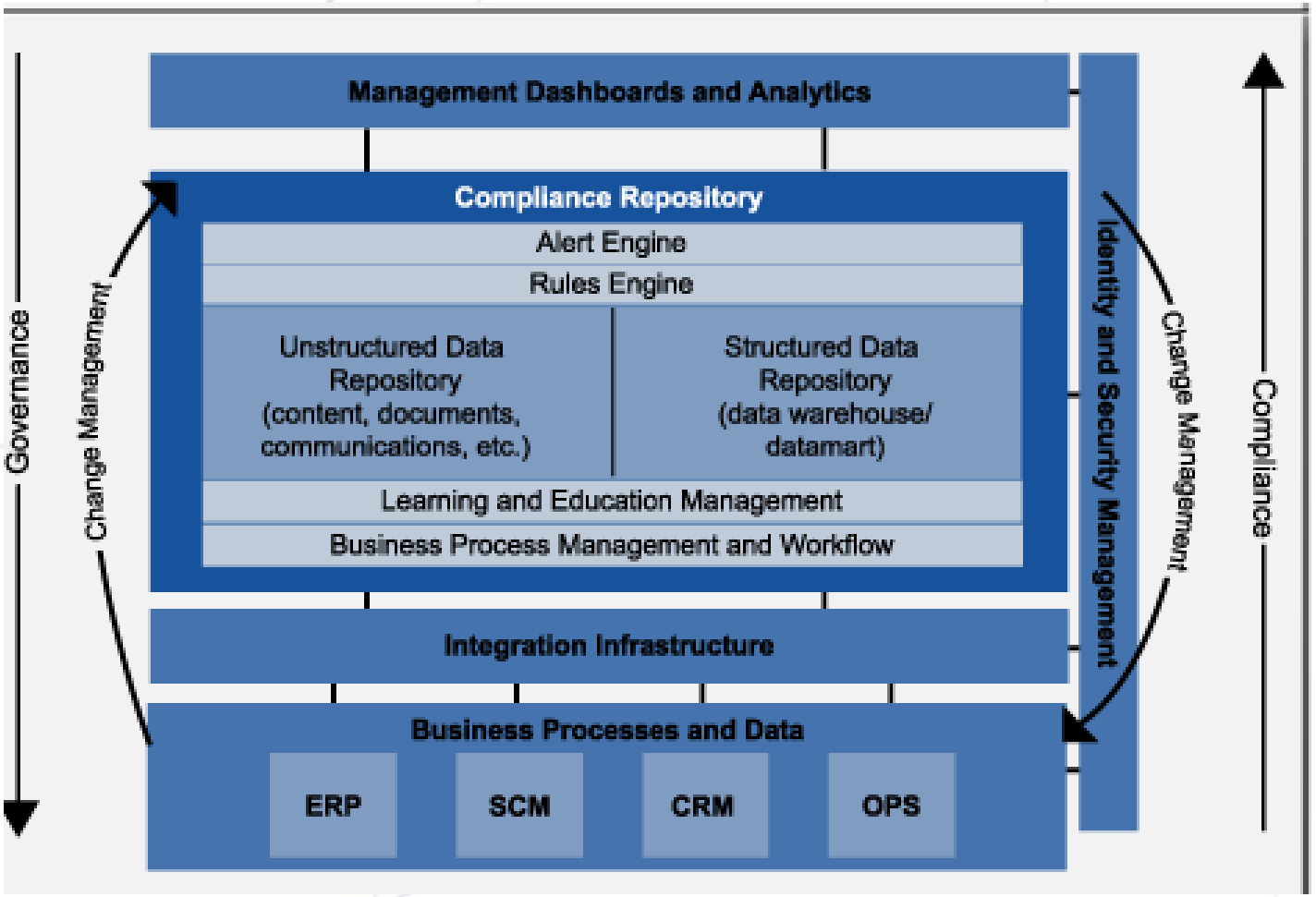
- No ‘visibility’ into operational performance
  - Slow time to react to market changes
- Many versions of the same data
  - Lack of validated information
- Limited communication & collaboration across businesses
- Little capability to perform knowledge capture or management
- Can limit the ability to innovate

Resulting in compromised quality, safety and profitability–and ultimately impacting the corporate bottom line

Common Requirements

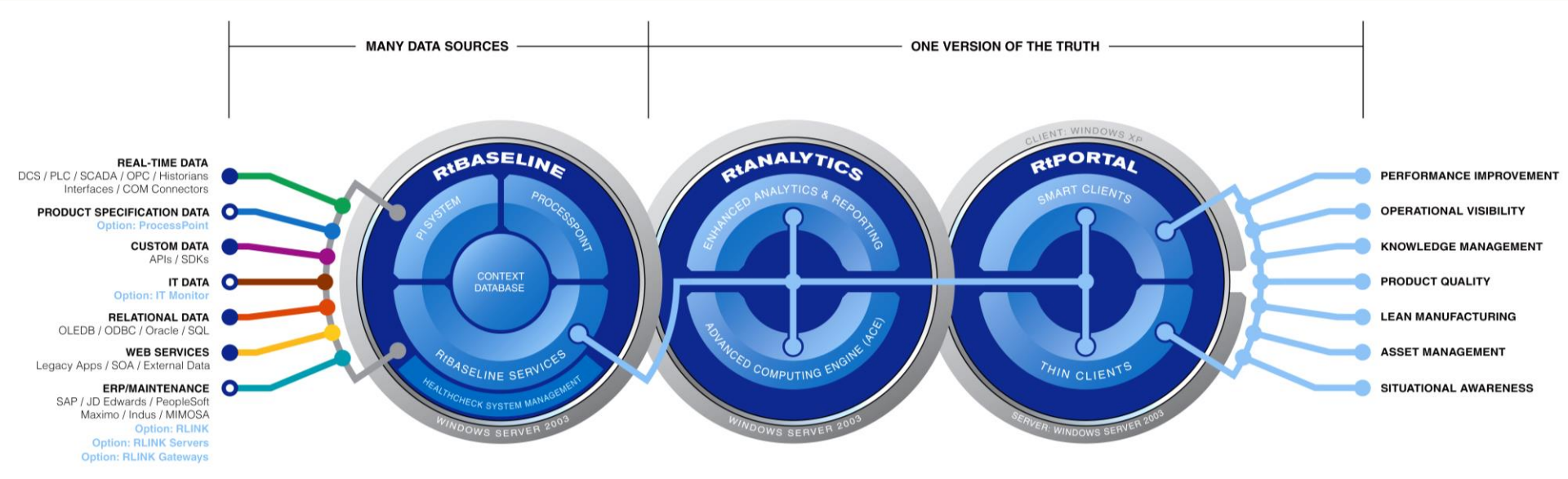
- All compliance areas need data.
  - Data integrity and trusted data is fundamental
  - Security and privacy are key
  - Archiving for a retention period is expected
- Each area needs context to identify the repeatable (reusable) patterns for compliance
  - Virtually all compliance mandates are driven by rules, policies and procedures
- Each area needs analysis (calculations) specific to it's needs
  - Most require sophisticated analytical capabilities
- The results of this analysis is reports on compliance results and alerts
  - Configurable version controlled reports with alert notification are required

Active Compliance Architecture



Source: AMR Research 2004

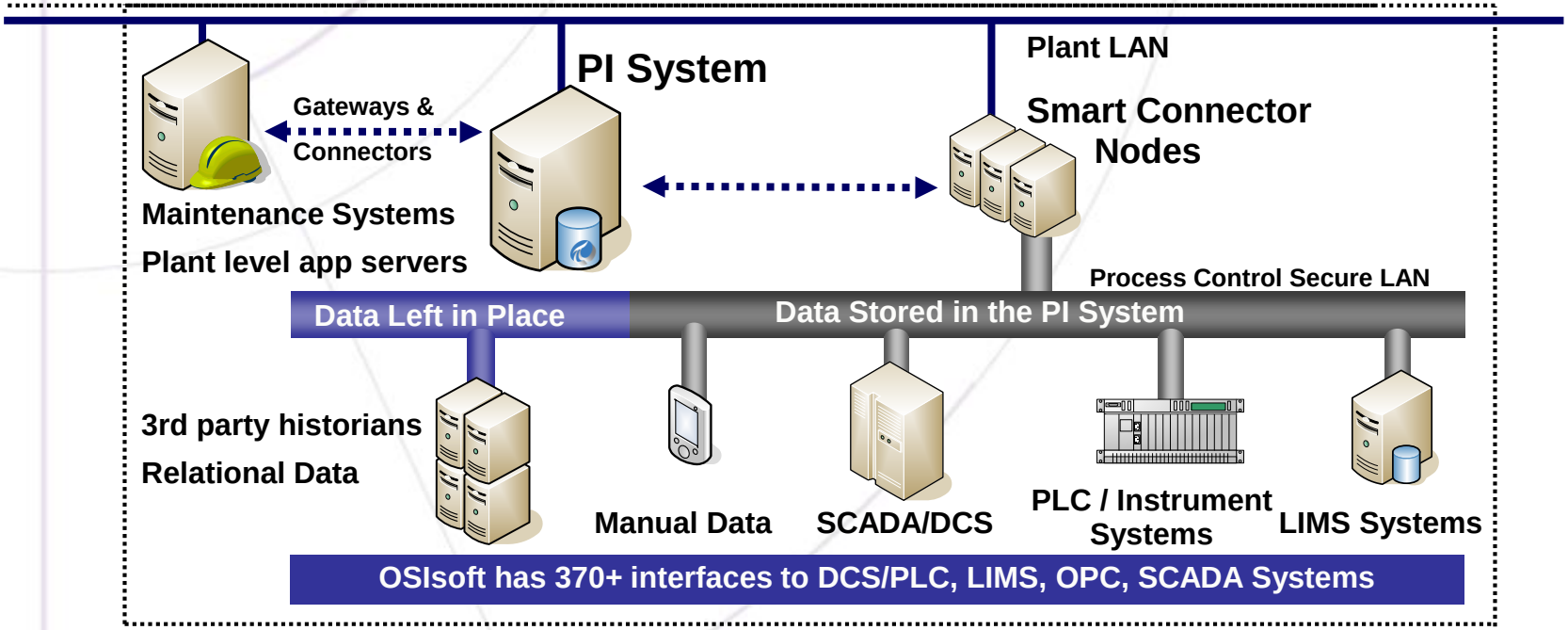
OSIsoft RtPM Platform



The OSIsoft platform provides comprehensive visibility into operations, unlocking the potential for timely analysis –fueling critical, informed and profitable actions.

Integration Infrastructure

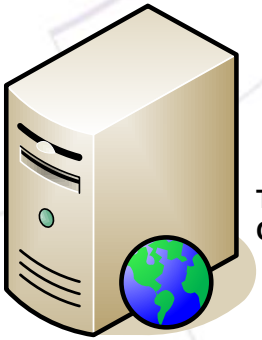
RtBaseline



Compliance Repository

Content, Documents, Communications

Sharepoint



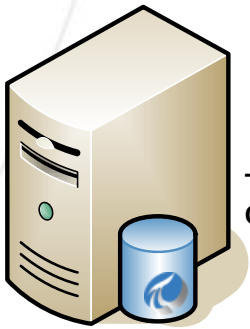
Trusted Connections

RtPortal Server

- Documents
- Reports
- Portal Sites
- Web Parts
- Web Content
- Collaboration

Data from Process, Instruments, SCADA

RtBaseline



Trusted Connections

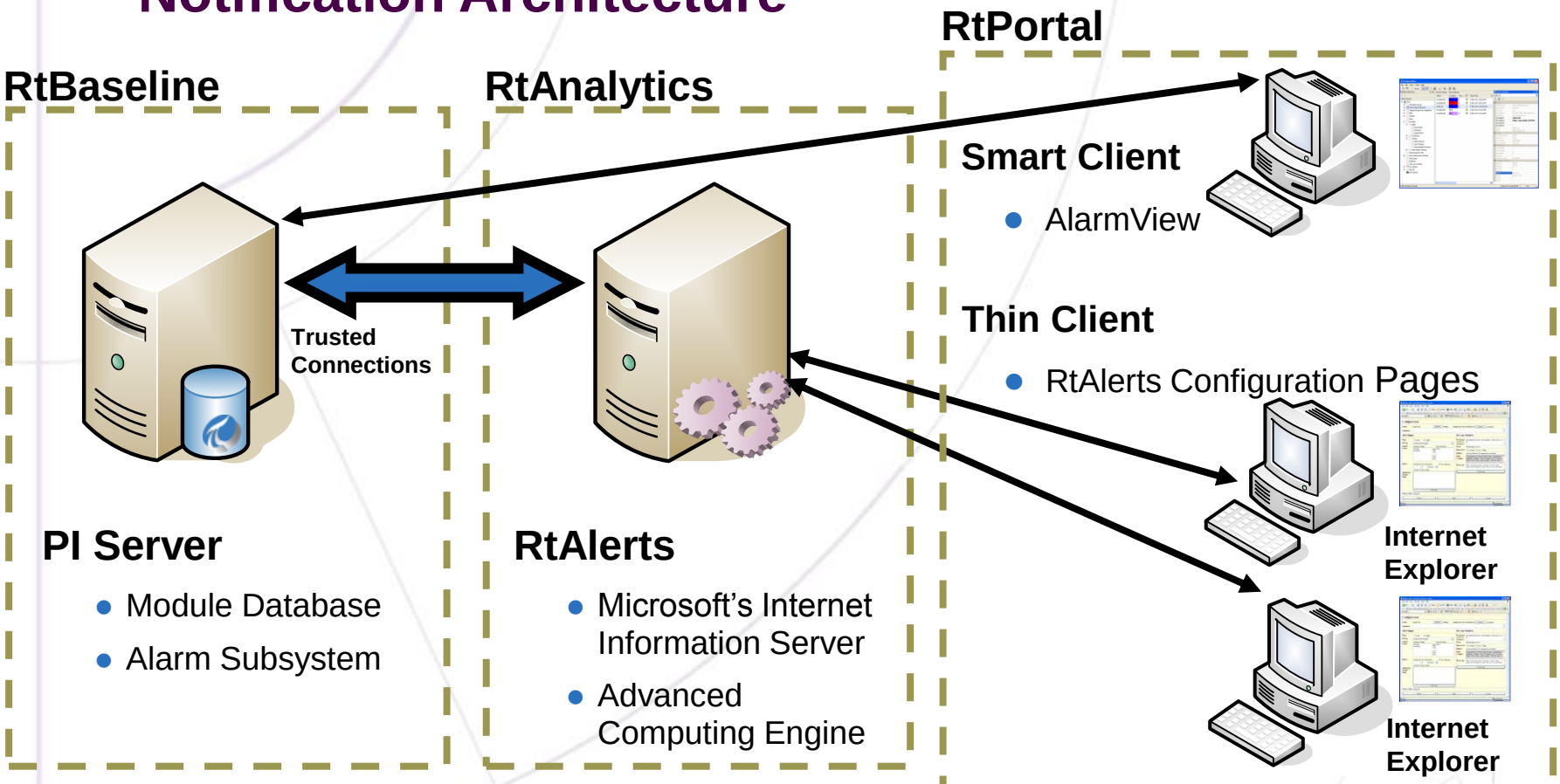
PI Server

- PI Data Archives
- Plant Data
- Event Data
- Alarms
- Audit Trail
- Security Database

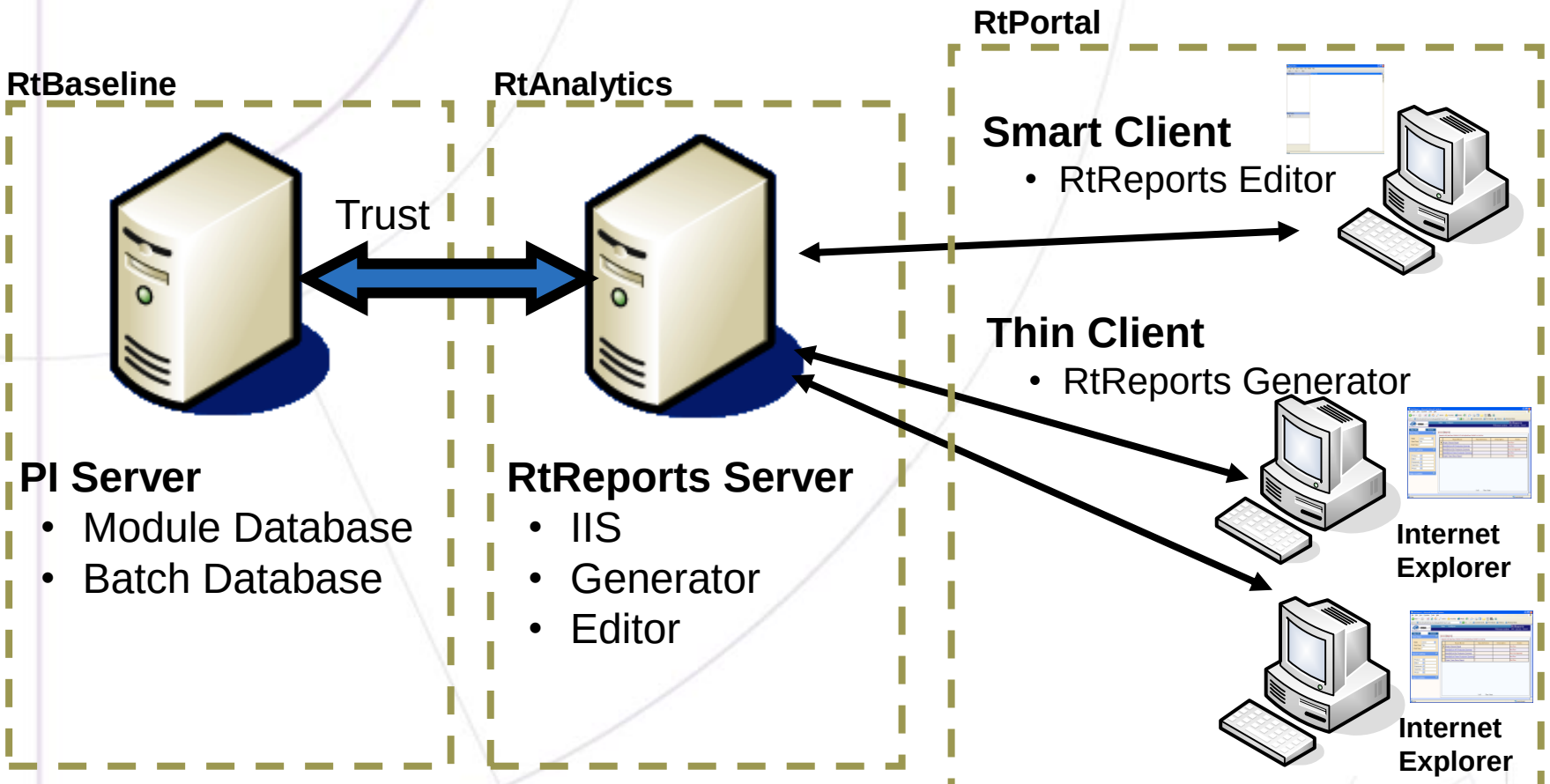
Alert Engine

Rules Engine

Notification Architecture

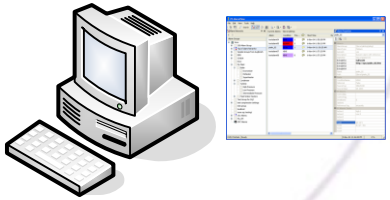


RtReports Compliance



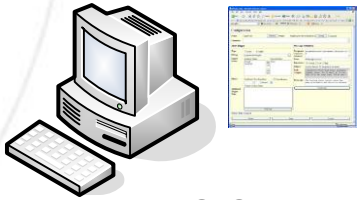
Analyze

OSIsoft Smart Clients



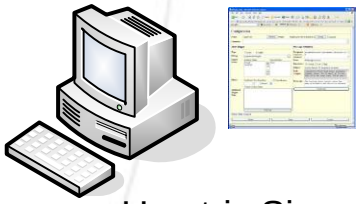
- Process Book, SQC addin
- Datalink
- Process Templates (Batch SQC)

3rd Party Compliance



- PDC Compass
- Quantum

3rd Party Heavy Duty SPC

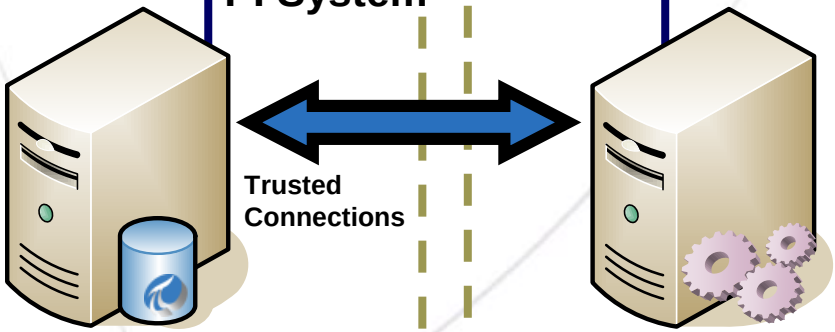


- Umetric Simca Batch
- SAS
- Others

RtBaseline | **RtAnalytics**

Plant LAN

PI System

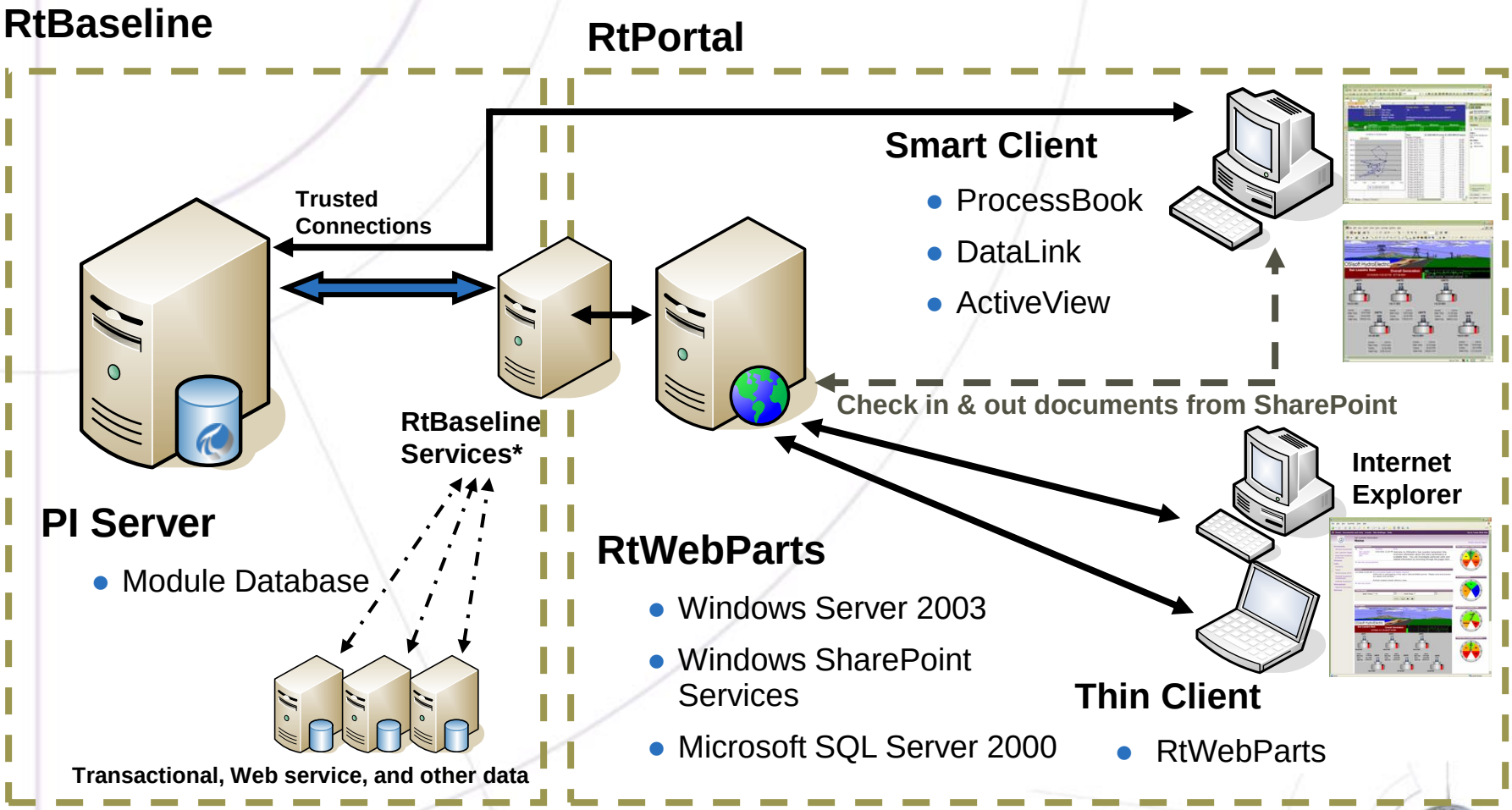


PI Server

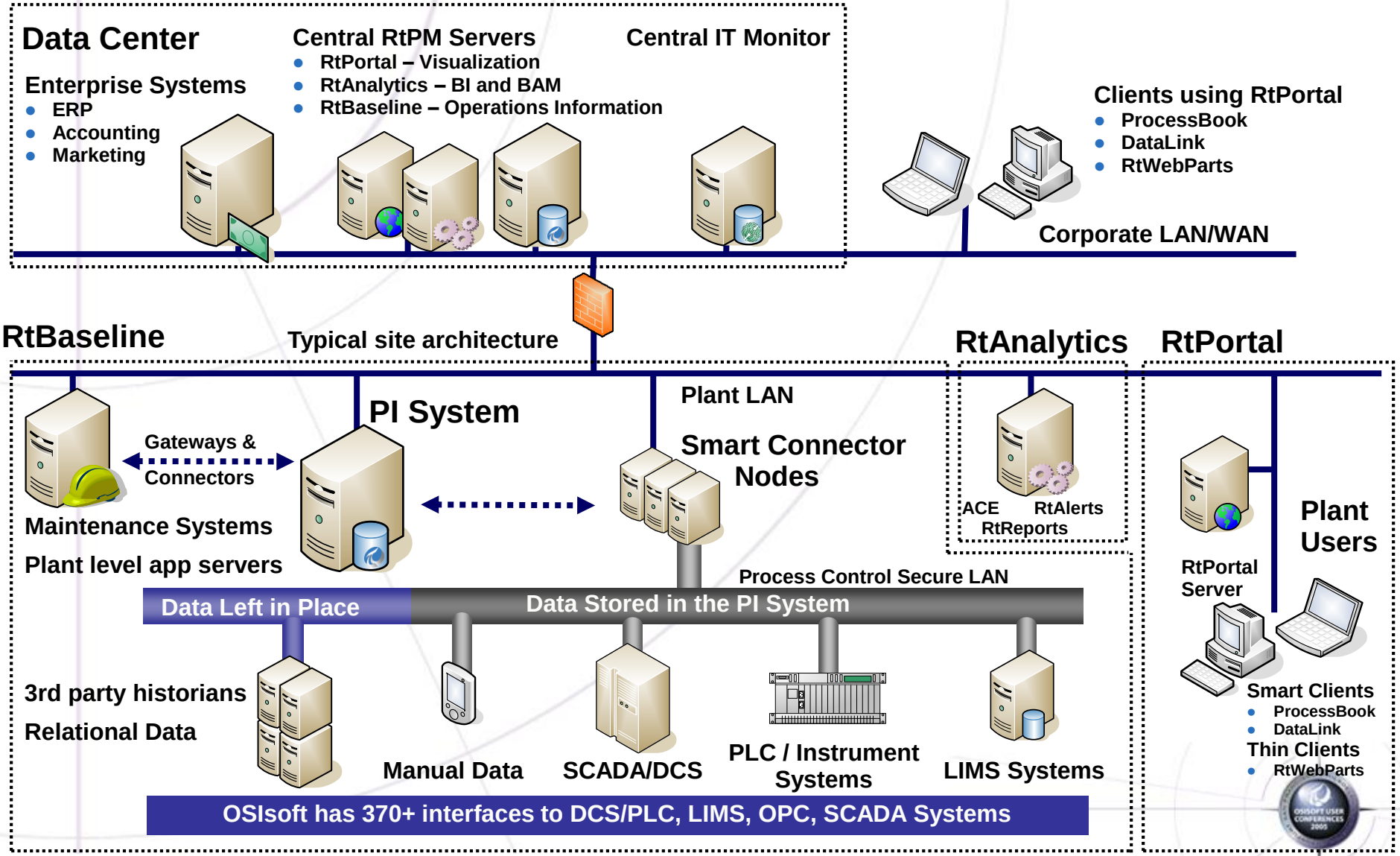
- Module Database
- Alarm Subsystem

- RtReports
- Advanced Computing Engine
- RtAlerts

RtPortal Architecture for SharePoint



Detailed Enterprise Compliance Architecture



Specific Product Features

To meet Compliance requirements

Why RtReports Compliance?

- Few COTS products for compliance reporting
  - Resulting in custom reporting projects
- Little flexibility in custom reporting solutions
  - Difficult to configure and produce accurate, repeatable reports
- Auditable management of change
  - Report queries or ‘templates’ need to be traceable and versioned to withstand regulatory auditing
- Report availability and consistency
  - Reports need to be Web-based and usable across the enterprise

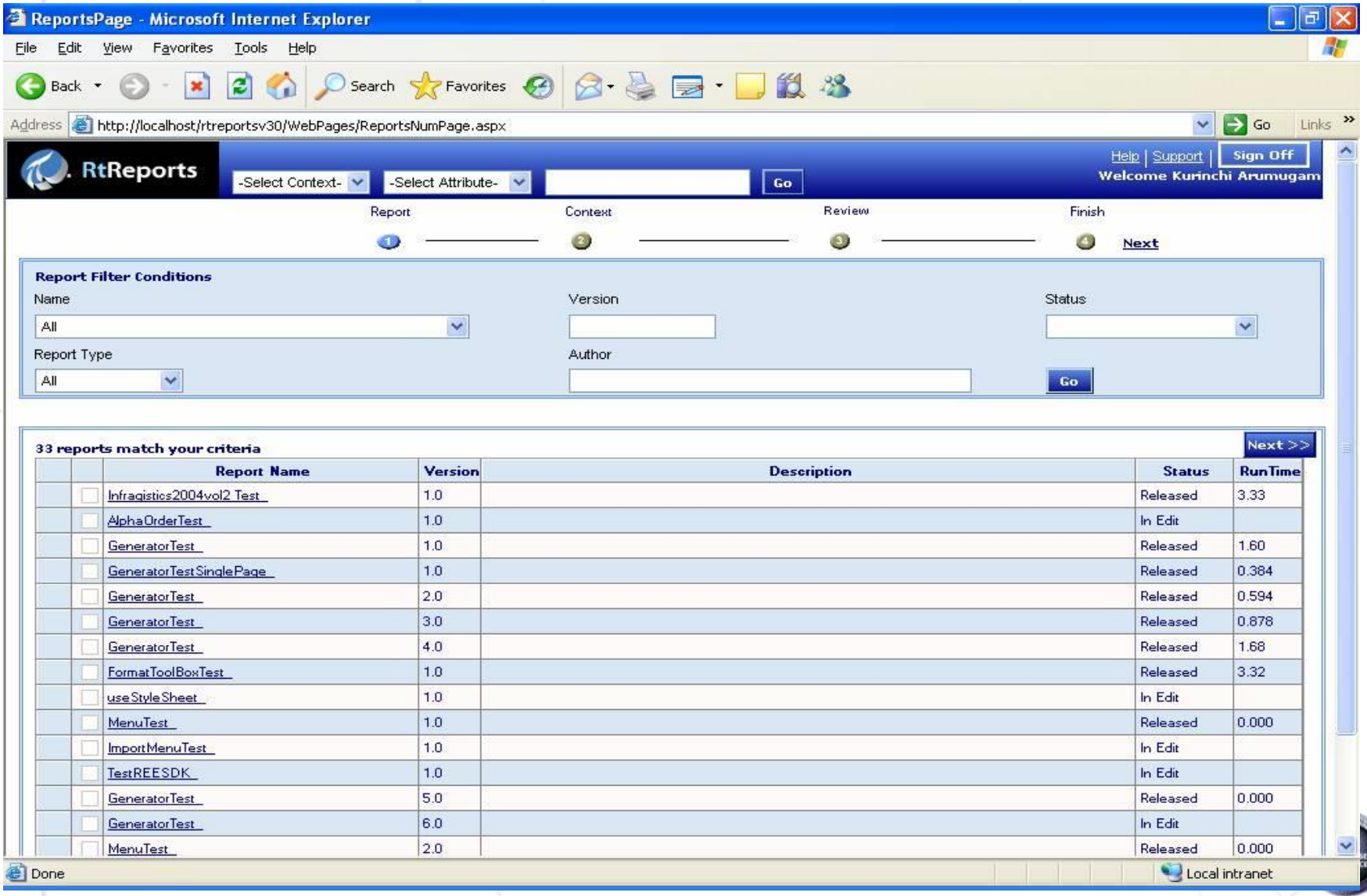
RtReports Benefits

- Data Transparency
  - Reduce variability in reporting because information workers retrieve the information from the same audited source
  - Electronic signatures and workflow provides the necessary accountability for compliance applications
  - A single report will work against a variety of process conditions
- Communication and Collaboration
  - Accelerated product release through automatic comparison with specification data
  - Automated approval workflow shortens sign-off
  - Reports are available on-demand, via a secure Web connection
- Knowledge Management
  - Centralization and version control for reports and report templates
  - Reports can be easily re-run in order to take advantage of updated report templates or updated data

RtReports Version 3.0

- Focused on providing functionality needed to address reporting requirements for Title V and environmental reports.
- Major development items include
  - Time based reports, remove dependency of the batch database
  - Provide summary functions for roll-up
  - Consume RtBaseLine Services for external data sources

New Report Search Page



RtAlerts and AlarmView

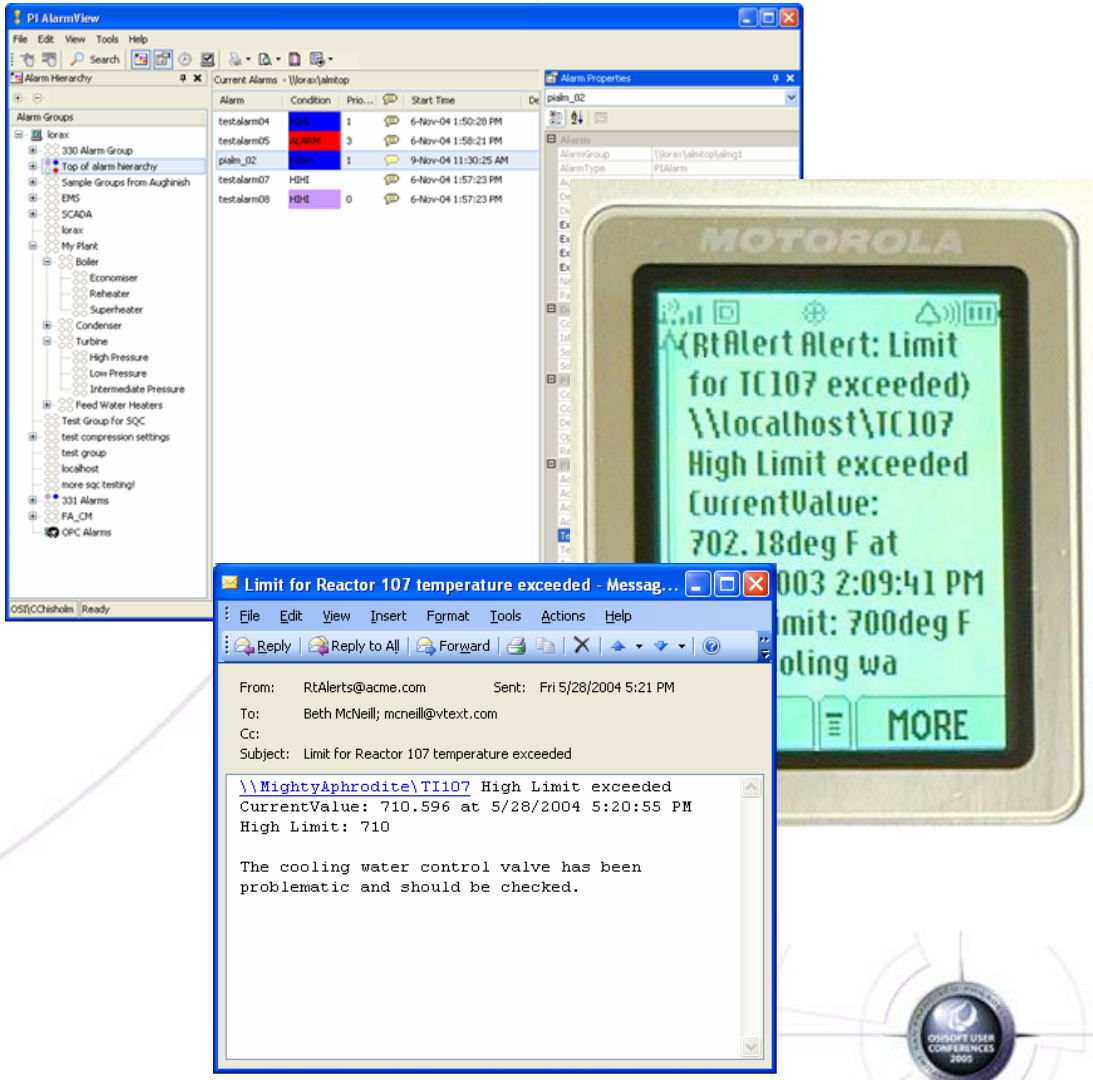
- RtAlerts
  - a server-based notification engine that delivers automated messages to specific contacts via email or pager
  - configured through a friendly client interface and can support all of the RtPM Platform's different types of data
- AlarmView
  - a smart client alarm manager built on the PI System's Alarm subsystem
  - configures alarms based on PI data and expressions and can use RtAlerts as the notification mechanism

RtAlerts and AlarmView Benefits

- Communication & Collaboration
  - Deliver the right notifications to each person in your organization
  - Accelerate problem resolution across time zones and geographic boundaries
  - Notifications can be keyed off of raw data or operational metrics defined in the RtPM Platform
  - Alarms can be acknowledged within a smart client and notifications can be configured in a thin client
  - Notifications can be filtered so that recipients aren't inundated with notifications during an abnormal situation

Proactive Notification

- AlarmView lets you manage alarms from your desktop
- RtAlerts delivers notifications where you are



Customer Case Studies

FDA 21 CFR Part 11 Batch Reporting

OSIsoft.
RtPM

Janssen Pharmaceutical Products LP

Corporate Headquarters: Belgium

Technical Environment:
Microsoft Windows 2000; SQL Server; Dell PC's; SAP

Challenge: To integrate control systems with higher-level business systems, optimize operations performance, reduce batch cycle time, streamline and electronicize quality assurance validation processes, move towards electronic batch reporting, and reduce the risk of not being able to sell our product into regulated markets.

Why OSIsoft Won: RLINK™ is a unique product on the market to integrate plant and business systems, and RtReports™ is a tool with configurable reporting value that Janssen hadn't seen elsewhere.

RtPM Applications:
- Automated Reports
- Baseline Best Practices
- Batch Quality Monitoring/Analysis
- Incident Investigations
- Inventory Management
- Material Usage Tracking
- Process Monitoring
- Product Compliance Monitoring/Reporting
- Production Data Integration to ERP

Benefits:
- Integration of business and manufacturing
- Improved communication enterprise-wide
- Fact-driven decision-making; no guesswork
- More accurate forecasting and budgeting
- Reduction of cycle time
- Reduction of Batch Book from over 100 pages to approximately four
- Easier, faster validation reporting
- More process investigations/improvements
- Improved operating efficiencies

Like many companies, Janssen Pharmaceutical was implementing SAP as their Enterprise Resource Planning (ERP) system. In order to integrate manufacturing data from the plant floor into SAP, Janssen simultaneously installed OSIsoft's Real-time Performance Management (RtPM™) Platform. For the first time, financial people, who had never before had any link to the production floor, were now costing in real time. People in Operations, Engineering, Quality Assurance (QA), Environmental, and Security were able to get multiple views from one data source, resulting in better operational visibility, process improvement, and collaboration. The use of RtPM has led to better decisions and ongoing improvements such as reduced cycle times, improved batch quality and releases, thorough incident investigations, decreased process variability, real-time costing, and better alarm management and security monitoring.

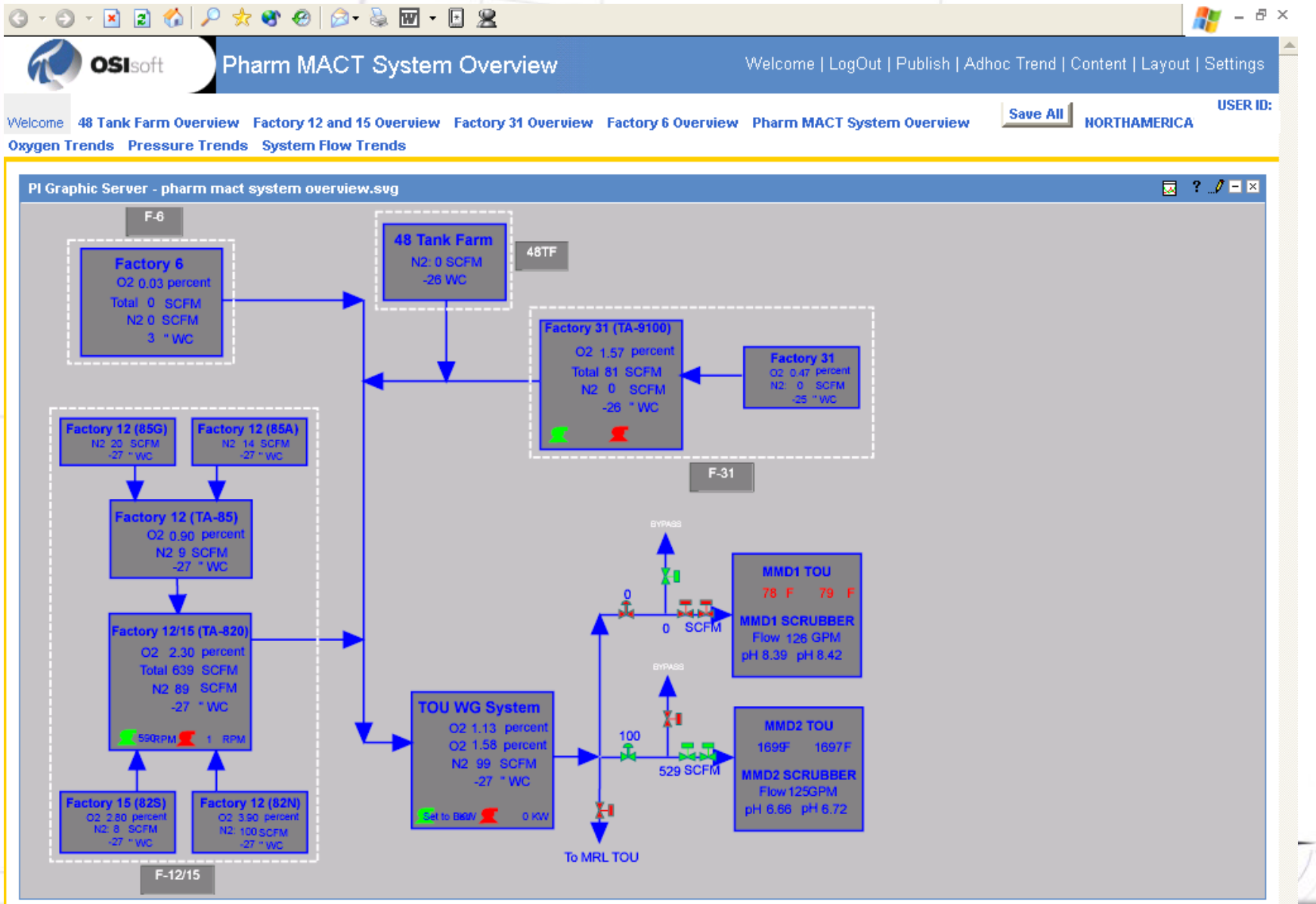
Now, with the implementation of OSIsoft's RtReports product, Janssen can provide quality assurance (QA) with a tool that streamlines the validation process for faster and more accurate compliance monitoring and reporting. The reams of paper with sign-offs and manual inputs from production to QA have been replaced with only a few targeted reports that include batch trends. Production is able to reduce cycle time with configurable, real-time batch performance reporting. Of significant importance to Janssen's business evolution is that RtReports has become a major part of Janssen's progression towards electronic batch records.

RtPM and RtReports have given Janssen the ability to produce a higher-quality, compliant product that enables the company to continue selling into regulated markets — a challenge all pharmaceutical companies face.

"The biggest risk in this organization is that we lose the ability to sell our product into regulated markets. RtReports is directly addressing the number one risk we face."

Vincent Walshe
Systems Integration Co-ordinator
Janssen Pharmaceutical

EPA Pharm MACT



Continuous Emissions Monitoring

OSIsoft.
RtPM

Korea Hydro & Nuclear Power Co., Ltd.

Corporate Headquarters:
Seoul, Republic of Korea

Technical Environment:
Intel, Microsoft, Cisco, Informix

Challenge:
Find an enterprise-level, unifying real-time platform that the environmental monitoring group could use to monitor and manage emissions from KHNP's nuclear power plants. Ensure that the company meets Korean environmental guidelines and provides continuous data to local communities were key requirements.

Why OSIsoft Won:
OSIsoft is a reliable, SAP-certified partner providing a bi-directional link between the production floor and SAP business applications, giving KHNP a seamless flow of information from the production units to business management.

RtPM Applications:
- Continuous Emissions Monitor
- Corporate Data Warehouse
- Environmental Compliance Monitor
- Manual Data Recording
- Plant Performance Overviews
- Power Turbine Trip Monitor
- Process Performance Analysis
- Production Data Integration to ERP
- Waste Treatment Monitor
- Weather Data Import

Benefits:
- Unifies previously separate and independent environmental monitoring systems at each of the plant sites
- Gives environmental engineers real-time information to help in identifying process abnormalities and determining the corrective action
- Integrates with SAP for synchronized data from the boardroom to the plant floor
- Provides the local community with Web-based information and updates on the nuclear plant's environmental emissions, thereby improving KHNP's public image

Korea Hydro & Nuclear Power Co. monitors environmental emissions with Real-time Performance Management from OSIsoft

Formed in 2001 as the result of a government initiative to create competitive subsidiaries in the power generation industry, Korea Hydro & Nuclear Power Company (KHNP) needed to monitor different variables at its multiple nuclear power facilities. KHNP also wanted to actively manage the changing business conditions in Korea. There was increasing public and government concern about safety and the environmental impact of nuclear power. Residents in the towns surrounding the plants were demanding greater transparency of operations and systems. Additional requirements were to enhance the efficiency of information between facilities and integrate plant data with the company's SAP Enterprise Resource Planning system. To solve information access and transparency problems, KNHP chose the Real-time Performance Management™ (RtPM™) Platform from OSIsoft®.

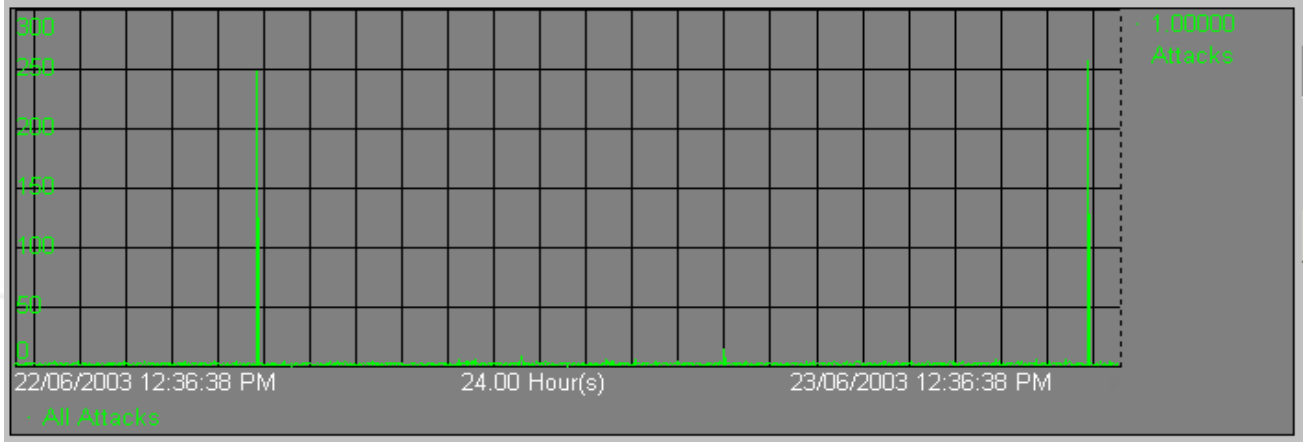
B.S. Lim
Assistant Manager
Radiation and Environment Management
Korea Hydro & Nuclear Power Co., Ltd.

"We have established information sharing at the highest level, as well as enhanced productivity, secure collaboration, operational transparency and reliability, and created an image of integrity and safety to the public. Best of all, the RtPM Platform is easy to use and maintain and we continue to find more ways to use it."

NERC 1300
Section 1304: Perimeter and Access Control Monitoring

PIX 515 - Attack Details

Attacks



1. Choose an Attack Type

All Attacks

2. Click the Button

List Messages

3. Messages with the selected IDS signature are listed below

Date	Time	Message
22/06/2003	12:35:54	PIX-4-400013: IDS:2003 ICMP redirect from 203.161.112.8 to 203.161.112.10 on interface outside
22/06/2003	12:39:29	PIX-4-400024: IDS:2151 Large ICMP packet from 203.161.116.2 to 203.161.127.131 on interface outside
22/06/2003	12:40:18	PIX-4-400024: IDS:2151 Large ICMP packet from 203.161.116.2 to 203.161.127.131 on interface outside
22/06/2003	12:42:17	PIX-4-400024: IDS:2151 Large ICMP packet from 203.161.116.2 to 203.161.127.195 on interface outside
22/06/2003	12:42:18	PIX-4-400024: IDS:2151 Large ICMP packet from 203.161.116.2 to 203.161.127.195 on interface outside
22/06/2003	12:53:01	PIX-4-400024: IDS:2151 Large ICMP packet from 207.88.54.34 to 203.62.199.10 on interface outside
22/06/2003	12:53:52	PIX-4-400013: IDS:2003 ICMP redirect from 203.161.112.8 to 203.161.112.10 on interface outside
22/06/2003	12:58:03	PIX-4-400013: IDS:2003 ICMP redirect from 203.161.112.8 to 203.161.112.10 on interface outside
22/06/2003	12:58:29	PIX-4-400013: IDS:2003 ICMP redirect from 203.161.112.8 to 203.161.112.10 on interface outside
22/06/2003	12:58:45	PIX-4-400024: IDS:2151 Large ICMP packet from 209.247.108.228 to 203.62.199.10 on interface outside
22/06/2003	13:00:50	PIX-4-400024: IDS:2151 Large ICMP packet from 216.139.159.4 to 203.62.199.10 on interface outside
22/06/2003	13:02:04	PIX-4-400012: IDS:2002 ICMP source quench from 203.162.29.34 to 203.161.127.111 on interface outside

ISO 9001, Six Sigma, OEE, KPIs

OSIsoft.

RtPM

QNI

YABULU REFINERY

QNI uses OSIsoft's RtPM Platform to control refinery operations and gain 41 percent IRR in 3.5 years

Until a few years ago, QNI's cobalt/nickel refinery in Yabulu, Australia, used manual process-recording methods. Process engineers found it difficult to determine the influence of variables on product quality, and to generate timely reports for management. Management was frustrated by the challenges of accounting for monthly reconciled recovery, determining where losses occurred, and tracking quality by batch.

To gain control over its operations and processes, QNI needed to track key performance indicators (KPIs) and overall equipment effectiveness (OEE). Though QNI already had a functioning A88 distributed control system, it couldn't store process data for more than three weeks — not really long enoughto track production records and monitor KPIs. Faced with ISO 9001 compliance and the need to implement Six Sigma in its manufacture of high-grade nickel and cobalt products, QNI chose OSIsoft's solution to combine production data from its six business units with their total of eight separate control rooms.

RtPM allows QNI to align products with specs, meet ISO 9001 quality assurance requirements, begin Six Sigma projects, and — best of all — pay off the capital and engineering costs of the Real-time Performance Management Platform™ (RtPM™) in 3.5 years. The system tracks KPIs and OEE, reduces scrap and risk, and stores shift logs electronically rather than on paper. It tracks plant operating conditions required for ISO 9001, warns operators when process conditions vary from setpoints, and lets management proactively resolve potential problems.

Corporate Headquarters:
Queensland, Australia

Challenge: QNI faced an unavoidable need for major improvements in process software and control equipment. Replacement costs for QNI's complex facility were in excess of $1 billion. QNI needed a high-performance IT infrastructure to standardize on an overall operations approach, maximize existing plant output, improve work processes and efficiencies, reduce waste, and meet customer expectations.

Why OSIsoft Won: The RtPM Platform builds on OSIsoft's industry-leading PI System™ data engine by providing an integrated product family that makes critical, actionable operations information visible across all levels, enterprise-wide.

RtPM Applications:

- Alarm Management
- Automated Reports
- Balanced Scorecards
- Baseline Best Practices
- Batch Quality Monitor
- Data Reconciliation
- Downtime Monitoring
- Key Performance Indicators (KPI)
- Lab Quality Data Integration
- Material Balance
- Quality Monitoring/Analysis
- Six Sigma
- SPC/SQC Production Quality Control
- Total Effective Equipment Productivity

Benefits:

- Real-time quality measurement results ensure high-quality cobalt production
- Achieved 9001 certification Quality Assurance/ Six Sigma goals
- Minimized downtime
- Automatically generated maintenance notifications in SAP
- Validated production information; verified data quality; monitoring and reporting of exactly where losses occur; calculation of monthly reconciled recovery

Dave Hunter
Group Leader of Metallurgical Accounting, QNI

"We've used the RtPM Platform to benefit our operations in many ways — from tracing product quality to justifying Six Sigma process improvement projects. The RtPM Platform has accomplished more than we set out for it, and we've easily achieved an initial rate of return (IRR) on our

OSIsoft Compliance Architecture Summary

Drive Operational Efficiency

- Built-in auditing reduces operational risk
- Configurable applications require no programming
- Flexible, rule-based reporting delivered via the Web

Accelerate Decision Making

- Compliance data collected from disparate sources
- Enterprise wide architecture to share best practices
- Composite view of enterprise risk

Enable Performance-Driven Manufacturing

- Delivering a single version of the truth
- Fuel critical, informed, profitable actions

OSIsoft's RTPM delivers a comprehensive compliance architecture for today's regulated industries.