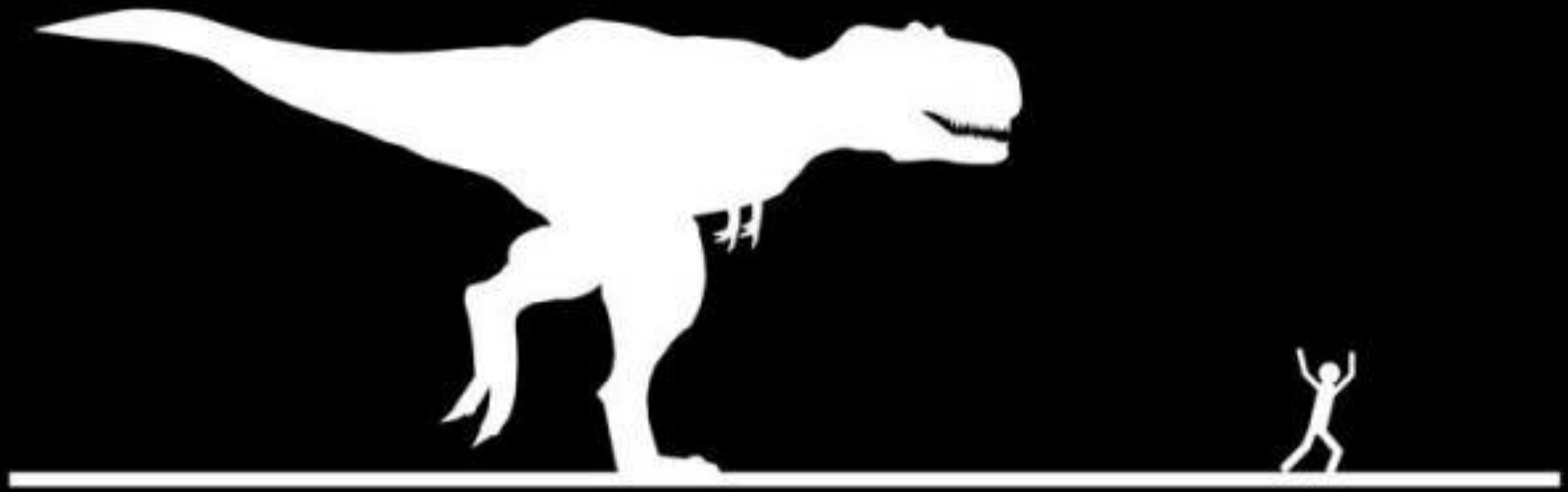
OSIsoft®

REGIONAL SEMINARS 2012

The Power of Data

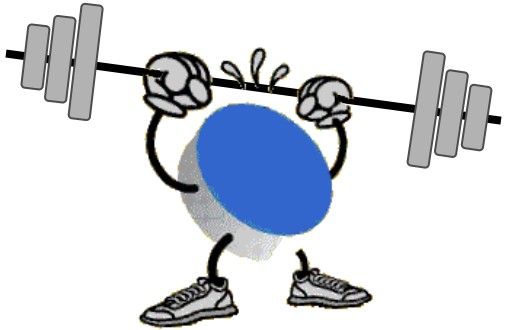
Infrastructure for Streaming Data and Events: The PI System

Presented by **Mariana Sandin**



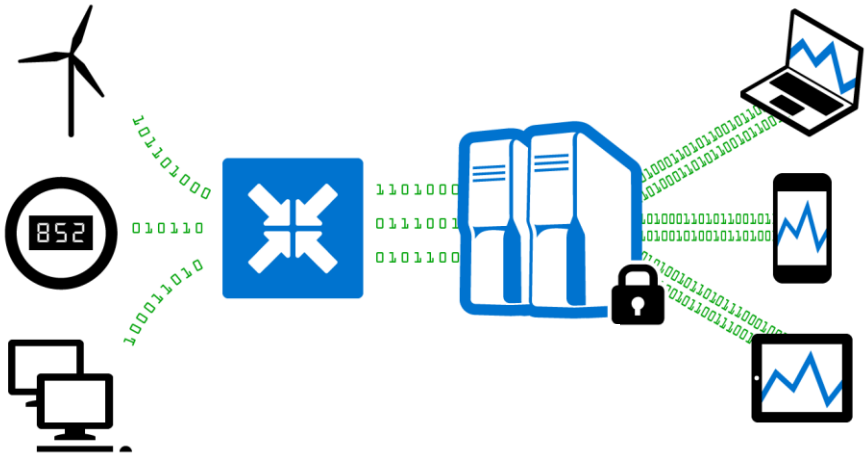
Rank order the following

- Telephone (voice)
- Water
- Gas
- Electricity
- Internet (Broadband)
- Transportation

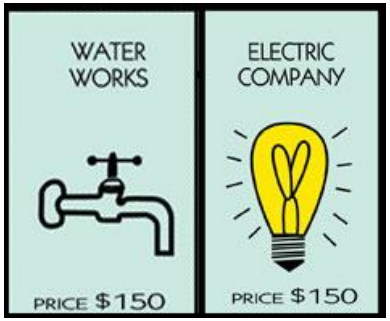


Was Internet last?

1. Water
2. Electricity
3. Internet (Broadband)
4. Transportation
5. Gas
6. Telephone (voice)



Data as a Utility



In 2012 it is a general expectation that data about almost anything will be available without a lot of friction

Characteristics of an Infrastructure

Challenge 1

Information necessary to solve problem is located in many systems which are not compatible with one another.

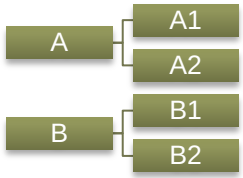
Challenge: Heterogeneous Data Landscape

Data Types

Time Series

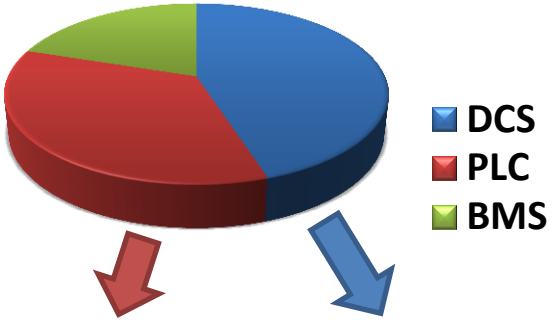
Relational

Hierarchical

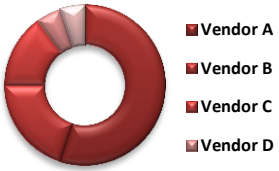


Unstructured

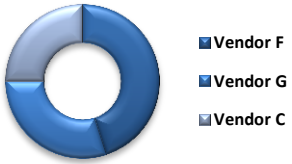
Process Control Systems



PLC Vendors



DCS Vendors



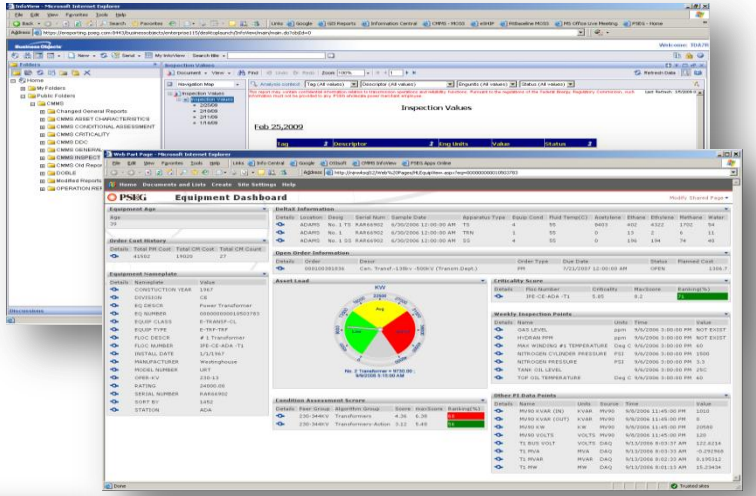
Geography

PSE&G: Condition Based Maintenance

"We get a detailed breakdown on equipment costs and man/hours to service that gives us important business benefits. Without the use of the PI System, it would have taken us several months to gather and analyze the information."

Angela Rothweiler Principal Engineer

PSE&G



Customer Business Challenge

- Providing the highest reliability Power Distribution is requirement
- Minimize Maintenance Costs
- Combine financial with operational data

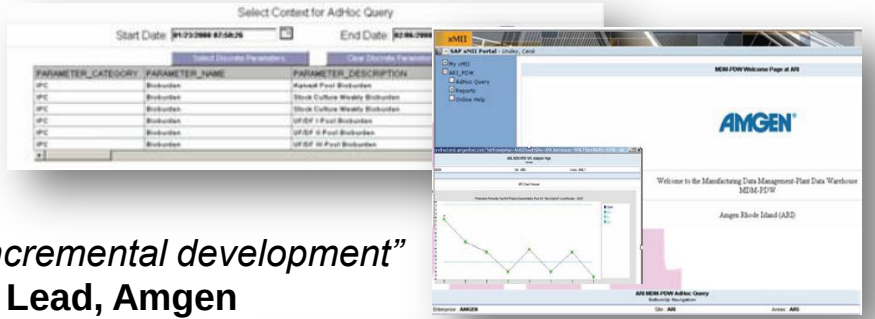
Solution

- Implemented automatic data collection and notifications to SAP PM
- Set up standard business rules for condition based maintenance using the PI System Analytics
- Provided focused view into equipment

Customer Results / Benefits

- Holds Reliability award for Mid Atlantic States for last 7 years
- Named most reliable Power Company in America
- Focused maintenance expenditures on needed targets

Amgen: Paving the Road to Plant Data Integration



"We wanted to establish an architecture that enabled future incremental development"
Robert Gamber -- Principal Engineer, Platform Lead, Amgen

Customer Business Challenge

- Expedite the Commercialization Process by reducing engineering and conformance runs required
- Improve Operational Effectiveness through Increased ROA yields and success rates
- Increase Quality by identifying root cause to build quality into the process
- Deliver business and operational information better, faster, cheaper → The Perfect Plant

Solution

- Implemented the PI System as data historian and analytical engine.
- Used SAP's MII as the user interface and reporting and display tool for operators to interact with business data and product schedules
- Leveraged data in existing source systems to reduce risks associated with data replication – 85% of MII data came directly from Amgen's plant PI Systems.

Customer Results / Benefits

- Able to provide operations with a "validated" single window of truth
- Provided a standard, repeatable manufacturing process characterization, monitoring and optimization by:
  - Optimize Process Improvements
  - Troubleshoot Process Issues
  - Resolve Non-conformance
  - Monitor in-process Control
  - Troubleshoot operational issues

Challenge 2

Solving problems without a data infrastructure often means having to compromise on several fronts – fidelity of data, sampling rate, behaviors, scaling, stability etc.

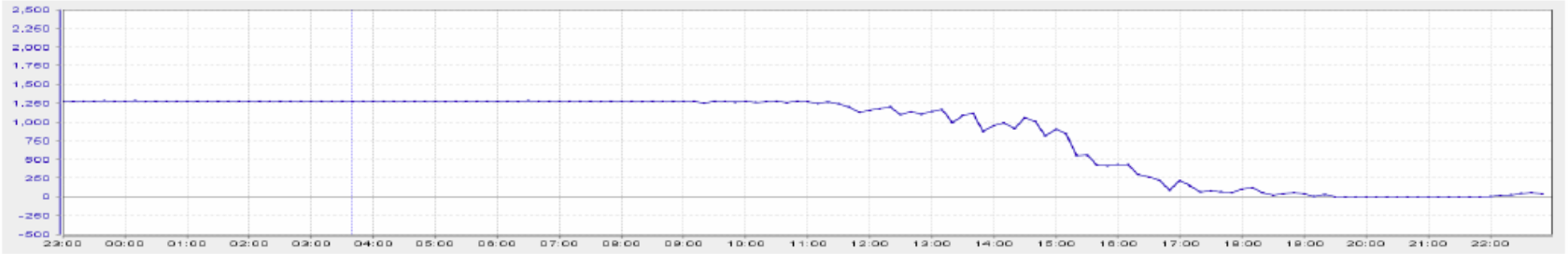
Suzlon Group

- Global Wind Turbine Manufacturer
- 5th largest Wind Turbine OEM
- 18+ GW Installed capacity around the world
- Current annual manufacturing 5.9 GW
- 2.5 GW and 1274 WTGs in the US

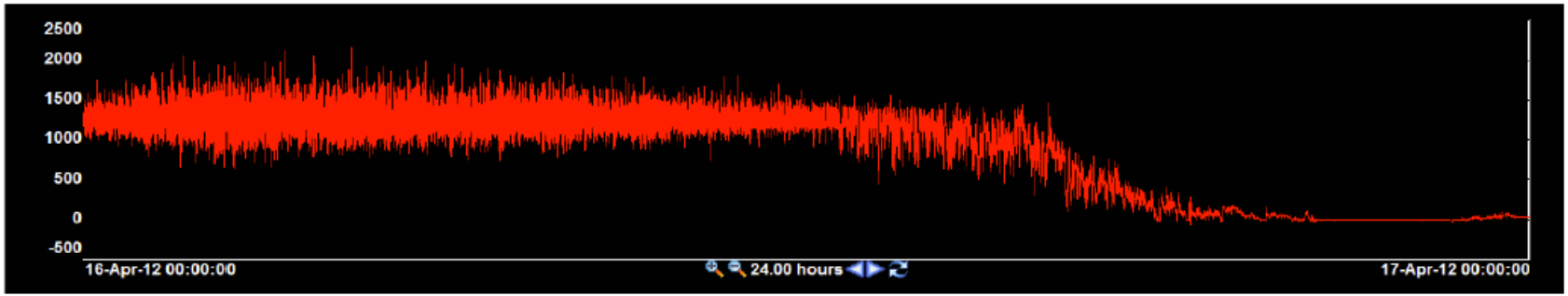
What could you be missing?

Active Power - 10 minute vs 1 second sampling

SCADA



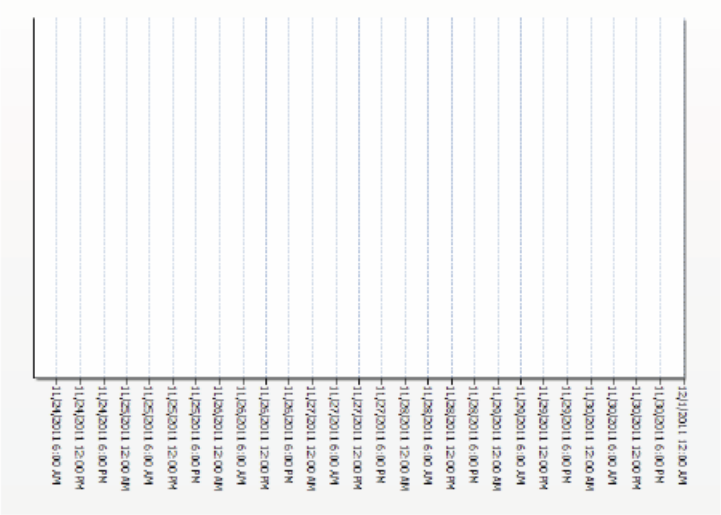
PI



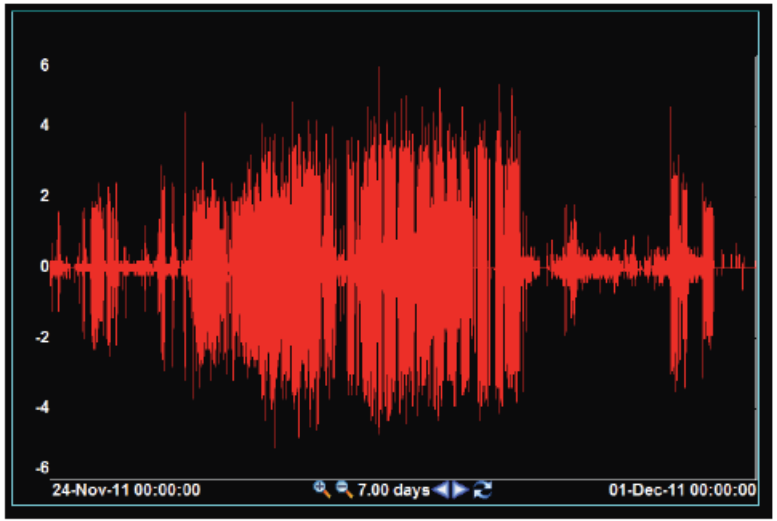
Even better …

10 minute drive train vibration data vs. 1 second data…

SCADA:



PI System:



Suzlon: Direct to Controller Integration Using OPC

SUZLON
POWERING A GREENER TOMORROW

"Having all analog values, digital states, fault states, user info, controller KPIs, and parameter settings adds a significant amount of value to a PI System."

Chris Wozniak – Senior SCADA Engineer, Suzlon

Customer Business Challenge

- Park visibility was limited.
- System of processing event and statistical logs was difficult to work with disconnected systems for reporting limited to only 10 minute average data and pre-canned reports
- Faults and warnings required manually created notifications

Solution

- Implemented a PI System to store and report using high fidelity data
- Created custom dashboards and reports and shared them enterprise wide using SharePoint and PI Clients
- Create automatic fault notifications with custom content

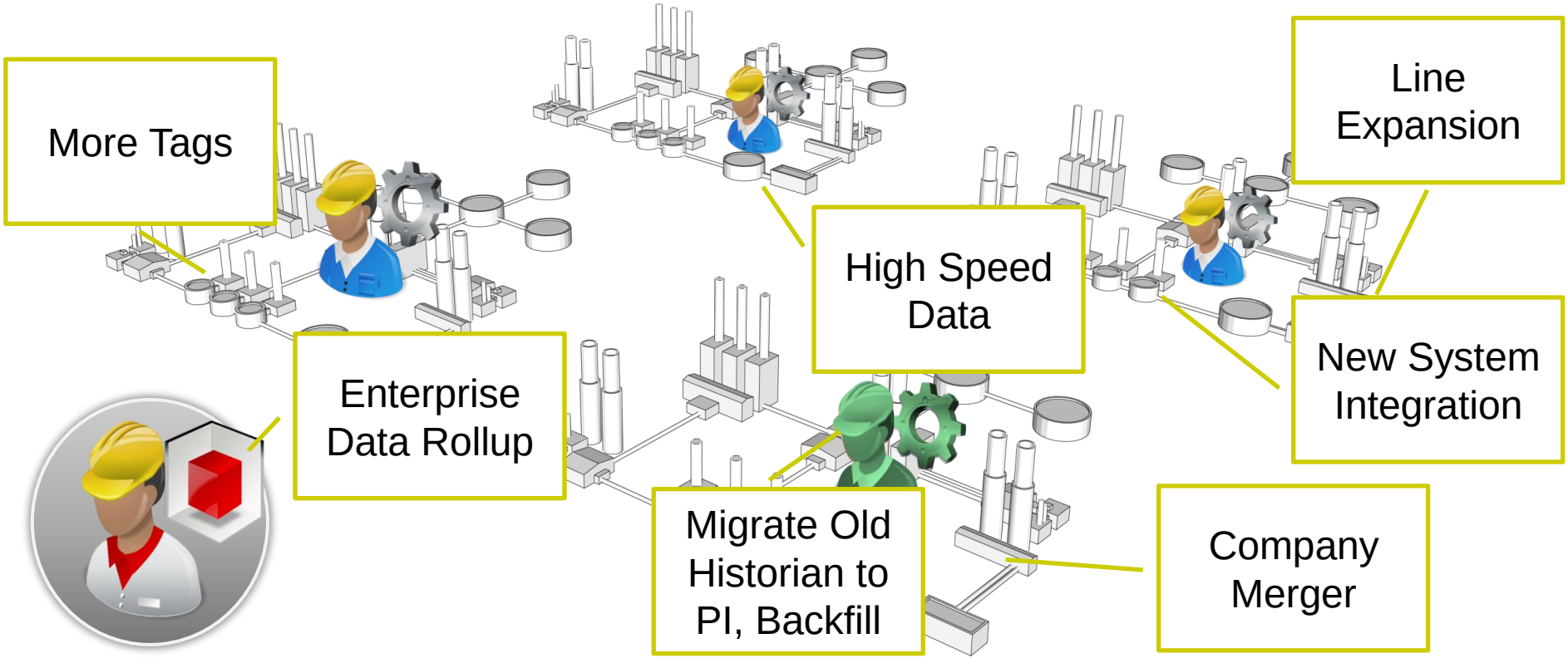
Customer Results / Benefits

- Reduced manpower needed to resolve alerts freeing them up for higher value functions
- Ability to visualize and respond to new types of events and alerts
- Switched to Proactive modes using KPIs and ACE calculation vs only reactive modes

Challenge 3

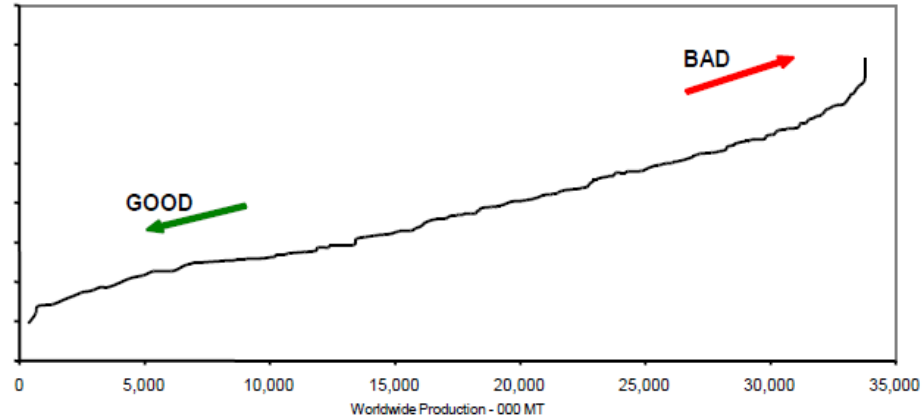
Business evolves over time. Change arrives in the form of expansion, acquisition, people, leadership, market, and passing knowledge from one generation to the next.

Change, business as usual



Aluminum Smelting Economics

Energy is 30-40% of Aluminum Production Costs….



Worldwide Smelter Cash Production Costs

Warrick Operations is Alcoa's Largest Operating U.S. Smelter

- 330,000 MT capacity/year

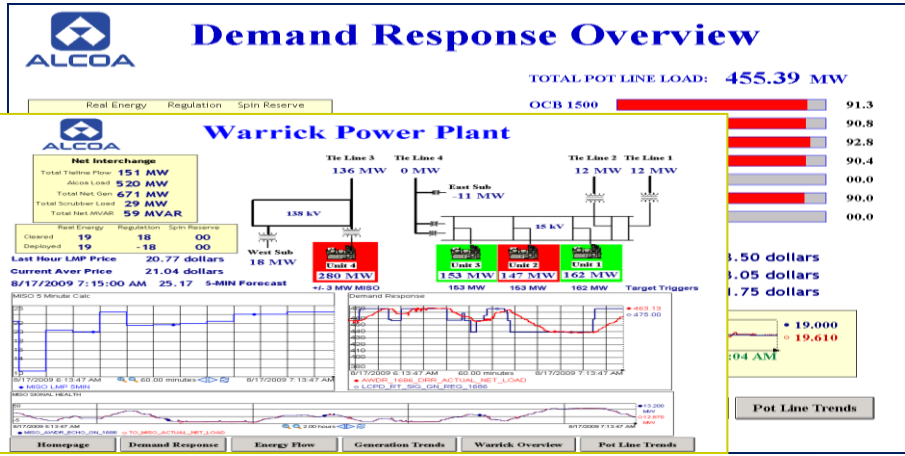
Competition in a Worldwide Commodities Market….

POWER & UTILITIES

Alcoa: Industrial Scale Demand Response

Warrick is Alcoa's Largest Operating US Aluminum Smelter

- 330,000 MT capacity/year
- Energy is 30-40% of Aluminum Production Costs
- Generate power for Smelter & Rigid Packaging



Brian Helms
Power Markets Coordinator
Alcoa Power Generation

ALCOA

Customer Business Challenge

- Worldwide commodities price competition
- Older (1960s) facility
- Business took a major hit due to economic downturn
- Needed to find a way to sustain the business & keep from going under

Solution

- Use PI for energy regulation – Sell generated electricity back into Midwest ISO (MISO)
- Monitor MISO for energy demand notifications, and respond accordingly
- Submit forecasted load data from PI
- Focused on selling regulation (20MW) and spinning reserve (40MW)

Customer Results / Benefits

- Total project cost was $700,000
- Project payback was in 4 months
- System runs efficiently
- Gets a weekly check from MISO for the power they generate in the grid
- Use this money to sustain their Aluminum business
- Revenue now above competition

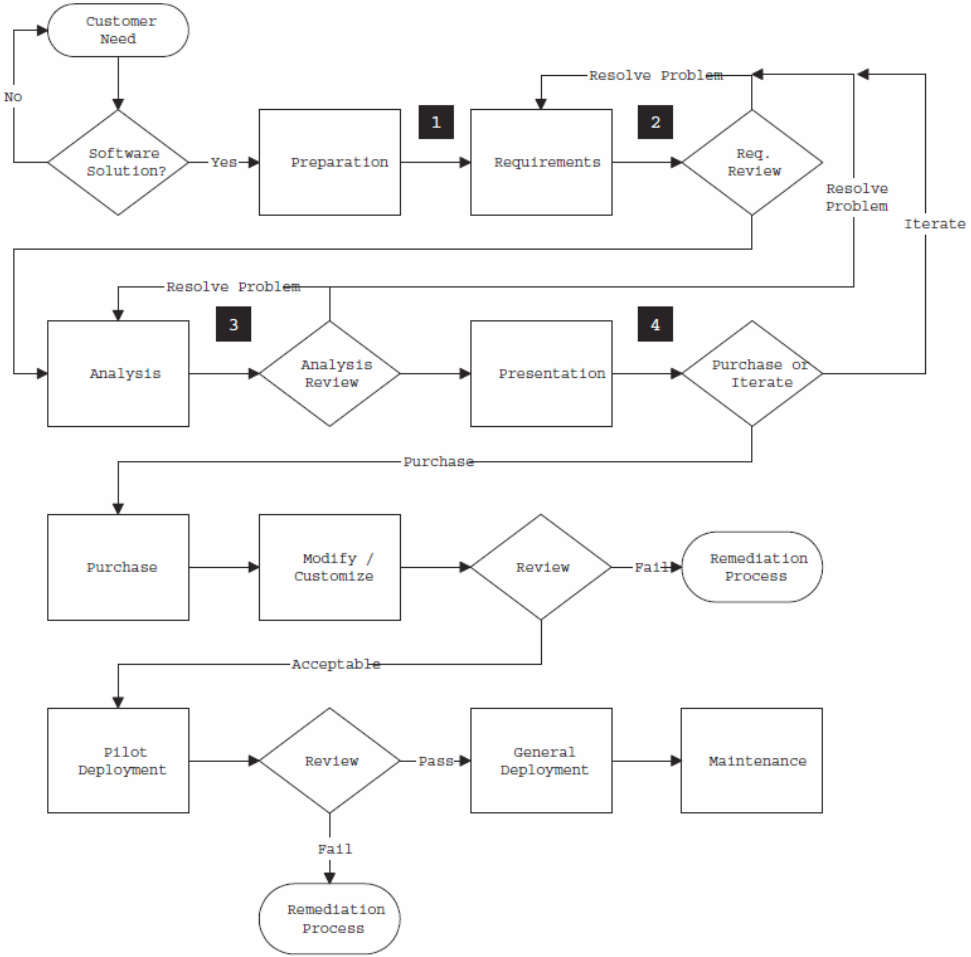
Challenge 4

Procurement costs and change costs for software are expensive -- money and time -- and the probability of success decreases with each additional system. N+1.

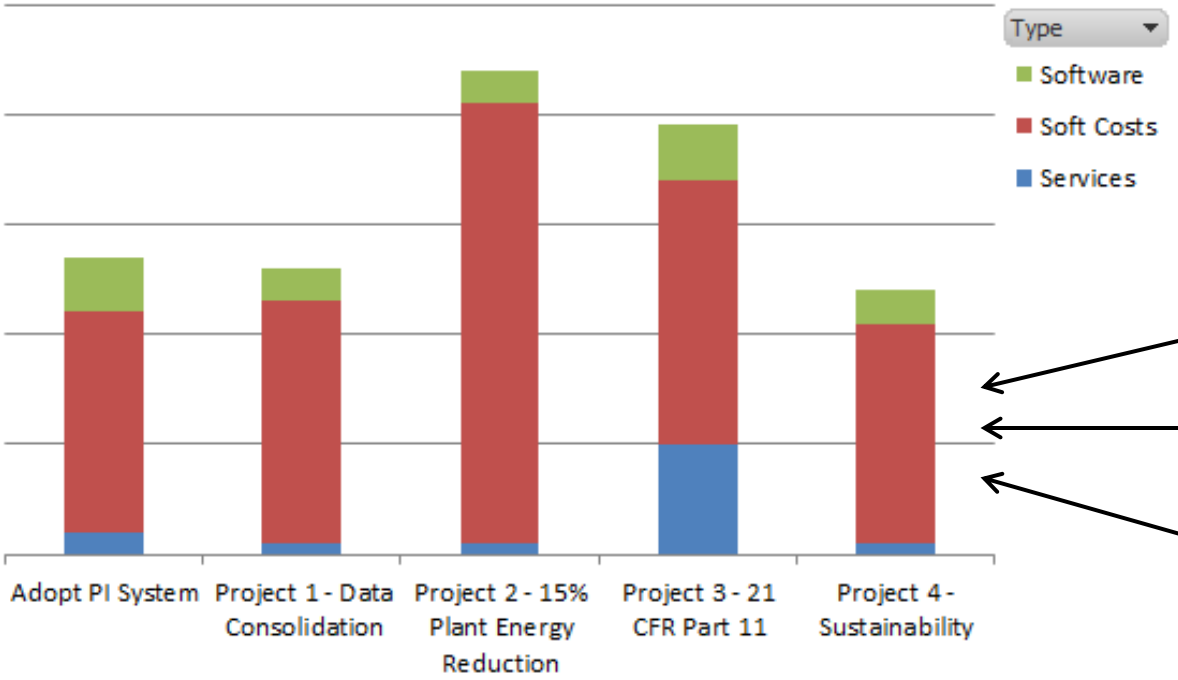
"Small agile beats big slow--big agile beats everything."

Information Week 2011, Top 10 CIO Priorities http://www.informationweek.com/global-cio/interviews/top-10-cio-priorities/

Fun Stuff



Beware of Soft (not Software) Costs



x 4

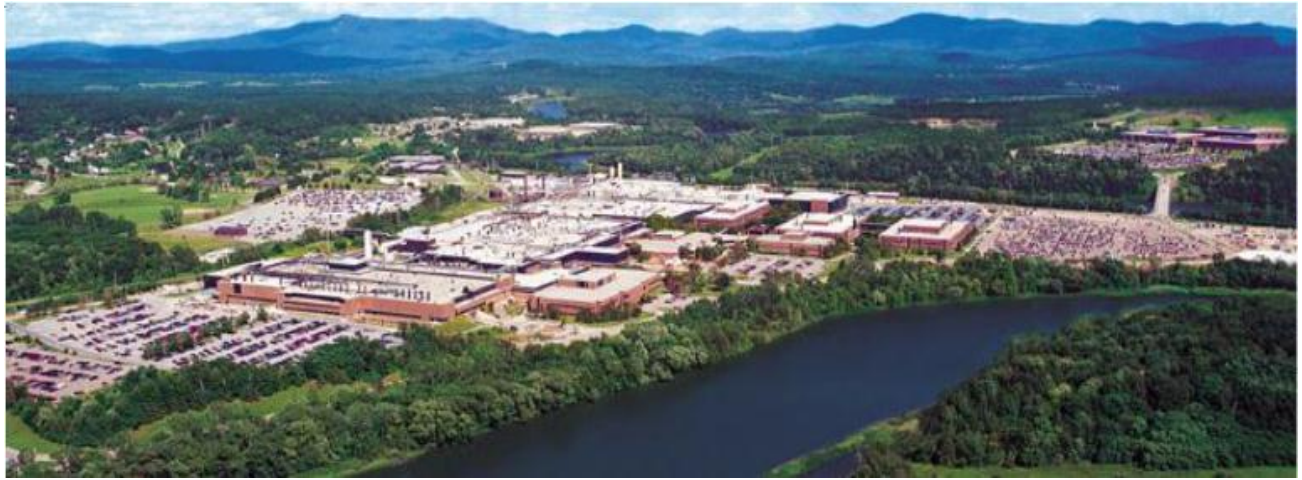
Employee Education

Procurement

Process Changes

IBM Vermont “A Smart Enterprise”

Water Use
- Fed from regional High Service Mains
- 3.2 MGD (similar to the City of Burlington)
- 2 MGD Ultra Pure Water
- 3 MGD Waste water treatment



Electrical Use
- Transmission Line Fed
- Own and operate Electrical Grid (similar to a Utility)
- Peak 65 Mega Watts (larger than Burlington)
- 60 miles high voltage lines
- 136 substations

SMART Attributes
- 60,000 field pts
- 700 PLCs
- 75 Work stations
- 5 servers
- Advance data analysis
- Load management
- Cost Control
- Quality

Center of Excellence for Enterprise Operations

Advanced Water Management: SMART and Sustainable

Close Supplier Relations

Kinetic Energy Recovery

Ultra Pure Water Treatment Efficiency

Instrumented – Obtain and collect real time data

Interconnected – Data analysis and visualization

Intelligent – Analysis becomes action, transform how we operate

Heat Energy Recovery

Manufacturing Use Efficiency

Smarter water for a smarter planet

Stewards of the Resource

Waste Water Treatment

IBM (200 nm Water Fabricator Burlington, Vermont)
Advanced Water Management

"IBM has achieve over $3.6MM in annual savings, reduced water usage by 27% while increasing manufacturing capability over 30%

Customer Business Challenge

- Reduce water consumption (and associated need for energy, chemicals, maintenance, and labor to reduce operating cost and minimize environmental impacts
- Monitor water usage and improve efficiency

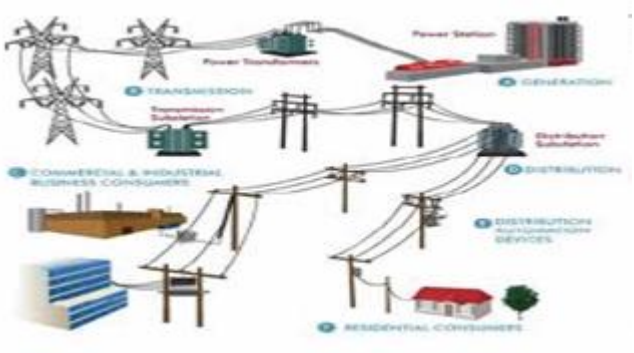
Solution

- Implement Data Collection and Storage infrastructure (sensors, servers, and PI)
- Apply statistical process control techniques to operational data
- Change behavior via 6 sigma methodology and KPI dashboards

Customer Results / Benefits

- Identified process improvements to reduce electrical and water usage.
- Increased production capacity and reduced overall costs.

Future Phases



Phase 1: Customer Usage Focus
- Usage data to promote awareness
- Combine with energy management programs at IBM

Phase 2: Customer and Renewables
- Enhanced analysis of usage data
- Bring renewable generation data online
- Promote cultural change

Phase 3: Transmission, Distribution and Generation Focus
- Improve reliability, efficiency, and customer service
- Analyze distribution efficiency
- Forecast renewable generation and purchasing

Challenge 5

Preserving and enhancing knowledge is key to success. Infrastructure is forever, people and spot solutions are not.

More Data Challenges

Harder to Search & Find Information

Speaking Different Languages

External Data Sources

Homosapien Spreadsheet Data Integration

Multiple Versions of the Truth

Nalco Company:

Essential Expertise for Water, Energy, and Air℠

- World's leading process improvement company
- 70,000 customers in more than 130 countries
- 75 years of experience in the hydrocarbon industries

Nalco's Value Proposal

"This solution allows us to offer our customers high-quality performance data, and allows them and our service engineers to optimize treatment programs for maximum cost/performance and sustainability credits, as well as benchmark their operations ."

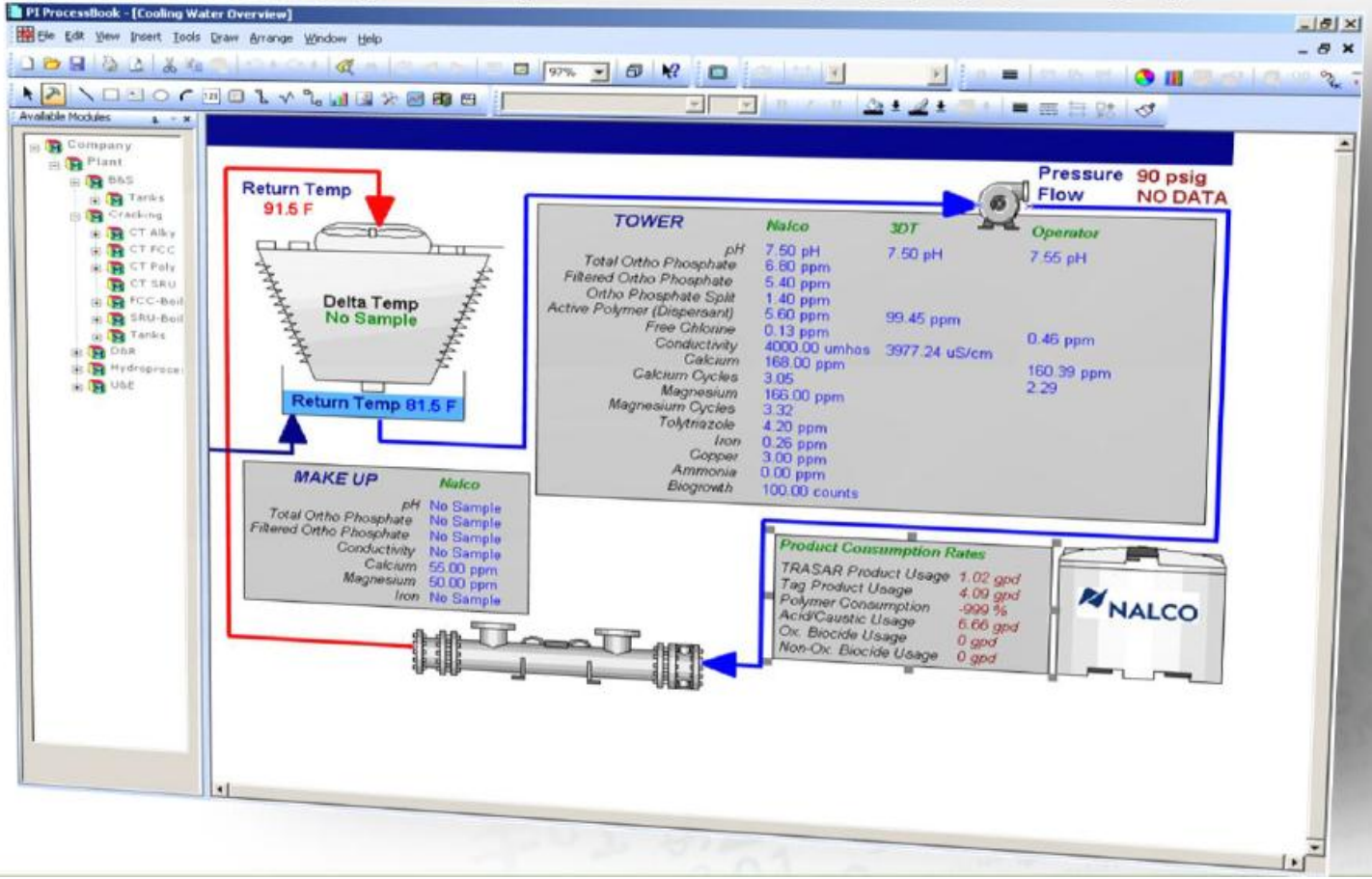
- Visibility Across Customer Chain
- Software + Services
- Enabling People to Provide Value-Add

The Result: Dynamic Access to Real-Time Data

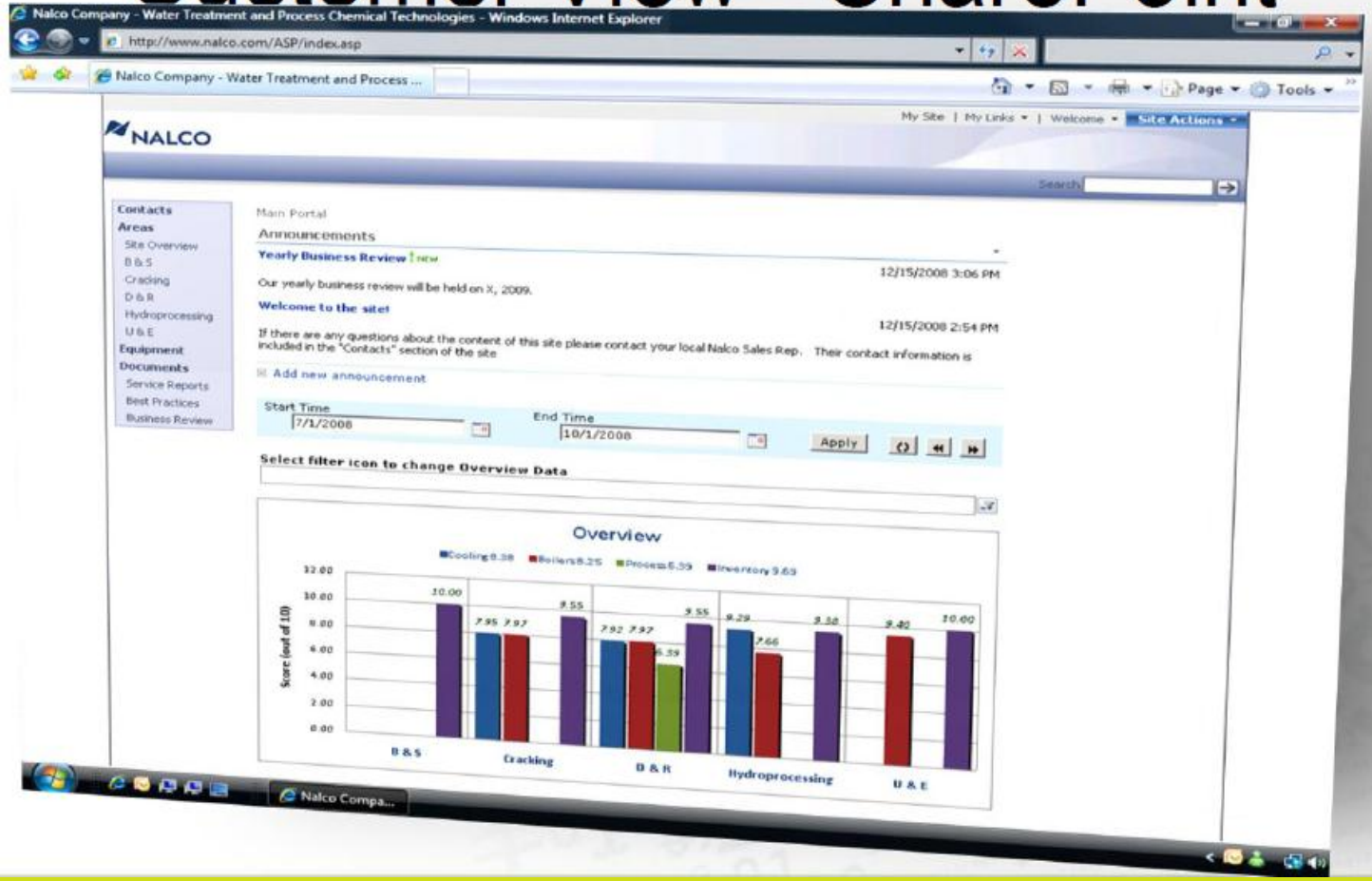
- Integration of Nalco and Customer data to provide the whole picture
- Condition-based maintenance and performance optimization
- Role-based visibility into plant operations and performance
- Summary and KPI information to customers and Nalco management
- Client-based tools to provide plant engineers with additional customized information analysis

Put the results in customers hands to bring greater value to the service Nalco provides

Nalco View - ProcessBook



Customer View - SharePoint

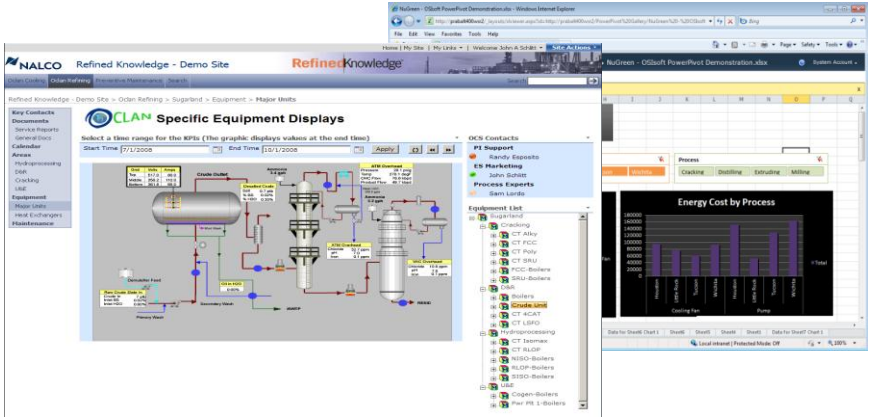


The Nalco Refined Knowledge offering combines the best of the three industry leaders:

- OSIsoft's Operational Infrastructure
- SharePoint and PI System
- Nalco as the Solutions Provider

John Schlitt - Business Manager

Automation COE, Nalco



Customer Business Challenge

- Process data held in various "islands of information"
- Performance data was collected manually
- Personal Service Reports (PSRs) were time-consuming
- The goal: centralize data collection to bring greater value to the service Nalco provides

Solution

Used OSIsoft's Operational Infrastructure

- Central Data Collection
- Tech View & Analysis
- Calculation Engine
- Value Generation Tool
- PI Notifications & OCS = real-time alerting

Customer Results / Benefits

- Centralized data collection
- Condition based maintenance and performance optimization
- Role-based visibility into plant operations and performance
- On-demand Summary and KPI info to customers and Nalco
- Actionable data now at customer's fingertips

Challenge 6

Regulatory evolution and sustainability initiatives are driving the need for data for reporting and accountability.

What has changed

- Clean Air Act
- FERC
- NERC CIP
- Sarbanes Oxley
- 21CFR Part 11
- OSHA Cal/OSHA

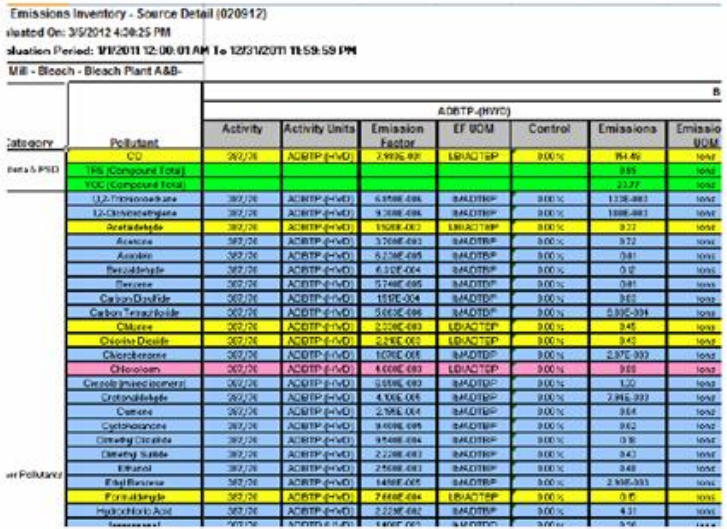
PULP & PAPER

International Paper

Environmental Monitor: Automation Journey

"The CEMR system allowed us 30 days to analyze data before (Information Collection Request) deadline."

INTERNATIONAL PAPER


Emissions Inventory - Source Detail (020912)

Mill - Bleach - Bleach Plant A&B-

Pollutant	Activity	Activity Units	Emission Factor	EF UOM	Control	Emissions	Emissio UOM
CO	282726	ADBTP-(HVD)	2.993E-001	LB/ADTBP	0.00 %	84.69	tons
TPE (Compound Total)						0.89	tons
VOC (Compound Total)						23.27	tons
1,2,Trimethylbenzene	282726	ADBTP-(HVD)	6.958E-006	LB/ADTBP	0.00 %	1.33E-003	tons
1,3-Dimethylpyrene	282726	ADBTP-(HVD)	9.308E-006	LB/ADTBP	0.00 %	1.99E-003	tons
Acetaldehyde	282726	ADBTP-(HVD)	1.160E-003	LB/ADTBP	0.00 %	0.33	tons
Acetone	282726	ADBTP-(HVD)	3.769E-003	LB/ADTBP	0.00 %	0.72	tons
Acrolein	282726	ADBTP-(HVD)	6.236E-005	LB/ADTBP	0.00 %	0.01	tons
Benzaldehyde	282726	ADBTP-(HVD)	6.315E-004	LB/ADTBP	0.00 %	0.12	tons
Benzene	282726	ADBTP-(HVD)	9.744E-005	LB/ADTBP	0.00 %	0.01	tons
Carbon Dioxide	282726	ADBTP-(HVD)	1.51E-004	LB/ADTBP	0.00 %	3.63	tons
Carbon Tetrachloride	282726	ADBTP-(HVD)	5.663E-006	LB/ADTBP	0.00 %	0.00E-309	tons
Chlorine	282726	ADBTP-(HVD)	2.228E-003	LB/ADTBP	0.00 %	0.45	tons
Chlorine Dioxide	282726	ADBTP-(HVD)	2.24E-003	LB/ADTBP	0.00 %	0.43	tons
Chlorobenzene	282726	ADBTP-(HVD)	1.03E-005	LB/ADTBP	0.00 %	2.97E-003	tons
Chloroform	282726	ADBTP-(HVD)	4.00E-003	LB/ADTBP	0.00 %	0.83	tons
Cresols (mixed isomers)	282726	ADBTP-(HVD)	0.559E-003	LB/ADTBP	0.00 %	1.20	tons
Crotonaldehyde	282726	ADBTP-(HVD)	4.30E-005	LB/ADTBP	0.00 %	2.94E-003	tons
Cumene	282726	ADBTP-(HVD)	2.39E-004	LB/ADTBP	0.00 %	0.04	tons
Cyclohexanone	282726	ADBTP-(HVD)	9.469E-005	LB/ADTBP	0.00 %	0.02	tons
Dimethyl Disulfide	282726	ADBTP-(HVD)	9.748E-004	LB/ADTBP	0.00 %	0.18	tons
Dimethyl Sulfide	282726	ADBTP-(HVD)	2.228E-003	LB/ADTBP	0.00 %	0.43	tons
Ethanol	282726	ADBTP-(HVD)	2.568E-003	LB/ADTBP	0.00 %	0.48	tons
Ethyl Benzene	282726	ADBTP-(HVD)	1.489E-005	LB/ADTBP	0.00 %	2.94E-003	tons
Formaldehyde	282726	ADBTP-(HVD)	7.440E-004	LB/ADTBP	0.00 %	0.15	tons
Hydrochloric Acid	282726	ADBTP-(HVD)	2.228E-002	LB/ADTBP	0.00 %	4.31	tons

Customer Business Challenge	Solution	Customer Results / Benefits
• Consolidate environmental reporting using live process measurements	• Built solution around the PI System installed in the 1990's	• Achieved cross report consistency • Gained ability to respond to "Impossible" data requests • Enabled sustainability goals by providing a common data source

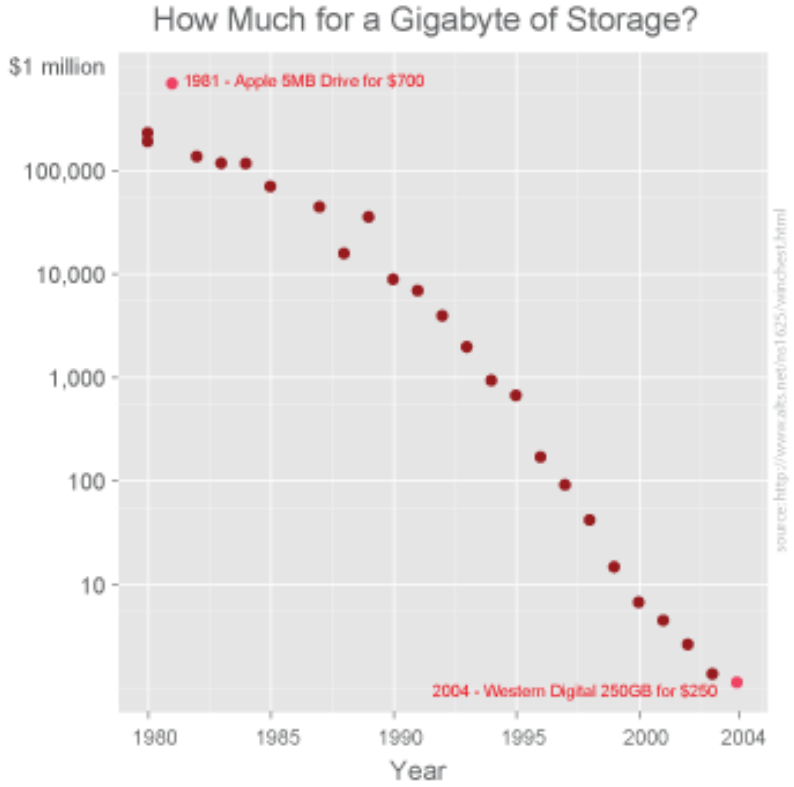
Why Infrastructure is Better?

(and by extension PI System)

Going beyond data collection

- Cost of storing data is quickly approaching the cost of the electricity to keep it online.

- It's more than just collecting it. How it is found, accessed, and consumed matters

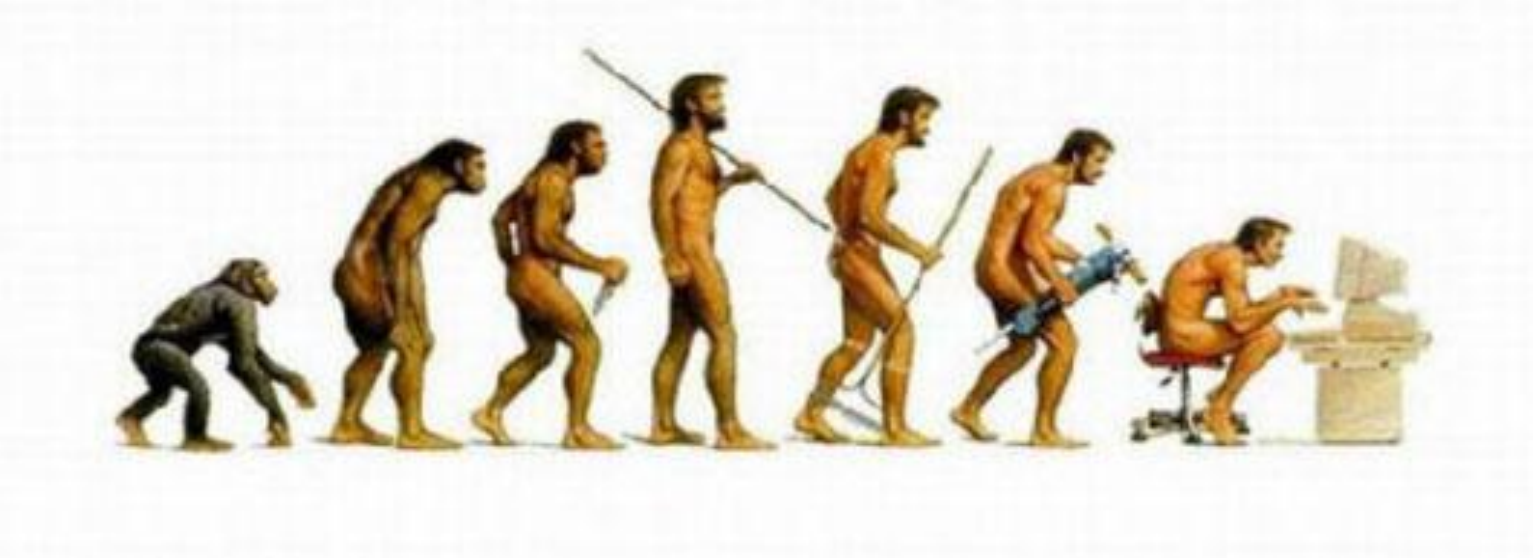


Neutral Vendor

- One of only two pure-play vendors left. (Industry consolidation, not selling)

- Unique capabilities
  - Asset centric capabilities
  - Event Management
  - Industry leader in data security
  - Highest performing and best scaling total solution

System Evolves over time



Solutions vs Infrastructure

- Cost curves (Capital vs Operational)
- Support Lifecycles
- Where does the knowledge end up
- Probability of Success
- Evolution of requirements over time
- Project N+1 costs less
  - Faster delivery of value
  - Start when people are ready (Yay RFPs)

For the skeptics

- World class support technical support
- CoE
- Partner Solution Showcase
- vCampus
- Professional ecosystem

Mariana Sandin

msandin@osisoft.com

Sales Support Engineer

OSIsoft, LLC

THANK YOU

Brought to you by OSIsoft.