



OSIsoft®

# Regional Seminar Series Paris, France



## Retours d'expérience à travers le monde

Martin Levionnois  
OSIsoft

19 octobre 2010

Real Time Information - Currency of the New Decade

© Copyright 2010, OSIsoft LLC. All rights Reserved.

- Cette présentation est constituée exclusivement de matériels issus des utilisateurs du système PI:
  - Users Conference
  - Regional Seminars

# Saudi Aramco

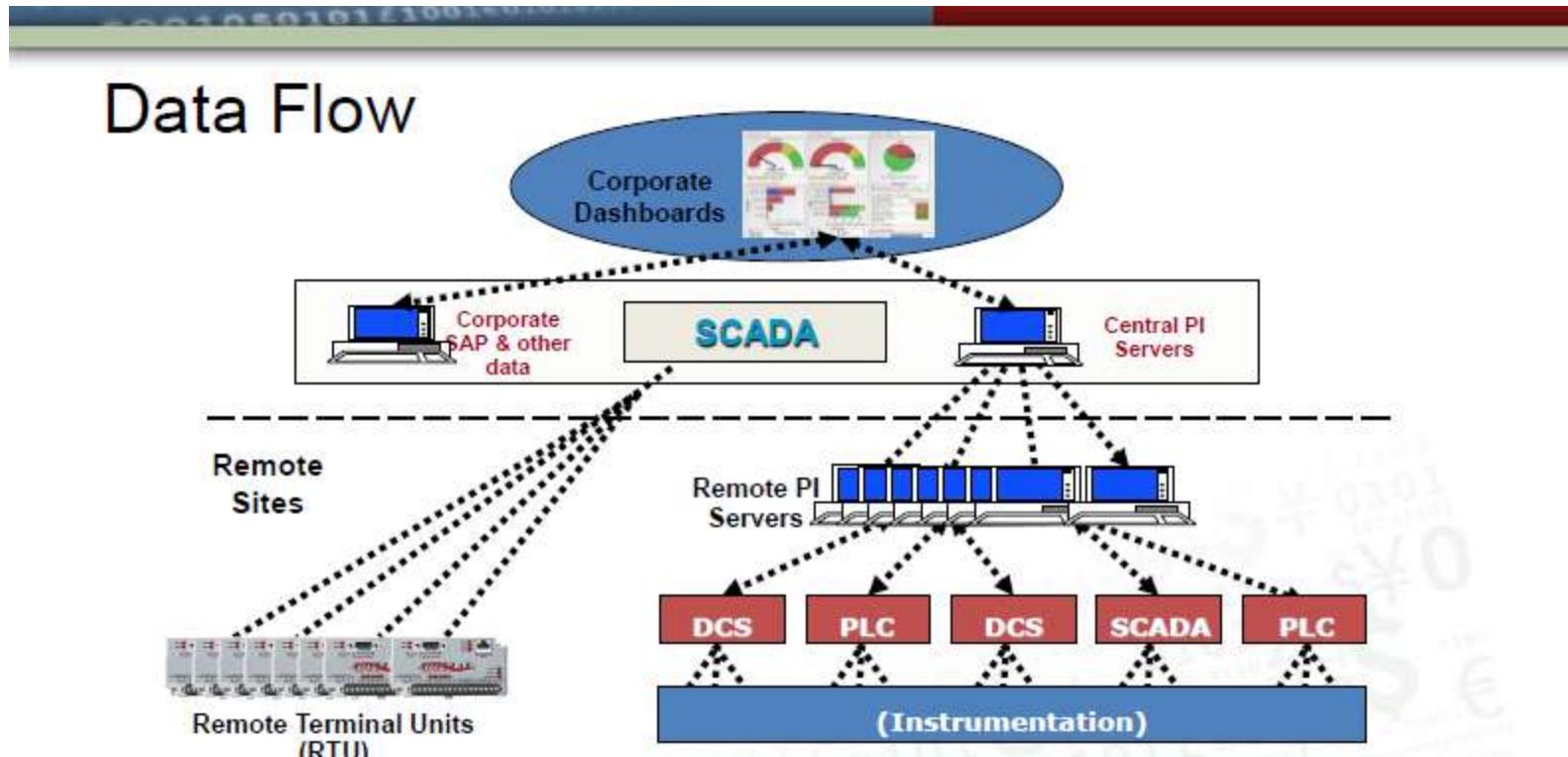


## Saudi Arabian Oil Company (Saudi Aramco)

- Fully integrated global petroleum enterprise of Saudi Arabia (exploration, production, refining, marketing, & Int shipping)
- Leads the word in crude oil production and export
- Responsible for about 1/4 of the worlds proven oil reserves
- Four refineries, ten gas and NGL plants, and three local joint ventures
- Number of joint ventures around the word in oil & gas refining & petrochemical businesses (USA, China, Japan)
- Headquarters in Dhahran – Saudi Arabia
- 54,000 employees (2 of 7 in training)

## OSIsoft at Saudi Aramco

- Largest user of PI and OSIsoft products in the Middle East
- First agreement was signed in 1996
- Approximately 105 PI servers
- Utilizing about 1.7 million PI tags.
- 2500+ of PI clients
  - PI-ProcessBook
  - PI-DataLink
  - PI-WebParts

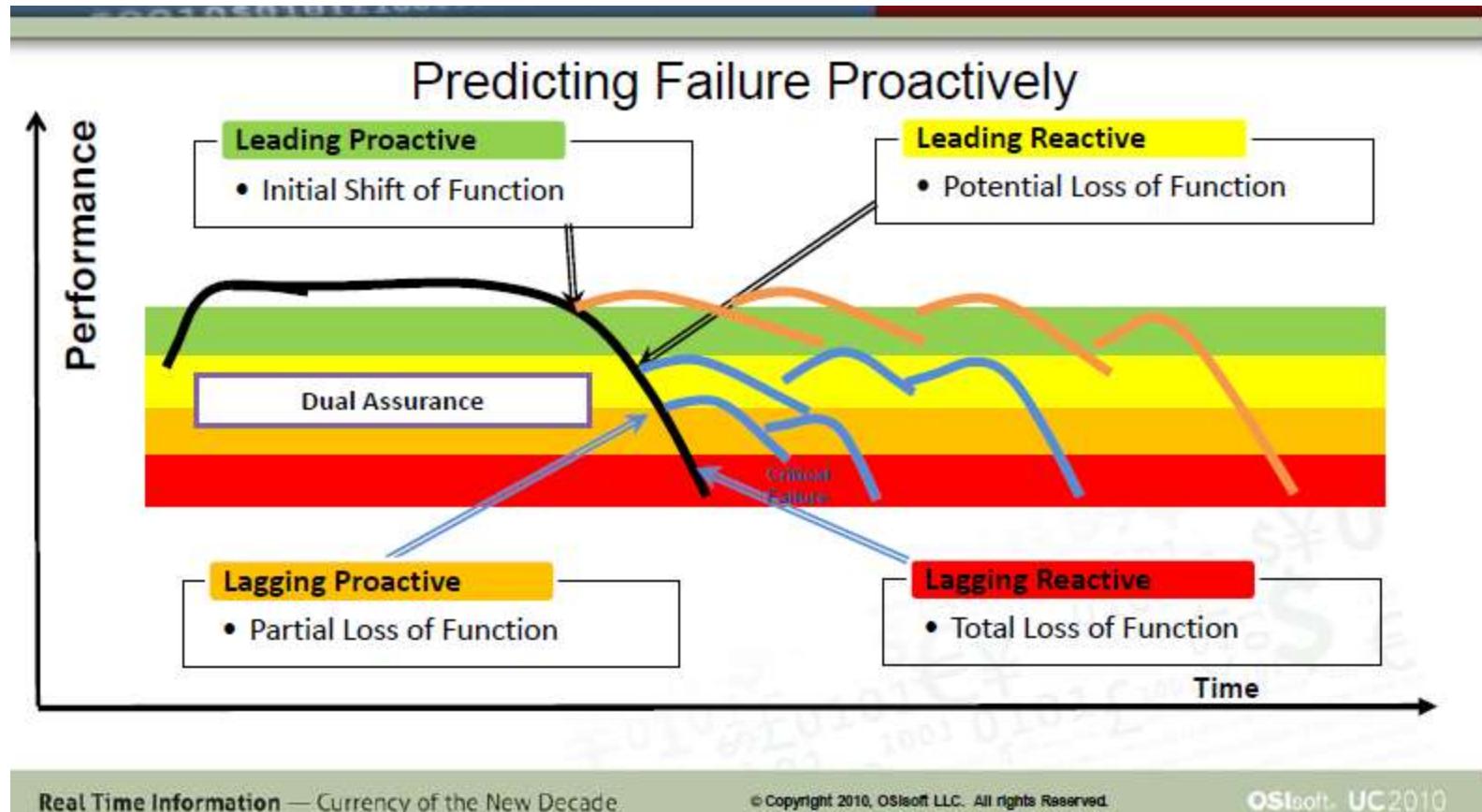


# Architecture PI (vue du ciel...)



## The need for good indicators

- Understand exactly what is going on
- Know how well we are doing
- Analyze the past (what happened)
- Provide feedback on current operation
- Support preparing actions/modifications in response to changes
- Learn of potential problems that might need early actions to be avoided



# Tableau de bord conditionnel



## The Dashboard

This dashboard provides real-time monitoring and analysis for the RTR MRU site, specifically focusing on the Mercury Removal Unit (MRU).

**Key Features:**

- Advisory Messages:** Displays critical information such as "Bed pressure drop shows high value 4/12/2010 10:05:00 AM" and instructions like "Consider installing filter. Filter change may be required 4/12/2010 10:05:00 AM". It also notes "Check particulate size, Check corrosion rates and changes 4/12/2010 10:05:00 AM" and "If no action, beds will have to be bypassed or beds may get plugged 4/12/2010 10:05:00 AM".
- Proactive KPIs Table:** Shows historical data for various parameters across three time periods: 4/12/2010 00:00:00 to 4/12/2010 10:05:00 AM, 4/12/2010 10:05:00 to 4/12/2010 10:10:00 AM, and 4/12/2010 10:10:00 to 4/12/2010 10:15:00 AM.
- Leading Indicators:** A circular chart titled "RTR MRU Proactive KPI" showing the status of leading indicators. The legend indicates: Green = Leading Indicator, Orange = Lagging Indicator, Yellow = Normal, and Red = Lagging Predictor.
- Key Measurements:** A line graph showing historical data for various measurements over time, with specific data points highlighted in yellow and red.

## Summary of benefits

- Complete monitoring and management pro-active tools
- Possibility to add any new units with minimal modifications
- Impact on performance improvement means multiple millions of dollars in additional revenues
- Solution's template could be used for other functionalities/applications
- The integration/utilization of OSIsoft tools removed layers of complications
- No additional investment is required

# International Power



## IPR's Capability



# 33GW

- IPR is a leading independent power generator
- 33.2GW (21.4GW net) capacity in operation
- 3.3GW (988MW net) under construction.

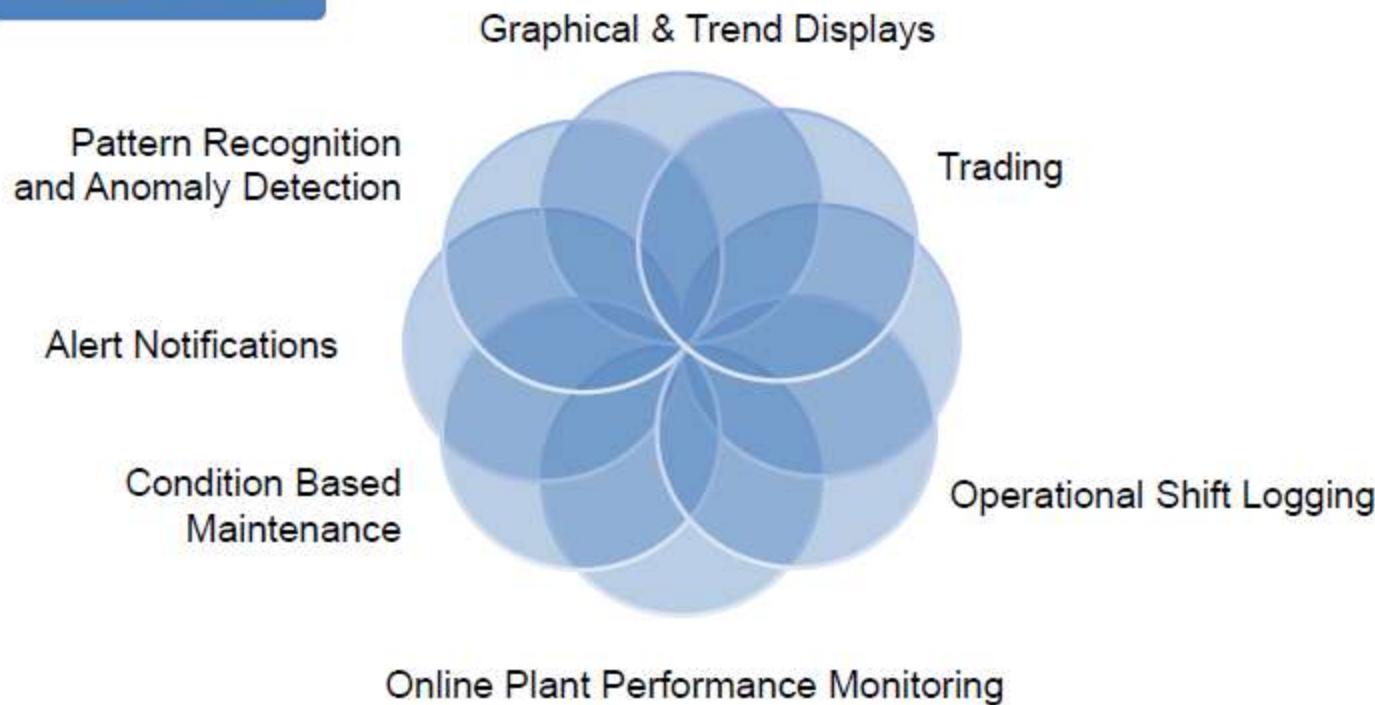


## How do we use PI?



Data historians are typically used to support the following key processes

### Real Time

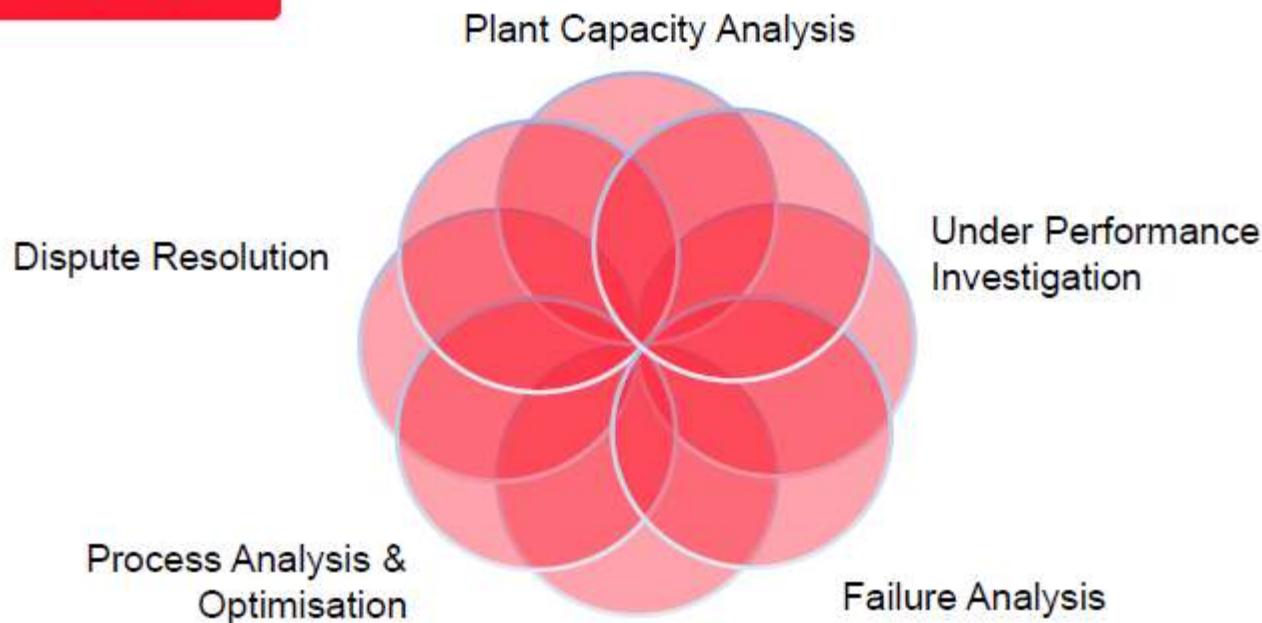


## How do we use PI?



Data historians are typically used to support the following key processes

**Ad Hoc**

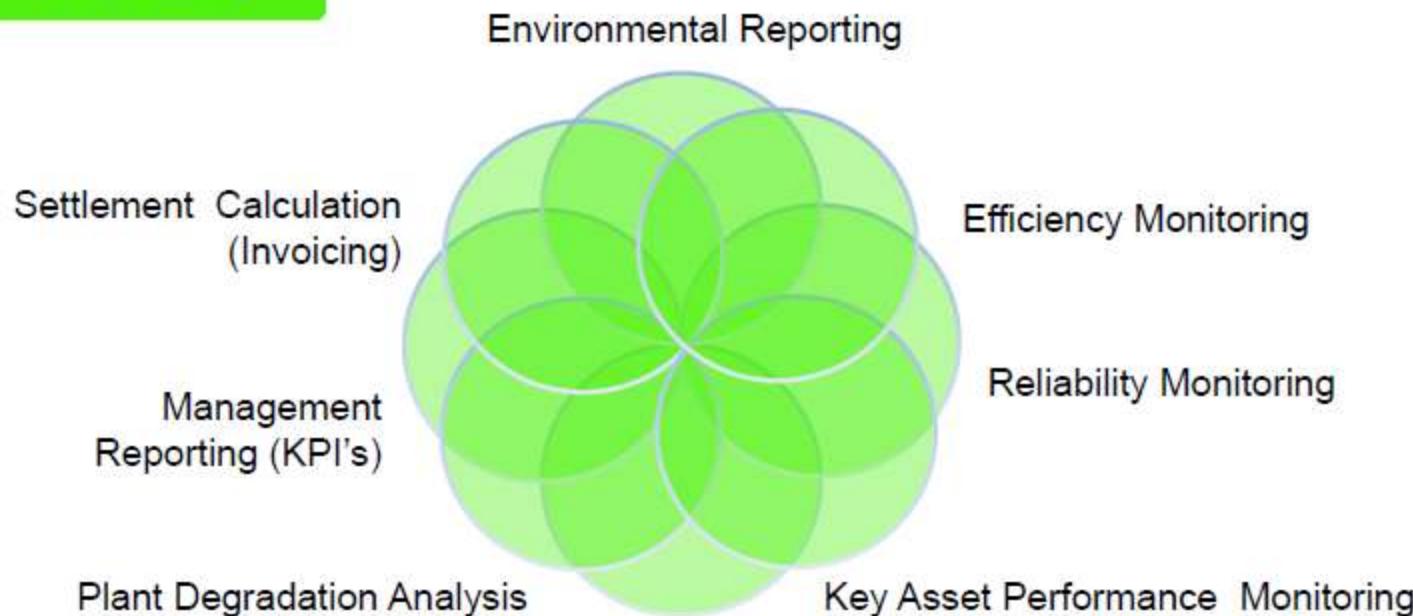


## How do we use PI?



Data historians are typically used to support the following key processes

Monthly



## How do we use PI?



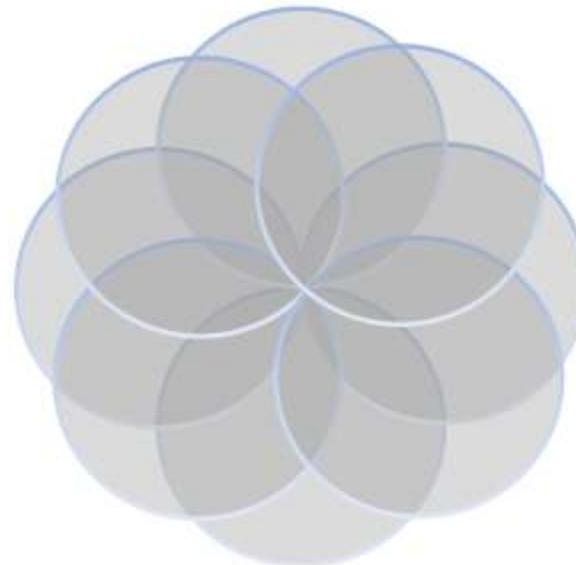
Data historians are typically used to support the following key processes

Annually

Final Settlement Calculation & Invoicing

Outage Planning

Plant Capability Projections



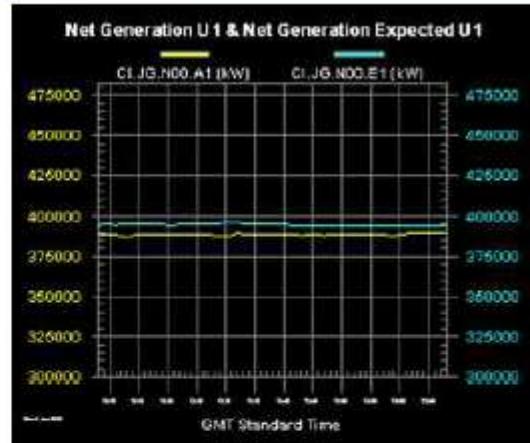
Generate Plant Production Profiles

## PI as Data Source: Case Study 1



### Thermal Performance Monitoring

- Proved to gas supplier that gas flow measurements were incorrect
- Gas supplier reimbursed > £1million



## Real Time Integration - Case Study 2



### Condition Based Maintenance

#### Aims

Optimise Maintenance Effectiveness by:

- Changing planned maintenance intervals:
  - From “time” based (e.g. every 3 months)
  - To “condition” based (e.g. every 2000 running hours)

#### Benefits

- 1 plant reduced boiler maintenance costs by \$120 000pa

# Alyeska Pipeline



## ABOUT ALYESKA PIPELINE



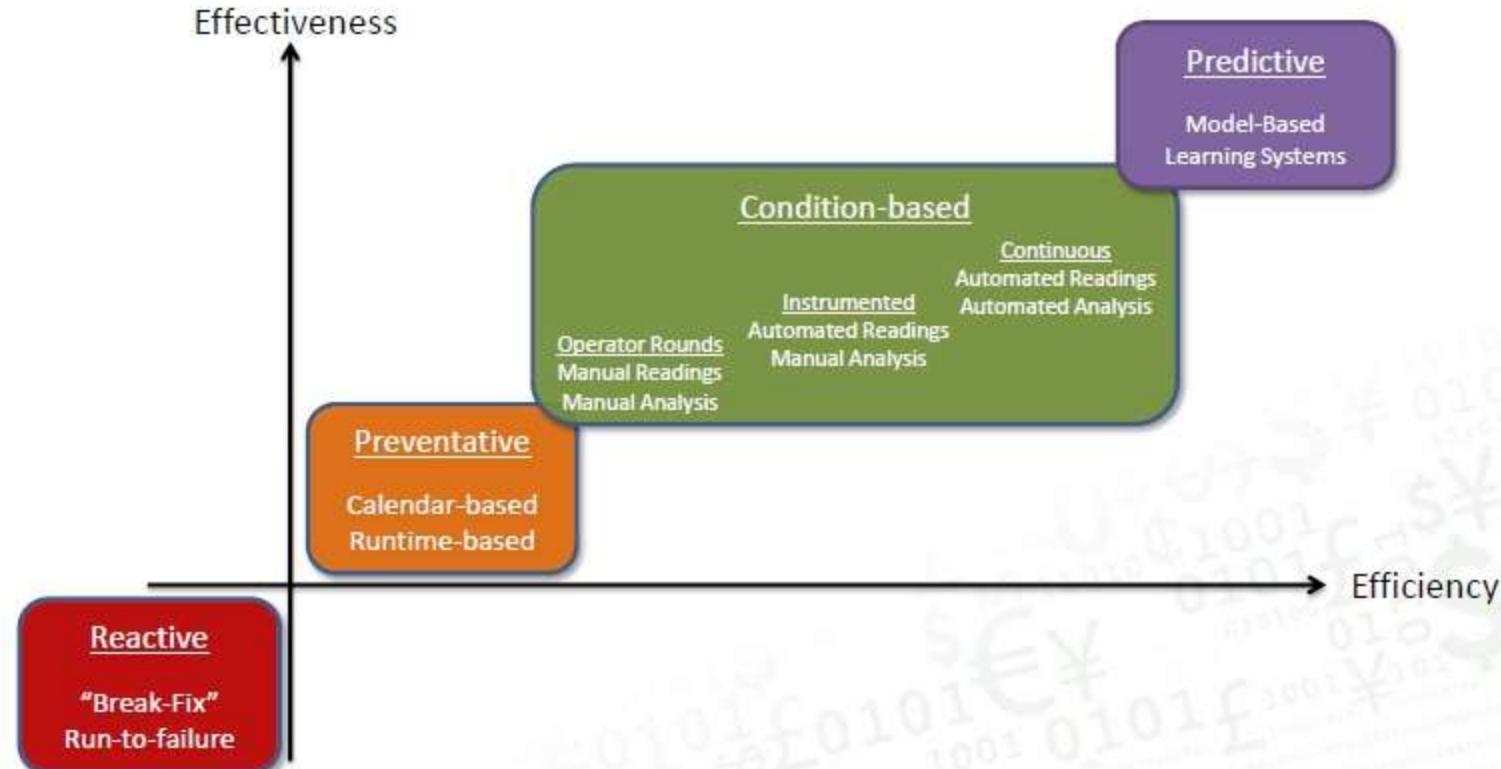
- 800 miles long
- 48" diameter pipe
- 5 Pump Stations
- Marine Terminal
- 1.4 Million bpd operating capacity
- Logistics & Operations centers in Valdez, Anchorage, and Fairbanks

**Real Time Information** — Currency of the New Decade

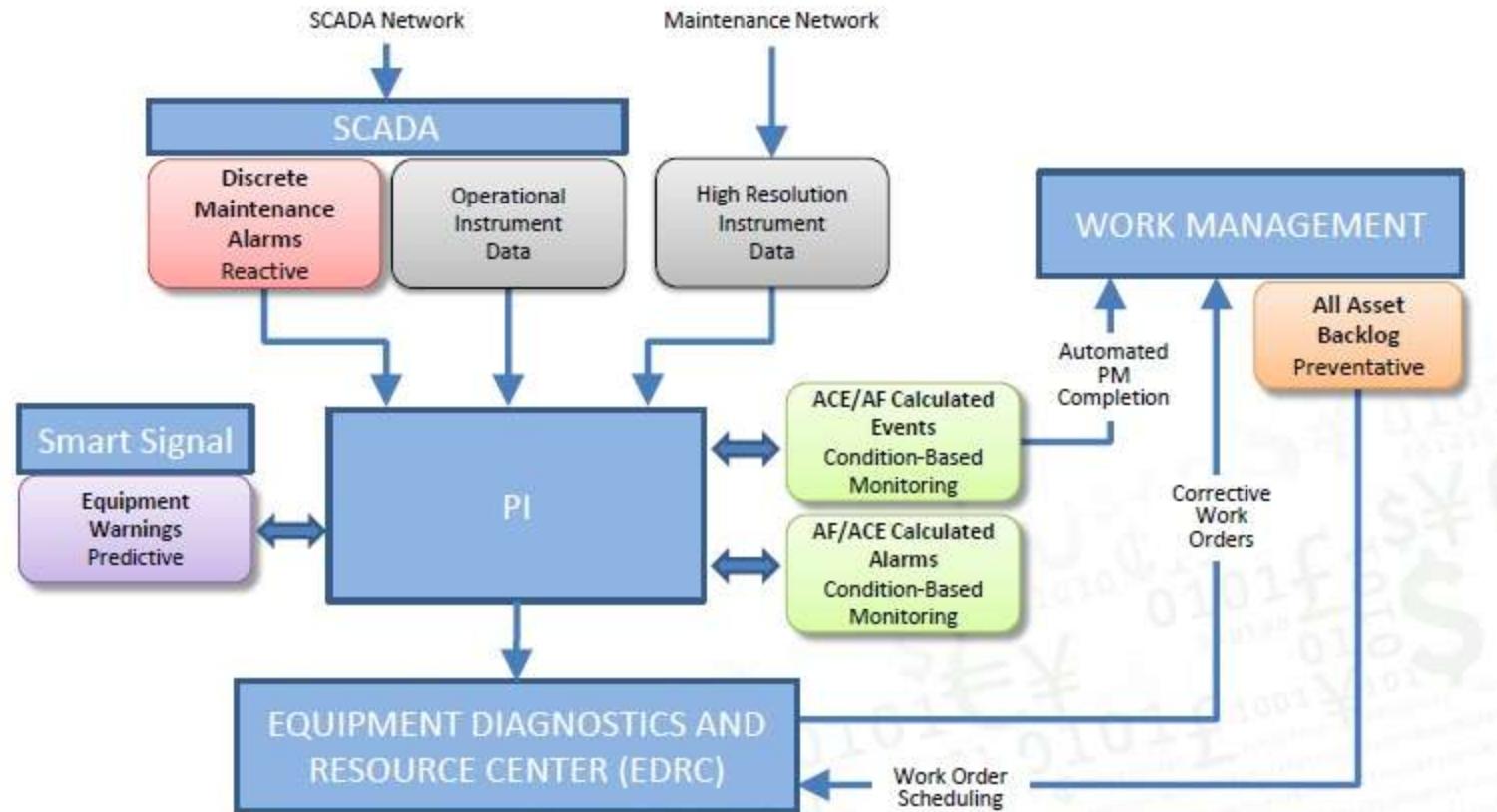
© Copyright 2010, OSIsoft LLC. All rights reserved.

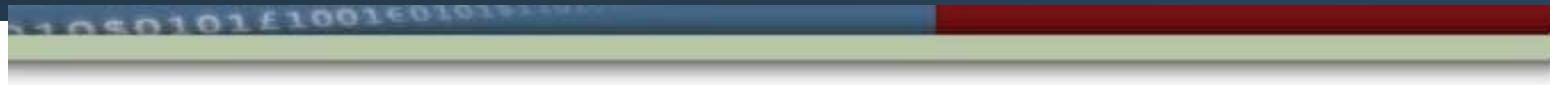
**OSIsoft UC2010**

## Evolution of Maintenance Strategies



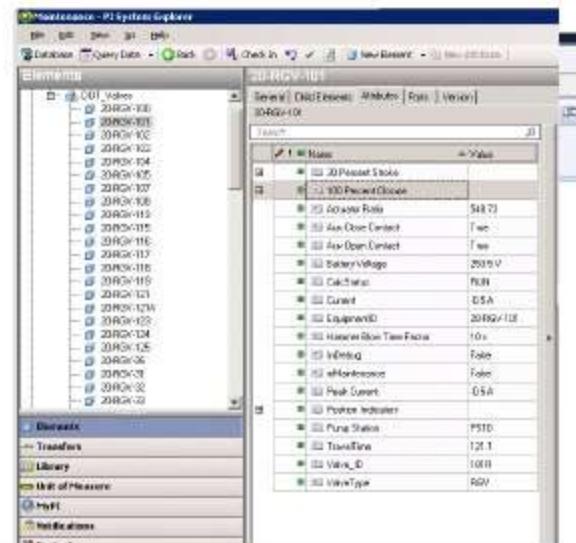
## Maintenance Strategies in Action





## Analysis Framework & Advanced Computing Engine

- Foundation of our architecture
  - Model assets to Alyeska standard system / subsystem / component hierarchy
  - Re-usable structured logic for asset-based Continuous Monitoring
  - Integrate disparate data sources
  - Provides notifications architecture
  - Platform for continuous monitoring of similar equipment types



```
' Set time period for debug purposes
' Position_InFullOpen.ExeTime = New AFTI
goLog.Log("Execution Time: " + & Format(Now, "MM/DD/YYYY HH:MM:SS"))

' Get current Digital State for Valve
IoTemp = Position_InFullOpen.ExeVal(Pos)
If IsNumeric(IoTemp) Then
    oVal = CDbl(IoTemp)
Else
    Throw New ACE_Exception("FATAL Error")
End If
cTime = New AFTI(Position_InFullOpen.P
```

## TANGIBLE BENEFITS

EDRC BENEFIT	ANNUAL SAVINGS
Regulatory Calendar-based PM Automation	
DOT Valve Strokes – Reduced Field Man-Hours	\$400,000
Function Testing of Valves – Reduced Field Man-Hours	\$100,000
DOT Relief Valve Testing	\$50,000
Tank Level PM's	\$35,000
Continuous CBM and PBM Algorithms	
Unplanned Downtime Avoidance	\$350,000
Device Deviation Monitoring – Reduced Field Man Hrs	\$150,000
<b>FIRST YEAR ANNUAL SAVINGS</b>	<b>\$1,085,000</b>

# eBay





## Introduction

On an average day, someone on eBay

- sells a vehicle every minute
- sells auto parts every second
- sells diamond jewelry every 2 minutes.



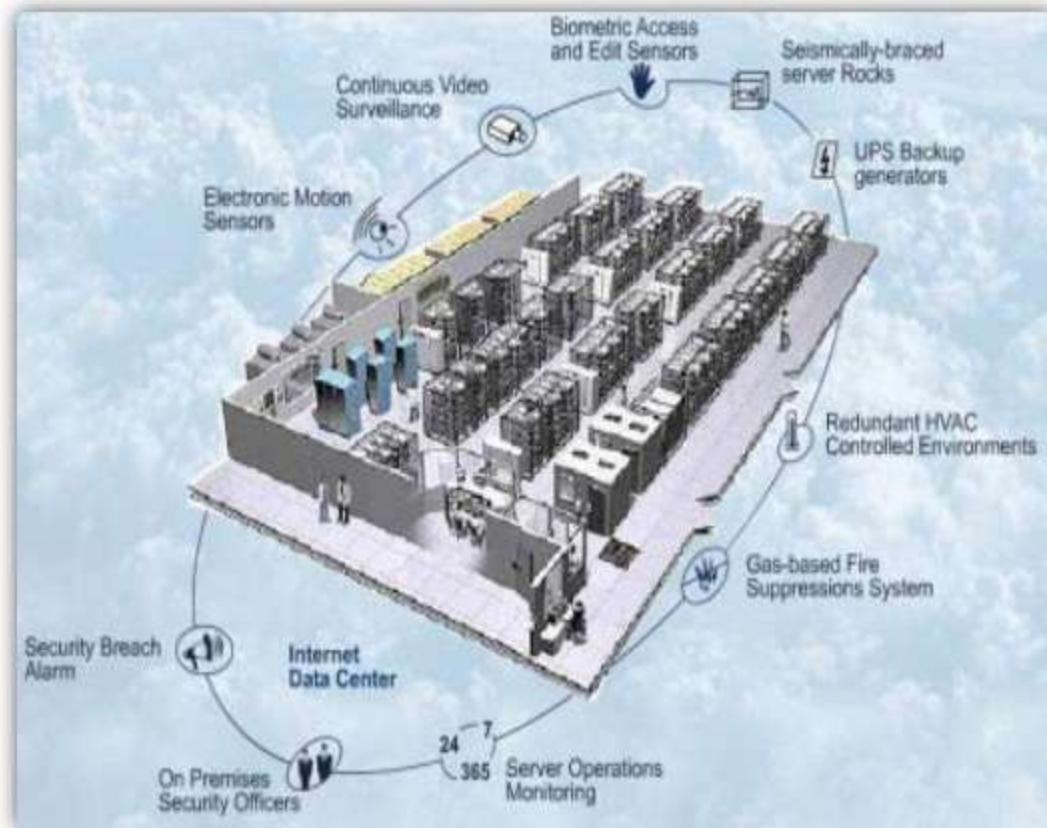
**"The foundation of our revenue is our data centers..."**

Dean Nelson, eBay  
Dir, Global DC Strategy

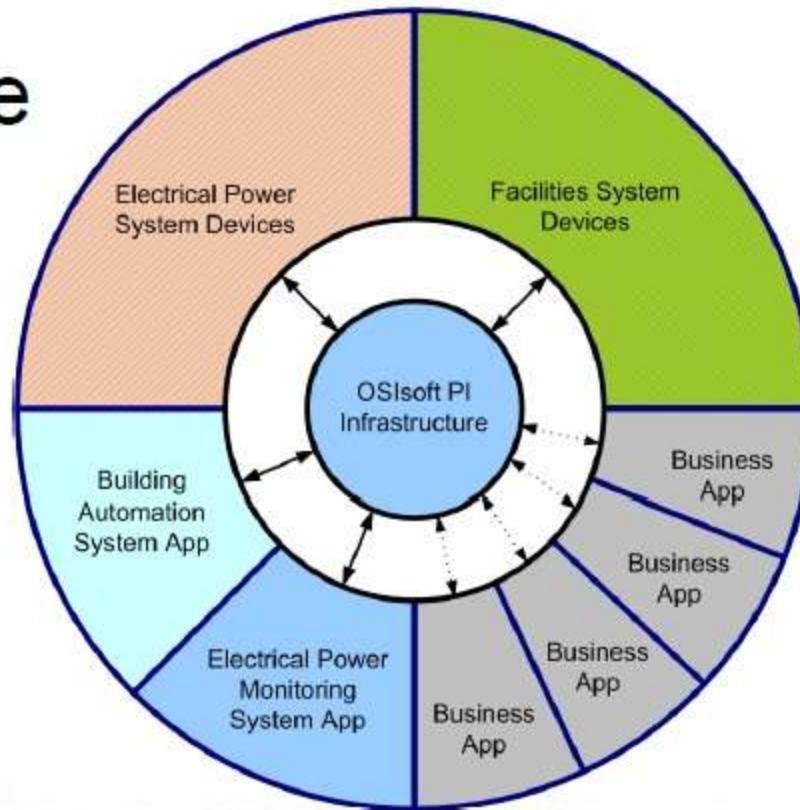
## Monitoring Requirement

Treat  
Mechanical,  
Power, IT and  
Security  
as one  
complete  
system

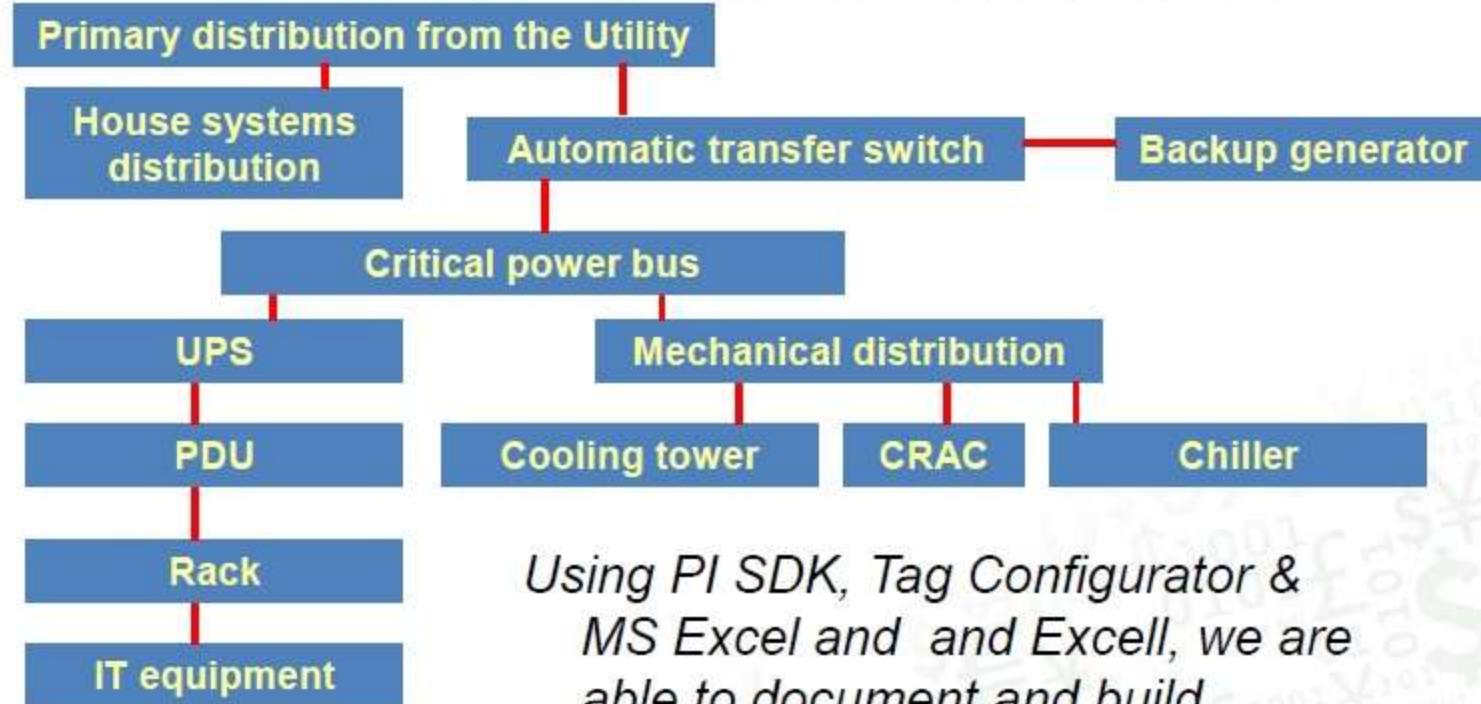
- *Nearly 1000 devices*
- *Over 110,000 points*



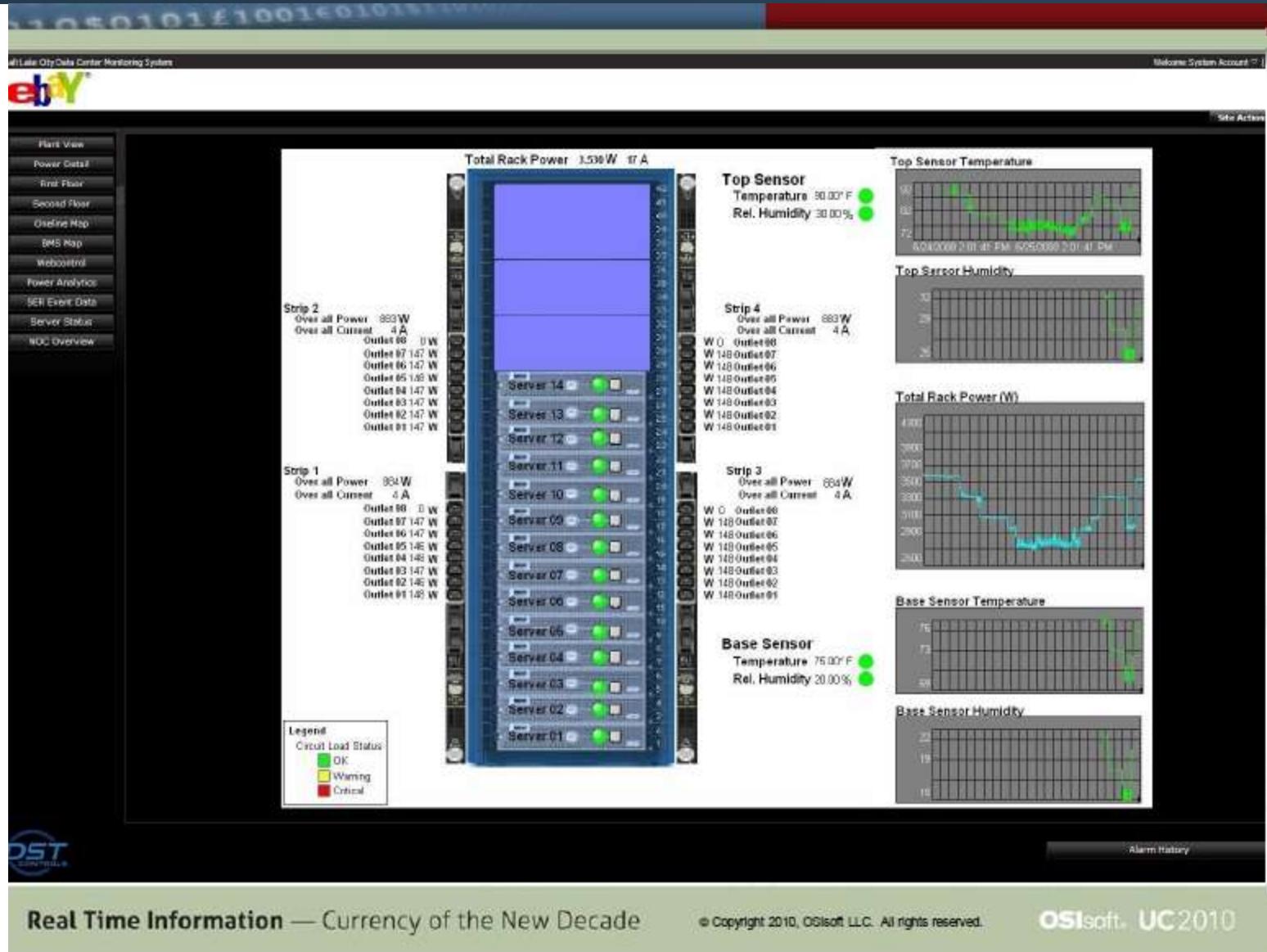
PI is an  
infrastructure



## Building the Monitoring System- Electrical Network - 138KV to 110V



# Portail de suivi temps-réel



# Duke Energy



## FACTS ABOUT DUKE ENERGY

- 150+ years of service
- 4 million customers
- Fortune 500
- \$50 billion in assets
- Stock dividends for 80+ years
- Traded on NYSE as DUK
- Dow Jones Sustainability Index



## The Problem

- Bad weather causes customer power outages.
- Outages must be tracked during an event.
- Outages > 50,000 must be reported to regulatory agencies.
- DOE-OE-417 Report – Must notify DOE within six hours when outages > 50K and is sustained for 1 hour.
- Copies to NERC and SERC.

## THE SOLUTION: AUTOMATED (2006)

- Utilized PI for managing this data
- Data from ORACLE feeds into PI every 15 minutes
- Data is displayed on Duke Energy's Internal Portal using PI WebParts
  - By State
  - By County
  - By Office

## THE SOLUTION: Mobile

- Currently 43 users receiving customer outage data on four types of Blackberry devices
  - 8830 World Edition
  - Storm
  - Tour
  - Bold



Real Time Information — Currency of the New Decade

© Copyright 2010, OSIsoft LLC. All rights Reserved.

OSIsoft UC2010

## RESULTS

- Eliminated around the clock staff to chart customer outages during storms
- Data available immediately via company portal to anyone that needs it
- Multiple visual formats available via PI WebParts
- Data now available 365 days per year, 24x7

# EDP



## EDP Group



## Renewables

U.S.A.  
Generation capacity  
1,556 MW  
Energy generated (2007)  
2,003 GWh

Europe  
Generation capacity  
2,290 MW  
Energy generated  
1,957 GWh



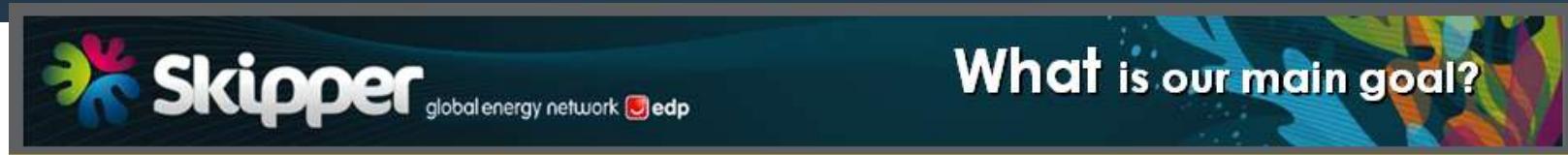
Brazil  
Generation capacity  
1.044 MW  
Electricity distribution  
12,731 GWh  
3,284 thousand customers



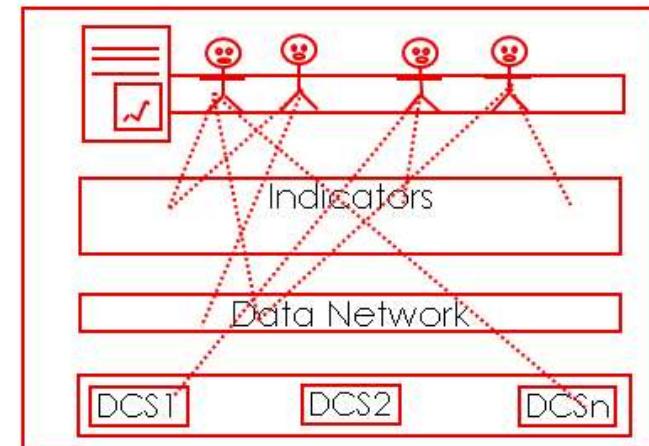
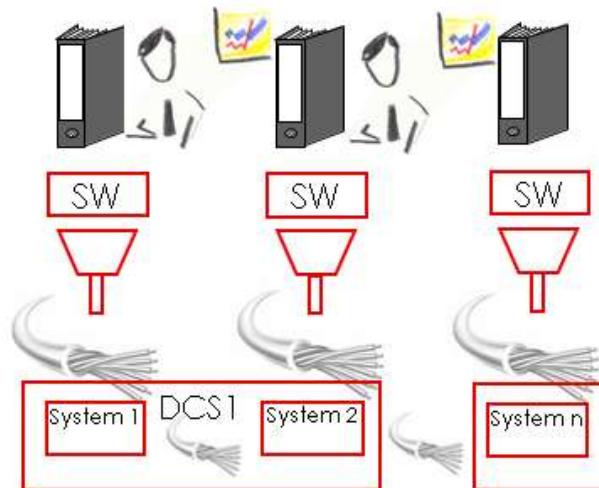
Portugal  
Generation capacity  
9,003 MW  
Electricity distribution  
23,129 GWh  
6,067 thousand customers  
Gas distribution  
188 thousand customers

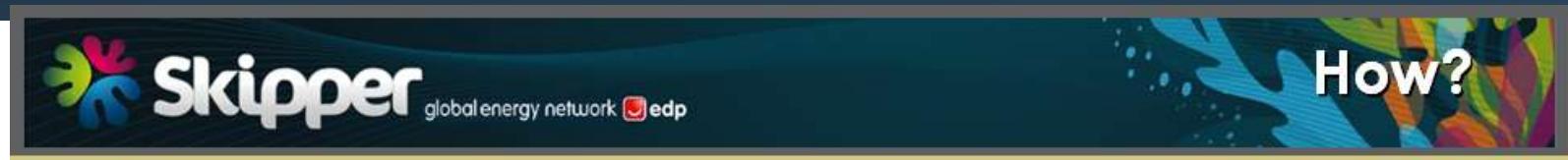


Spain  
Generation capacity  
2.978 MW  
Electricity distribution  
4,911 GWh  
623 thousand customers  
Gas supply  
496 thousand customers



**Moving from each one working by itself to everyone sharing information and working together**





**Promoting the Evolution, Modernization and Consolidation of EDP Information Systems**

**Sharing information between EDP collaborators**

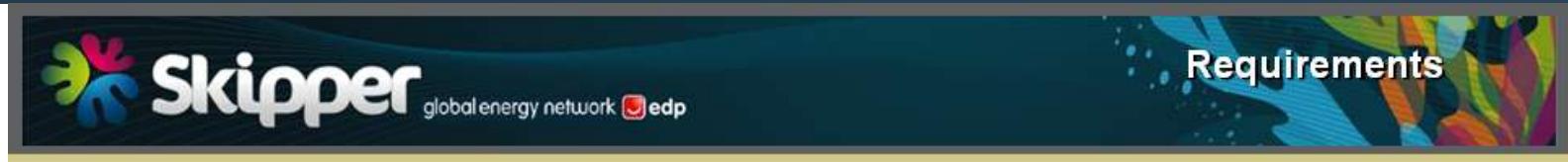
**Promoting world wide data access**

**Providing on line operational data to all EDP collaborators**

**Promoting networking between EDP collaborators**

**Growing and spreading knowledge**

**Spreading the EDP way to new EDP plants**



**Open system**



**Scalable**



**IT state of the art**



**Easy**



**Universal**



**... on budget and on time**



# Socle commun au service de toutes les divisions



# Une vue exhaustive de la performance



The screenshot displays a SharePoint portal for Skipper global energy network edp. The top navigation bar includes links for Home, Negócio, Processo, Produção, Risco, MySkipper, and Portal. The main content area features several integrated Business Objects and RT Webparts:

- Operacional e Ambiente:** A dashboard showing operational data and environmental metrics. It includes a table for Produtos de Fábrica (Ano de 2008) and a pie chart for Consumo de Combustíveis (Ano de 2008).
- Sustentabilidade:** A dashboard focused on sustainability, featuring a map titled "Mapa de Unidades Brônicos" showing locations across Brazil, a sidebar with "Relatórios Anuais de Sustentabilidade," and a "Lista de Relatórios - Sustentabilidade" section.
- Produções Controladas Internacionais:** A dashboard showing international controlled productions, with a table for "Produções Controladas Internacionais" and a line chart for "Consumo de Combustíveis (Ano de 2008)."
- Relatórios Anuais de Sustentabilidade:** A detailed sidebar listing annual sustainability reports from 2000 to 2008, such as "Relatório de Sustentabilidade 2000," "Relatório de Sustentabilidade 2001," etc.
- RT Webparts:** A large section at the bottom right showing real-time data for "Produções Controladas Internacionais," including graphs for "Consumo de Combustíveis" and "Produções Controladas Internacionais."

**Business Objects and RT Webparts integrated in a Sharepoint portal**

# Une large variété de calculs



## Performance Equation, Totalizer and ACE



The screenshot displays two windows from the PI System Management Tasks interface:

- PI System Management Tasks - Performance Equations**: Shows a list of servers and a tag mask for "Pm". The tag mask includes various tags such as "QuserFile1\_value", "QuserFile1\_value\_0001", etc. An extended description for one tag is shown, containing complex logic involving IF statements and AND/OR operators.
- PI-ACE Manager**: Shows a tree view of Alarms, Contexts, and Tags. Under Alarms, there are entries like "ConectividadeOSI" and "Unidades\_exploracao". Under Contexts, there are entries for "CALCULA\_MEDIA", "Compar", "Dpsfl", "Enrombar\_novo", "Ener", "Ercog\_nivel", "Salva", and "QUALITOUT\_grafico". Under Tags, there are entries for "Input Tags" (64) and "Output Tags" (16). A context summary table provides details for specific contexts.

On the left, a sidebar shows system management plug-ins for Alarms, Batch, Data, Interfaces, IT Points, Operation, and Points. A mathematical formula for calculating probability is displayed at the bottom left:

$$P = \prod_{i=1}^n p_i$$
$$1 - ((1 - p)^{m-n}) * {}_n C^m$$

- Online calculation.
- Steam functions.
- Data validation and consolidation.
- Totals.
- Complex calculations.

# Détection en temps-réel de dysfonctionnements



## Applications - Boiler leakage



The screenshot shows a web-based monitoring interface for boiler leakage detection. On the left, there are search parameters for 'Start Time' and 'End Time', and a group selection dropdown showing 'Grupo 2' selected. In the center, there's a 3D model of a boiler with various sensors and a status indicator for 'Grado 2'. To the right, there are two line graphs showing acoustic detection data over time, with one graph highlighting an 'ALT POT ACTIVA' event. A callout box contains the text: 'Increase our ability to detect in real time malfunctions or non optimized operational conditions.'

• Increase our ability to detect in real time malfunctions or non optimized operational conditions.



11

Empowering Business in Real Time.

© Copyright 2009, OSIsoft Inc. All rights Reserved.

# Détermination de la durée de vie effective des équipements



## Applications - Remaining Life-Time

