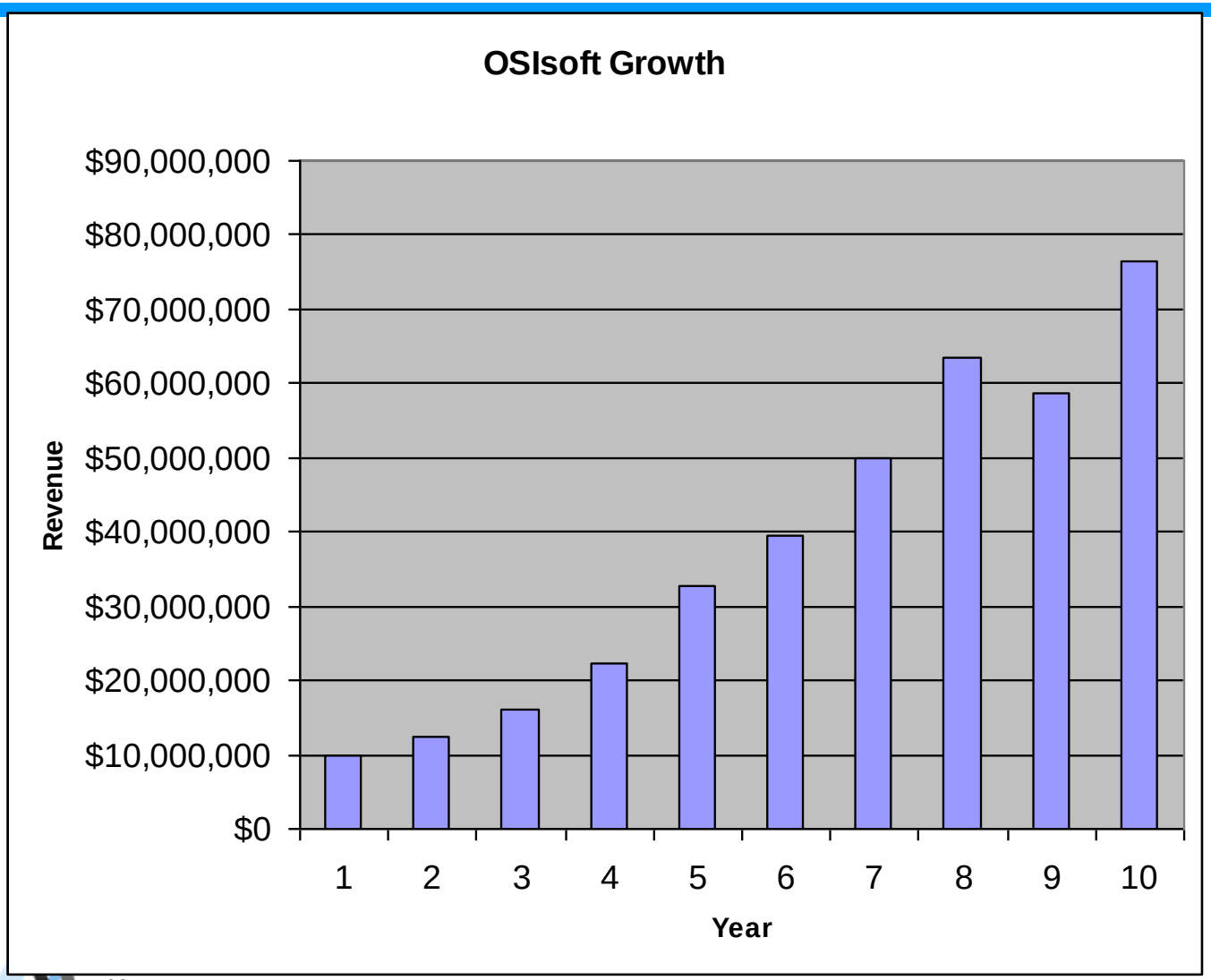
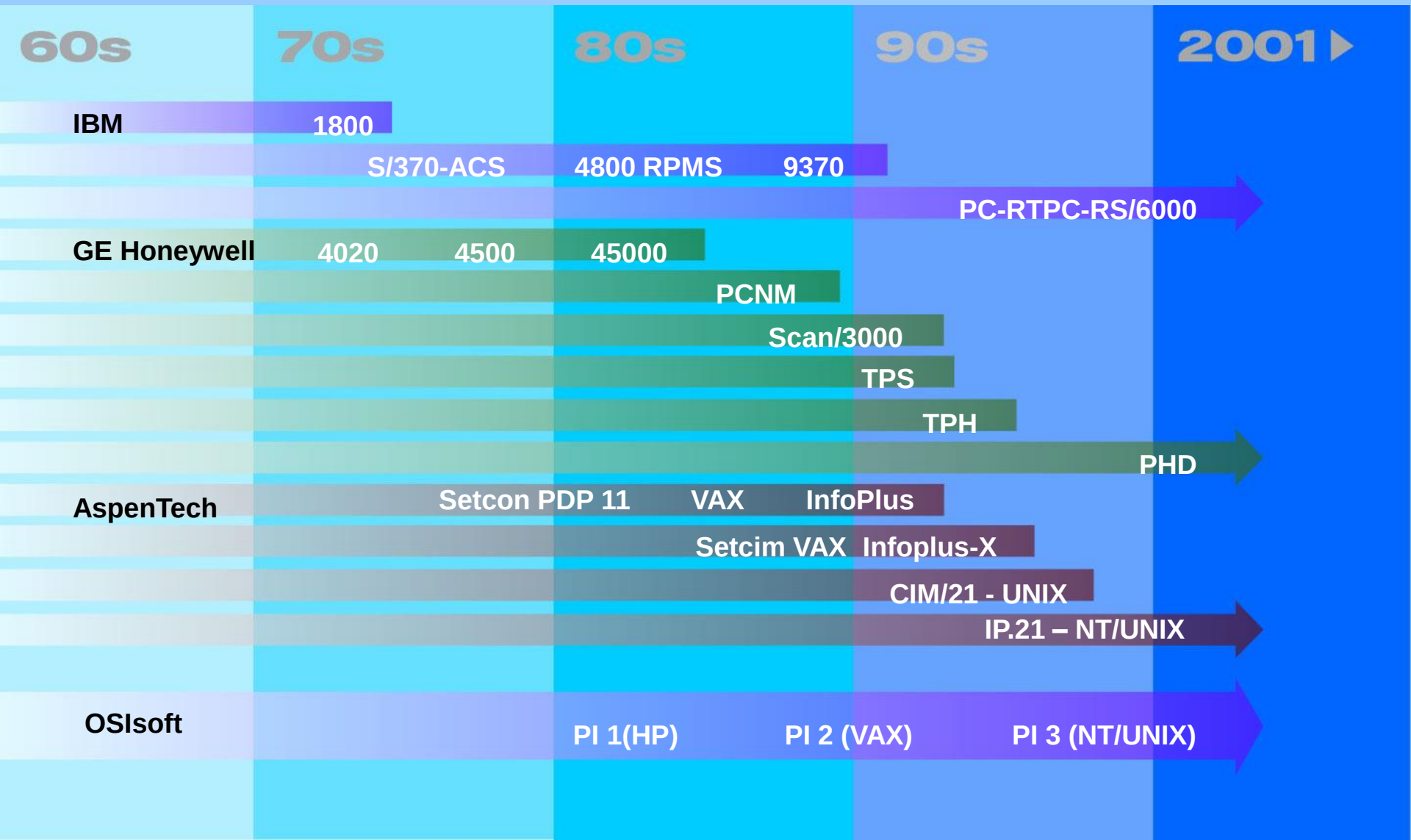
Real Time Performance Management

Dr. J. Patrick Kennedy, CEO

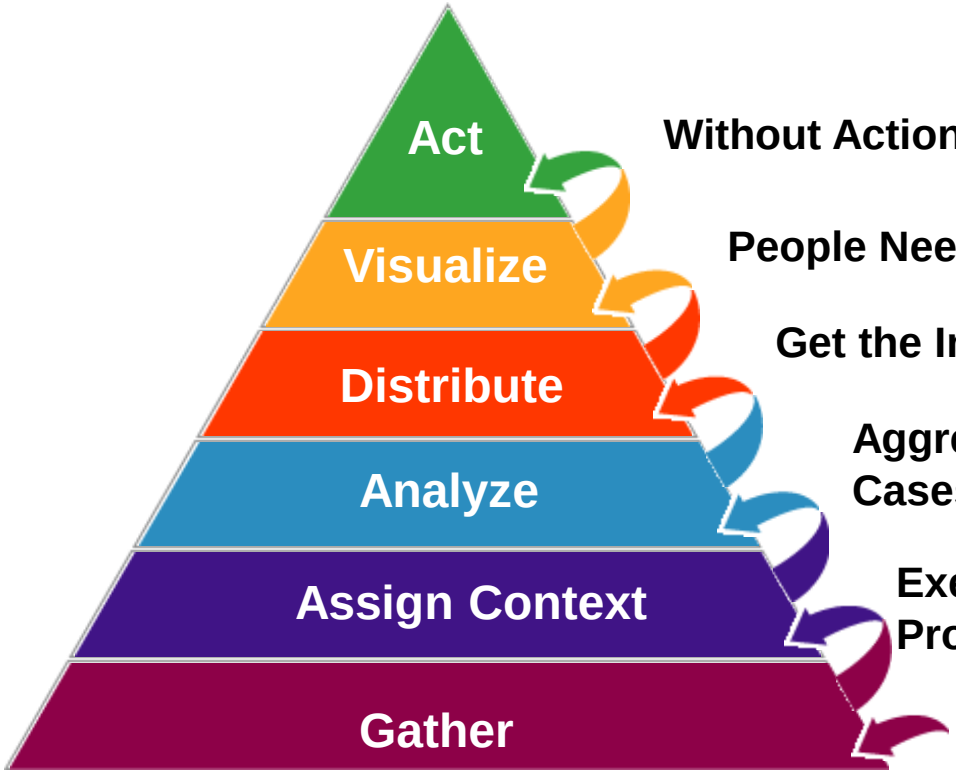
OSIsoft Growth



Historical Perspective



RtPM Pyramid



Without Action, there is no Benefit

People Need Pictures, Graphs, Trends

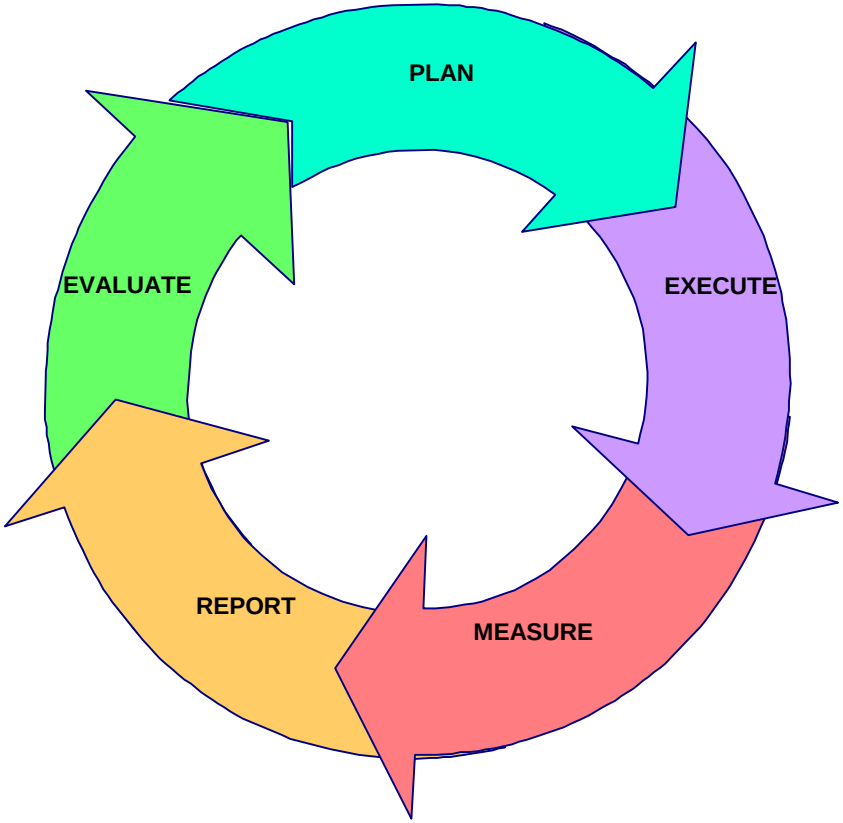
Get the Information to People Who Need It

Aggregation, Reconciliation, Calculation, Cases

Execs Look for Equipment, Plants, Products, not Tags

Data Collection from Inside and Outside the Corporation

Continuous Improvement

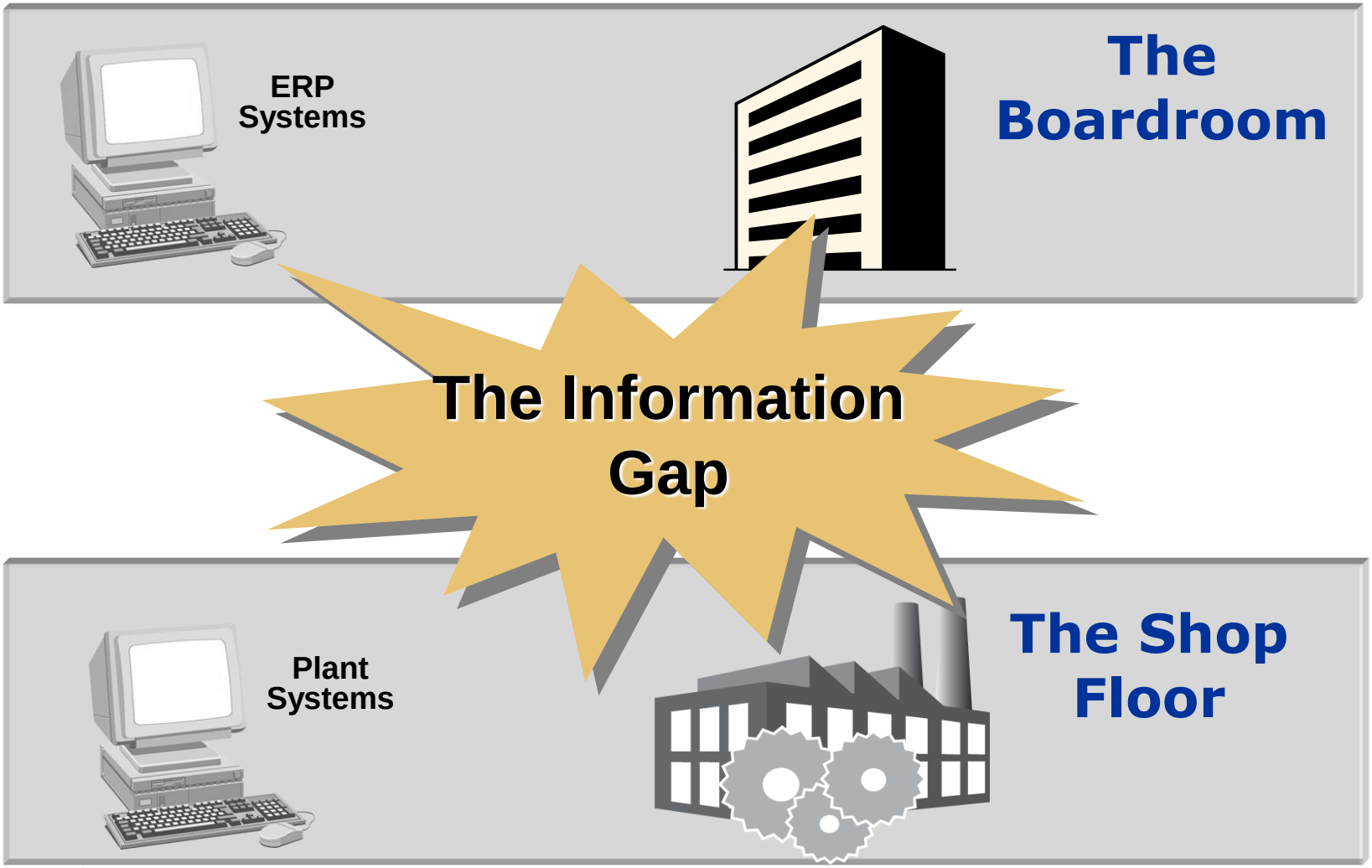


Paul Kurchina and Paul Gray

Portal Technology at Transalta

"Empowering People with Information"

The Information Gap



The Issue

- *How do organizations develop a common reference that links the shop floor to boardroom*
  - *From an information perspective*
  - *From an application perspective*

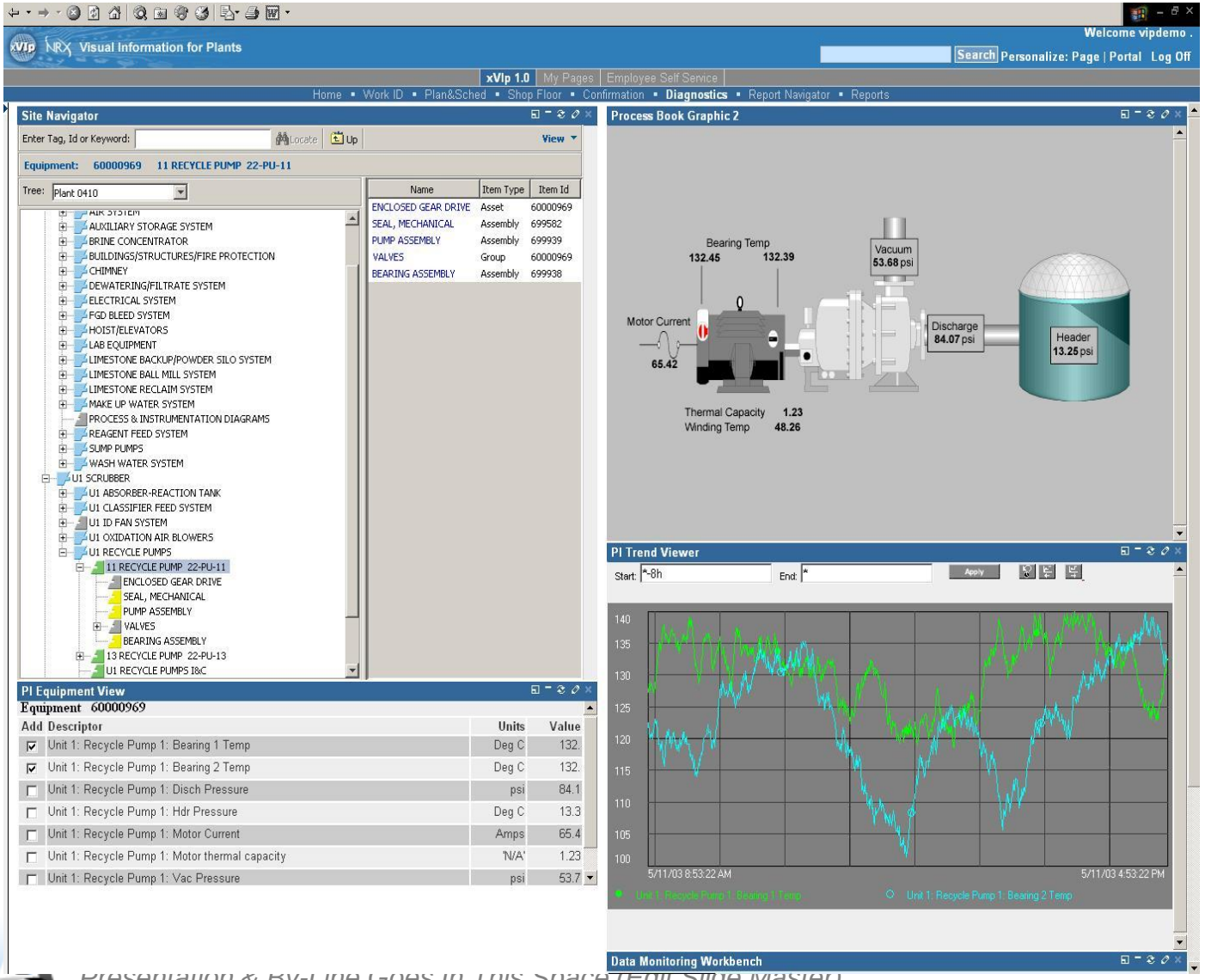
Introducing NRX

- *Visualization solution that empowers both plant and management people*
  - *Collaborative application*
  - *Provides a PI view in ERP*
  - *Empowers people with the same information*
  - *Regardless of source of the information*

Empowering People with Information

- *NRX provides a collaborative application that provides role based access to all relevant plant and enterprise information*
  - *ERP systems*
  - *Technical maintenance documentation*
  - *Real-time data*
  - *Financial information*
  - *EAM information*
  - *…*

NRX/PI in SAP Portal



Technology Collaboration

- *OSI/NRX collaboration*
- *OSI/NRX deliver engineering and maintenance information*
- *Prepackaged integration*
- *Agnostic to EAM and Portal solutions*

Summary

…to link the Shop Floor to the Boardroom

…to Deliver the Information and Unify Applications

OSI and NRX are Integrating their solutions…

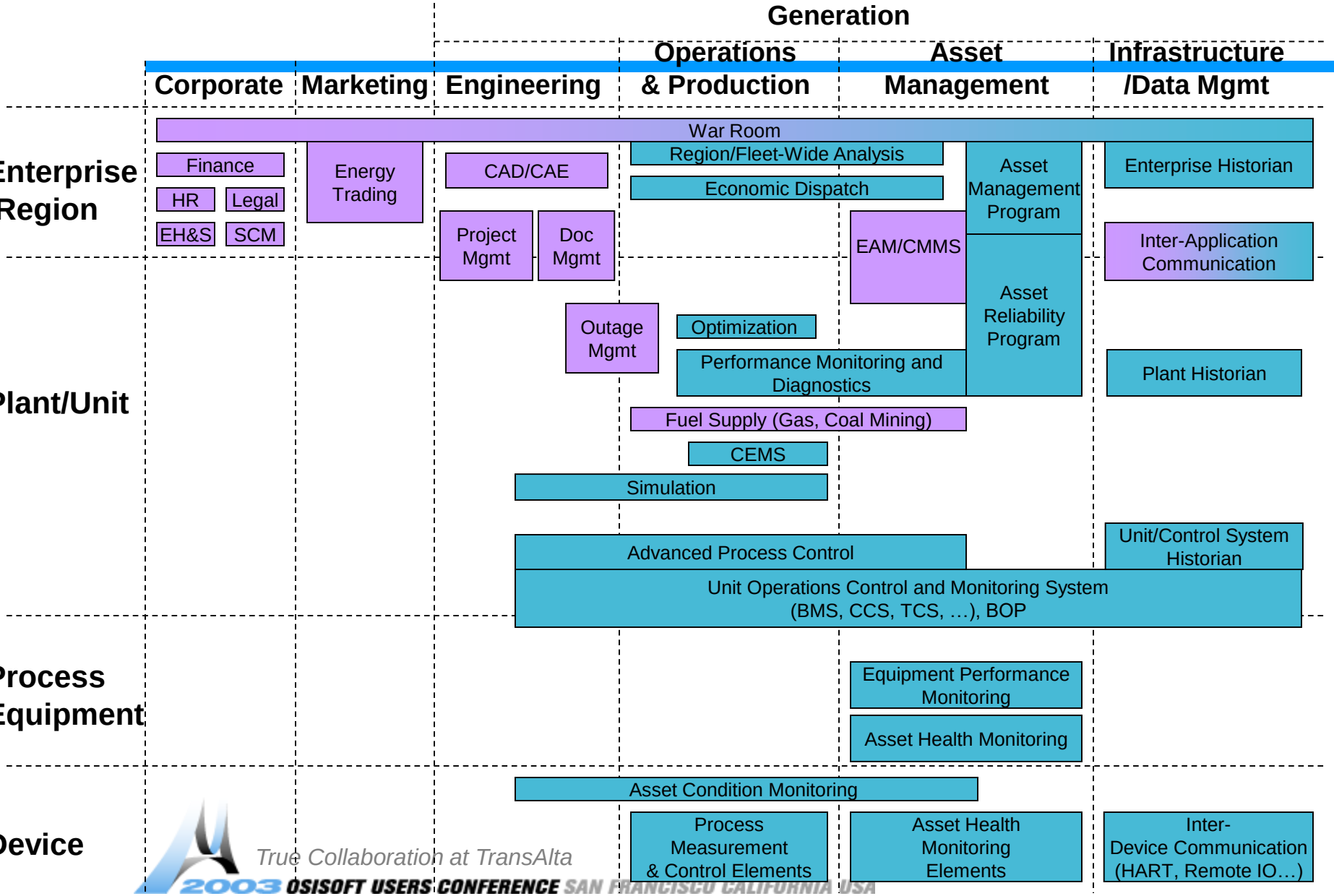
True Collaboration at TransAlta

TransAlta

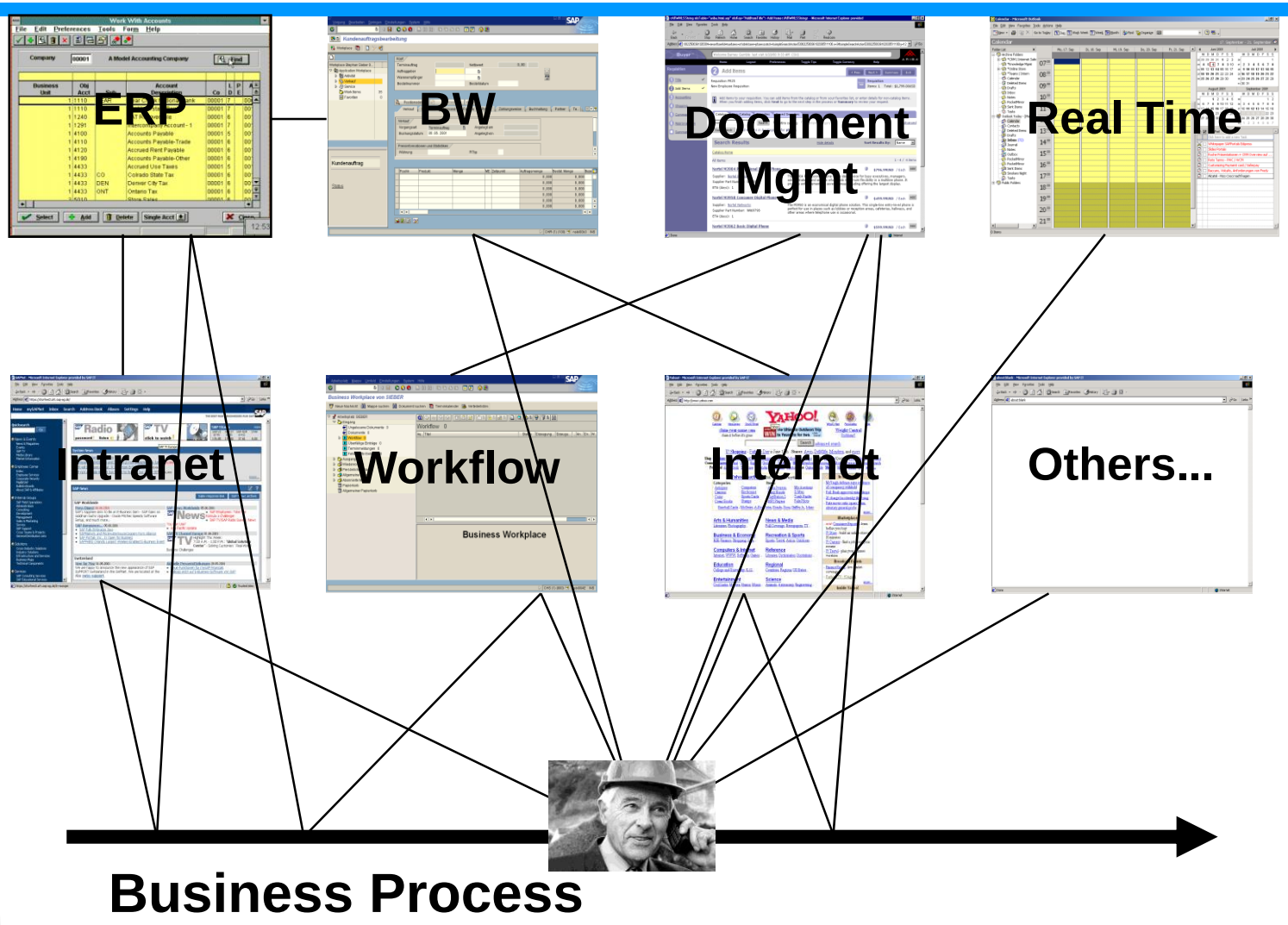
- *Canada's largest non-regulated electric generation and marketing company*
- *Coal Mining (Canada & US)*
- *Operations in Canada, United States, Mexico, and Australia*
- *10,000 MW generating capacity*
- *Close to $9 billion in coal-fired, gas-fired, hydro and renewable assets in operation, under construction or in development*


POPLAR CREEK
(FORT McMURRAY, AB)
258 MW
FORT SASKATCHEWAN
(FORT SASKATCHEWAN, AB)
118 MW total
(26% owned)
MERIDIAN
(LLOYDMINSTER, AB)
220 MW
CENTENNIAL 1 & 2
(KEEPHILLS, AB)
800 MW
GENESEE 3
(GENESEE, AB)
450 MW
CALGARY, AB
CORPORATE OFFICE
CASTLE RIVER
(PINCHER CREEK, AB)
44 MW
McBRIDE LAKE
(FORT MACLEOD, AB)
75 MW
CENTRALIA
(CENTRALIA, WA)
1,404 MW
BIG NAMAFORD
(CENTRALIA, WA)
248 MW
PORTLAND, OR
CANADA
OTTAWA
(OTTAWA, ON)
69 MW
SARANAC
(PLATTSBURGH, NY)
240 MW total
(37.5% owned)
SARNIA
(SARNIA, ON)
578 MW
BINGHAMTON
(BINGHAMTON, NY)
47 MW
MISSISSAUGA
(MISSISSAUGA, ON)
188 MW
WINDSOR-ESSEX
(WINDSOR, ON)
69 MW
ANNAPOLIS, MD
UNITED STATES
YUMA
(YUMA, AZ)
50 MW
CHIHUAHUA
(CHIHUAHUA, MX)
259 MW
POWER RESOURCES INC.
(BIG SPRING, TX)
230 MW
MEXICO
MEXICO CITY
CORPORATE OFFICE
CAMPECHE
(CAMPECHE, MX)
252 MW

TranAlta Standard Reference (Business) Model – Functional Architecture

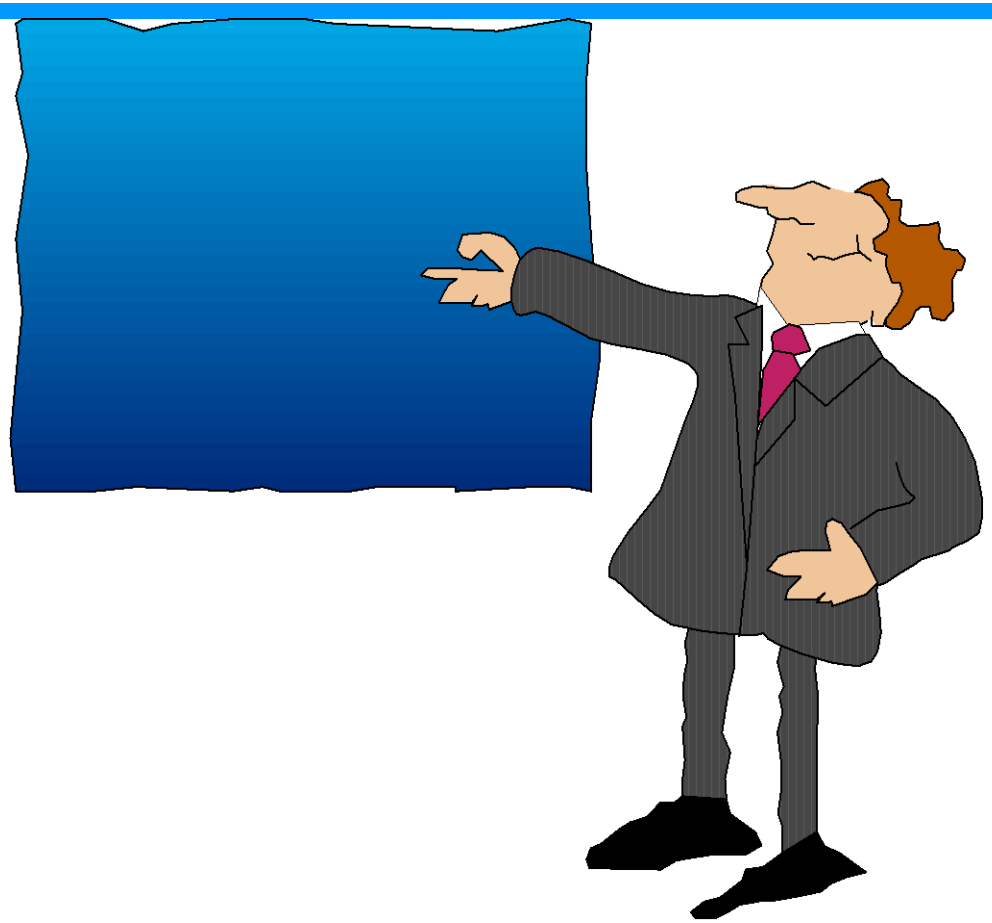


Working the Process - Before



Working the Process - After xVIP

Demonstration – Collaboration in Action



PI 3.4 Server

Ray Verhoeff, VP Engineering

PI Server 3.4

Ray Verhoeff

Vice President – Engineering

Objectives

- *Scalability*
- *Throughput*
- *Concurrency*

In other words…

- *Bigger*
- *Better*
- *Faster*
- *More*

Scalability

- *Higher point count*
- *Objective: 1 million*
  - *Power Transmission and Distribution*
  - *Low data rates*

Throughput

- *Input data rate*
- *Objective: 50000 events/second into the archive*
  - *Sequence-of-events systems*
  - *Low point count*

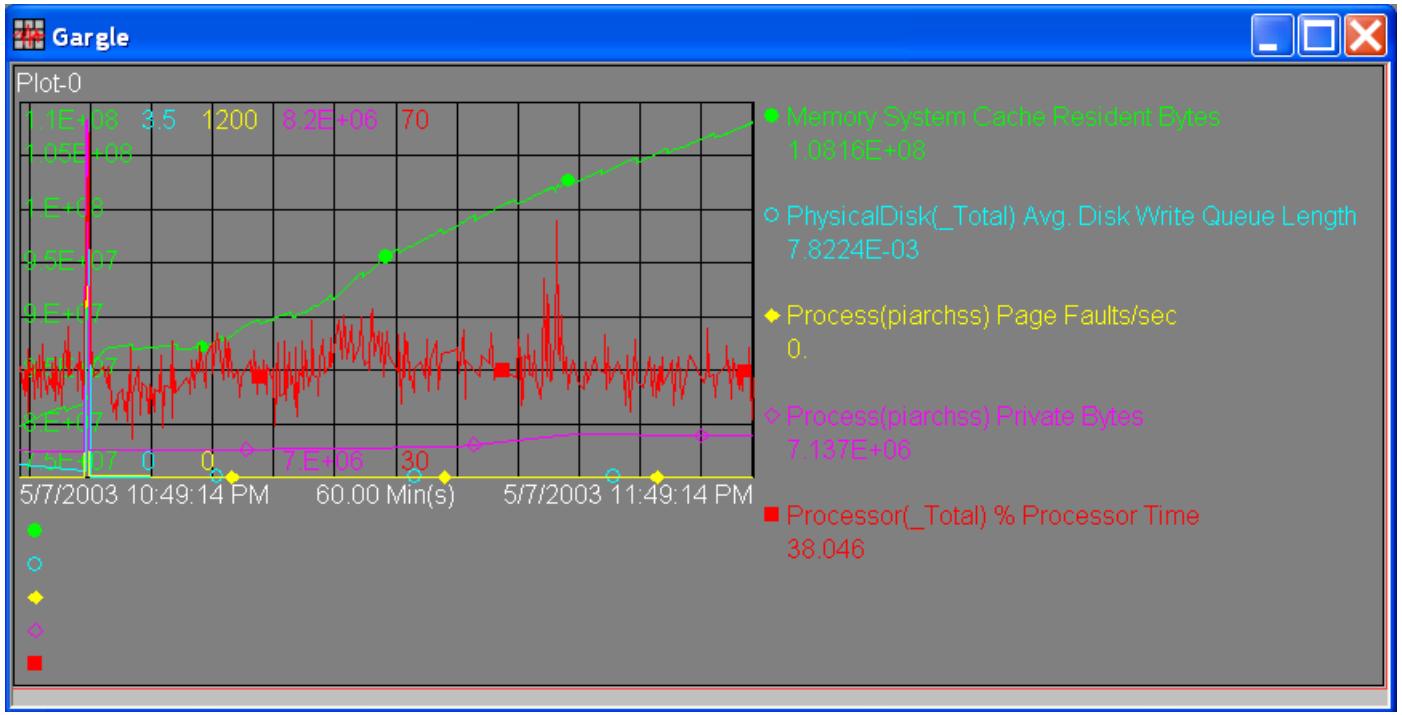
Concurrency

- *Higher retrieval rates*
- *Threads*
  - *Independent execution paths within one process*
  - *Requires locking of common data*
  - *Developed high-speed locks*
  - *Makes better use of multi-processor machines*

Study the Problem

- *Measure computer system variables*
- *Determine long-term trends*
- *Evaluate relationships*

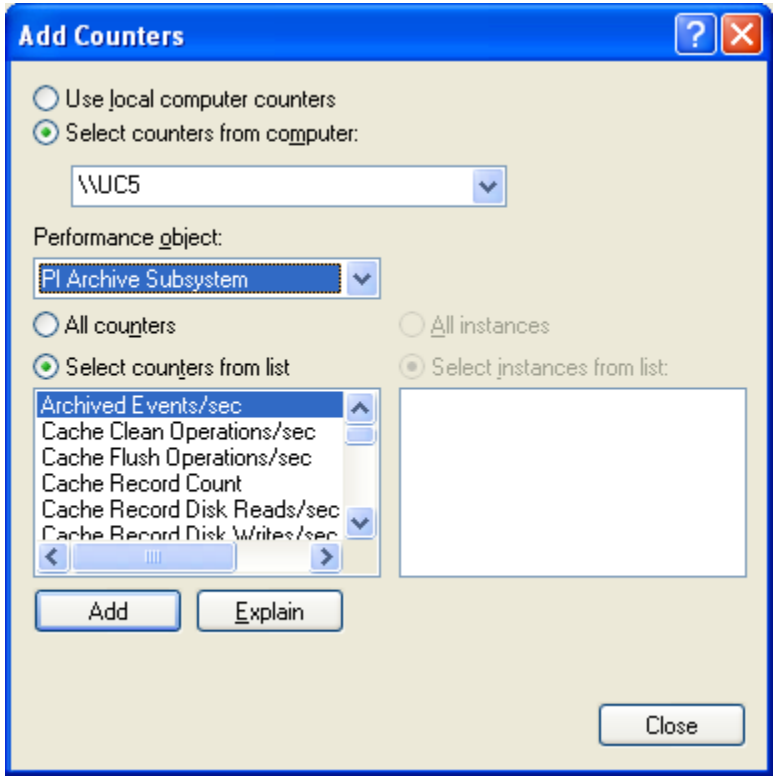
IT Monitor


Gargle
Plot-0
1.1E+08 3.5 1200 8.2E+06 70
1.05E+08
1E+08
9.5E+07
9E+07
8.5E+07
8E+07
7.5E+07 0 0 7E+06 30
5/7/2003 10:49:14 PM
60.00 Min(s)
5/7/2003 11:49:14 PM
Memory System Cache Resident Bytes
1.081E+08
PhysicalDisk(_Total) Avg. Disk Write Queue Length
7.8224E-03
Process(piarchss) Page Faults/sec
0.
Process(piarchss) Private Bytes
7.137E+06
Processor(_Total) % Processor Time
38.046

Some significant counters

- *Memory*
  - *System Cache Resident Bytes*
- *Physical Disk*
  - *Avg. Disk Queue Length*

PI Server Counters



3 Most Important Lessons

- *1. Avoid paging*
- *2. Paging is not your friend*
- *3. Do whatever you can to avoid paging*

Managing Memory

- *Base Subsystem*
  - *Reduce configuration data in memory*
  - *Load as needed*
- *Archive Subsystem*
  - *Manage Cache separately for Read and Write*

Objectives Met

- *Scalability*
  - *One million points and up*
- *Throughput*
  - *50,000 events/sec and up*
- *Concurrency*
  - *8 simultaneous threads (configurable)*

Other PI 3.4 features

- *Archive “activity grid”*
- *Out-of-order event archiving*
- *Summaries in COM Connectors*

Presentations

- *PI 3.4*
  - *Tuesday, May 13, 10:50 a.m.*
  - *Wednesday, May 14, 10:00 a.m.*
- *PI System Management Tools*
  - *Tuesday, May 13, 10:00 a.m.*

Rapid and Consistent PI System Deployment

Mark Brown, Calpine

Rapid and Consistent PI System Deployment

Mark Brown – Calpine Corporation

Software Implementation Metrics

- *$250 Billion/year spent on software projects*
- *31% of those projects were cancelled before completion*
- *$81 Billion was spent on cancelled projects*
- *53% of projects had cost overruns of 89%*
- *84% of software projects missed schedule and budget targets*

Problems Created by Poor Implementation

- *"Scope Creep" – The hidden forces that attack every project and attempt to increase the deliverables to a higher, unmanageable level.*
- *Schedule Overruns – Not completing the project by the original target date. These most often occur due to "Scope Creep".*
- *Budget Overruns – Not completing the project within the originally approved budget. This too is a close friend of "Scope Creep".*
- *Business Unit Involvement – As the project timeline slips, often the commitment of the supporting business unit(s) slips as well. This factor alone can result in the cancellation of a project.*

How to Avoid Implementation Problems

- *Develop and employ a rapid and consistent implementation strategy.*
  - *Address the business requirements*
  - *Implement quickly to begin Return On Investment (ROI) quickly*

Why did Calpine Standardized on the PI System?

- *Standardized in early 2001*
- *Prior, Calpine did not have a standard operations historian*
- *Relied on control system historians and embedded historian systems*
- *This environment often meant data was inaccessible outside the plant and the amount of historical data that could be archived varied with the type of historian deployed*

How did Calpine Implement their PI Systems?

- *Hired initial staff of 6*
- *Developed a standard deployment method*
  - *This included standard server hardware*
  - *Also included standard PI installation manual*
  - *Preferred network infrastructure configuration*

How did Calpine Implement their PI Systems? (Continued)

- *Evaluated the plant's operational timeline*
  - *Operating, Acquisition, Under Construction*
- *Determined optimum time for install was 2 weeks prior to first fire*
  - *This decision was reinforced with a successful $24MM turbine warranty claim*

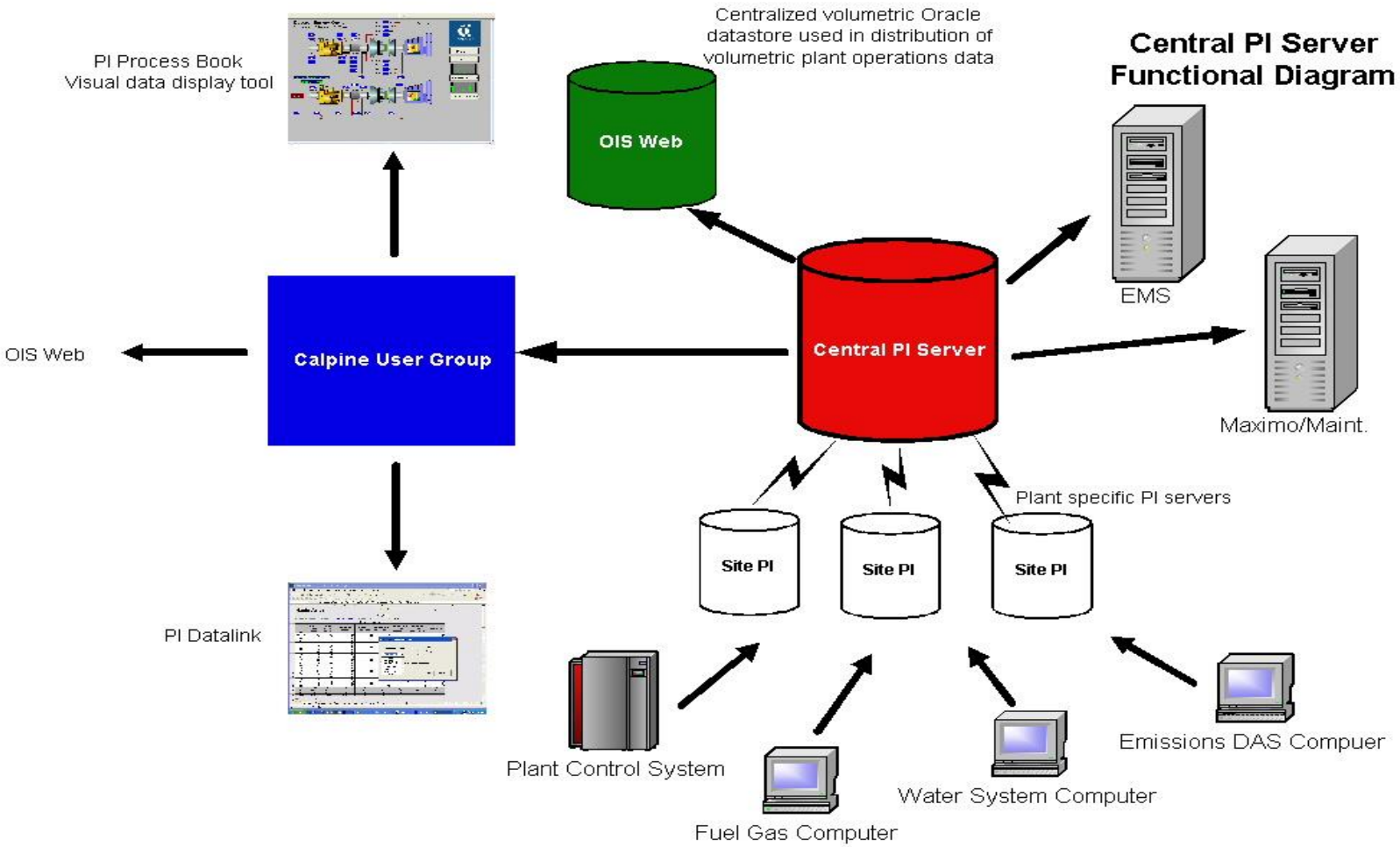
The Typical Installation Time for PI

- *Average install time 2 days/1 person*
  - *Not including hardware procurement or strenuous data validation*
- *PI data validation often dependant on others*
  - *In Calpine's case, plant personnel or engineering staff provide final data validation*
- *Calpine standard practice is to schedule 4 days for an install*
  - *1st day PI is installed and acquiring data, remaining time spent fine tuning and training user on PI Client Tools*

How many Implementation does Calpine have?

- *PI is installed at 79 of Calpine's 82 generating facilities*
- *We have 55 production PI servers and 24 API nodes*
  - *Not all sites require a production PI server*
- *Implementations occurred over 2 year period, but could have been completed in 1 year if all plants were operational*

Basic Overview of Calpine's PI Systems



Closing