Survive and Thrive

Dr. J. Patrick Kennedy, CEO
OSIsoft Inc.
San Leandro, CA 94577

Those that ignore the past . . .

- 15th Annual User Group
- First UG – 83 Attendees
- Continual Fight to Ready for Next Wave
- Arie de Geus
  - Ave Life of Fortune 500 Co – 40 yrs
  - Ave Life of All Companies – 12.5 yrs

- Find the Winning Edge

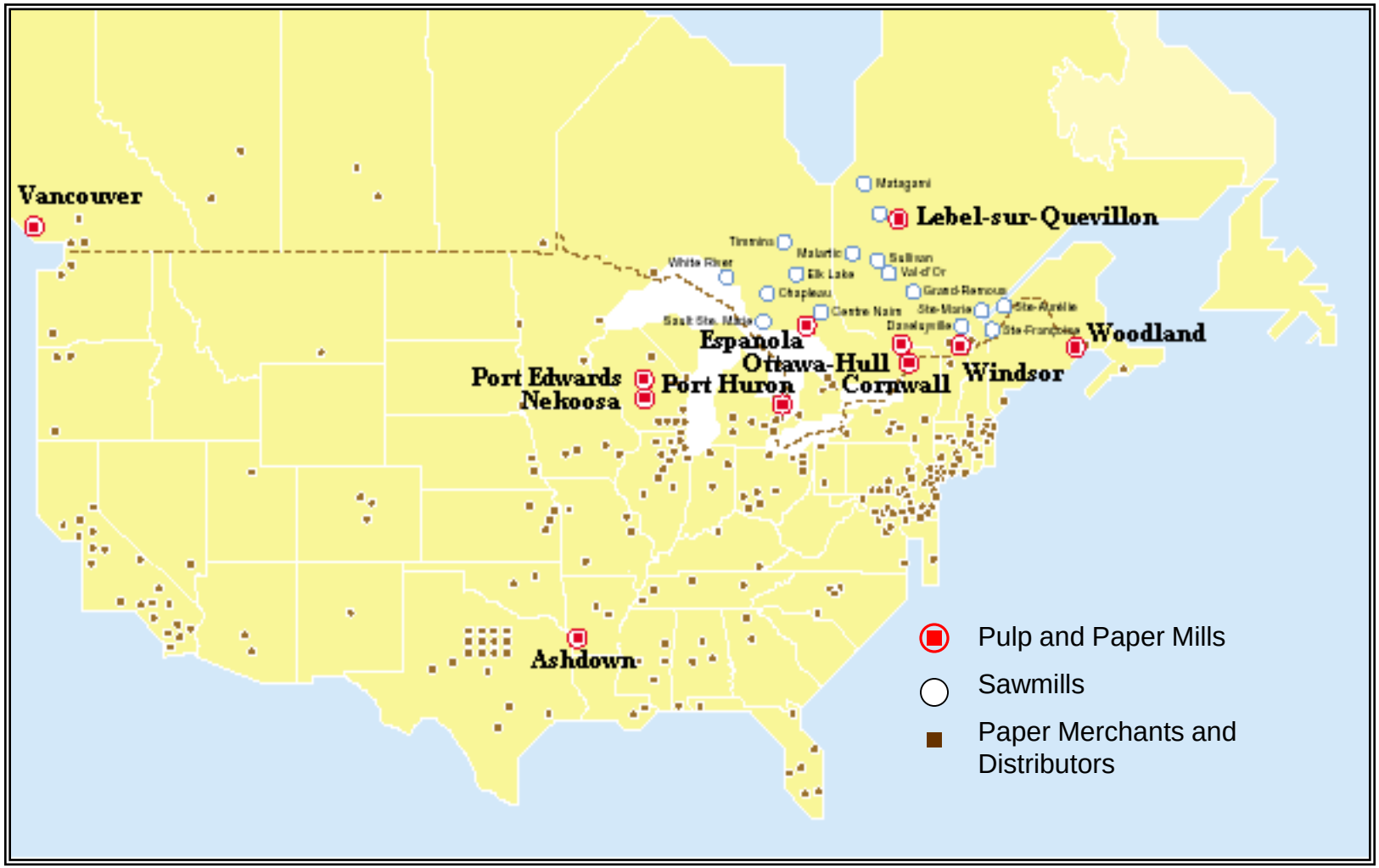
Hardball

- Recent Article in HBR
- Cite Wal-Mart, Dell, Toyota
- Hardball Manifesto
  - Focus on Competitive Advantage
  - Strive for “Extreme” Competitive Advantage
  - Avoid Attacking Directly
  - Exploit People’s Will to Win
  - Know the Caution Zone

Winning Strategy

- All are knowledge based
  - Know costs, know sales/competition
  - Know the legal boundary
  - Know employees
  - Know the market
- What are the Trends
- Where can OSIsoft Help
- Looking at the Past

Domtar Locations



PI at Domtar – Example Applications

- Integrating PI for Viewing Costs in Real Time
  - Producing values reports using data from PI and other sources
- Real-time Detection of Operational Non-conformance
  - Using PI to ensure ISO conformance
- Evaporator Simulator
  - To assist in the planning of evaporator boil outs
- AOX Simulator
  - To predict level of AOX emissions to ensure conformance to environment standards

PI at Domtar – Applications (cont…)

- Grade change applications (at 2 mills)
  - To decrease waste caused by grade changes
- Fiber tracking
  - To track pulp types from wood chips to paper
- Condition Based Maintenance (in progress)
  - To trigger work based on equipment condition
- Electronic Log Sheets (multiple mills)
  - applications that automatically updates hourly readings from PI tags and manual tests by operators

Why Domtar Promotes Networking

Since 1998, Domtar acquired 7 pulp and paper mills. Now have the critical mass, purchasing leverage and technical know-how to:

- promote the exchange of information for expediently resolving problems, and
- progress towards improved return on capital invested

Dow Corning

- 2002 Sales: 2.6 Billion
- Employees: 7000 globally
- Manufacture of Silicon based chemicals
- Significant softwares
  - OSIsoft PI tools including RLink
  - SAP 4.6B – single instance globally (the “beast”)
  - Sample Manager LIMS
  - Web based Radio Frequency (RF) interface to PI and SAP
  - Various Control Systems (one of everything)

Implementation Costs – It is not cheap

- A 10 year journey
  - PI – 3 MM
  - LIMS – 2 MM
  - RF – 1 MM
  - ERP – 100 MM
- A 5 year future
  - PI – 0.5 MM
  - LIMS – 1 MM
  - RF – 0.5 MM
  - ERP – 20 MM

ROI

- Satisfied Customers – increased sales
- Lower maintenance costs (@ DC 800,000 USD per annum for a given supply chain - 4 plants)
- Lower operating expenses (not quantified at this time)
- 5,000,000 USD per annum from improved quality and lower reject rates – this is from the OSIsoft PI infrastructure for E-commerce

Dofasco

- Major North American metal solutions producer
- Annual revenue approximately $3 Billion
- Produce approximately 4.5 million tons of product per year
- Supplier to automotive, manufacturing, construction and packaging customers
- $5 Billion equipment replacement value

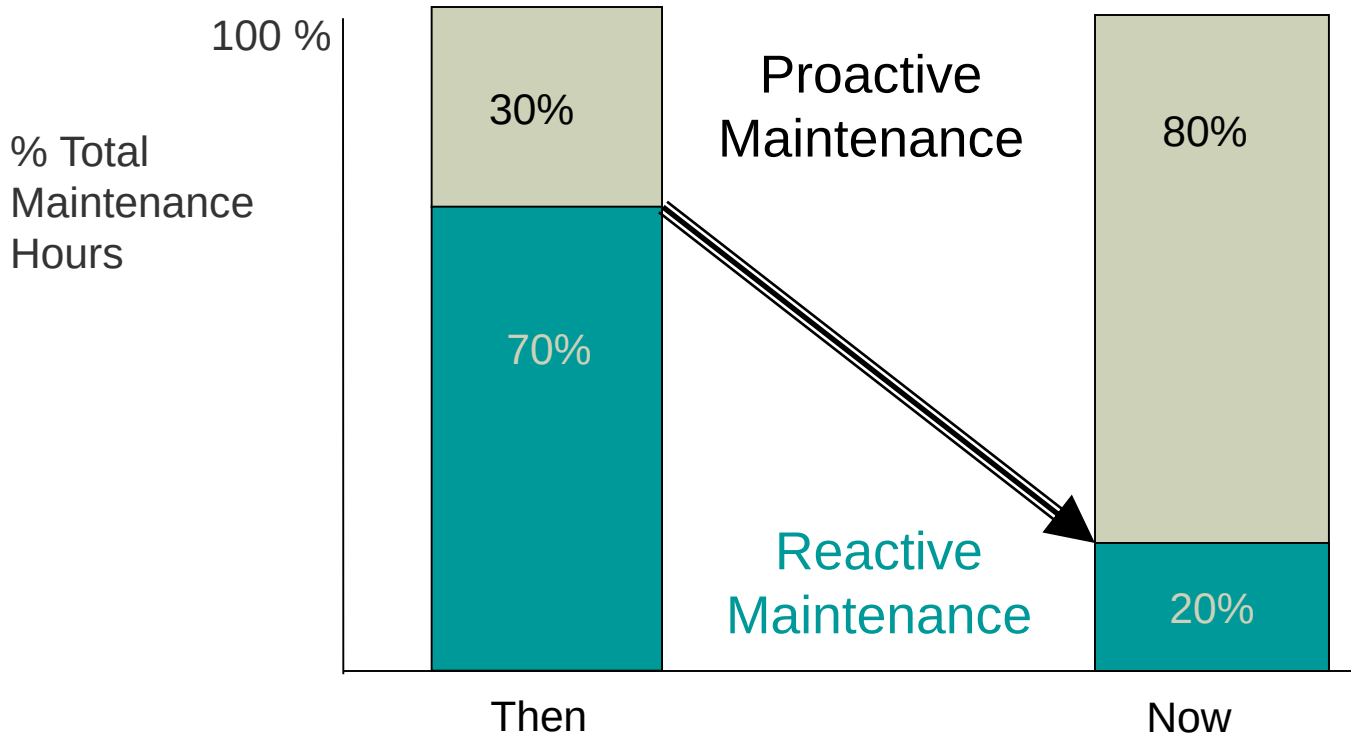
Dofasco Main Site

Dofasco Response

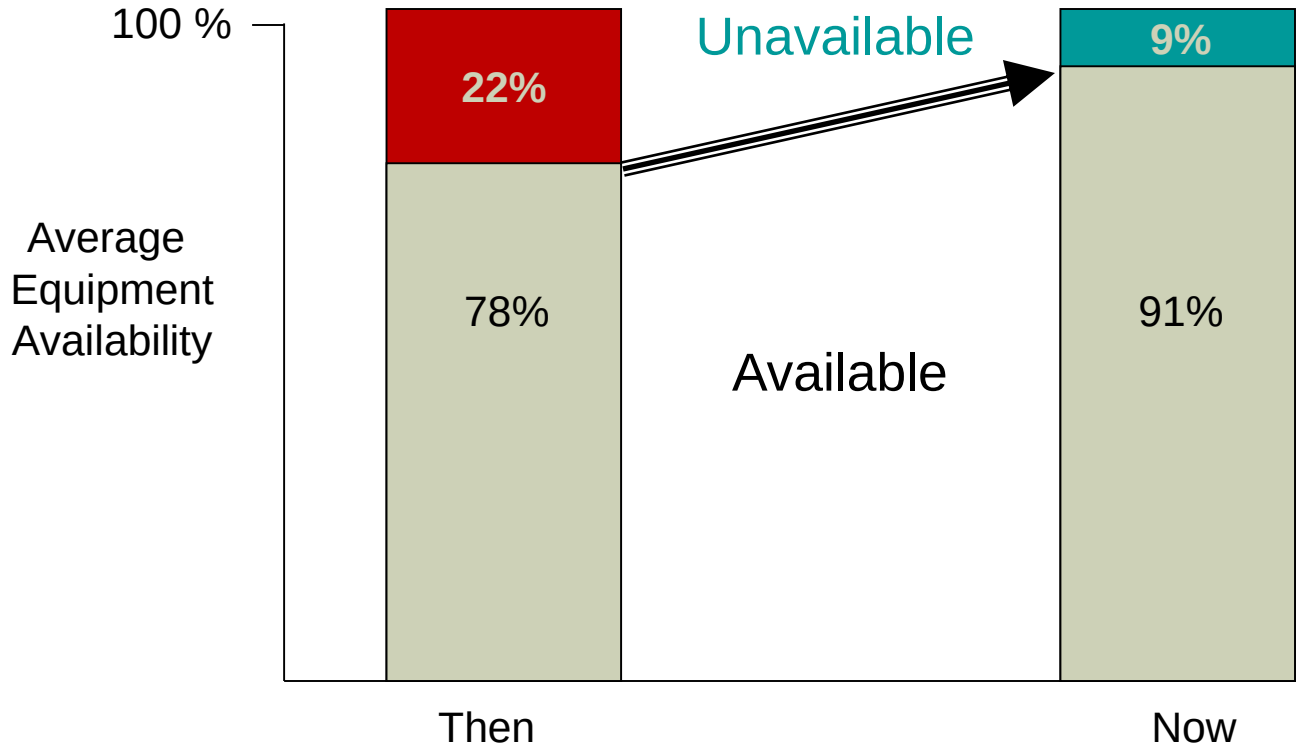
A solution to the changing world of maintenance required a Reliability Driven Maintenance focus

- Asset reliability business process
- Maintenance & reliability practices
- Enabling technologies
- Sustained corporate commitment to reliability

The Results


100 %
% Total Maintenance Hours
30%
70%
Proactive Maintenance
Reactive Maintenance
80%
20%
Then
Now

The Results


100 %
Average Equipment Availability
22%
78%
Unavailable
Available
9%
91%
Then
Now

Timken Bearing

- Leading bearing company in the U.S.
- 3rd largest bearing company in the world
- Torrington Company recently acquired from Ingersoll-Rand
- Timken now offers the most comprehensive array of bearing products on the market today

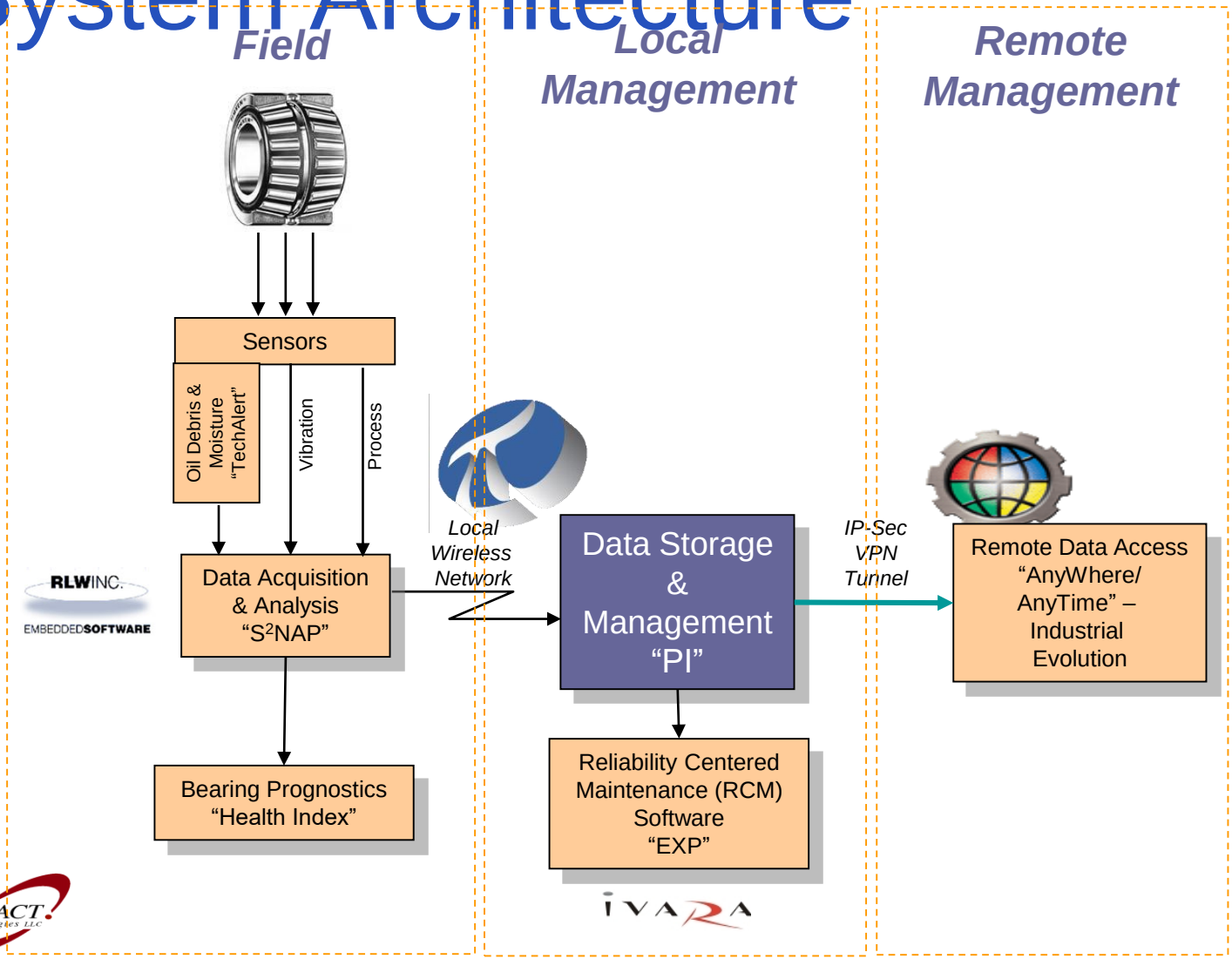
Un-Served Need

- Current situation
  - Knowledge of current equipment health is typically lacking
- Future situation
  - Accurate predictions of equipment failure
- Serving that need requires:
  - Qualified real-time diagnosis of bearing condition
  - Accurate prognosis of future bearing performance

Assembling the Solution

- Tools already exist - need to be assembled and applied to *prognosis*
- Timken working with a team of industry experts and products to accomplish this objective:
  - TechAlerts from Macom – oil debris monitoring sensors
  - S^2NAP from RLW – local intelligence platform
  - EXP reliability software from Ivara – manages total asset health
  - PI from OSIsoft – manages real-time data and makes it available where needed
  - AnyWhere/AnyTime from Industrial Evolution – provides remote access for monitoring team
  - Diagnostic/Prognostic software from Impact Technologies – assesses bearing health

System Architecture



Timken - Overview - Microsoft Internet Explorer provided by AT&T WorldNet Service

File Edit View Favorites Tools Help

Back Search Favorites Media

Address http://www.osisoftdemo.com/Dashboard/dashboard.asp?DashboardID=http://www/DAVCatalog/ICE/Public/6%20-%20Timken/ Go

Timken - Overview

LogOut | Publish | Adhoc Trend | Content | Layout | Settings

Timken - Overview | Oil Debris - Slave Bearing | Oil Debris - Test Bearing #1 | Oil Debris - Test Bearing #2

Dashboard View

- ICE/Private/ice
- ICE/Public
  - 1 - Welcome
  - 2 - Airplane Tracker
  - 3 - Building Monitor
  - 4 - Cleveland Weather
  - 5 - JEA Water Plant
  - 6 - Timken
    - Oil Debris Test Bearing2
    - Oil Debris Test Bearing1
    - Oil Debris Slave Bearing

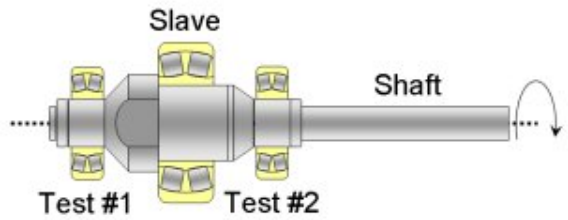
Frequency Analysis

Slave Bearing
Test Bearing #1
Test Bearing #2

Time Range

Start: *-8h
End: *
Apply

Test Rig #1



Slave Bearing

Shaft

Descriptor	Value	Engineering Units
TR#1 Lube Oil Pressure	37.000	psi
TR#1 Lube Oil Temperature	38.000	°F
TR#1 Shaft Speed	39.000	RPM

Test Bearing #1

Descriptor	Value	Engineering Units
TB#1		
TB#1		
TB#1		
TB#1		
TB#1		
TB#1 Demodulated RMS		
TB#1 Demodulated Kurtosis	19.000	
TB#1 Demodulated Crest Factor	20.000	
TB#1 Demodulated Fundamental	21.000	g
TB#1 Demodulated Ball Pass	22.000	g
TB#1 Demodulated Inner	23.000	g
TB#1 Demodulated Outer	24.000	g

Click to personalize layout

Test Bearing #2

Descriptor	Value	Engineering Units
TB#2 Temperature	88.000	°C
TB#2 RMS Vibration	26.000	g
TB#2 Broadband RMS	27.000	g
TB#2 Broadband Crest Factor	29.000	
TB#2 Demodulated RMS	30.000	g
TB#2 Demodulated Kurtosis	31.000	
TB#2 Demodulated Crest Factor	32.000	
TB#2 Demodulated Fundamental	33.000	g
TB#2 Demodulated Ball Pass	34.000	g
TB#2 Demodulated Inner	35.000	g
TB#2 Demodulated Outer	36.000	g

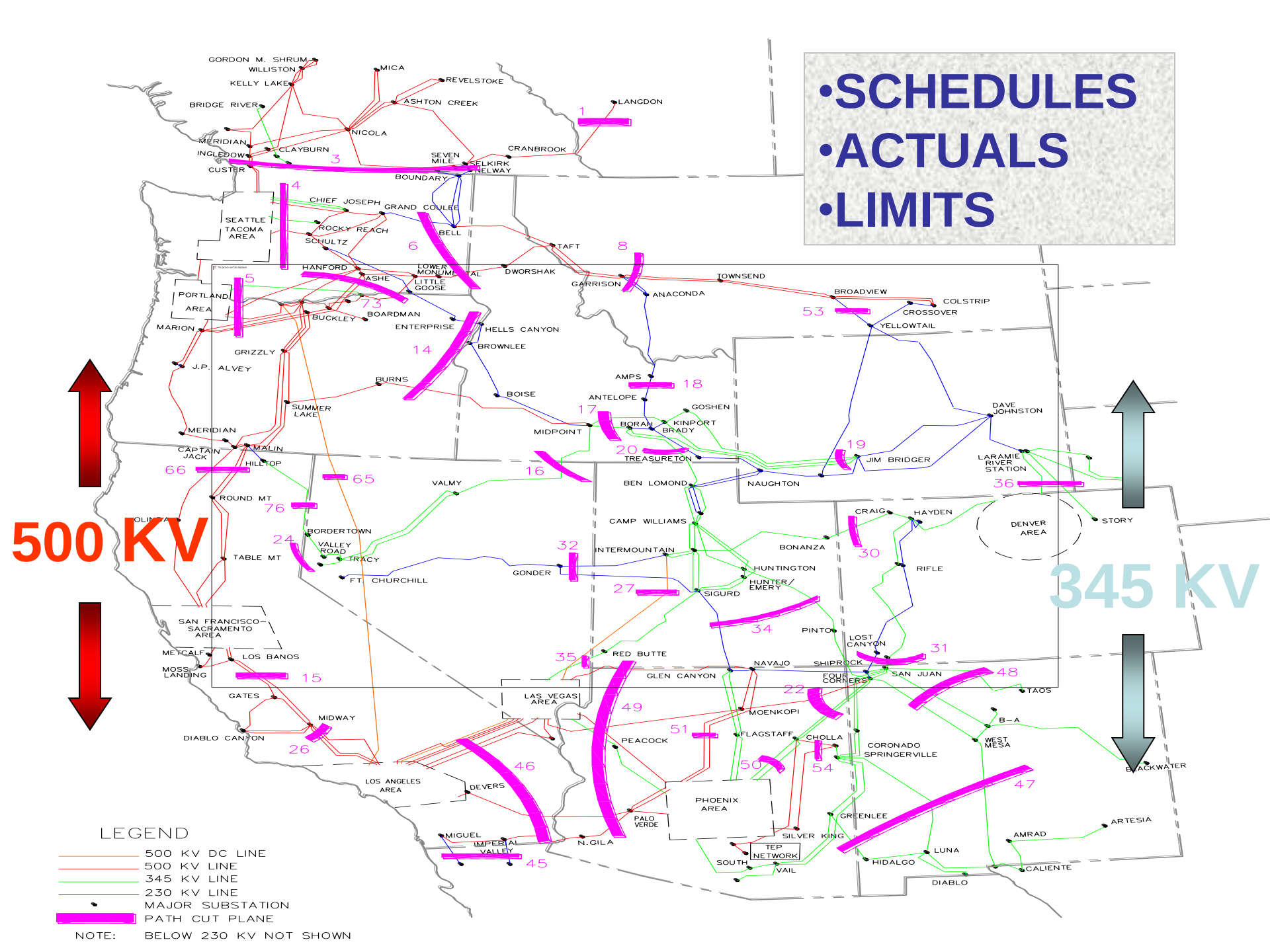
Internet

NE Blackout Investigation

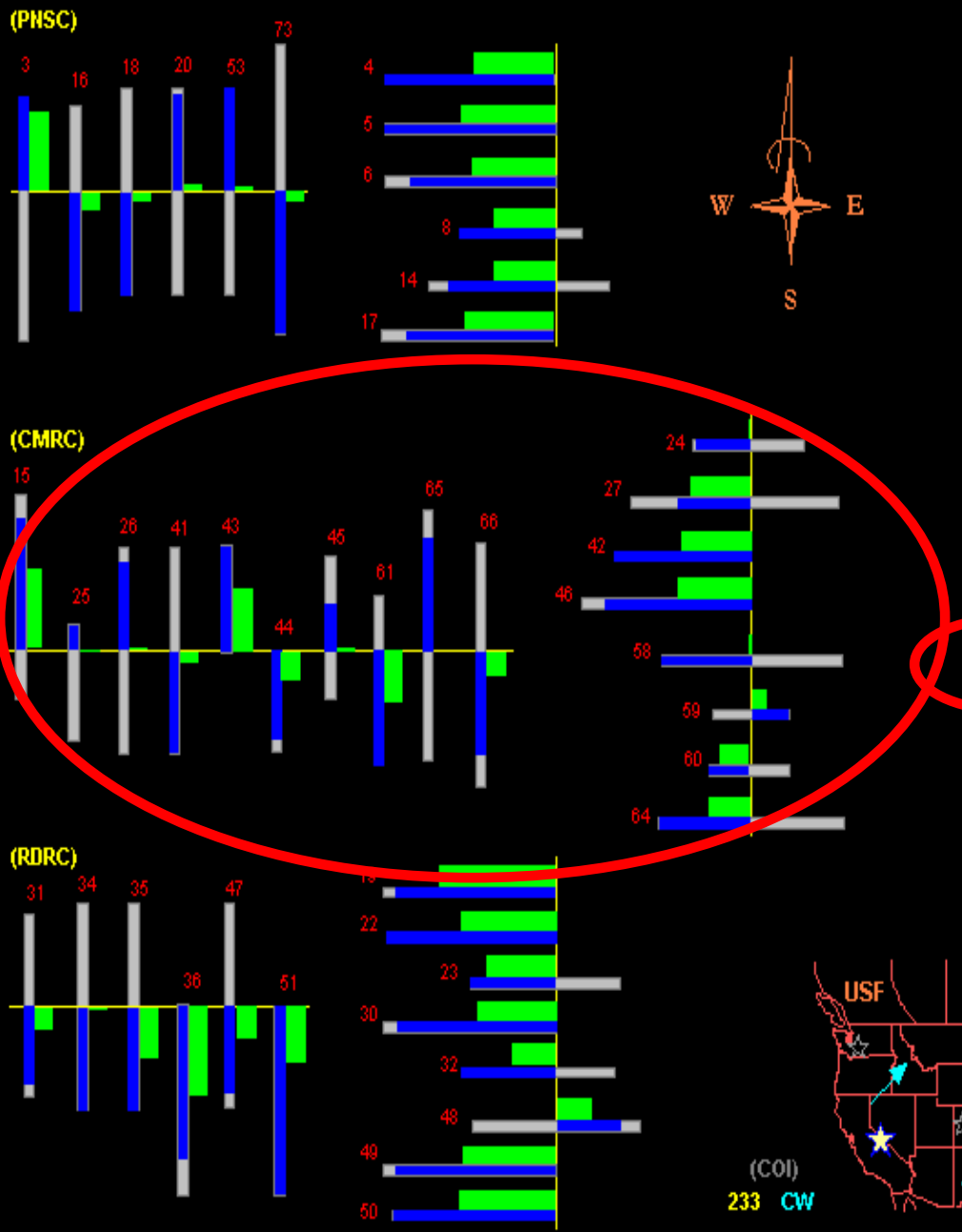
- Relays Protect Equipment
- Operational Practice Prevents Large Scale Blackouts
- NE Blackout totally preventable

And then the lights went out . .

- 46 Task Force Recommendations
- 20/46 Recommendations of NERC Related to better use of Information
- #22 Evaluate and adopt better real-time tools for operators and reliability coordinators.
- #28 Require use of time-synchronized data recorders.
- Take a Look at WECC


•SCHEDULES
•ACTUALS
•LIMITS
500 KV
345 KV
GORDON M. SHRUM
WILLISTON
KELLY LAKE
BRIDGE RIVER
MERIDIAN
INGLEDOW
CUSTER
CLAYBURN
NICOLA
MICA
REVELSTOKE
ASHTON CREEK
LANGDON
CRANBROOK
SEVEN MILE
SELKIRK
NELWAY
BOUNDARY
CHIEF JOSEPH
GRAND COULEE
SEATTLE
TACOMA
AREA
ROCKY REACH
SCHULTZ
BELL
TAFT
HANFORD
ASHE
LOWER MONUMENTAL
LITTLE GOOSE
DWORSHAK
GARRISON
TOWNSEND
ANACONDA
BROADVIEW
COLSTRIP
CROSSOVER
YELLOWTAIL
PORTLAND
AREA
BUCKLEY
BOARDMAN
ENTERPRISE
HELLS CANYON
MARION
GRIZZLY
J.P. ALVEY
BROWNLEE
BURNS
AMPS
ANTELOPE
BOISE
SUMMER LAKE
GOSHEN
BORAH
KINPORT
BRADY
MIDPOINT
DAVE JOHNSTON
MERIDIAN
CAPTAIN JACK
MALIN
HILLTOP
TREASURETON
JIM BRIDGER
LARAMIE RIVER STATION
NAUGHTON
VALMY
BEN LOMOND
ROUND MT
CAMP WILLIAMS
CRAIG
HAYDEN
STORY
DENVER AREA
BORDERTOWN
VALLEY ROAD
TRACY
TABLE MT
FT. CHURCHILL
GONDER
INTERMOUNTAIN
BONANZA
HUNTINGTON
HUNTER/ EMERY
SIGURD
RIFLE
SAN FRANCISCO–SACRAMENTO AREA
METCALF
MOSS LANDING
LOS BANOS
GATES
MIDWAY
DIABLO CANYON
LAS VEGAS AREA
RED BUTTE
GLEN CANYON
NAVAJO
PINTO
LOST CANYON
SHIPROCK
FOUR CORNERS
SAN JUAN
TAOS
MOENKOPI
B–A
WEST MESA
BLACKWATER
PEACOCK
FLAGSTAFF
CHOLLA
CORONADO
SPRINGERVILLE
LOS ANGELES AREA
DEVERS
PHOENIX AREA
PALO VERDE
GREENLEE
SILVER KING
TEP NETWORK
SOUTH
VAIL
HIDALGO
LUNA
AMRAD
ARTESIA
CALIENTE
DIABLO
MIGUEL
IMPERIAL VALLEY
N.GILA
LEGEND
500 KV DC LINE
500 KV LINE
345 KV LINE
230 KV LINE
MAJOR SUBSTATION
PATH CUT PLANE
NOTE: BELOW 230 KV NOT SHOWN

WSCC PATH MONITOR



PACIFIC NORTHWEST

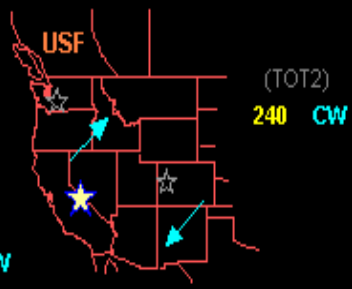
PATH	ACTUAL	LIMIT
P-3	-1677	-2400
P-4	4764	9800
P-5	3919	7000
P-6	-1380	-2406
P-8	1444	2200
P-14	1387	2400
P-16	-84	-500
P-17	1187	2307
P-18	35	337
P-20	72	950
P-53	-22	-400
P-73	759	8400

CALIFORNIA / MEXICO

PATH	ACTUAL	LIMIT
P-15	018	334
P-24	-6	-150
P-25	0	200
P-26	99	2600
P-27	974	1200
P-4	-153	-1200
P-4	311	600
P-4	1475	2440
P-4	760	2200
P-4	-52	-408
P-4	4443	-8749
P-5	56	1140
P-5	-31	-72
P-60	41	56
P-61	-904	-1950
P-64	566	1200
P-65	-28	-2204
P-66	852	-35

ROCKY / DESERT

PATH	ACTUAL	LIMIT
P-19	1500	2050
P-22	1326	2325
P-23	693	840
P-30	306	600
P-31	163	555
P-32	-114	-245
P-34	39	850
P-35	149	300
P-36	759	1280
P-47	301	795
P-48	632	1106
P-49	4084	7000
P-50	714	1200
P-51	709	2264



(TOT2)
240 CW

(COI)
233 CW

QUALIFIED USF PATH

TIME ERROR

PATH OVERVIEW

USF

- CMRC TOTALS -

SCHED INTG	ACTUAL INTG	GENERATION	ACE	LOAD	OR	SR
-8732	-8680	34211	34	42614	3290	2120

TIME ERROR

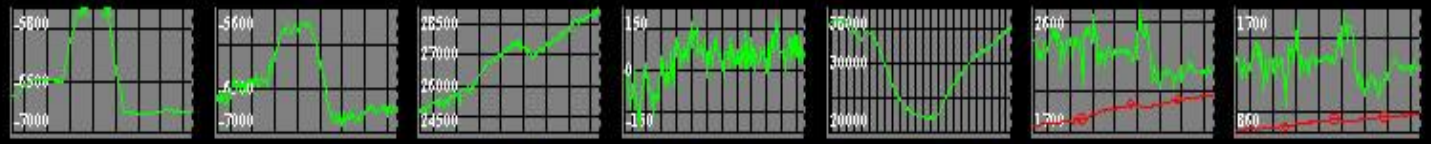
+2 SECOND

SLOW

-2 SECOND

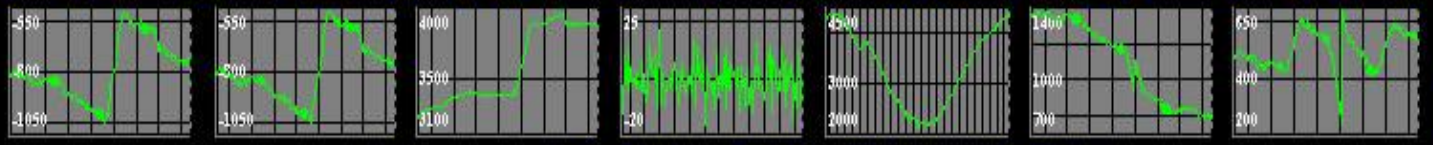
California Independent System Operator (CISO)

SCHED INTG	ACTUAL INTG	GENERATION	ACE	LOAD	OR	SR
-6797	-6740	28478	36	35218	2142	1298



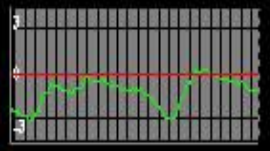
Los Angeles Dept. of Water & Power (LADWP)

SCHED INTG	ACTUAL INTG	GENERATION	ACE	LOAD	OR	SR
-774	-772	3883	0	4345	786	544



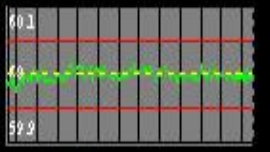
TIME ERROR

-0.790



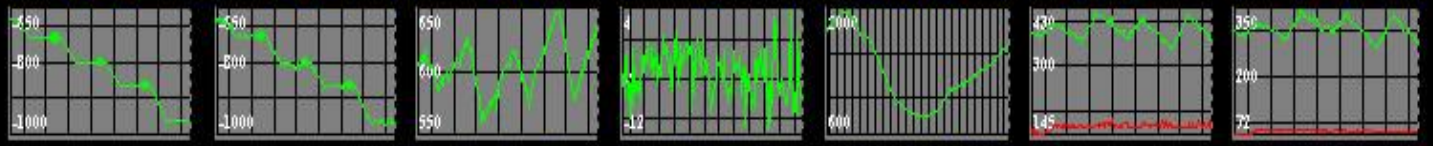
FREQUENCY

59.995



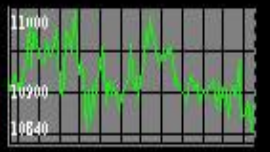
Sacramento Municipal Utility District (SMUD)

SCHED INTG	ACTUAL INTG	GENERATION	ACE	LOAD	OR	SR
-961	-967	634	-8	1601	363	279



SCIT

10888

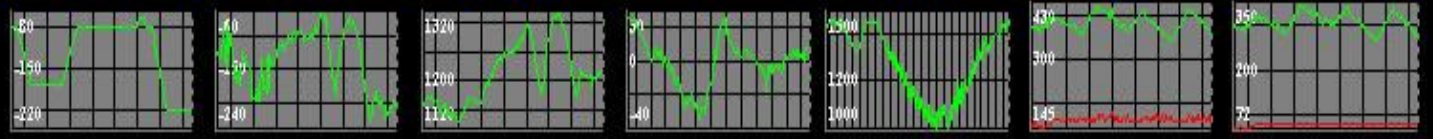


AGC DETAIL

CISO | LDWP | CFE | SMUD

Comision Federal De Electrcidad (CFE)

SCHED INTG	ACTUAL INTG	GENERATION	ACE	LOAD	OR	SR
-200	-202	1216	5	1451	363	279



GENERATORS

N. West | S. West | N. East | S. East

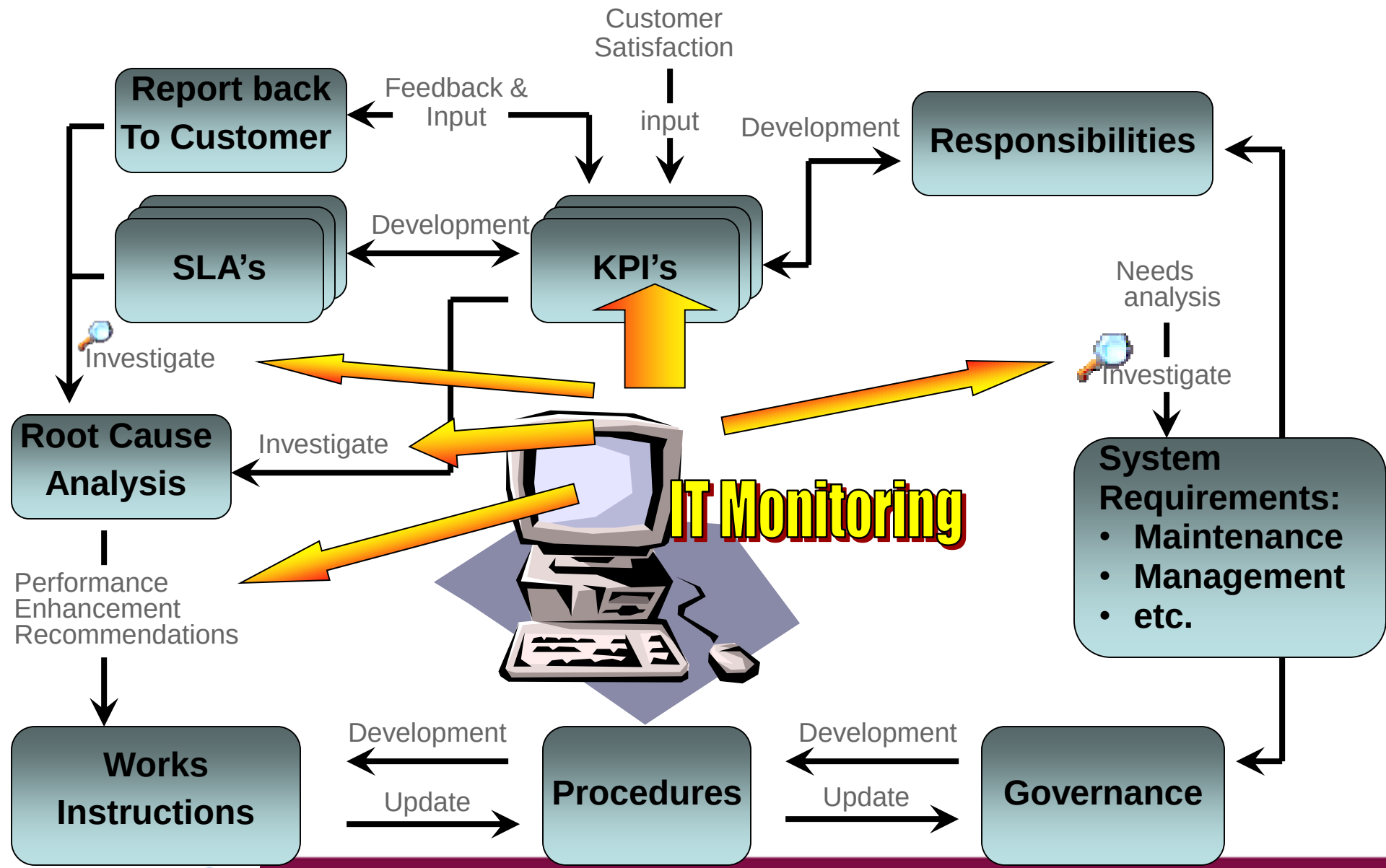
MISC.

KV | LOAD | CMRC EHV

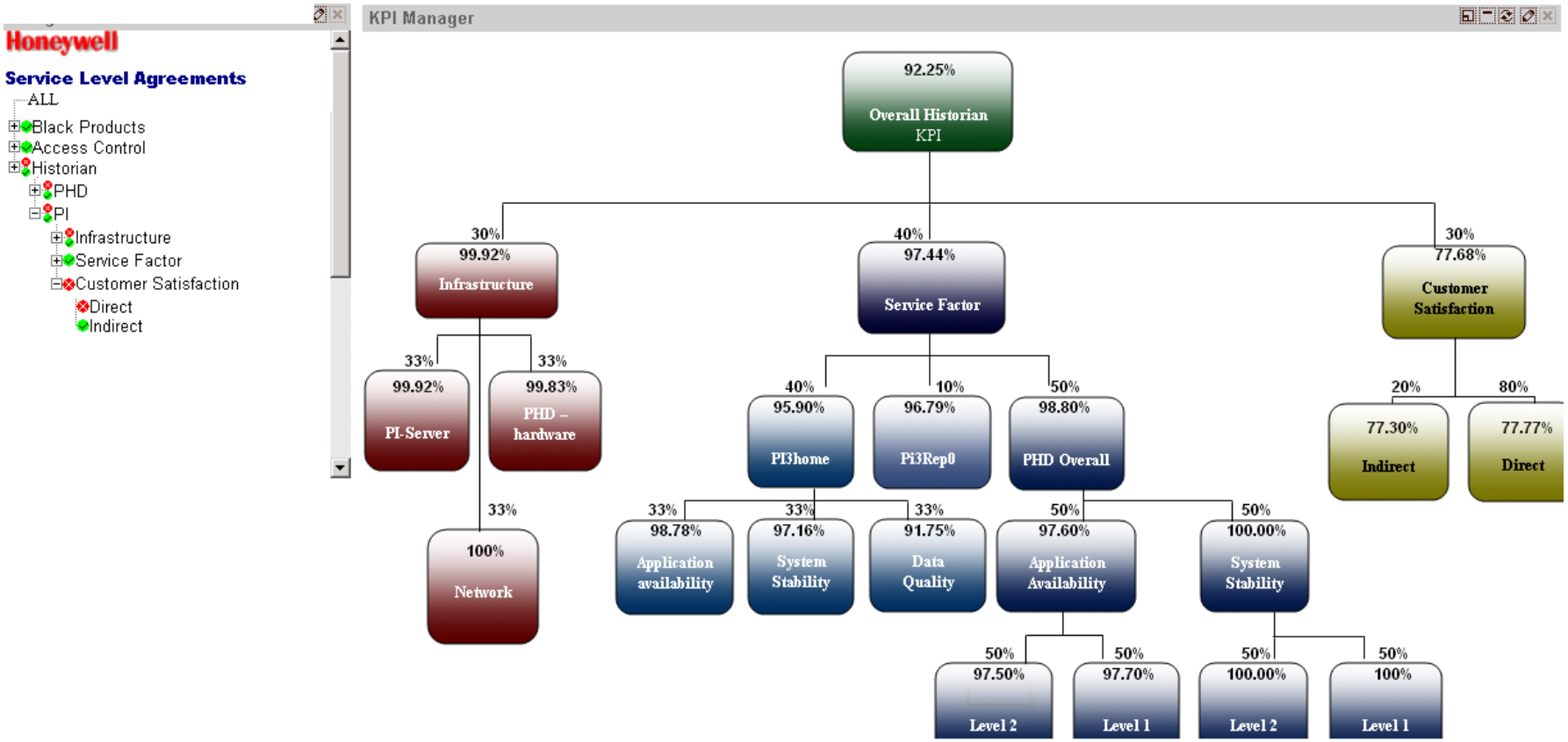
No Shoes for the Cobbler's children – What about the IT System?

- IT Infrastructure Often Critical Business Element
- First Element of Reliability is Monitoring
- Sasol – One of the Largest Industrial Complexes in the World
- Mines, Refinery, Chemical Plants, Gasification

IT Monitoring in SLA management



SLA Monitoring and Management - Portal



Benefits thus far

- Real-time Performance Monitoring
- Preventative Maintenance strategies
- Advanced trouble shooting and fault finding system
- Incentive Based Service Level Agreements (SLA), based on Key Performance indicators (KPI)
- Integration into Synfuels Portal as Monitoring, Fault finding, operations and Management tool
- Single Site-wide monitoring system

Strategic Enterprise Initiatives

- Michael Porter – Strategic – Changes the Fundamental Economics of an Industry
- Real Time Information, Portals, Web Services – all are new and *potentially* Strategic
- Portals, Web Services are *inherently* Enterprise level

Abitibi-Consolidated is…

- **A global company with 60 facilities in 7 countries on 3 continents:**
  - Approximately 17,000 employees
  - 27 paper mills, 1 market pulp mill, 22 sawmills, 3 remanufacturing facilities and 10 recycling centres
- **Each year, we manufacture:**
  - Close to 6 million tonnes of newsprint
  - 1.9 million tonnes of value-added papers
  - Over 2 billion board feet of lumber
  - 444,000 tonnes of market pulp
  - And we consume some 2 million tonnes of recycled papers

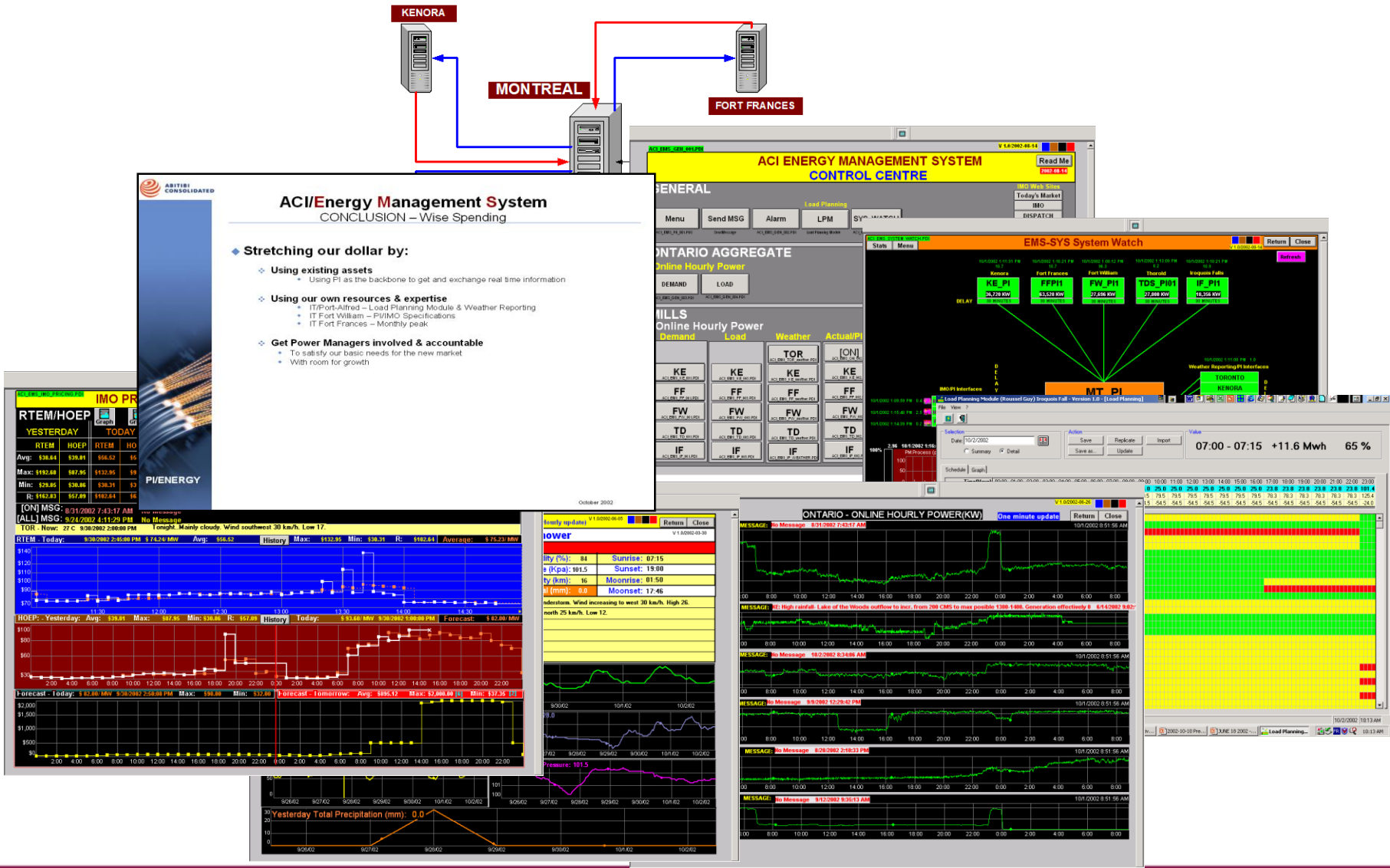
ACI/Energy Management System

PROBLEM AND SOLUTION

- **‘’ We are bringing more than a system to the mills, we are bringing a cultural change”**

- **The problem**
  - The province of Ontario decided to open the electricity market, May 1 2002
- **What was at stake (2000 data)**
  - ACI Energy cost of $760M, including $500M in electricity
  - ON mills paid $90M for their electricity
- **Playing the game:**
  - You can make money or…
  - Lose your shirt !!!
- **The proposed solutions**
  - Plan A:
    - Off the shelf solution (>$3M)
  - Plan B:
    - ACI Solution using PI

ACI/Energy Management System



Abitibi Consolidated – Strategic Use of Power

- Made decisions to generate, consume conserve
- Decisions based on price data
- Hence the title – Make Paper or Make Power

Others

- IP – Marginal Economics
- Codelco – Enabling the Worker
- Polimeri – Polyethylene
- PolyOne – Chemicals

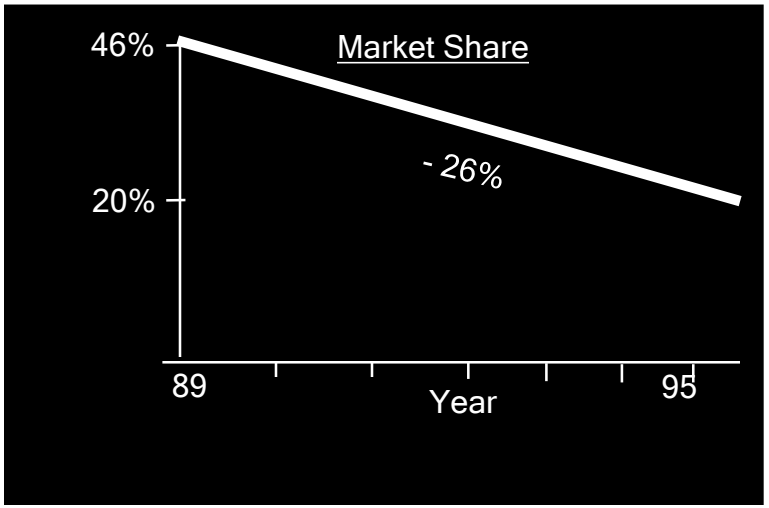
Strategic Apps – Is this New?

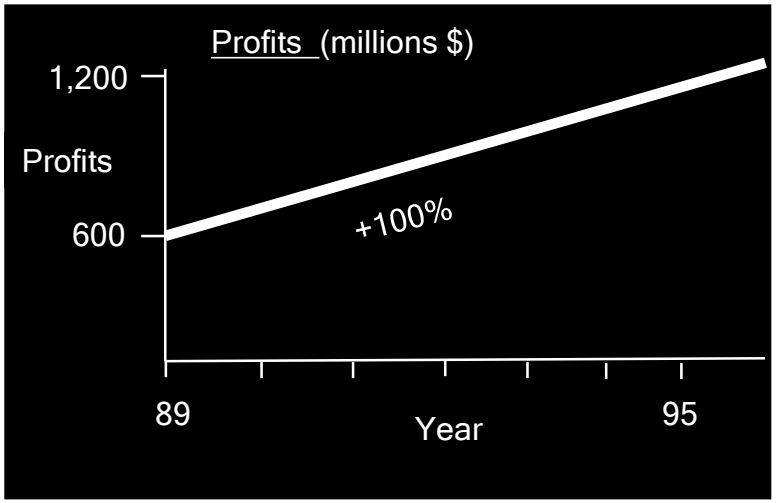
- Most of Examples are 2002 or 2003 UG
- Lets Look at 1993 UG
- UK Privatization of Power – Had to go from government company burning government coal to an aggressive entity that had to bid for power in hourly increments
- Had to know exact costs in real time – developed idea of OIS

National Power

- Privatized CEB
- 47% Power in the UK
- Required OIS
  - Availability
  - Event Logging
  - Reporting
  - Condition Monitoring
  - Efficiency Monitoring
  - Chemistry
  - Environmental Monitoring
  - Optimization

What were the results?





NP decreased its market share by:

- Focusing on its best plants to produce the best product (went from 37 to 9 plants).
- Building new plants to maintain a competitive position against new entrants (4 new CCGTs).
- Maintaining earnings by investing overseas in core activities - operating and managing generation plants

NP increased profits by maximizing revenue and reducing costs:

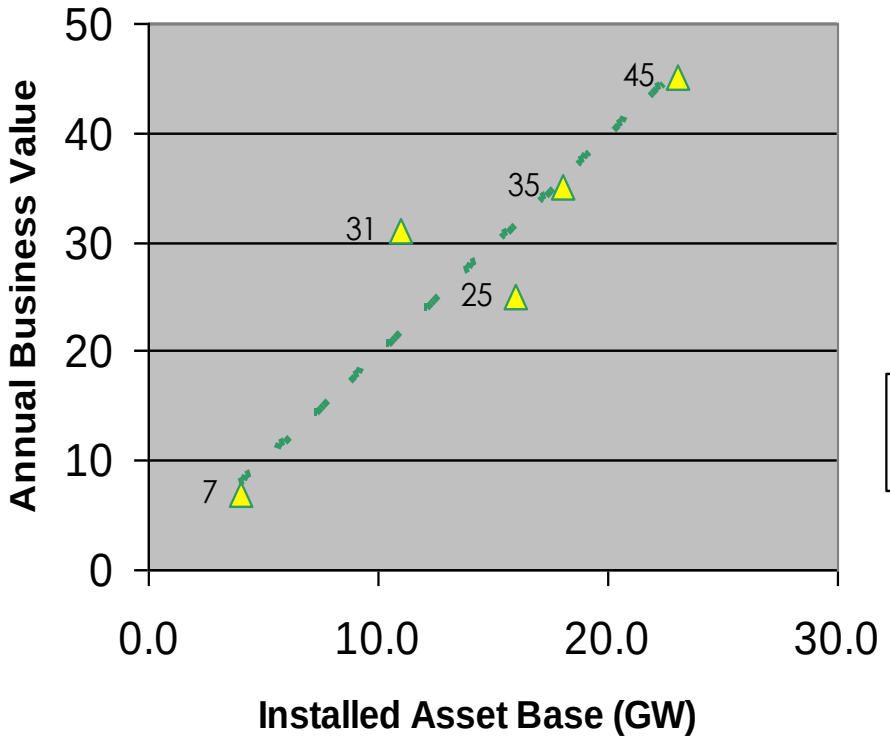
- New processes and tools enabled a reduction in personnel from 17,600 to <4,000.
- Real-time information led to improvements of 1% in thermal efficiency and 3% in reliability.
- By understanding products/costs, NP became the market leader in Ancillary Services.

National Power

- From the Project Manager - Payback on the NP project was achieved in 7 months, my total budget was £20m ($32m) for OIS and related projects, they were linked with work management, integrated load management, etc. This translates to $54m annually.
- NP had 30 GW Fleet Capacity

Value Calculator

Power2Profits Economic Value Estimator



Customer economic value, resulting from the P2P offering, is based on regional market factors, fleet size, technology mix, and client appetite for change.

Economic Value Created

Business Value Estimator

Typical customer results provide rapid payback with built-in continuous improvement that sustain the benefits realization.

Lessons Learned

- Our lesson simple, Customers have been telling us for a decade that real-time information is strategic, not an adjunct to process control – Hence RtPM
- We listen but Selectively
- We are Changing – New Program for Listening

Introducing OSI SIG's

- Propose Starting SIG Influence Groups
- First Meeting in Sept/Las Vegas 2004
  - Arranged by OSIsoft
  - Create Five SIG's (Power, Oil and Chemical, Pharmaceutical, Metals and Mining, Pulp and Paper)
  - Procedure for Creating New SIG's
  - Need Customers Willing to Dedicate Time

User Conferences –New Format

- Hard for Users to Meet Once per Year in San Francisco
- Changing to Regional UG's
  - Estimate 5/year
  - NOT in San Francisco (maybe one but competes with others for location)
  - Two Day
  - Some outside of USA
- SIG's – Listen => UG – OSIsoft Reports Back

Living Company

- Goal of a Living Company – NOT Shareholder Value, NOT profits – it is Survival
- Arie de Geus also studied Companies that had Survived 100 – 700 Years (e.g. Stora)
- Living Companies LEARN – and good learning extends their lifetime
- OSIsoft Intends to be a Living Company
- OSIsoft Intends our Customers Survive and Thrive

OSISOFT USERS CONFERENCE 2004

DISCOVER YOUR PORTAL TO PERFORMANCE