
# *Extending PI for Process Improvement in Operations and Maintenance at TransAlta*

# Agenda

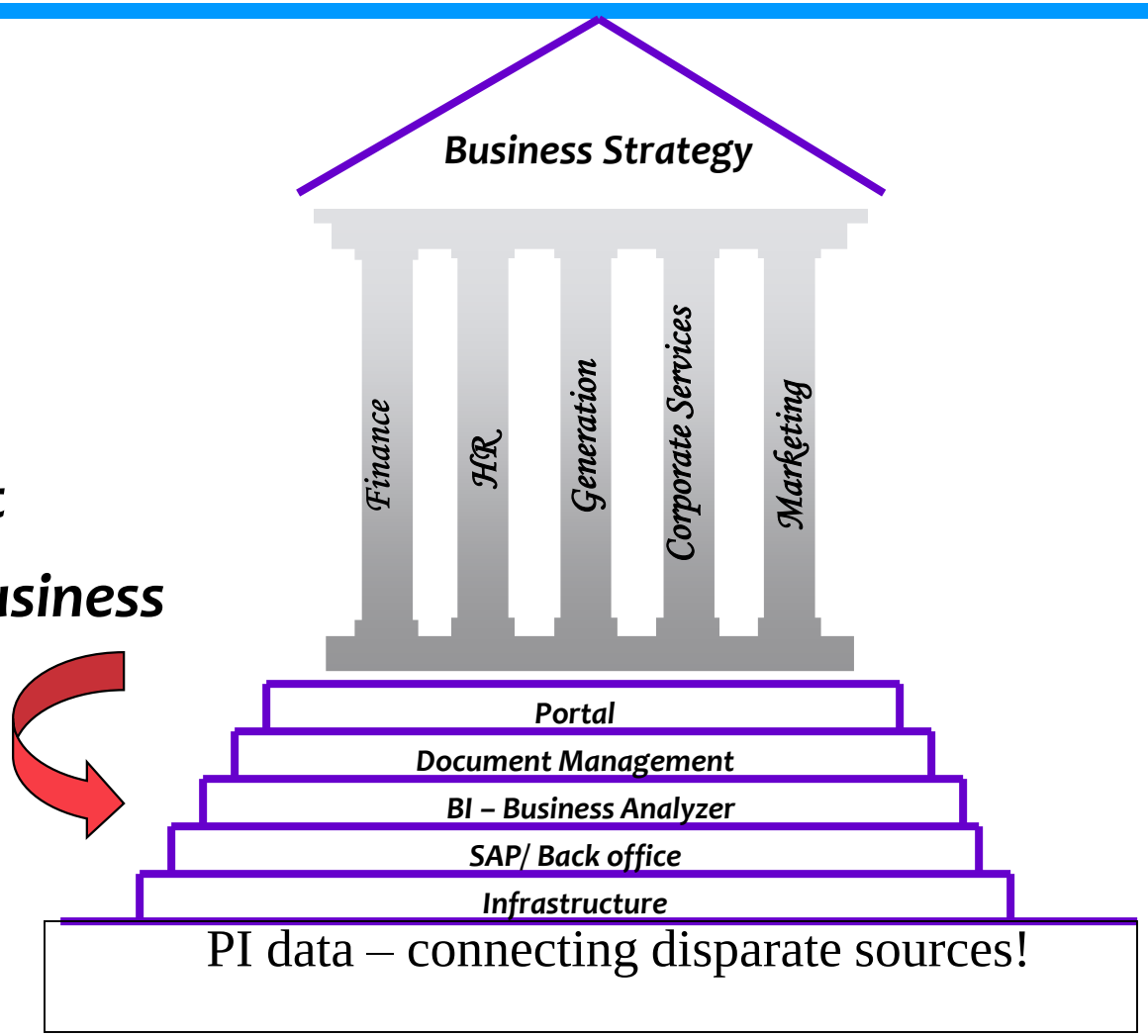
- *TransAlta Overview*
- *Vision*
- *Scope*
- *Standard Business Model*
- *Maintenance*
- *Operations*
- *Integrated Decision Support*
- *Conclusions*
- *Q&A*

# TransAlta

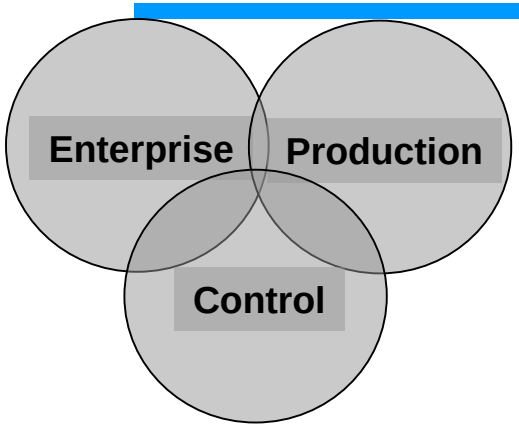
- *Canada's largest non-regulated electric generation and marketing company*
- *Coal Mining (Canada & US)*
- *Operations in Canada, United States, Mexico, and Australia*
- *10,000 MW generating capacity*
- *Close to $9 billion in coal-fired, gas-fired, hydro and renewable assets in operation, under construction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

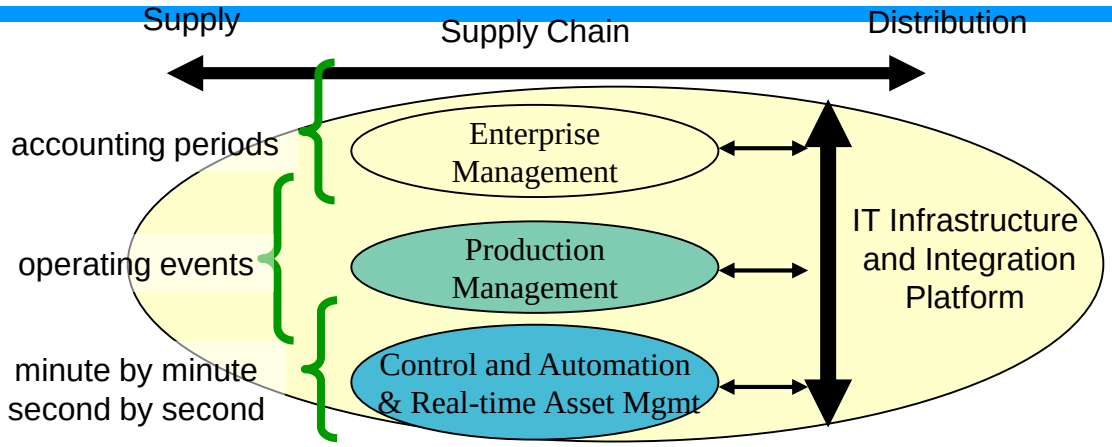
# TransAlta … State of the Business

***Platforms that support the business***



# Vision



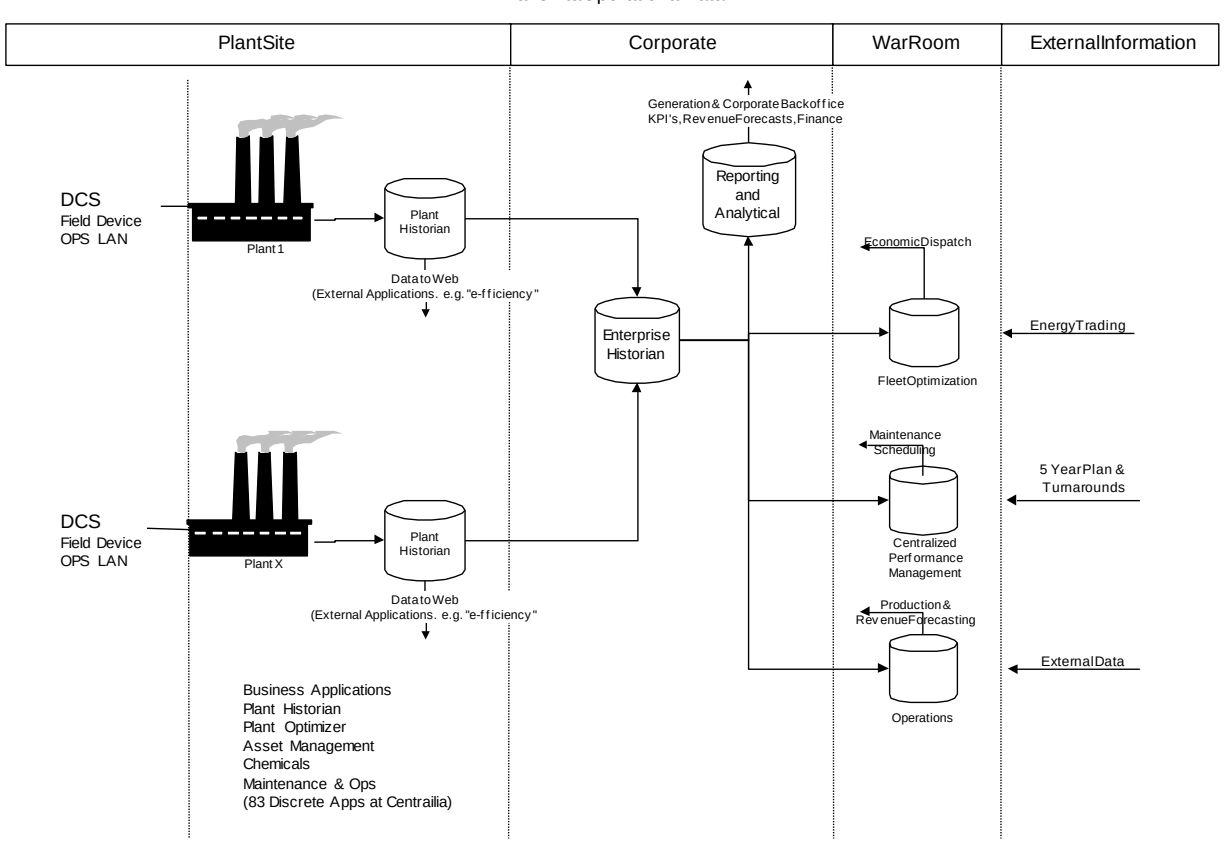




- "Right-time" information accessible throughout the enterprise.
- Enterprise integration from the "sensor to ERP system."
- Customized and formatted visualization of information as required.
- Centralized real time control and automation areas.
- Virtual plant environments to utilize knowledge and expertise across the enterprise.

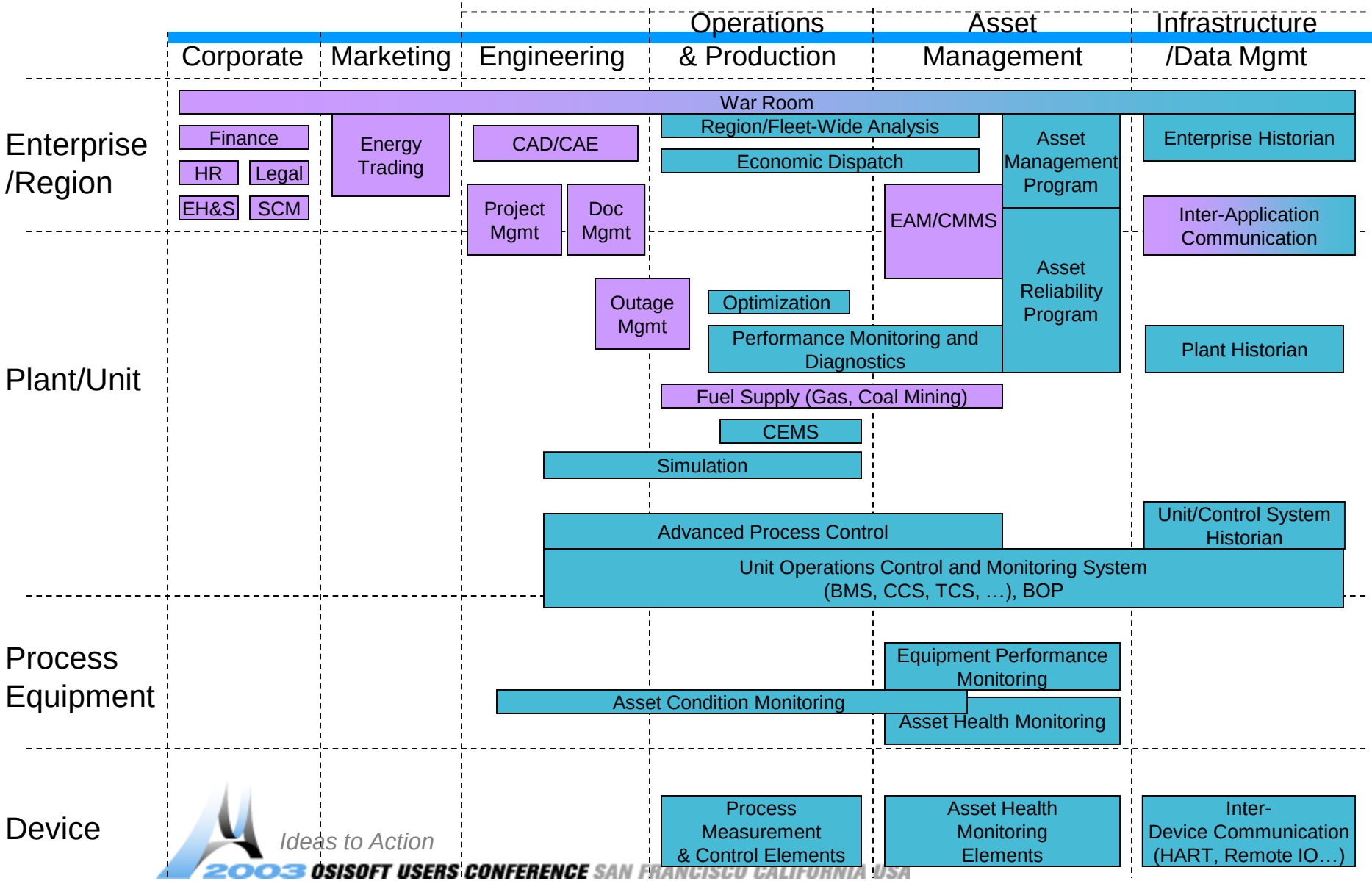
# High Level Scope

- *TOP = "TransAlta Optimization Program"*
- *Purpose:*
  - *"The Integrated Enterprise"*
  - *Vertical and horizontal integration and optimization*
- *Scope:*
  - *From sensor to boardroom*
  - *All levels; Enterprise, plant, process control*
  - *Develop a standard business model*
  - *Pilot site to prove concepts*
  - *Deploy across the fleet*
  - *Seize opportunities to deploy standards as they arise*

# Typical Plant View



# TOP – Standard Business Model



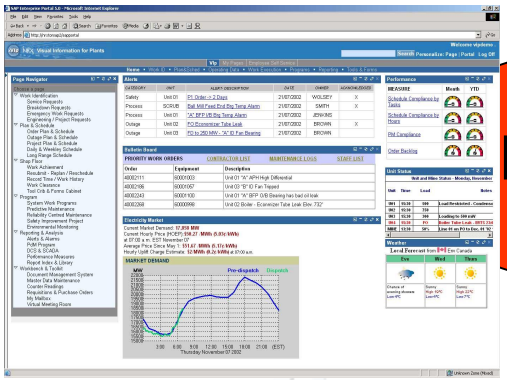
# Maintenance

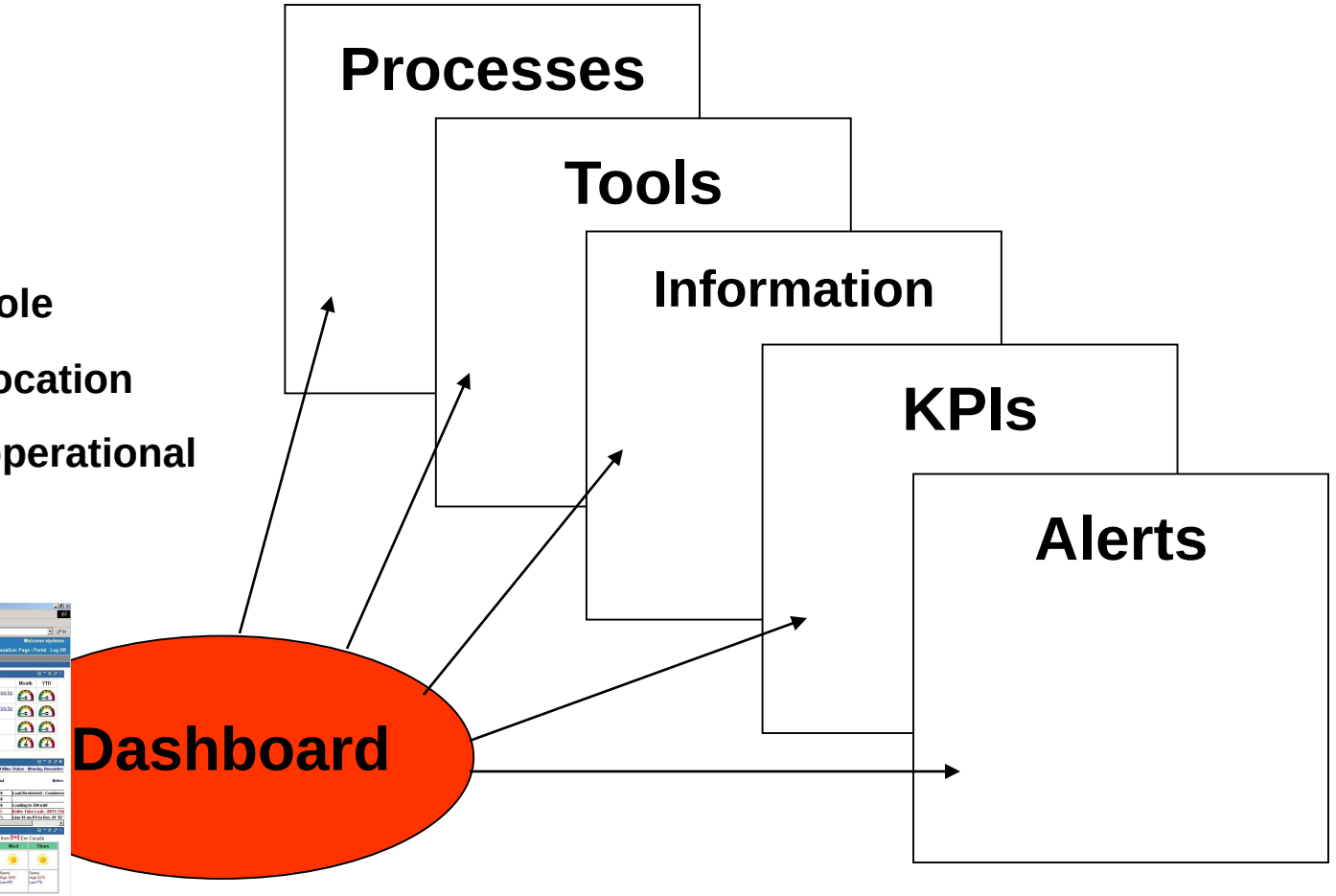
# Maintenance Goals

- *Consistent routine maintenance practices fleet wide to produce :*
  - *Bottom line businesses results*
  - *Ease acquisition installations*
  - *Comparability internally/externally*
  - *Ease introduction of new tools*
    - *TOPS, EDM, hand held or other technology*
  - *Transferability amongst people (learning)*
  - *Sharing of practices*
  - *Operational excellence & repeatability*

# Maintenance Improvements

- role
- location
- operational





# Total Maintenance Solution – xVIp™

**Maintenance Best Practices and Processes**

**Ver 1.0 – Q1 '03**

**Ver 1.x – Q3 '03**

PDAs

PCs

Portal

Alerts

Web
- Suppliers (Info, Alerts)
- Maintenance Companies
- Monitoring
- Contractors

Visual Parts Catalogue

Search

Visual Plant Structure

Collaboration

Work Clearance

RCM

Process Integration
(Process Maps Activated)

Document Stores
- Drawings, Technical Docs
- Operating Manuals

**Real-Time Plant Info.**

ERP
**(eg., Plant Maintenance, MM, etc.)**

Automated Work Packages

Working Offline

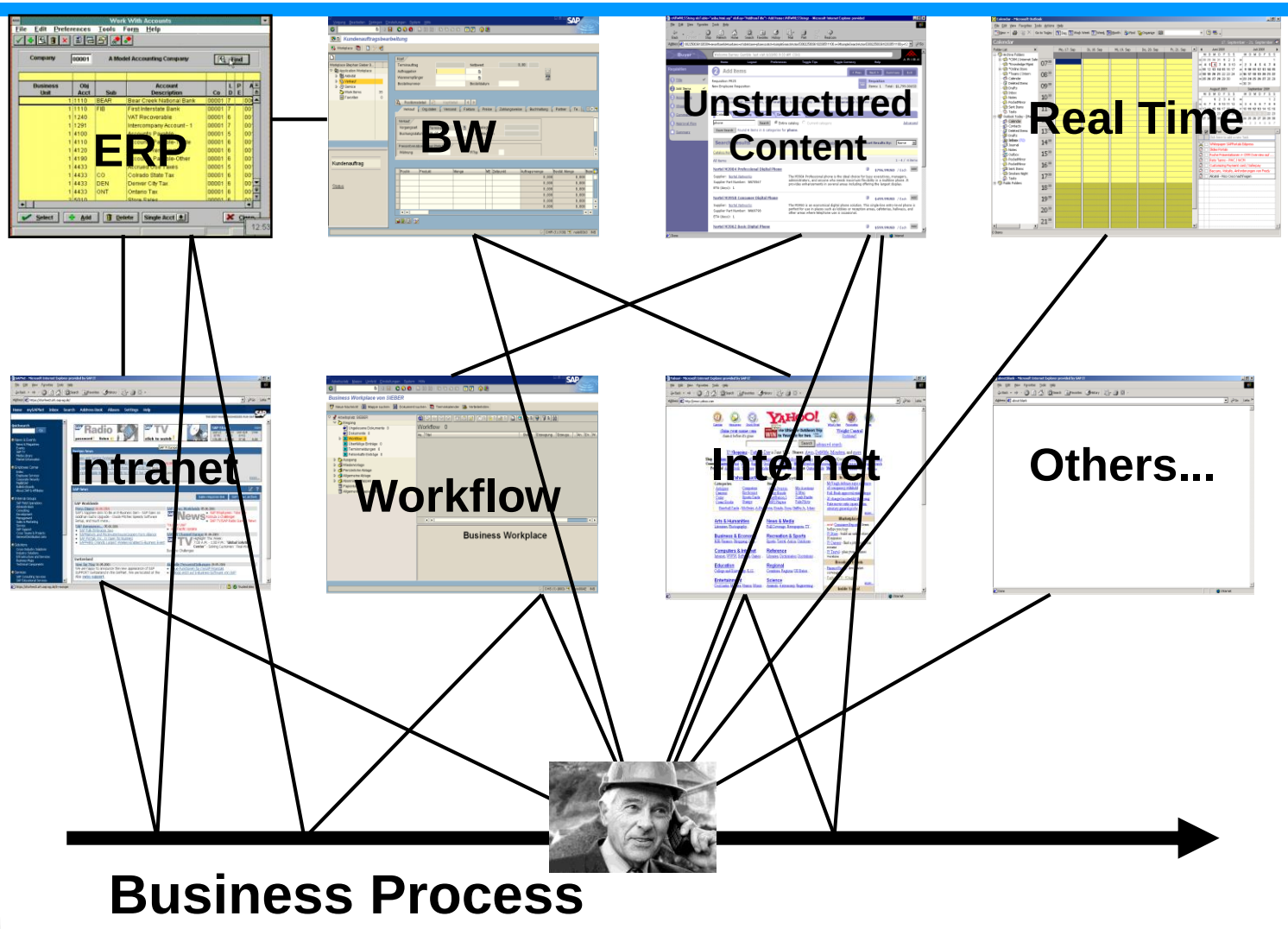
Business Packages - iViews
(Assets, Financial, Projects , etc)

Data Warehouse
SAP BW

**Maintenance Data**

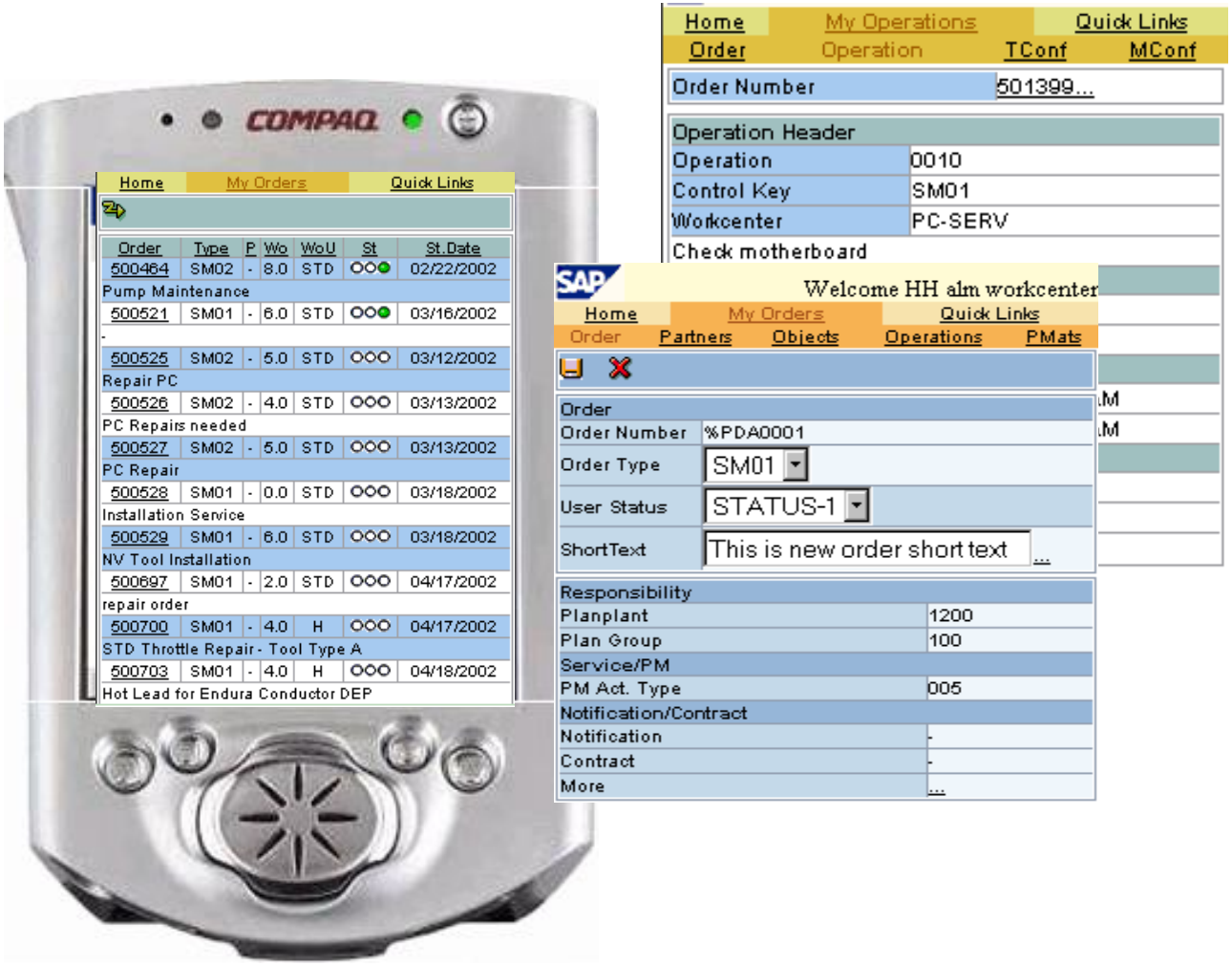
**Plant Maintenance (View all Plants as one)**

# Working the Process - Before

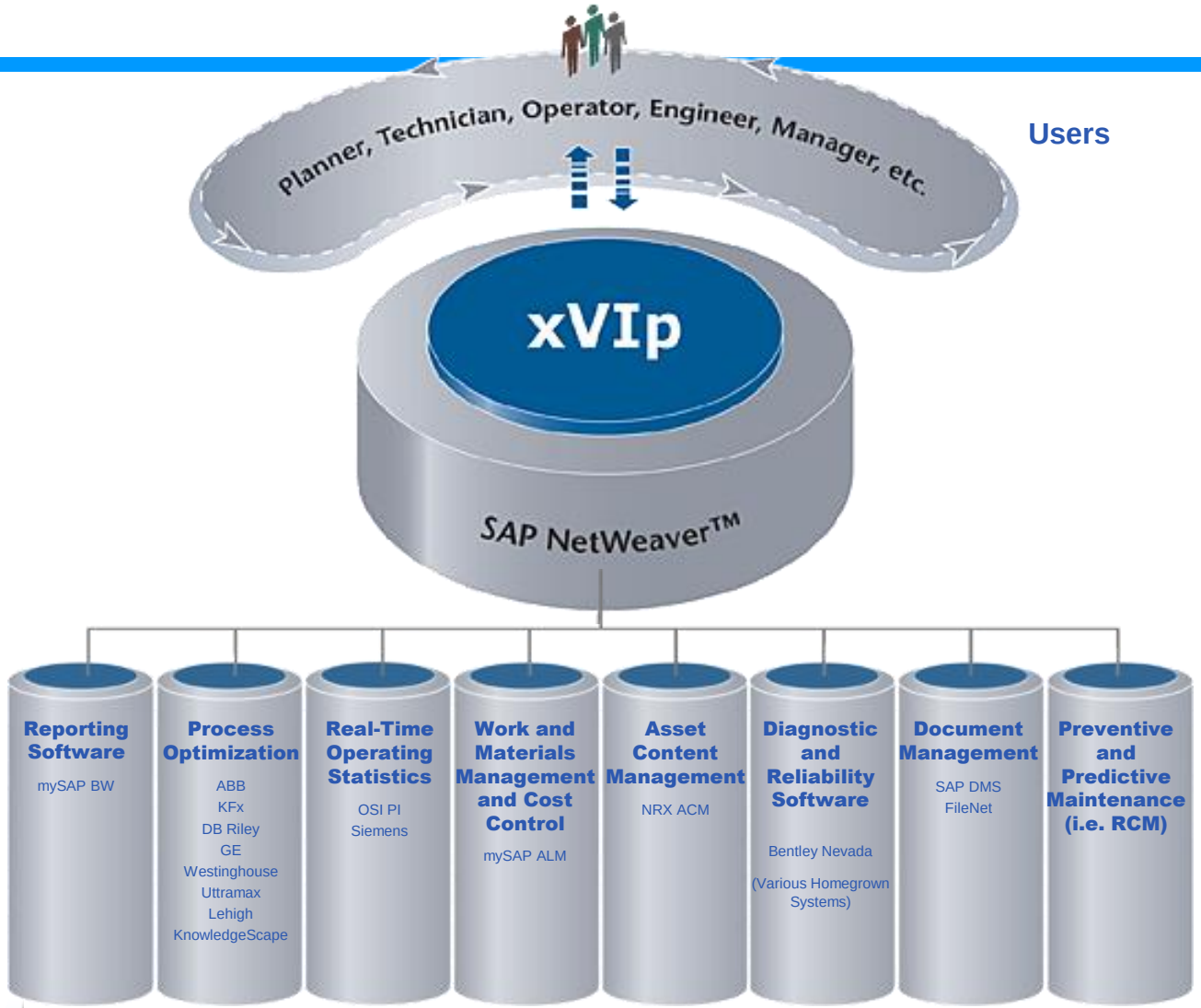


# Working the Process - After xVIP

# Mobile


COMPAQ
Home
My Orders
Quick Links
Order
Type
P
Wo
WoU
St
St.Date
500464 SM02 - 8.0 STD 02/22/2002
Pump Maintenance
500521 SM01 - 6.0 STD 03/16/2002
-
500525 SM02 - 5.0 STD 03/12/2002
Repair PC
500526 SM02 - 4.0 STD 03/13/2002
PC Repairs needed
500527 SM02 - 5.0 STD 03/13/2002
PC Repair
500528 SM01 - 0.0 STD 03/18/2002
Installation Service
500529 SM01 - 6.0 STD 03/18/2002
NV Tool Installation
500697 SM01 - 2.0 STD 04/17/2002
repair order
500700 SM01 - 4.0 H 04/17/2002
STD Throttle Repair - Tool Type A
500703 SM01 - 4.0 H 04/18/2002
Hot Lead for Endura Conductor DEP
Home
My Operations
Quick Links
Order
Operation
TConf
MConf
Order Number
501399...
Operation Header
Operation
0010
Control Key
SM01
Workcenter
PC-SERV
Check motherboard
SAP
Welcome HH alm workcenter
Home
My Orders
Quick Links
Order
Partners
Objects
Operations
PMats
Order
Order Number
%PDA0001
Order Type
SM01
User Status
STATUS-1
ShortText
This is new order short text
Responsibility
Planplant
1200
Plan Group
100
Service/PM
PM Act. Type
005
Notification/Contract
Notification
Contract
More

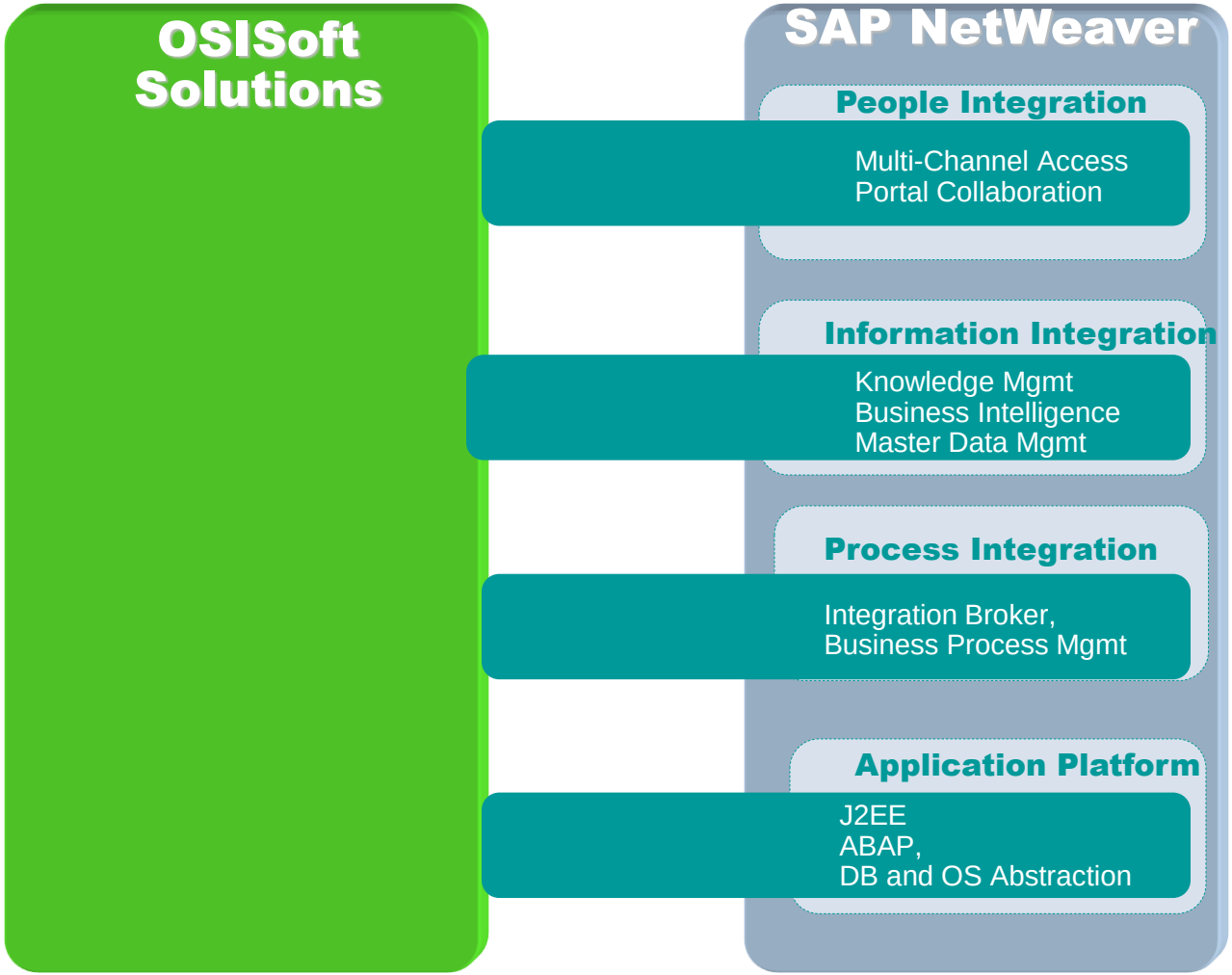
# Solution Overview



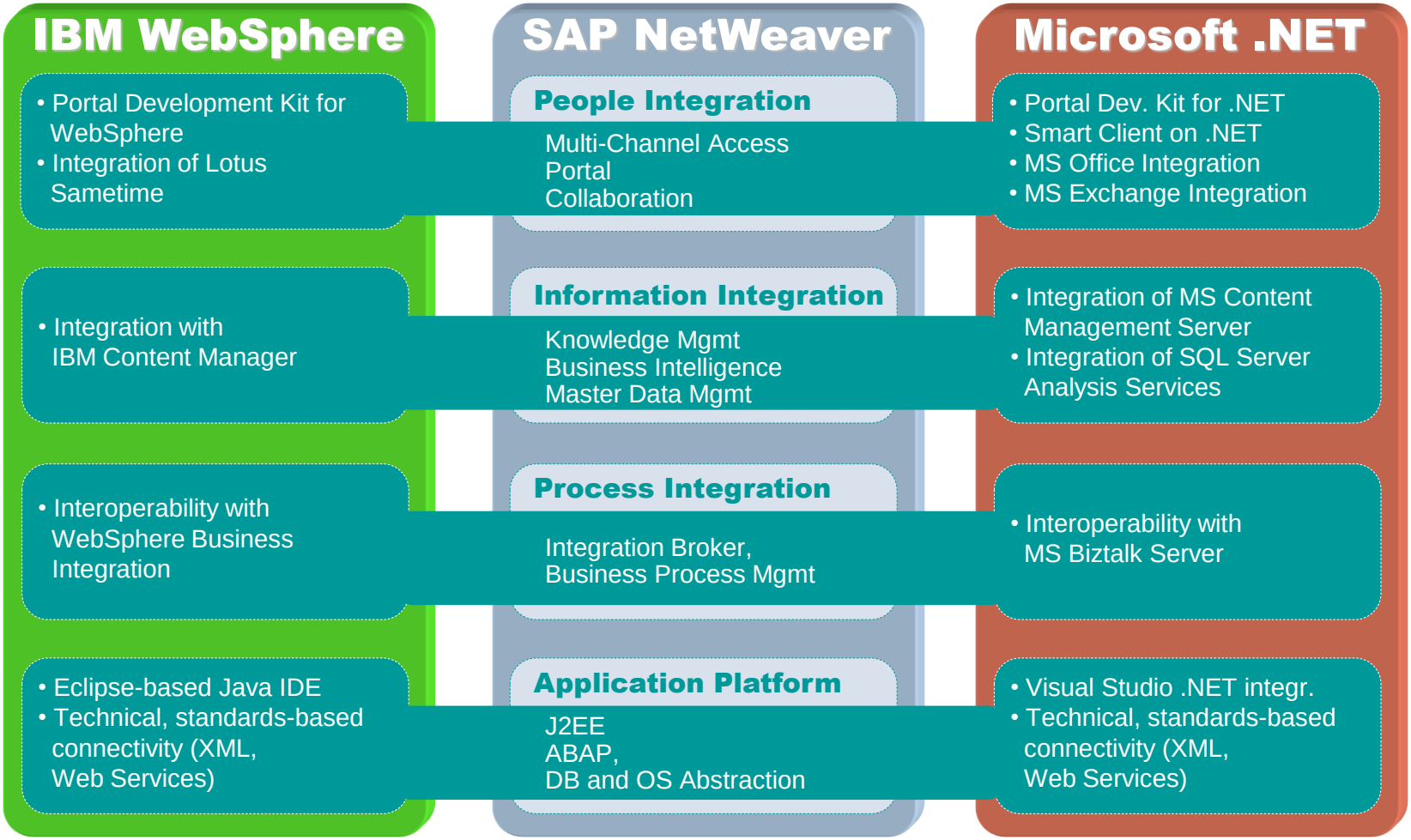
# xVIp Background

- *xVIp  developed by NRX (SAP partner)*
- *Developed with input from TransAlta*
- *Incorporating Plant Maintenance best practices*
- *xVIp continuing to evolve*

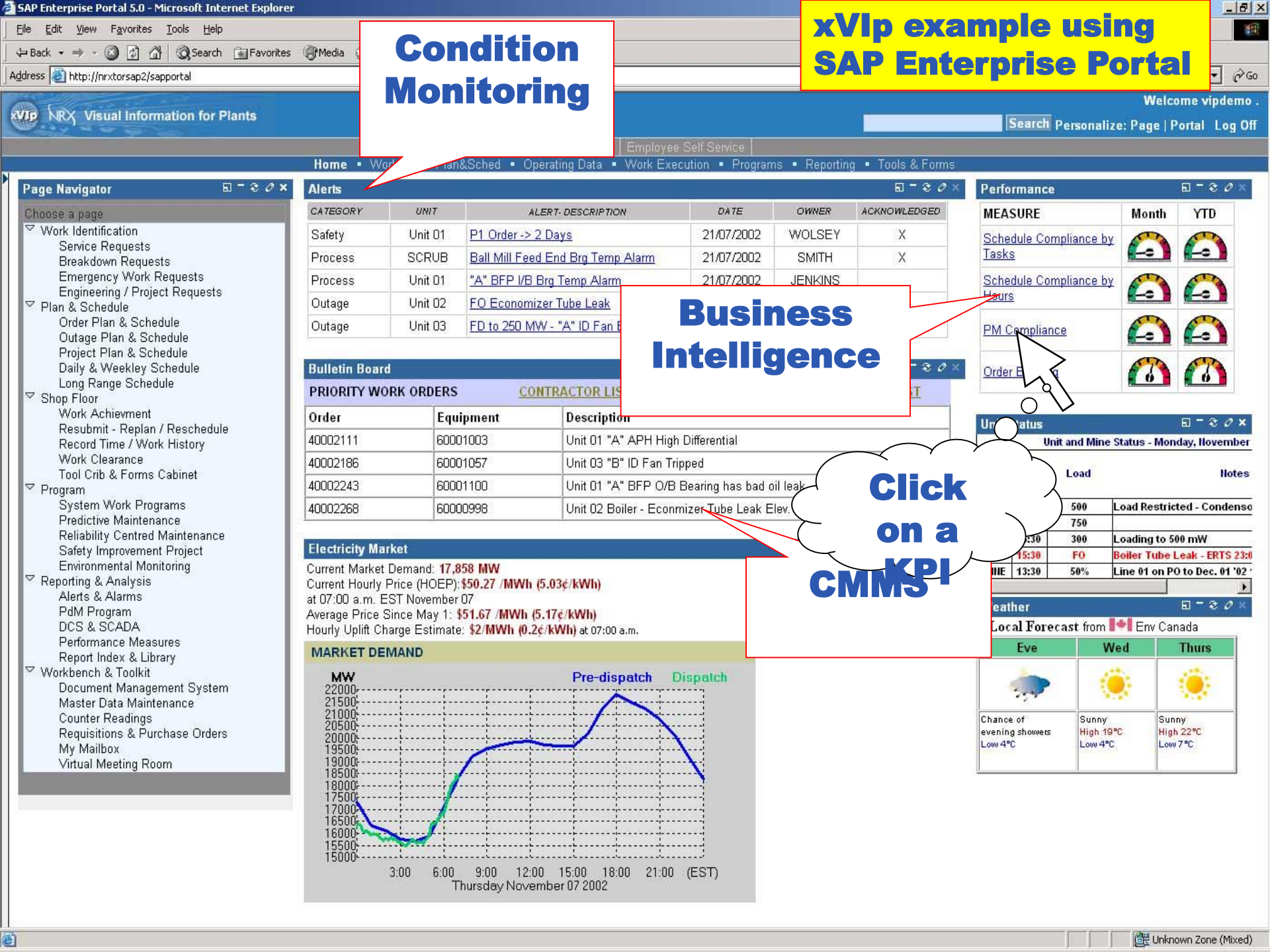
# OSISoft and SAP NetWeaver Interoperability



# SAP NetWeaver Interoperability



# Screenshot Examples


SAP Enterprise Portal 5.0 - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites Media
Address http://nrxtorsap2/sapportal
Condition Monitoring
xVIp example using SAP Enterprise Portal
xVIp NRX Visual Information for Plants
Welcome vipdemo .
Search Personalize: Page | Portal Log Off
Employee Self Service
Home Work Plan&Sched Operating Data Work Execution Programs Reporting Tools & Forms
Page Navigator
Choose a page
Work Identification
Service Requests
Breakdown Requests
Emergency Work Requests
Engineering / Project Requests
Plan & Schedule
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System Work Programs
Predictive Maintenance
Reliability Centred Maintenance
Safety Improvement Project
Environmental Monitoring
Reporting & Analysis
Alerts & Alarms
PdM Program
DCS & SCADA
Performance Measures
Report Index & Library
Workbench & Toolkit
Document Management System
Master Data Maintenance
Counter Readings
Requisitions & Purchase Orders
My Mailbox
Virtual Meeting Room
Alerts
CATEGORY UNIT ALERT- DESCRIPTION DATE OWNER ACKNOWLEDGED
Safety Unit 01 P1 Order -> 2 Days 21/07/2002 WOLSEY X
Process SCRUB Ball Mill Feed End Brg Temp Alarm 21/07/2002 SMITH X
Process Unit 01 "A" BFP I/B Brg Temp Alarm 21/07/2002 JENKINS
Outage Unit 02 FO Economizer Tube Leak
Outage Unit 03 FD to 250 MW - "A" ID Fan
Performance
MEASURE Month YTD
Schedule Compliance by Tasks
Schedule Compliance by Hours
PM Compliance
Order
Business Intelligence
Bulletin Board
PRIORITY WORK ORDERS
Order Equipment Description
40002111 60001003 Unit 01 "A" APH High Differential
40002186 60001057 Unit 03 "B" ID Fan Tripped
40002243 60001100 Unit 01 "A" BFP O/B Bearing has bad oil leak
40002268 60000998 Unit 02 Boiler - Econmizer Tube Leak Elev.
Click on a KPI
CMMS
Unit and Mine Status - Monday, November
Load Notes
500 Load Restricted - Condenso
750
300 Loading to 500 mW
15:30 FO Boiler Tube Leak - ERTS 23:0
13:30 50% Line 01 on PO to Dec. 01 '02
Electricity Market
Current Market Demand: 17,858 MW
Current Hourly Price (HOEP): $50.27 /MWh (5.03¢/kWh)
at 07:00 a.m. EST November 07
Average Price Since May 1: $51.67 /MWh (5.17¢/kWh)
Hourly Uplift Charge Estimate: $2/MWh (0.2¢/kWh) at 07:00 a.m.
MARKET DEMAND
MW
Pre-dispatch
Dispatch
22000 21500 21000 20500 20000 19500 19000 18500 18000 17500 17000 16500 16000 15500 15000
3:00 6:00 9:00 12:00 15:00 18:00 21:00 (EST)
Thursday November 07 2002
Weather
Local Forecast from Env Canada
Eve Wed Thurs
Chance of evening showers Low 4°C
Sunny High 19°C Low 4°C
Sunny High 22°C Low 7°C
Unknown Zone (Mixed)

SAP Enterprise Portal 5.0 - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Search Favorites Media

Address http://nrxtorsap2/sapportal

Go

Visual Information for Plants

Welcome vipdemo .

Search Personalize: Page | Portal Log Off

VIp My Pages Employee Self Service

Home ▪ Work ID ▪ Plan&Sched ▪ Operating Data ▪ Work Execution ▪ Programs ▪ Reporting ▪ Tools & Forms

## Page Navigator

Choose a page

- Work Identification
  - Service Requests
  - Breakdown Requests
  - Emergency Work Requests
  - Engineering / Project Requ
- Plan & Schedule
  - Order Plan & Schedule
  - Outage Plan & Schedule
  - Project Plan & Schedule
  - Daily & Weekley Schedule
  - Long Range Schedule
- Shop Floor
  - Work Achievment
  - Resubmit - Replan / Resch
  - Record Time / Work Histor
  - Work Clearance
  - Tool Crib & Forms Cabinet
- Program
  - System Work Programs
  - Predictive Maintenance
  - Reliability Centred Mainten
  - Safety Improvement Projec
  - Environmental Monitoring
- Reporting & Analysis
  - Alerts & Alarms
  - PdM Program
  - DCS & SCADA
  - Performance Measures
  - Report Index & Library
- Workbench & Toolkit
  - Document Management Sy
  - Master Data Maintenance
  - Counter Readings
  - Requisitions & Purchase O
  - My Mailbox
  - Virtual Meeting Room

## Alerts

| CATEGORY | UNIT | ALERT- DESCRIPTION | DATE | OWNER | ACKNOWLEDGED |
|---|---|---|---|---|---|
| Safety | Unit 01 | P1 Order -> 2 Days | 21/07/2002 | WOLSEY | X |
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| Process | Unit 01 | "A" BFP I/B Brg Temp Alarm | 21/07/2002 | JENKINS | |

## Performance

| MEASURE | Month | YTD |
|---|---|---|
| Schedule Compliance by Tasks | | |
| Schedule Compliance by Hours | | |
| PM Compliance | | |
| Order Backlog | | |

## Unit Status

Unit and Mine Status - Monday, November

| Unit | Time | Load | Notes |
|---|---|---|---|
| U01 | 15:30 | 500 | Load Restricted - Condenso |
| U02 | 15:30 | 750 | |
| U03 | 15:30 | 300 | Loading to 500 mW |
| U04 | 15:30 | FO | Boiler Tube Leak - ERTS 23:0 |
| MINE | 13:30 | 50% | Line 01 on PO to Dec. 01 '02 |

## Weather

Local Forecast from Env Canada

| Eve | Wed | Thurs |
|---|---|---|
| Chance of evening showers Low 4°C | Sunny High 19°C Low 4°C | Sunny High 22°C Low 7°C |

KPI - Microsoft Internet Explorer

## Maintenance Measures - Work Accomplishment

Reliability Program Compliance Critical Tasks

Detail

N

120 100 80 60 40 20 0

Fuel Boiler Feedwater Turbine 4kV Controls Common Environment

Q1% Q2% Q3% Q4%

Major Plant Systems

Weekly Plan Compliance Tasks

Detail

%

80 70 60 50 40 30 20 10 0

MECH1 MECH2 MECH3 CONT1 CONT2

Work Center

Tasks Actual Tasks Target

Backlog Weeks

Detail

CONT2 CONT1 MECH3 MECH2 MECH1

0.0 2.0 4.0 6.0 8.0 10.0 12.0

Target March Weeks February Weeks January Weeks

Weekly Plan Compliance Hours

Detail

Work Center

CONT2 CONT1 MECH3 MECH2 MECH1

0 20 40 % 60 80

Hours Target Hours Actual

16500 16000 15500 15000

3:00 6:00 9:00 12:00 15:00 18:00 21:00 (EST)

Thursday November 07 2002

Unknown Zone (Mixed)

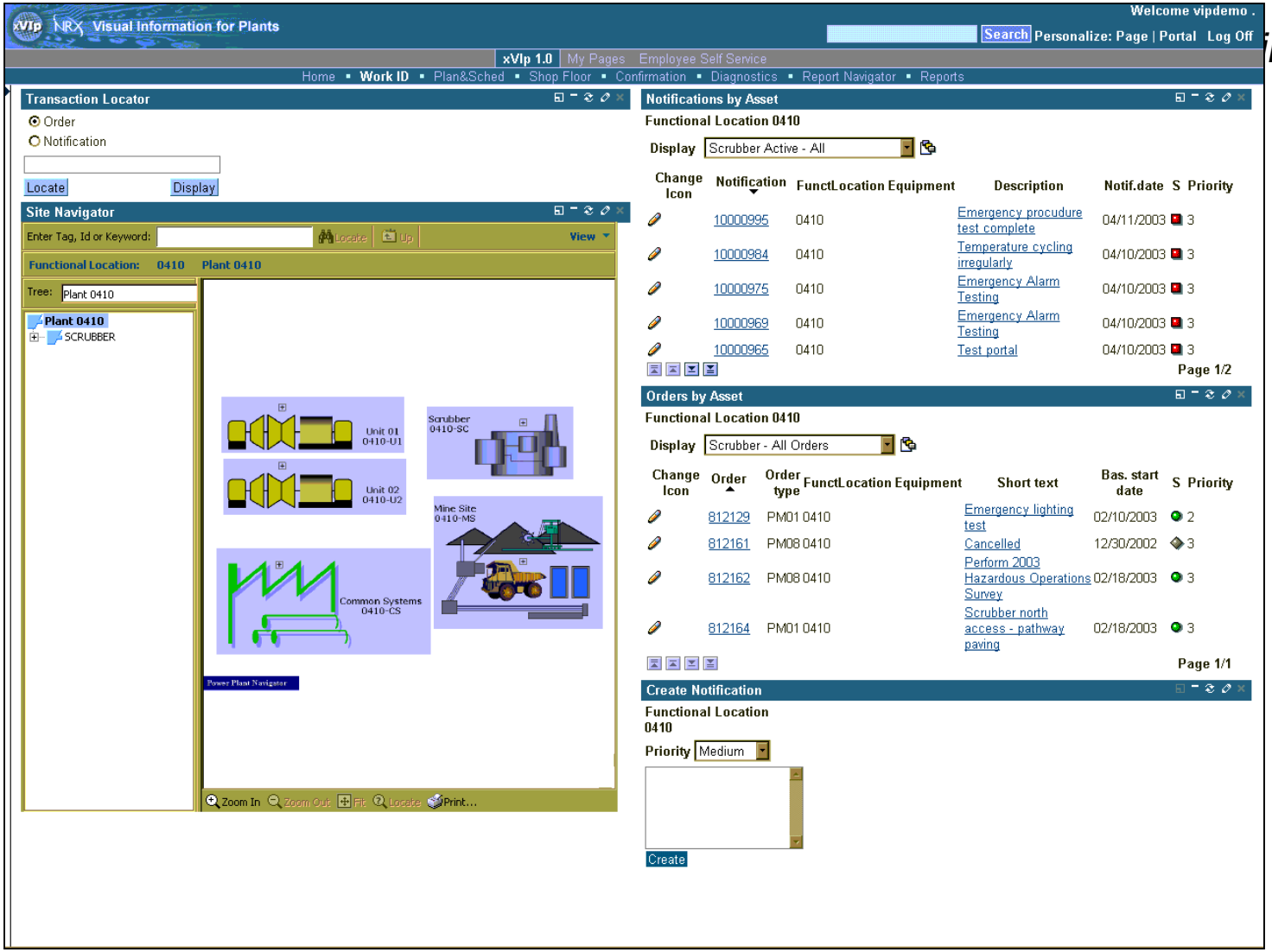
Start | Inbox - Microsoft Outlook | SAP Enterprise Portal 5.0 ... | carm2 kpi.bmp - Paint | KPI - Microsoft Intern...

11:52 AM

# xVIP Roles

- *Maintainer*
- *Planner*
- *Supervisor*
- *Operator*
- *Planner*
- *Engineer*
- *Manager*
- *Plant Manager*

# Role - Maintainer



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| Process | Unit 01 | "A" BFP I/B B[illegible] Alarm | 21/07/2002 | JENKINS | |
| Outage | Unit 02 | FO Economizer [illegible] Leak | 21/07/2002 | BROWN | X |
| Outage | Unit 03 | FD to 250 MW - "A" [illegible] an Bearing | 21/07/2002 | BROWN | |

## Bulletin Board

PRIORITY WORK ORDERS CONTRACTOR LIST [illegible] STAFF LIST

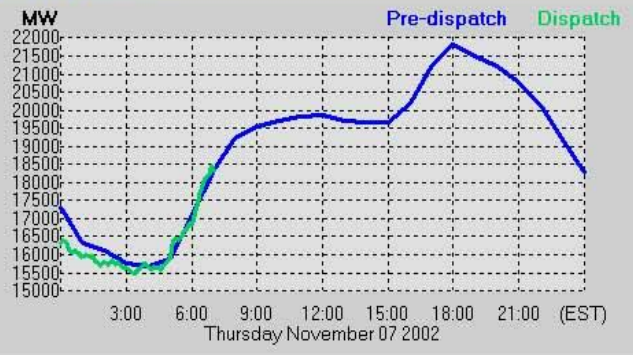
| Order | Equipment | Description |
|---|---|---|
| 40002111 | 60001003 | Unit 01 |
| 40002186 | 60001057 | Unit 03 "[illegible] |
| 40002243 | 60001100 | Unit 01 "A" [illegible] |
| 40002268 | 60000998 | Unit 02 Boiler - Econmizer [illegible] Elev. 732' |

Click on an alert

## Electricity Market

Current Market Demand: **17,858 MW**
Current Hourly Price (HOEP): **$50.27 /MWh (5.03¢/kWh)**
at 07:00 a.m. EST November 07
Average Price Since May 1: **$51.67 /MWh (5.17¢/kWh)**
Hourly Uplift Charge Estimate: **$2/MWh (0.2¢/kWh)** at 07:00 a.m.

### MARKET DEMAND

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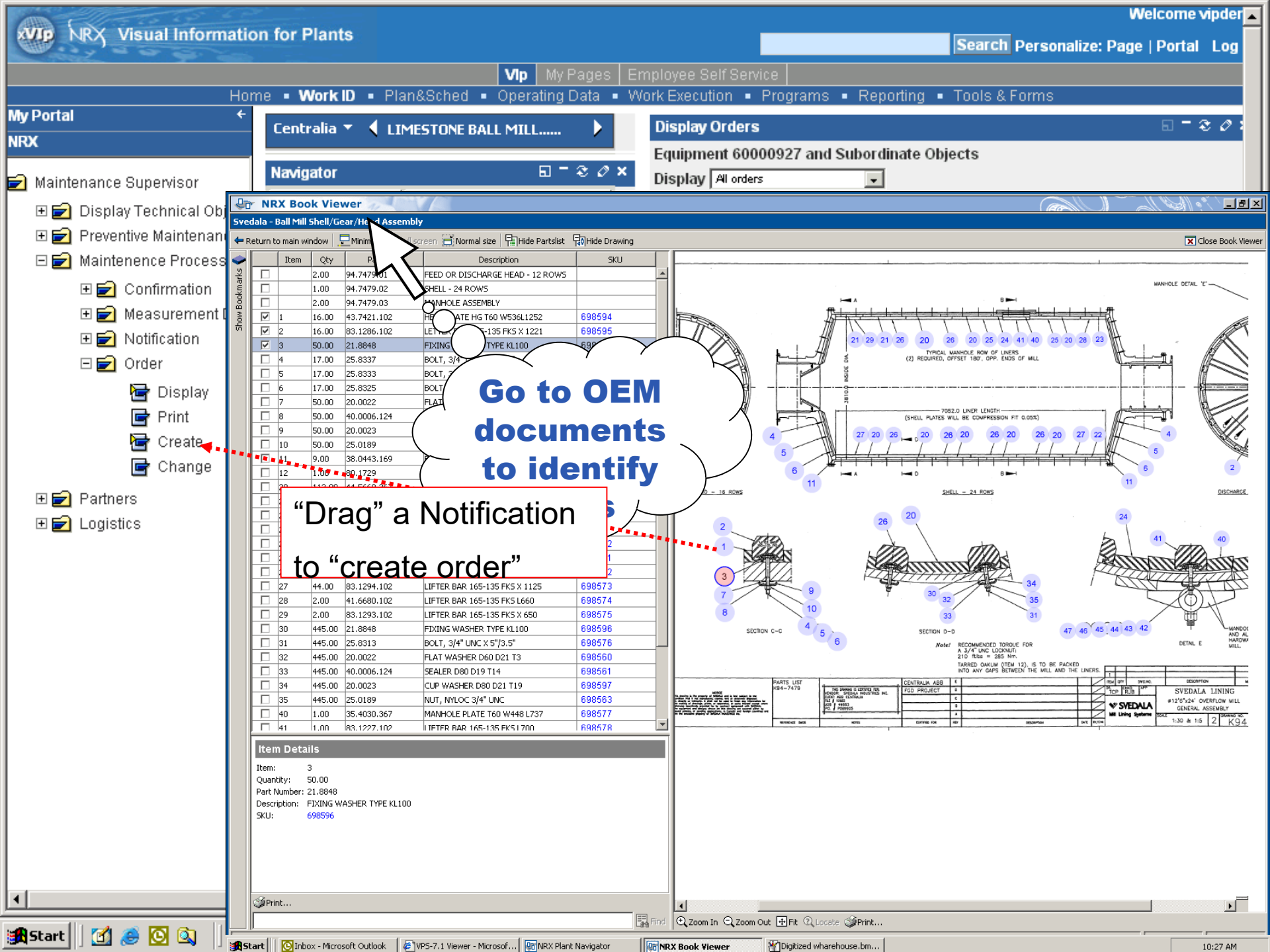

Visual Information for Plants
Welcome vipder
Search
Personalize: Page | Portal
Log
Vip
My Pages
Employee Self Service
Home
Work ID
Plan&Sched
Operating Data
Work Execution
Programs
Reporting
Tools & Forms
My Portal
NRX
Maintenance Supervisor
Display Technical Obj
Preventive Maintenan
Maintenence Process
Confirmation
Measurement
Notification
Order
Display
Print
Create
Change
Partners
Logistics
Centralia
LIMESTONE BALL MILL.....
Navigator
Display Orders
Equipment 60000927 and Subordinate Objects
Display
All orders
NRX Book Viewer
Svedala - Ball Mill Shell/Gear/Head Assembly
Return to main window
Normal size
Hide Partslist
Hide Drawing
Close Book Viewer
Show Bookmarks
Item
Qty
Description
SKU
2.00 FEED OR DISCHARGE HEAD - 12 ROWS
1.00 SHELL - 24 ROWS
2.00 MANHOLE ASSEMBLY
1 16.00 698594
2 16.00 698595
3 50.00 FIXING TYPE KL100
4 17.00 BOLT, 3/4
5 17.00
6 17.00 BOLT
7 50.00 FLAT
8 50.00 40.0006.124
9 50.00 20.0023
10 50.00 25.0189
11 9.00 38.0443.169
12 1.00
27 44.00 83.1294.102 LIFTER BAR 165-135 FKS X 1125 698573
28 2.00 41.6680.102 LIFTER BAR 165-135 FKS L660 698574
29 2.00 83.1293.102 LIFTER BAR 165-135 FKS X 650 698575
30 445.00 21.8848 FIXING WASHER TYPE KL100 698596
31 445.00 25.8313 BOLT, 3/4" UNC X 5"/3.5" 698576
32 445.00 20.0022 FLAT WASHER D60 D21 T3 698560
33 445.00 40.0006.124 SEALER D80 D19 T14 698561
34 445.00 20.0023 CUP WASHER D80 D21 T19 698597
35 445.00 25.0189 NUT, NYLOC 3/4" UNC 698563
40 1.00 35.4030.367 MANHOLE PLATE T60 W448 L737 698577
41 1.00 83.1227.102 LIFTER BAR 165-135 FKS L700 698578
Item Details
Item: 3
Quantity: 50.00
Part Number: 21.8848
Description: FIXING WASHER TYPE KL100
SKU: 698596
Print...
Find
Zoom In
Zoom Out
Fit
Locate
Print...
Go to OEM documents to identify
"Drag" a Notification
to "create order"
Start
Inbox - Microsoft Outlook
VPS-7.1 Viewer - Microsof...
NRX Plant Navigator
NRX Book Viewer
Digitized wharehouse.bm...
10:27 AM

# The Result

**VPS customer example accessed from within SAP PM**

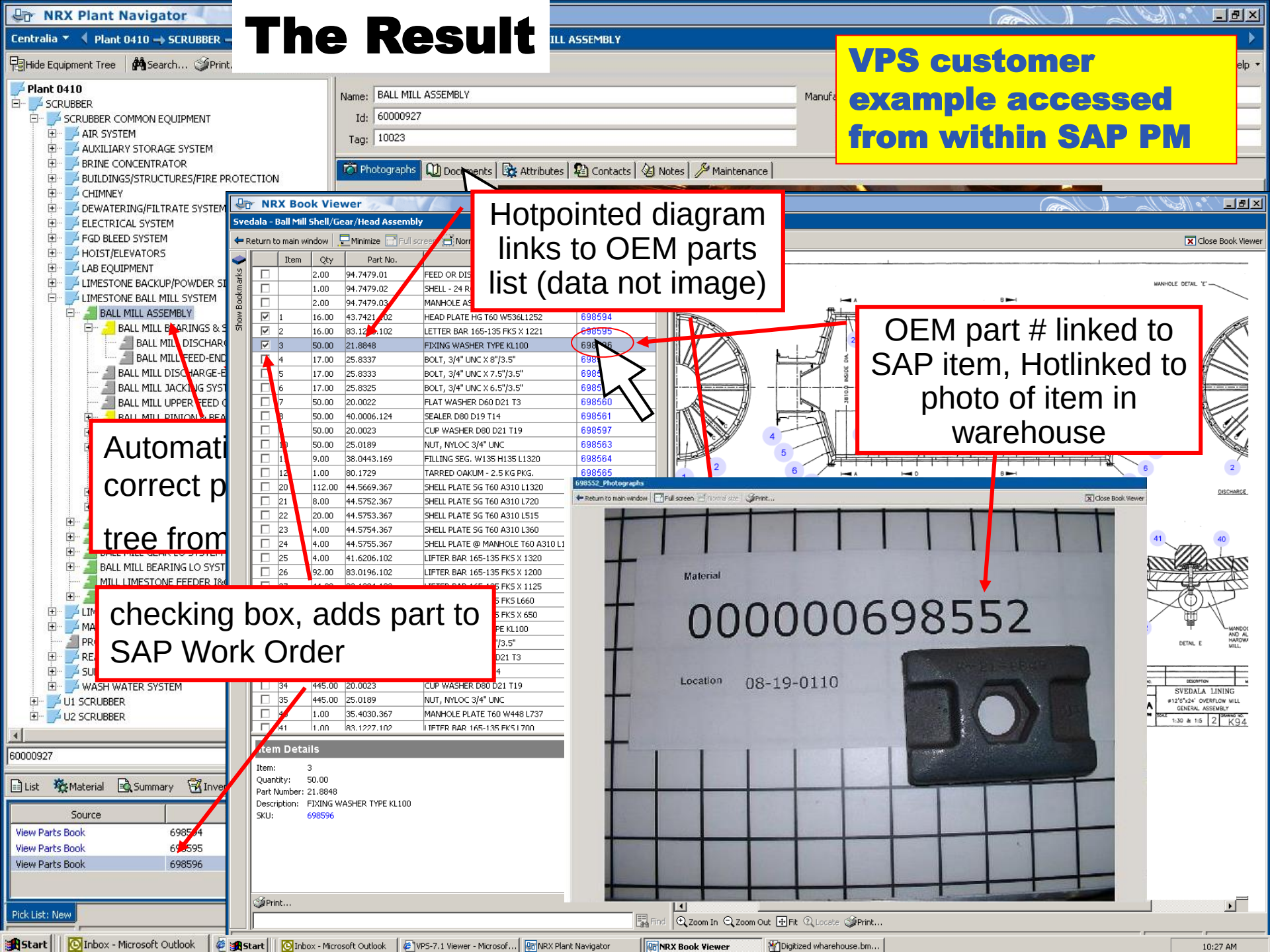
Hotpointed diagram links to OEM parts list (data not image)

OEM part # linked to SAP item, Hotlinked to photo of item in warehouse

Automati
correct p

tree from

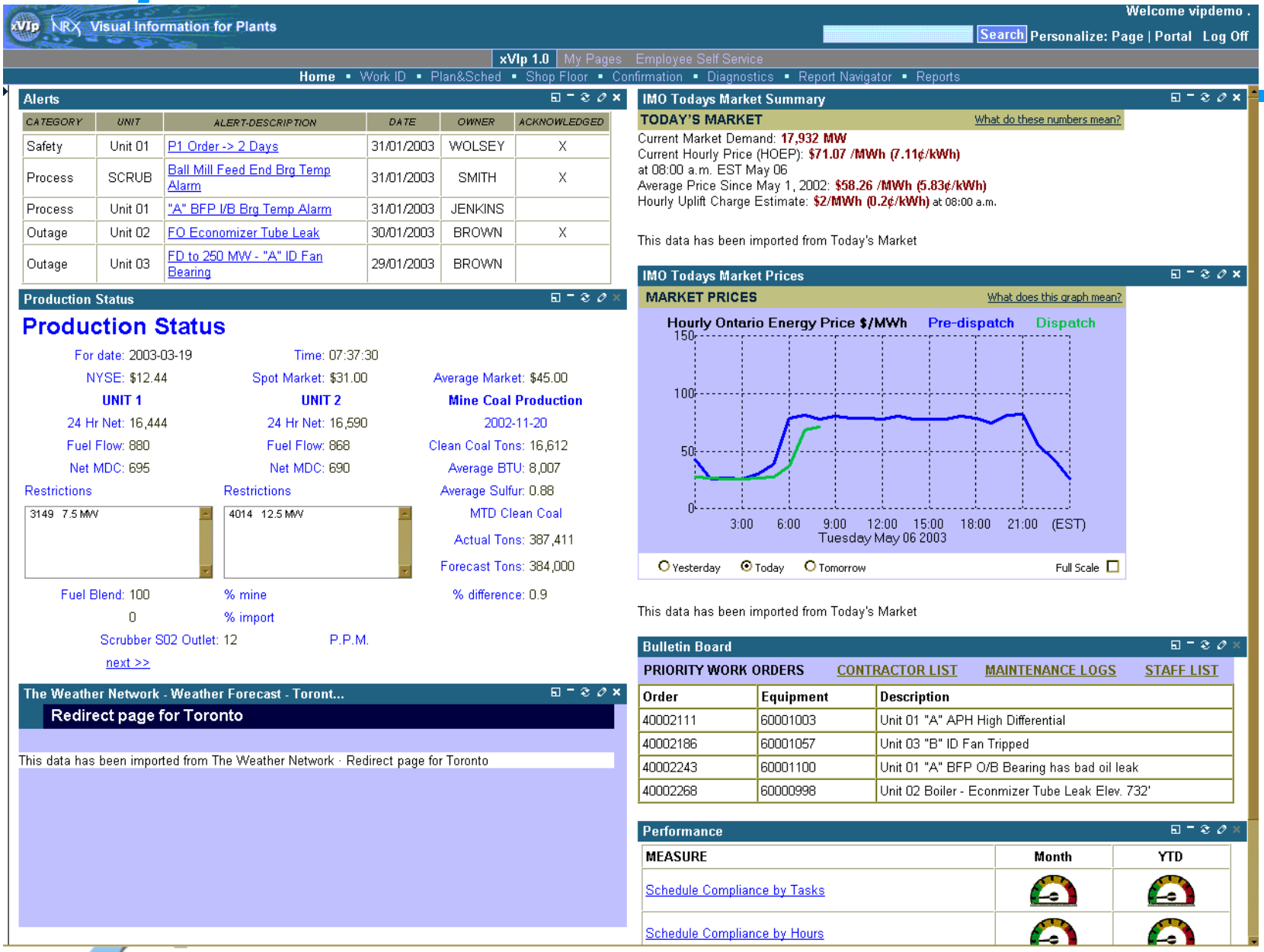
checking box, adds part to SAP Work Order



# Role - Engineer

gineer as
itoring

# xVIp i-Views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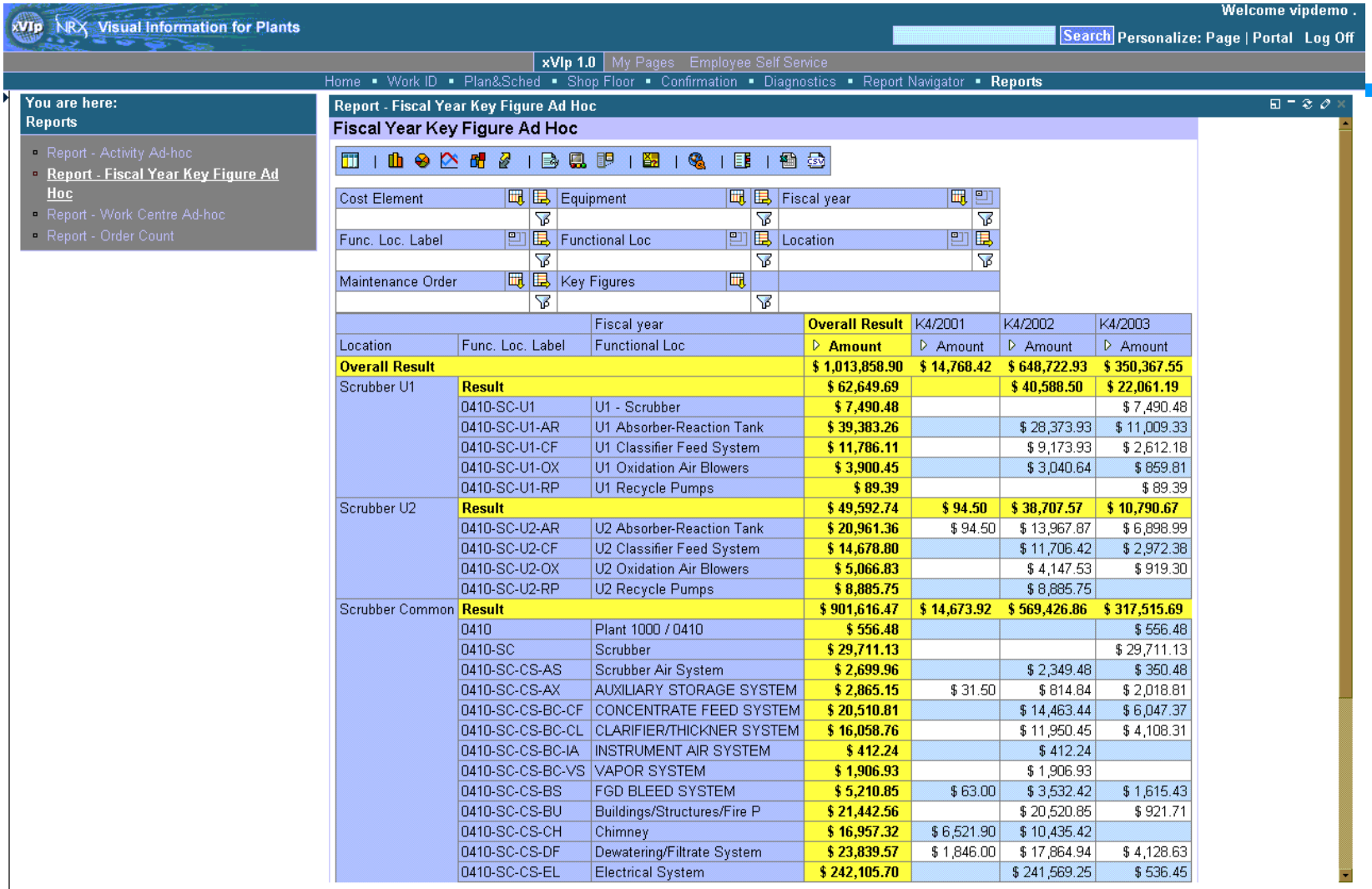
Outage | Unit 03 | FD to 250 MW - "A" ID Fan Bearing | 29/01/2003 | BROWN
Production Status
Production Status
For date: 2003-03-19
Time: 07:37:30
NYSE: $12.44
Spot Market: $31.00
Average Market: $45.00
UNIT 1
24 Hr Net: 16,444
Fuel Flow: 880
Net MDC: 695
Restrictions
3149 7.5 MW
UNIT 2
24 Hr Net: 16,590
Fuel Flow: 868
Net MDC: 690
Restrictions
4014 12.5 MW
Mine Coal Production
2002-11-20
Clean Coal Tons: 16,612
Average BTU: 8,007
Average Sulfur: 0.88
MTD Clean Coal
Actual Tons: 387,411
Forecast Tons: 384,000
% difference: 0.9
Fuel Blend: 100
% mine
0
% import
Scrubber S02 Outlet: 12
P.P.M.
next >>
The Weather Network - Weather Forecast - Toront...
Redirect page for Toronto
This data has been imported from The Weather Network · Redirect page for Toronto
IMO Todays Market Summary
TODAY'S MARKET
What do these numbers mean?
Current Market Demand: 17,932 MW
Current Hourly Price (HOEP): $71.07 /MWh (7.11¢/kWh)
at 08:00 a.m. EST May 06
Average Price Since May 1, 2002: $58.26 /MWh (5.83¢/kWh)
Hourly Uplift Charge Estimate: $2/MWh (0.2¢/kWh) at 08:00 a.m.
This data has been imported from Today's Market
IMO Todays Market Prices
MARKET PRICES
What does this graph mean?
Hourly Ontario Energy Price $/MWh
Pre-dispatch
Dispatch
150
100
50
0
3:00 6:00 9:00 12:00 15:00 18:00 21:00 (EST)
Tuesday May 06 2003
Yesterday
Today
Tomorrow
Full Scale
This data has been imported from Today's Market
Bulletin Board
PRIORITY WORK ORDERS
CONTRACTOR LIST
MAINTENANCE LOGS
STAFF LIST
Order | Equipment | Description
40002111 | 60001003 | Unit 01 "A" APH High Differential
40002186 | 60001057 | Unit 03 "B" ID Fan Tripped
40002243 | 60001100 | Unit 01 "A" BFP O/B Bearing has bad oil leak
40002268 | 60000998 | Unit 02 Boiler - Econmizer Tube Leak Elev. 732'
Performance
MEASURE | Month | YTD
Schedule Compliance by Tasks
Schedule Compliance by Hours

# xVIp i-Views

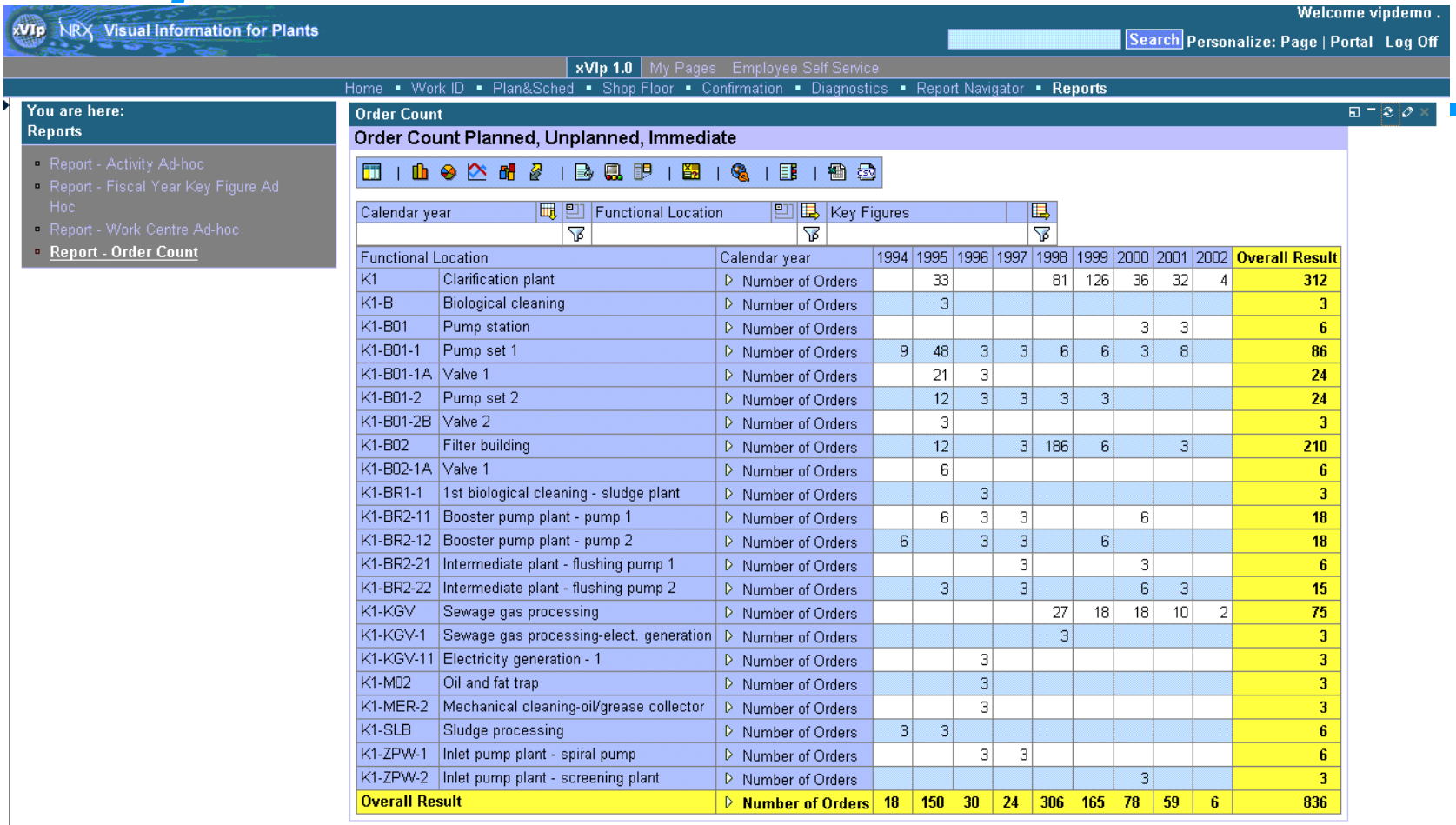

xVIp NRX Visual Information for Plants
Welcome vipdemo .
Search
Personalize: Page | Portal Log Off
xVIp 1.0 My Pages Employee Self Service
Home ▪ Work ID ▪ Plan&Sched ▪ Shop Floor ▪ Confirmation ▪ Diagnostics ▪ Report Navigator ▪ Reports
Outage Unit 02 FO Economizer Tube Leak 30/01/2003 BROWN X
Outage Unit 03 FD to 250 MW - "A" ID Fan Bearing 29/01/2003 BROWN
This data has been imported from Today's Market
IMO Todays Market Prices
MARKET PRICES
What does this graph mean?
Pre-dispatch
Dispatch
Full Scale
Production Status
Production Status
For date: 2003-03-19
Time: 07:37:30
NYSE: $12.44
Spot Market: $31.00
Average Market: $45.00
UNIT 1
24 Hr Net: 16,444
Fuel Flow: 880
UNIT 2
24 Hr Net: 16,590
Fuel Flow: 868
Mine Coal Production
2002-11-20
Clean Coal Tons: 16,612
KPI - MICROSOFT INTERNET EXPLORER
Maintenance Measures - Work Accomplishment
Reliability Program Compliance Critical Tasks
Fuel
Boiler
Feedwater
Turbine
4kV
Controls
Common
Environment
Major Plant Systems
Weekly Plan Compliance Tasks
MECH1 MECH2 MECH3 CONT1 CONT2
Work Center
Tasks Actual
Tasks Target
Backlog Weeks
CONT2
CONT1
MECH3
MECH2
MECH1
Target
March Weeks
February Weeks
January Weeks
Weekly Plan Compliance Hours
Work Center
Hours Target
Hours Actual
Today's Market
CONTRACTOR LIST
MAINTENANCE LOGS
STAFF LIST
Description
Unit 01 "A" APH High Differential
Unit 03 "B" ID Fan Tripped
Unit 01 "A" BFP O/B Bearing has bad oil leak
Unit 02 Boiler - Econmizer Tube Leak Elev. 732'
Month
YTD
Order Backlog

# xVIp i-Views



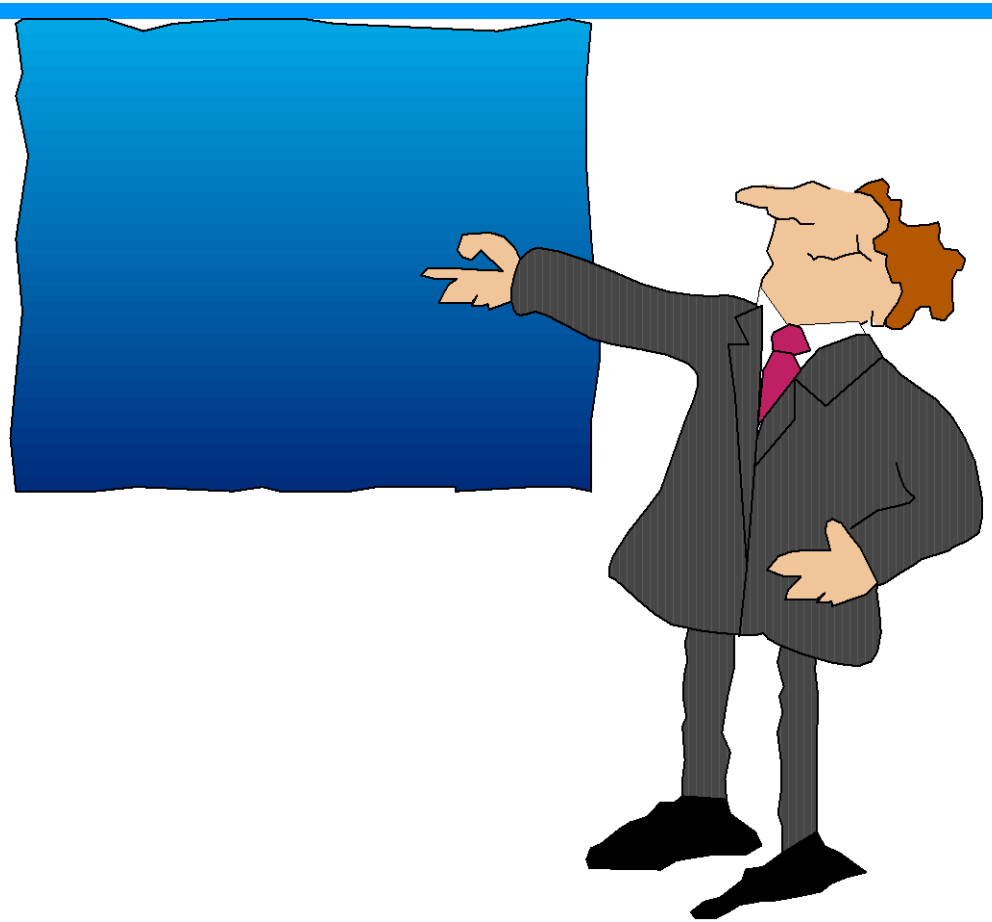

| | | Fiscal year | Overall Result | K4/2001 | K4/2002 | K4/2003 |
|---|---|---|---|---|---|---|
| Location | Func. Loc. Label | Functional Loc | Amount | Amount | Amount | Amount |
| **Overall Result** | | | **$ 1,013,858.90** | **$ 14,768.42** | **$ 648,722.93** | **$ 350,367.55** |
| Scrubber U1 | **Result** | | **$ 62,649.69** | | **$ 40,588.50** | **$ 22,061.19** |
| | 0410-SC-U1 | U1 - Scrubber | **$ 7,490.48** | | | $ 7,490.48 |
| | 0410-SC-U1-AR | U1 Absorber-Reaction Tank | **$ 39,383.26** | | $ 28,373.93 | $ 11,009.33 |
| | 0410-SC-U1-CF | U1 Classifier Feed System | **$ 11,786.11** | | $ 9,173.93 | $ 2,612.18 |
| | 0410-SC-U1-OX | U1 Oxidation Air Blowers | **$ 3,900.45** | | $ 3,040.64 | $ 859.81 |
| | 0410-SC-U1-RP | U1 Recycle Pumps | **$ 89.39** | | | $ 89.39 |
| Scrubber U2 | **Result** | | **$ 49,592.74** | **$ 94.50** | **$ 38,707.57** | **$ 10,790.67** |
| | 0410-SC-U2-AR | U2 Absorber-Reaction Tank | **$ 20,961.36** | $ 94.50 | $ 13,967.87 | $ 6,898.99 |
| | 0410-SC-U2-CF | U2 Classifier Feed System | **$ 14,678.80** | | $ 11,706.42 | $ 2,972.38 |
| | 0410-SC-U2-OX | U2 Oxidation Air Blowers | **$ 5,066.83** | | $ 4,147.53 | $ 919.30 |
| | 0410-SC-U2-RP | U2 Recycle Pumps | **$ 8,885.75** | | $ 8,885.75 | |
| Scrubber Common | **Result** | | **$ 901,616.47** | **$ 14,673.92** | **$ 569,426.86** | **$ 317,515.69** |
| | 0410 | Plant 1000 / 0410 | **$ 556.48** | | | $ 556.48 |
| | 0410-SC | Scrubber | **$ 29,711.13** | | | $ 29,711.13 |
| | 0410-SC-CS-AS | Scrubber Air System | **$ 2,699.96** | | $ 2,349.48 | $ 350.48 |
| | 0410-SC-CS-AX | AUXILIARY STORAGE SYSTEM | **$ 2,865.15** | $ 31.50 | $ 814.84 | $ 2,018.81 |
| | 0410-SC-CS-BC-CF | CONCENTRATE FEED SYSTEM | **$ 20,510.81** | | $ 14,463.44 | $ 6,047.37 |
| | 0410-SC-CS-BC-CL | CLARIFIER/THICKNER SYSTEM | **$ 16,058.76** | | $ 11,950.45 | $ 4,108.31 |
| | 0410-SC-CS-BC-IA | INSTRUMENT AIR SYSTEM | **$ 412.24** | | $ 412.24 | |
| | 0410-SC-CS-BC-VS | VAPOR SYSTEM | **$ 1,906.93** | | $ 1,906.93 | |
| | 0410-SC-CS-BS | FGD BLEED SYSTEM | **$ 5,210.85** | $ 63.00 | $ 3,532.42 | $ 1,615.43 |
| | 0410-SC-CS-BU | Buildings/Structures/Fire P | **$ 21,442.56** | | $ 20,520.85 | $ 921.71 |
| | 0410-SC-CS-CH | Chimney | **$ 16,957.32** | $ 6,521.90 | $ 10,435.42 | |
| | 0410-SC-CS-DF | Dewatering/Filtrate System | **$ 23,839.57** | $ 1,846.00 | $ 17,864.94 | $ 4,128.63 |
| | 0410-SC-CS-EL | Electrical System | **$ 242,105.70** | | $ 241,569.25 | $ 536.45 |

# xVIp i-Views




| Functional Location | | Calendar year | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | Overall Result |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| K1 | Clarification plant | Number of Orders | | 33 | | | 81 | 126 | 36 | 32 | 4 | 312 |
| K1-B | Biological cleaning | Number of Orders | | 3 | | | | | | | | 3 |
| K1-B01 | Pump station | Number of Orders | | | | | | | 3 | 3 | | 6 |
| K1-B01-1 | Pump set 1 | Number of Orders | 9 | 48 | 3 | 3 | 6 | 6 | 3 | 8 | | 86 |
| K1-B01-1A | Valve 1 | Number of Orders | | 21 | 3 | | | | | | | 24 |
| K1-B01-2 | Pump set 2 | Number of Orders | | 12 | 3 | 3 | 3 | 3 | | | | 24 |
| K1-B01-2B | Valve 2 | Number of Orders | | 3 | | | | | | | | 3 |
| K1-B02 | Filter building | Number of Orders | | 12 | | 3 | 186 | 6 | | 3 | | 210 |
| K1-B02-1A | Valve 1 | Number of Orders | | 6 | | | | | | | | 6 |
| K1-BR1-1 | 1st biological cleaning - sludge plant | Number of Orders | | | 3 | | | | | | | 3 |
| K1-BR2-11 | Booster pump plant - pump 1 | Number of Orders | | 6 | 3 | 3 | | | 6 | | | 18 |
| K1-BR2-12 | Booster pump plant - pump 2 | Number of Orders | 6 | | 3 | 3 | | 6 | | | | 18 |
| K1-BR2-21 | Intermediate plant - flushing pump 1 | Number of Orders | | | | 3 | | | 3 | | | 6 |
| K1-BR2-22 | Intermediate plant - flushing pump 2 | Number of Orders | | 3 | | 3 | | | 6 | 3 | | 15 |
| K1-KGV | Sewage gas processing | Number of Orders | | | | | 27 | 18 | 18 | 10 | 2 | 75 |
| K1-KGV-1 | Sewage gas processing-elect. generation | Number of Orders | | | | | 3 | | | | | 3 |
| K1-KGV-11 | Electricity generation - 1 | Number of Orders | | | 3 | | | | | | | 3 |
| K1-M02 | Oil and fat trap | Number of Orders | | | 3 | | | | | | | 3 |
| K1-MER-2 | Mechanical cleaning-oil/grease collector | Number of Orders | | | 3 | | | | | | | 3 |
| K1-SLB | Sludge processing | Number of Orders | 3 | 3 | | | | | | | | 6 |
| K1-ZPW-1 | Inlet pump plant - spiral pump | Number of Orders | | | 3 | 3 | | | | | | 6 |
| K1-ZPW-2 | Inlet pump plant - screening plant | Number of Orders | | | | | | | 3 | | | 3 |
| **Overall Result** | | **Number of Orders** | **18** | **150** | **30** | **24** | **306** | **165** | **78** | **59** | **6** | **836** |

# Demonstration – Collaboration in Action



# Approach / Status

*Strategy – Phase 1*

- *Implemented Proof of Concept at Centralia ACM*
- *Expand xVIP with Portal Team*
- *IT Plan to Support IT Strategy*
- *Integrating with SAP Enterprise Portal, EDM, FORCE – SAP R/3 Enterprise Upgrade, BW, TOP – Real Time*

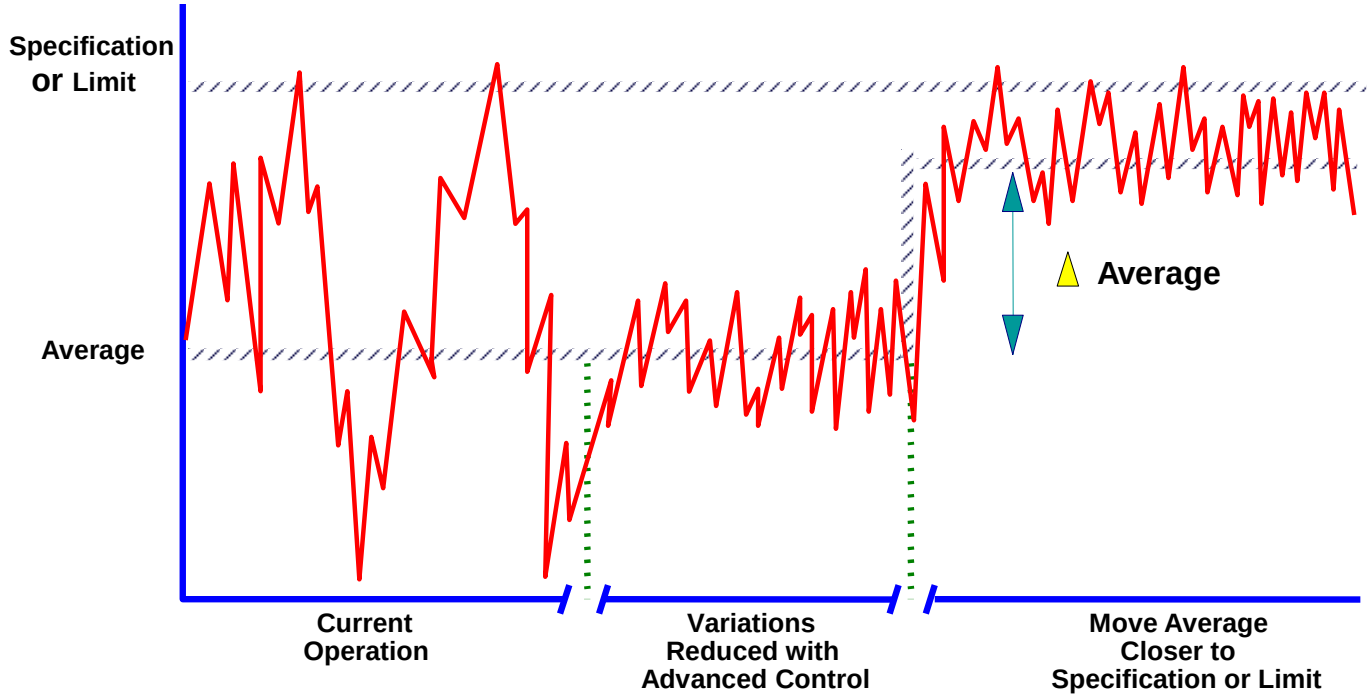
# Steps to Enabling Maintenance

- *Maintenance Strategy*
- *Community Pages for Maintenance*
- *KPI's – Turning on BW Content*
- *Document Mgmt (getting your data in order)*
- *SAP Simplication (Portal, iViews for ALM)*
- *Realtime Info (bringing in PI)*
- *Bringing it all together (xVIP)*
- *Rollout across Fleet in Sync with Other Projects and Opportunities (eg, New Plants, Upgrades, etc)*

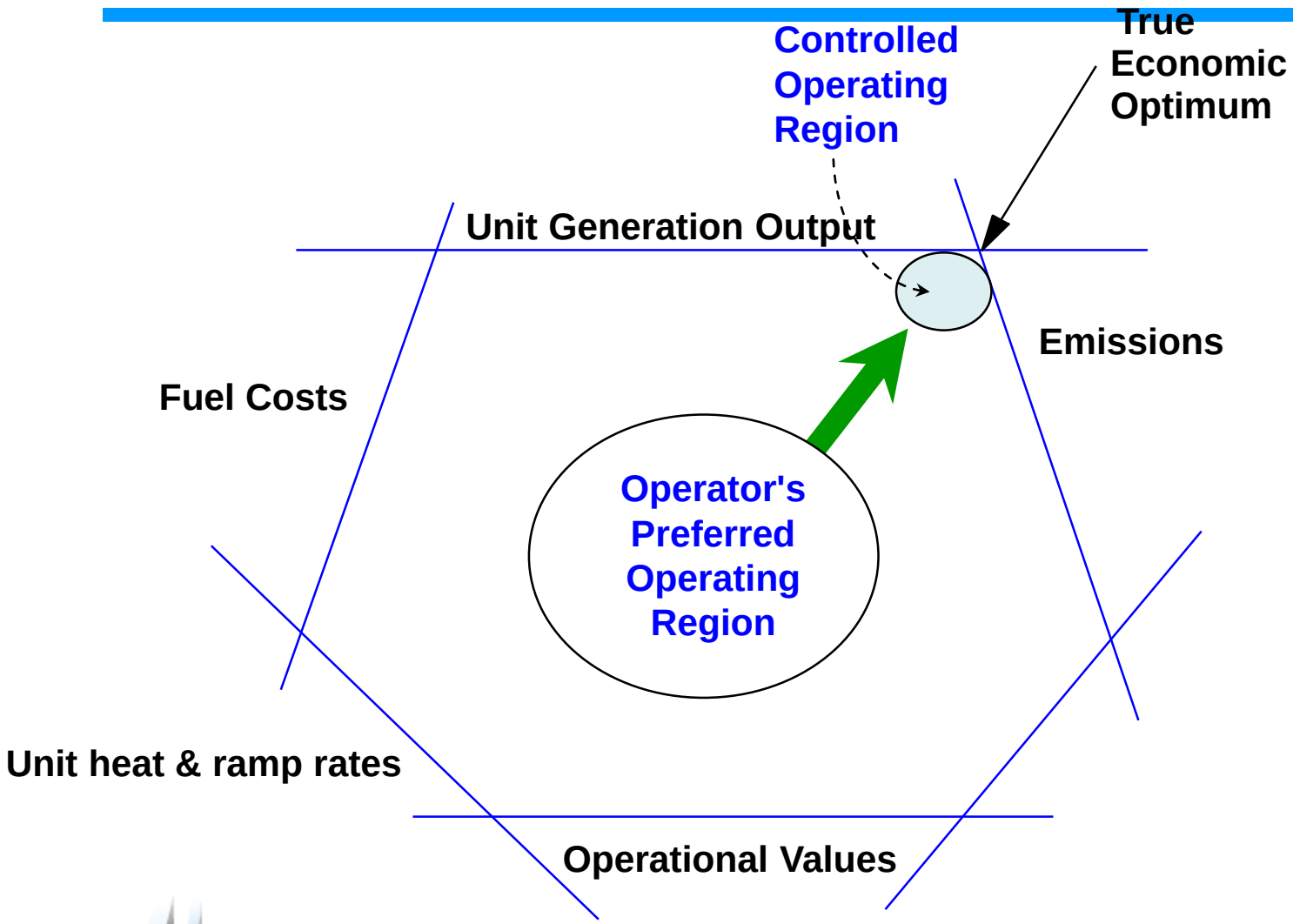
# Operations

# Optimization leads to Continuous Improvement

Minimize operational variances enabling the units to “push” the constraints



# Goal: Integrate, Optimize all Areas



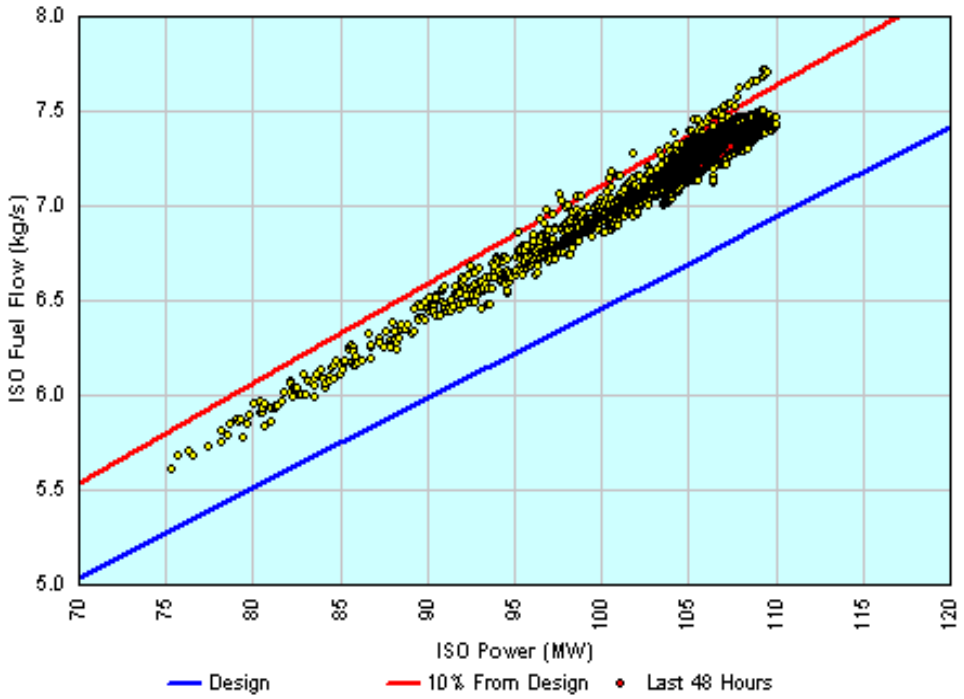
# Existing GT Performance Trends

| | |
|---|---|
| **Operating from** | 01 May 2001 00:00 |
| **Operating to** | 30 April 2002 23:59 |

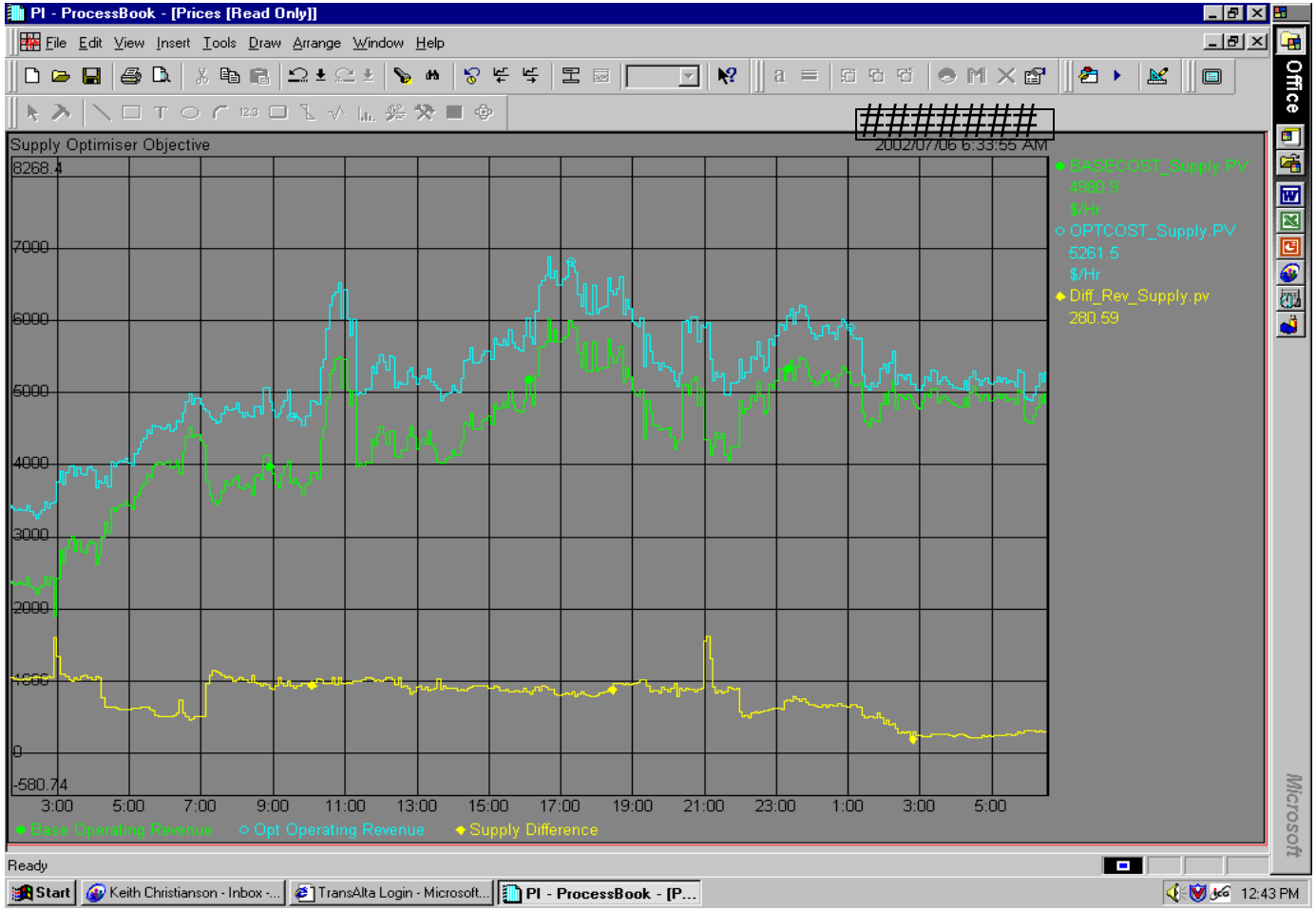
Notes

None A

## Fuel Flow vs. Power



# Optimization in Action




Yellow = differential between current operation and model based optimal operation

# TOP – Pilot Expected Benefits

- Production Increases
- Avoid trips caused by process upsets
- Soot-blower Optimization = less boiler stress
- Steam Temperature Control improvements
- Reduced Startup times via HM monitoring
- Improved Heat rates due to improved pressure control, derived from Historical Data.
- Improved operation of unit due to control system improvements via APC

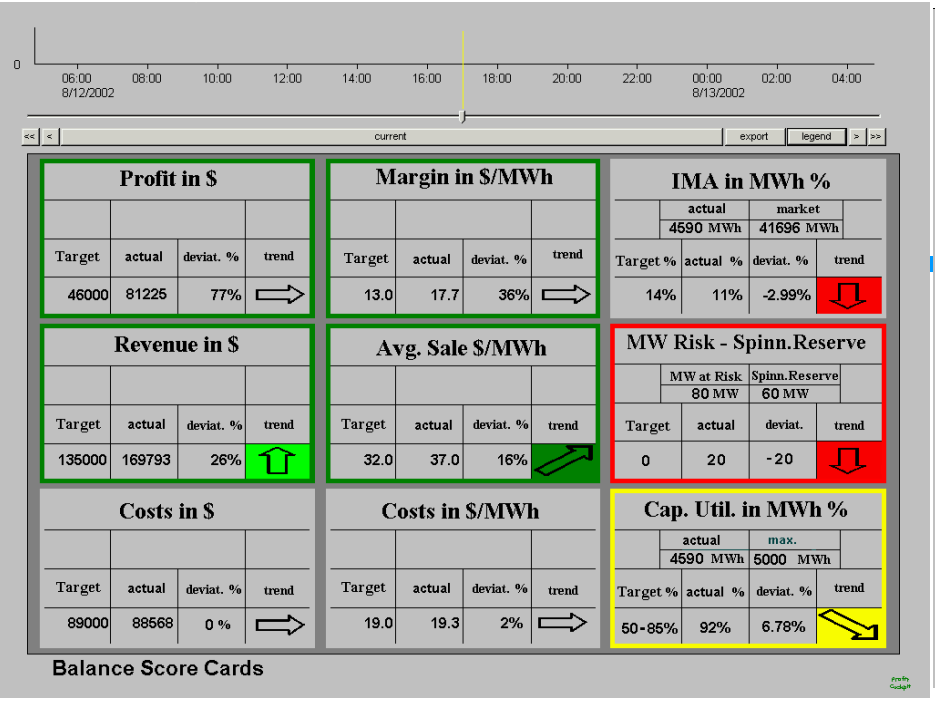
Above results in less operator intervention of process, allowing operator to focus on more details of optimizing the unit operation.

# TOP – Efficiency Benefits

- Improved Energy Marketing communication - less missed trades, etc.
- High level summary available from any networked PC with drill down capabilities to details (plant/unit/device level)
  - One source of Plant operational data for corporate decision making
  - Financial and non Financial information sharing for defined KPI's
  - Applications sharing Information with acceptable performance.
- Implementation must be repeatable at reduced costs and using more TA resources

# TOP – Current State

- Initiated Pilot – Jan ‘03
  - Award contract to vendor – April ’03
  - Develop project plan, scope and firm Pilot costs – March ‘03
  - Define the Standard Reference Model and KPI’s - IP
  - Implementation of Vendor tools (Pilot) – April ‘03
  - Integration of non-Vendor tools (Pilot) – May ‘03
- Program – 3rd quarter
  - Confirm DCS, Fit-Gap of existing plants
  - Develop deployment plan > turnaround schedules

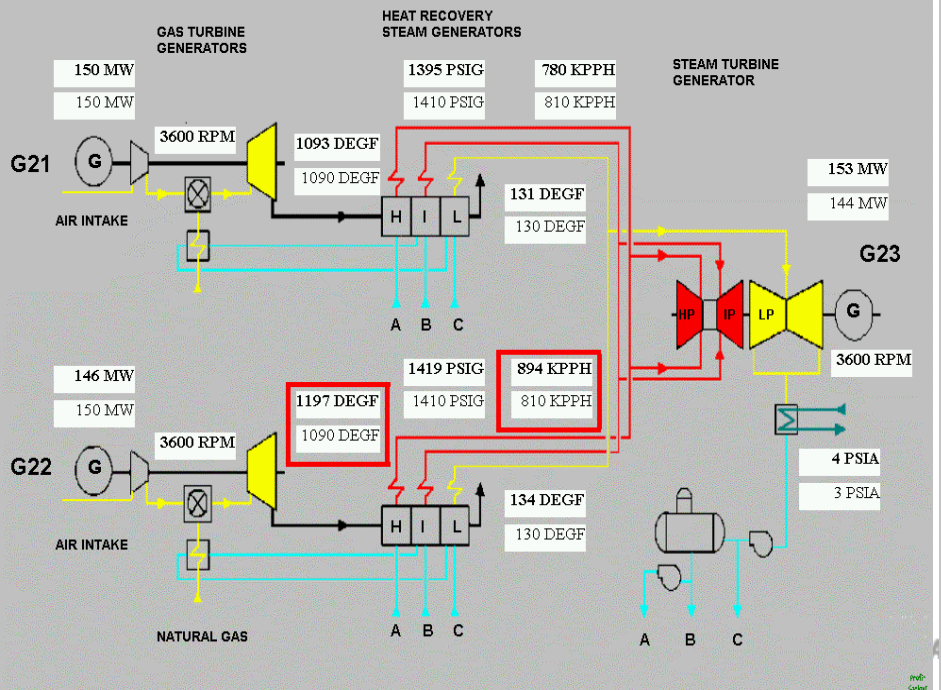



## Schedule of Economics, Generation Coal U1 — 08/13/02 02:00 PM

| Committed Physical | | Committed Economics | |
|---|---|---|---|
| Long Term Market | 280.0 MWh | Contract Value | 6160.0 $ |
| Day Ahead Market | 70.0 MWh | Contract Value | 1645.0 $ |
| Real Time Market | 40.0 MW | Estimated Value | 350.0 $ |
| Aut. Generat. Control | .0 MW | Contract Value | .0 $ |
| Reserve Market | .0 MW | Contract Value | .0 $ |

| Potential Growth Physical | | Potential Growth Economics | |
|---|---|---|---|
| Long Term Market | 255.0 MWh | "Market Closed" | |
| Day Ahead Market | 255.0 MWh | Marginal Price / Cost | 8.2 $/MWh / 2665.0 $ |
| Ramp Up | 8.0 +MW/min | | |
| Ramp Down | 20.0 -MW/min | | |
| Real Time Market | 42.5 MW | Marginal Price / Cost | 15.3 $/MW / 650.3 $ |
| Aut. Generat. Control | 8.0 MW | Marginal Price / Cost | 30.0 $/MW / 240.0 $ |
| Reserve Market | 150.0 MW | Marginal Price / Cost | 2.0 $/MW / 300.0 $ |
| MW at Risk | 80.0 MW | Penalty | 8000.0 $ |

## Process Values compare to Model Estimate Values




## TransAlta, Centralia

| CC1 | AGC | State | Power Output MW | Production Costs $/MWh | Min. Load Cap. MW | Max. Load Cap. MW | Ramp Rate Up | Ramp Rate Down |
|---|---|---|---|---|---|---|---|---|
| | Off | | | | | | | |
| Current | | | 446 | 11.8 | 50 | 605 | 12.0 | 20.0 |
| Planned/Scheduled | | | 450 | 11.0 | 50 | 580 | 8.0 | 15.0 |

| CC2 | AGC | State | Power Output MW | Production Costs $/MWh | Min. Load Cap. MW | Max. Load Cap. MW | Ramp Rate Up | Ramp Rate Down |
|---|---|---|---|---|---|---|---|---|
| | Off | | | | | | | |
| Current | | | 442 | 15.4 | 50 | 320 | 1.5 | 5.0 |
| Planned/Scheduled | | | 450 | 11.0 | 50 | 580 | 4.0 | 4.0 |

| CC3 | AGC | State | Power Output MW | Production Costs $/MWh | Min. Load Cap. MW | Max. Load Cap. MW | Ramp Rate Up | Ramp Rate Down |
|---|---|---|---|---|---|---|---|---|
| | On | | | | | | | |
| Current | | | 122 | 13.1 | 50 | 580 | 20.0 | 30.0 |
| Planned/Scheduled | | | 130 | 13.3 | 50 | 400 | 15.0 | 15.0 |

# Integrated Decision Support Areas

## Operations

### Plant Operations

- Generation schedule execution
- Unit capability and availability
- Unit performance and optimization decisions
- Shift management
- Resource allocation (O&M)

### Energy Marketing

- Balancing marginal costs and market prices
- Generation risk and market commitment decisions
- Scheduling generation units
- Power reserves for handling of forced outages

### Maintenance & Repair

- Diagnostics of deratings and component failures
- Maintenance and repair scheduling decisions
- Equipment isolation and occupational safety requirements

### Performance Reporting & Bench Marking

- Collection and prediction of performance data
- Benchmarking of units and operation modes
- Environmental monitoring


Centralia + BHP
-> Unit 1
-> Unit 2
-> CC Unit
Status Threshold Detail
Generation Management Centralia and Big Hanaford
Display Work Clearance Application
Approvals
Work approval
Operational WCD
TransAlta

# Conclusions

PI is the glue between process and Enterprise

Exploit Technologies like xVIP, OSISoft and SAP NetWeaver to leverage your existing investments – bring it all together

TOP is another step in integration and standardization:

"The Integrated Enterprise"

Vertical and horizontal integration and optimization

Thank you!

# Q& A

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*Paul Kurchina – Paul_Kurchina@TransAlta.com*