



OSIsoft®

Regional Seminar Series



Fleet Optimization Through Process Information

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Empowering Business in Real Time.

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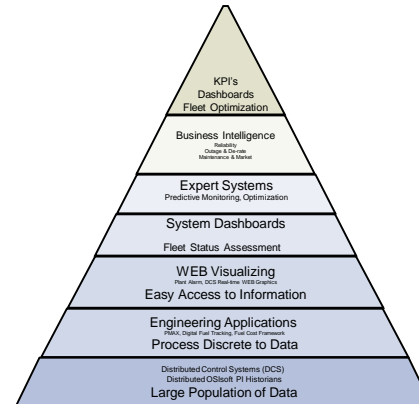
- About DTE Energy

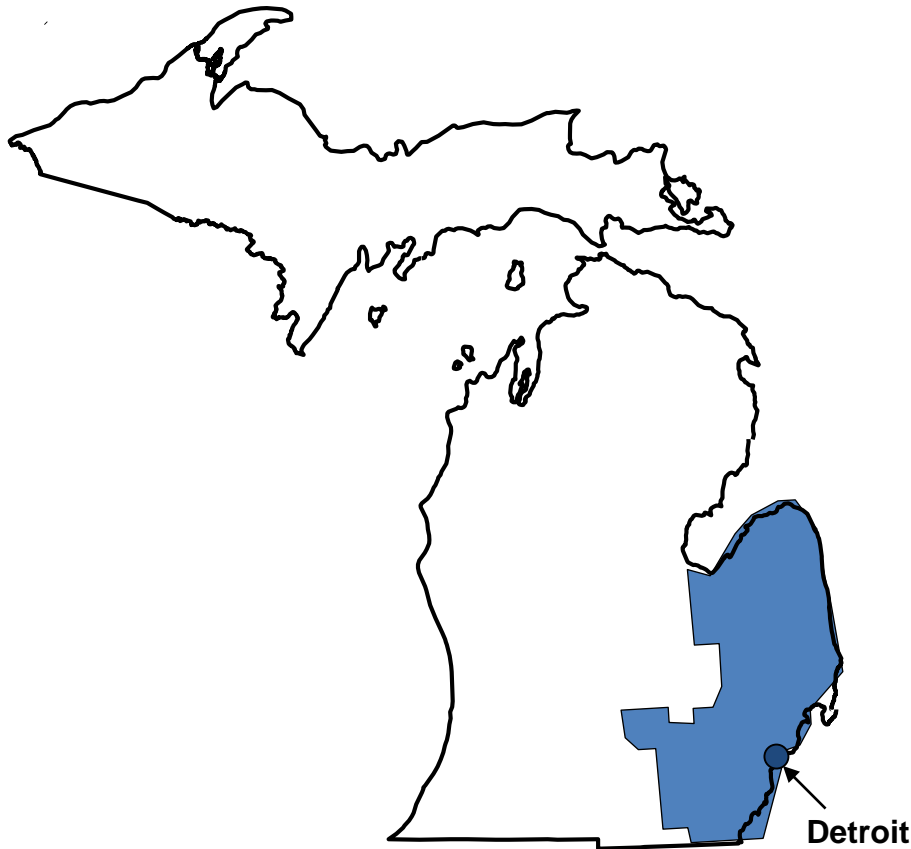


- Technology Framework



- DTE Energy Integration Framework





Detroit Edison

- Michigan's largest electric utility with 2.2 million customers
- Over 11,080 MW of power generation, primarily coal fired
- 54,000 GWh in electric sales
- \$4.7 billion in revenue

 DTE Energy - Detroit Edison

Plants & Performance Center



Monroe – 3,135 mw



Belle River – 1,260 mw



Trenton Channel - 730 mw



Performance Center – 11,588 mw



River Rouge - 527 mw



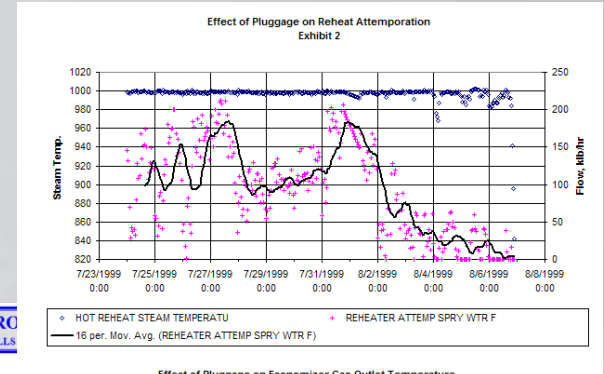
Greenwood – 785 mw

Generating Unit	Capacity Unit	Capacity Plant
Belle River 1	625	
Belle River 2	635	
Belle River		1260
Conners Creek 15	135	
Conners Creek 16	100	
Conners Creek		235
Fermi 2	1110	1110
Greenwood 1	785	785
Harbor Beach 1	103	103
Monroe 1	770	
Monroe 2	795	
Monroe 3	795	
Monroe 4	775	
Monroe		3135
River Rouge 2	247	
River Rouge 3	280	
River Rouge		527
St Clair 1	150	
St Clair 2	162	
St Clair 3	168	
St Clair 4	158	
St Clair 6	321	
St Clair 7	450	
St Clair		1409
Trenton Channel 7A	124	
Trenton Channel 8	122	
Trenton Channel 9	520	
Trenton Channel		766
Peakers	1224	1224
Totals:	10554	10554

History of OSI PI in DTE Energy

- Pilot at Monroe PP in 1998
- Fossil Generation Fleet 1999
- GenOps – EMS Ranger 2001
- SOC SCADA– 2002
- Fermi Nuclear– 2003
- DTE Subsidiaries – 2007
- Enterprise Agreement – 2007
- Continuous PI Expansion

- ▶ Magnitude
- ▶ Functionality



UNIT 1 – COMBUSTION PRO (I.E., AIR HEATER PERFORMANCE VS COAL MILLS)

Exhibit 5

Concerns have recently arisen regarding degrading performance of Unit 1's Coal Mills over this past week. I would like to take this opportunity to **throw-caution-to-the-wind** in light of two factors: 1) Lack of good air heater radial seals, and 2) rising ambient air temperatures.

In the PI graph below of Unit 1's parameters, a review of **PA-to-Windbox differential pressure** (key to Coal Mill performance) is compared simultaneously to ambient air temperatures (FD Fan Air Leaving) and **PA-to-Windbox delta-P**. Past operating history has defined that when the PA-to-Windbox delta-P reaches a level of **19" H₂O**, that boiler combustion and coal mill performance is drastically impacted. This is the **level** at which air heater radial seal replacement is dictated if unit load is to be maintained without restrictions.

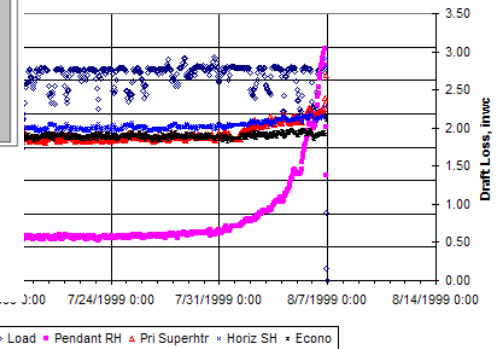


Understanding that air density changes as temperature changes and that it has an inverse effect on fan and air heater performance (i.e., as air temp. increases, efficiency of fans/air heater decrease) we can readily see in the above graph that since October 25th the ambient air temperature changed drastically. This was the reported time that Unit 1 coal mill output problems began to arise. As a result, **pluggage** was reduced and coal mills removed from service in an attempt to maintain enough Hot PA **to-Windbox** to the running mills. For a brief period, this provided a false impression that **PA-to-Windbox** pressure was not affected by rising ambient temperatures, yet when compared to unit load one can easily surmise the error of this perception. It was on Oct. 27th that the true impact on **PA-to-Windbox** pressure can be seen in the PI graph above. **Please note in the above graph that air temperature had a POSITIVE impact on PA-to-Windbox on Oct. 22nd when it cooled down.**

Effect of Pluggage on Economizer Gas Outlet Temperature

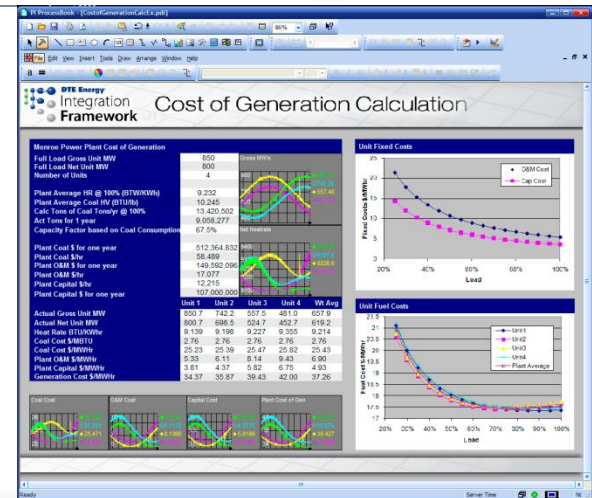


Water, Superheater, and Economizer Draft Loss
Exhibit 4



Integration between Process Controls & Business Systems to achieve Fleet Optimization.

Using OSIsoft's suite of applications as a foundation, DTE Energy has created a framework that integrates plant information to work management & financial management systems. This enables us to streamline business processes and drive decisions at the point of activity.



Business Challenge

- Technology implementation over the last decade to achieve various business objectives has created an overload of data.
- How to convert this data in to information?
- How to deliver the right information to the right people at the right time?
- How to become proactive instead of reactive and then on the path to continuous improvement.

Solution

- Use a single platform (PI WebParts) to deliver the information across the fleet.
- Acquire data and perform computations using Analysis Framework (AF) & ACE
- Implement a logical structure called Hierarchical System Index (HSI) on all data sources using AF / MDB

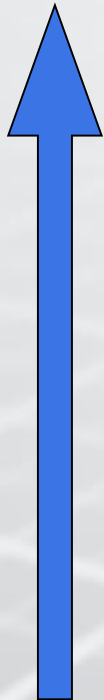
Customer Results / Benefits

- Ability to view KPI's for Plant / Unit / Equipment uniformly from disparate data sources.
- Comparative analysis of like equipment through out the fleet.
- Information tailored to the end-user based the job function and role.
- One stop and one source for all information.

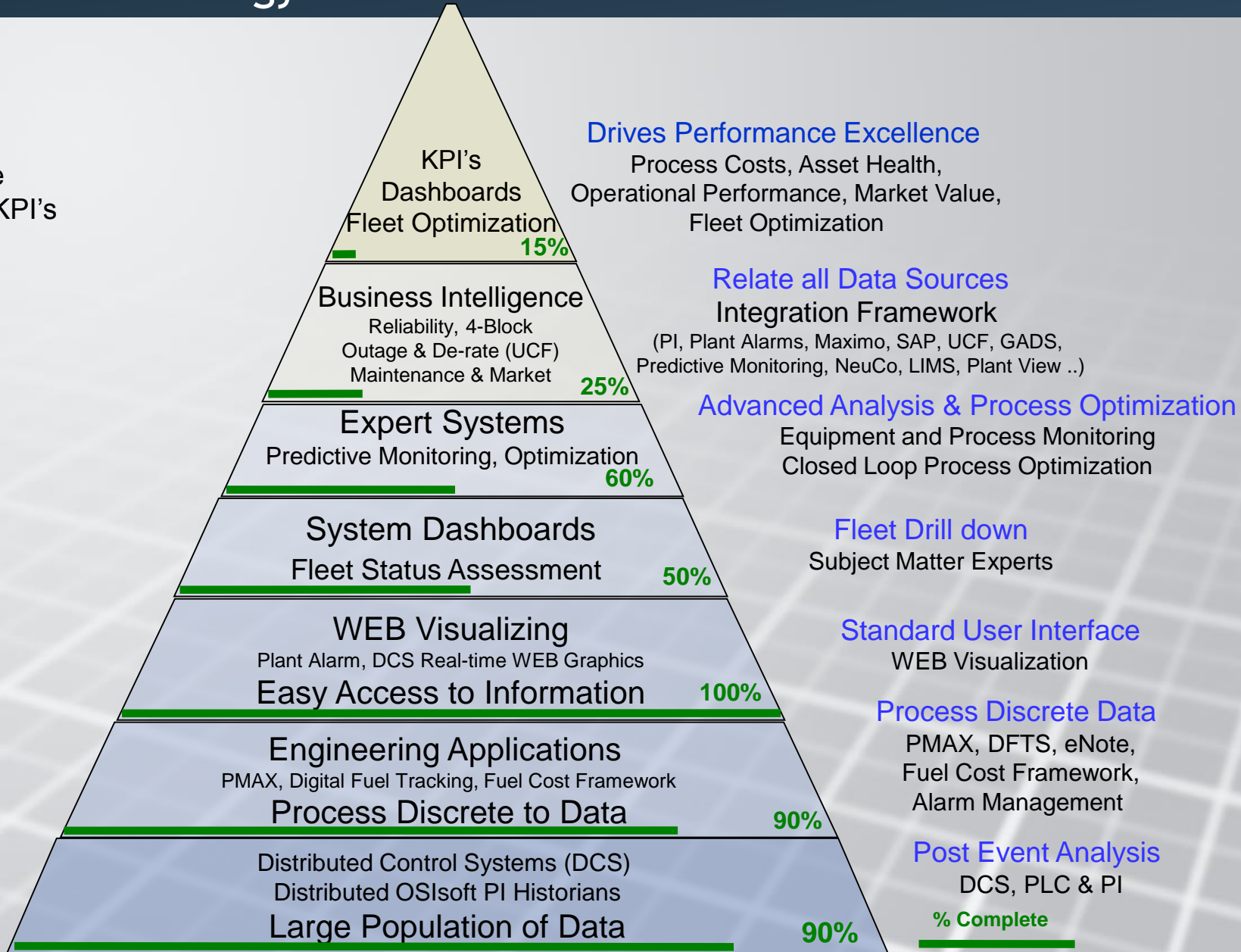
Control & Technology Framework



Actionable
Information – KPI's

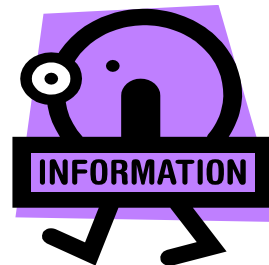


Discrete data
Limited value



Challenge - Process Data Everywhere!

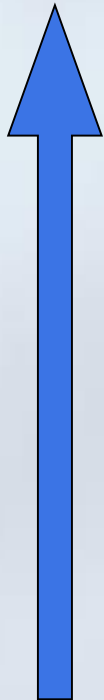
- DCS installations on nearly every unit
- Nearly 1,000,000 process data tags
 - PI Systems at each plant
 - PI Interfaces to DCS & many PLC's
- What is that **data screaming** at us?
- How do you effectively **utilize** the data?
- How do you turn data into **information**?



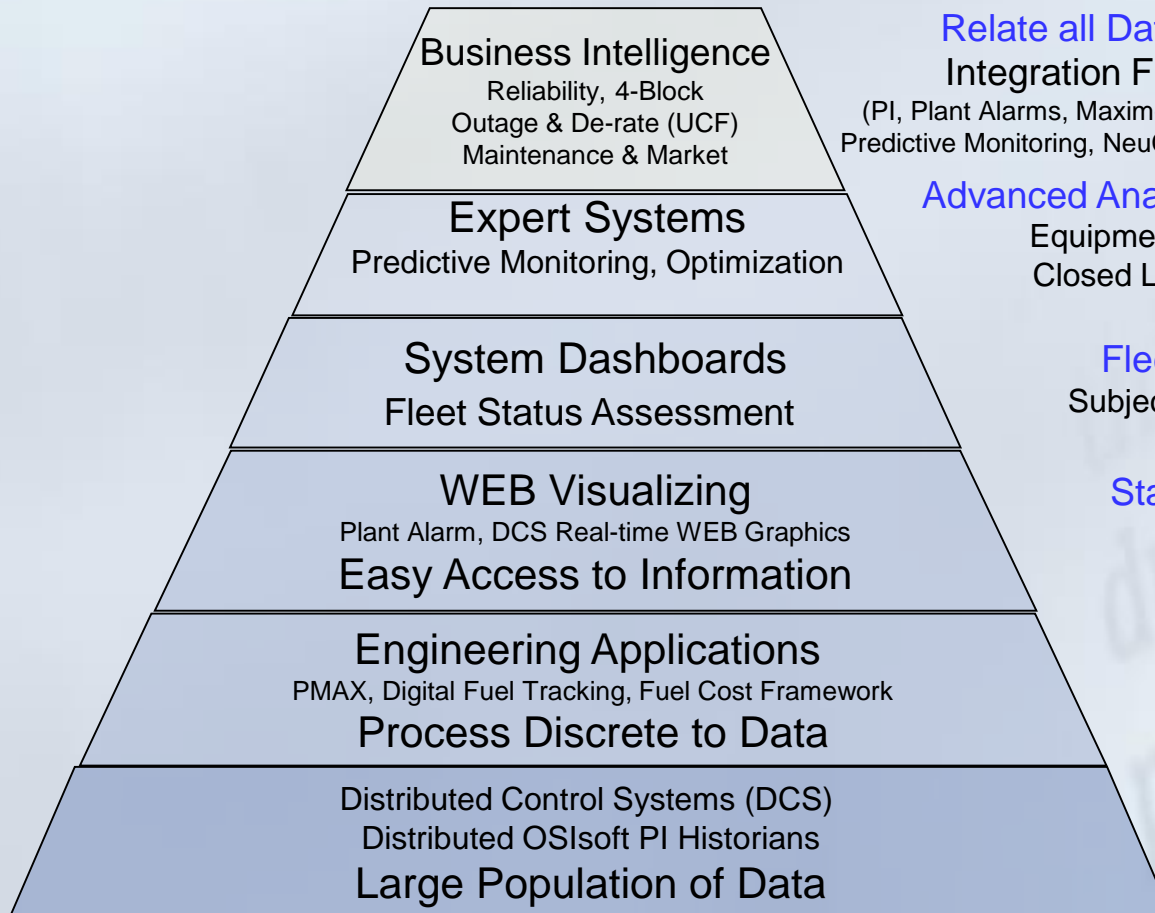
Control & Technology Framework



Actionable
Information – KPI's



Discrete data
Limited value



Relate all Data Sources
Integration Framework
(PI, Plant Alarms, Maximo, SAP, UCF, GADS,
Predictive Monitoring, NeuCo, LIMS, Plant View ..)

Advanced Analysis & Process Optimization
Equipment and Process Monitoring
Closed Loop Process Optimization

Fleet Drill down
Subject Matter Experts

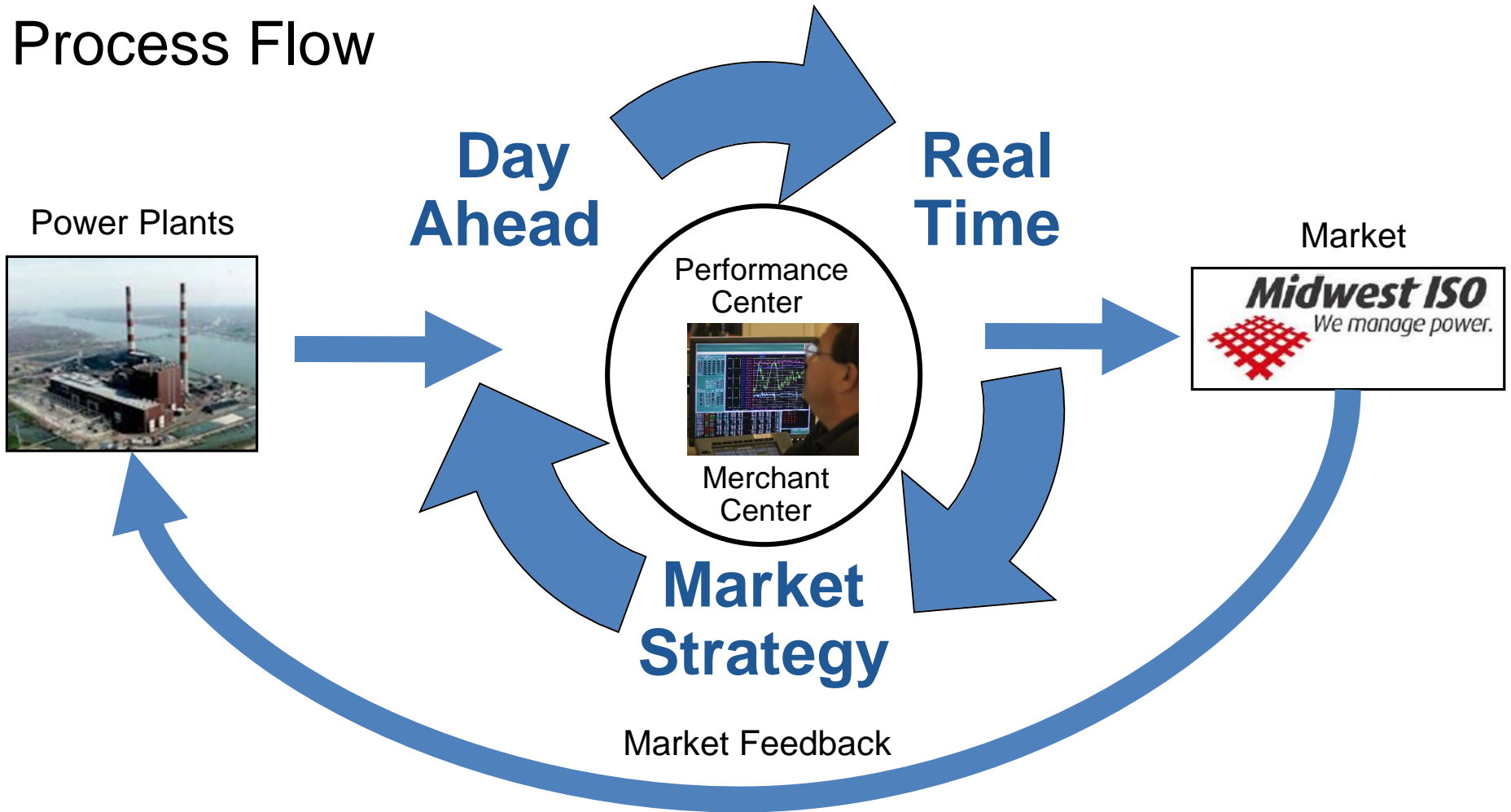
Standard User Interface
WEB Visualization

Process Discrete Data
PMAX, DFTS, eNote,
Fuel Cost Framework,
Alarm Management

Post Event Analysis
DCS, PLC & PI

Unit Capacity Framework (UCF)

Process Flow

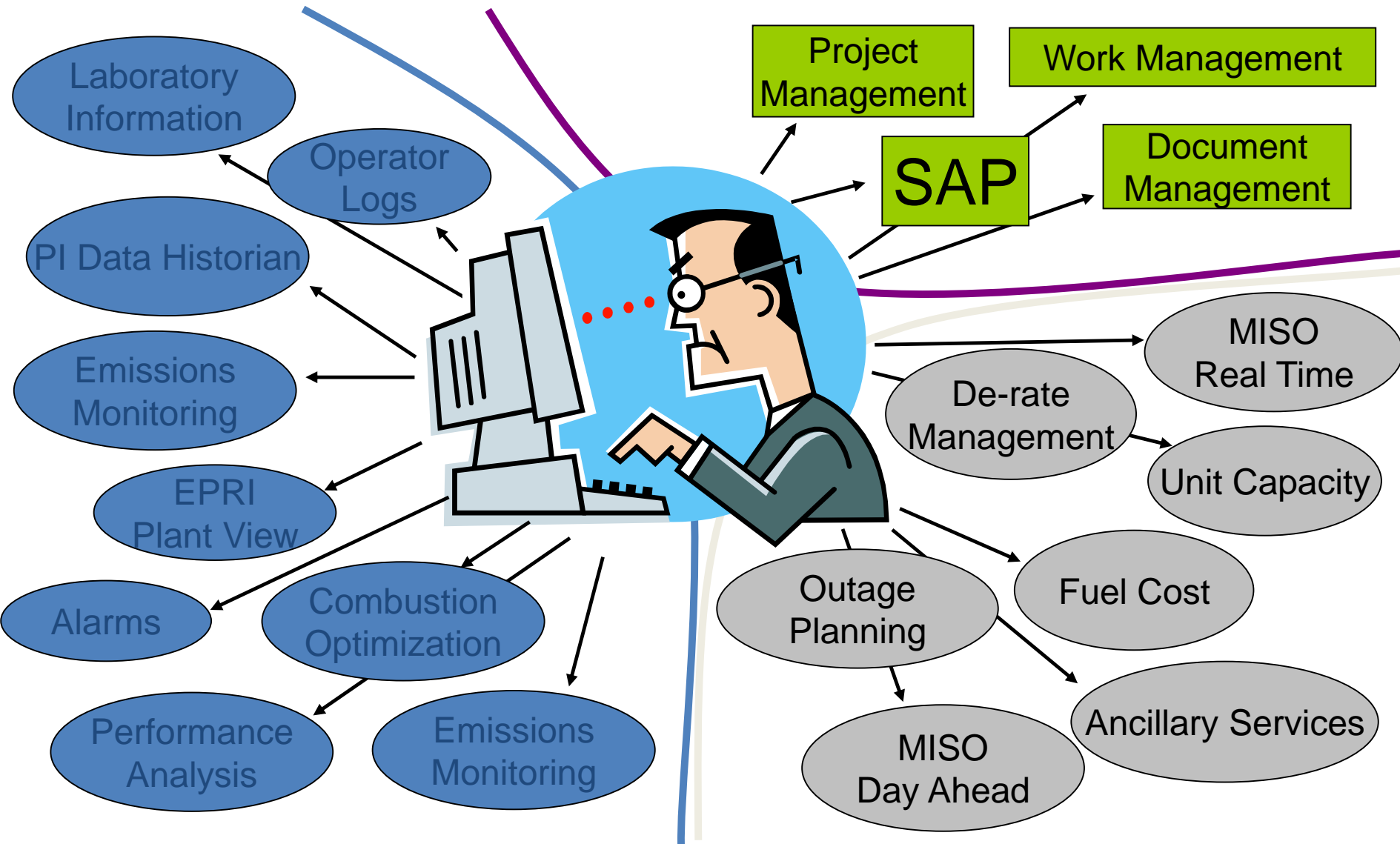


Unit Capacity Framework (UCF)

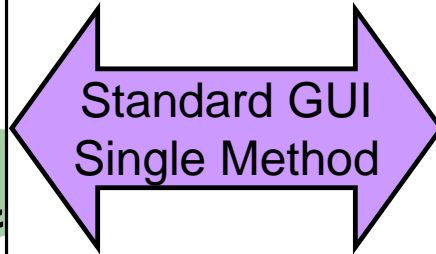
- Manages all Unit Capacity and De-rates - Interfaces to MISO, P3M & EMS
- Automatically Generated Status Report (Availability on BlackBerry)
- Dynamically linked with Outage and de-rate process

Fossil Generation Unit Capacity Framework										User: N/A				
Reports		Data Entry		Options		Quick Links:				DTE Energy				
Date/Time: 4/6/2006 12:46:00 PM		Go										Export to Excel		
<input type="checkbox"/> Show Optional Fields		<input checked="" type="checkbox"/> Group Peaker Units		<input type="checkbox"/> Group Cycler Units		<input type="checkbox"/> Group Base Units						Export to Word		
Sort: Alphabetically		Historical Time: Current										Field Definitions		
Fossil Generation Status Report										Last Modified By: David W Skiver (E49449) on Apr 6 2006 6:24AM				
Thursday, April 06, 2006 12:46:56 PM														
Unit	On	NDC	Pr Avail	Pr+Of Avail	Current Blend	Unit Constraints/Special Conditions	Primary Econ. Blend	Unit Econ. Blend	Primary Sched.	Primary Rand.	Unit Sched.	Unit Rand.	Total Sched.	Total Rand.
BRVPP 1	<input type="checkbox"/>	625	600	625	{100%LSW}+(100%2O1L)		0	0	0	0	0	0	0	0
BRVPP 2	<input checked="" type="checkbox"/>	635	610	635	{100%LSW}+(100%2O1L)		0	0	0	0	0	0	0	0
CCKPP 15	<input type="checkbox"/>	135	135	135	{100%NGAS}		0	0	0	0	0	0	0	0
CCKPP 16	<input type="checkbox"/>	100	100	100	{100%NGAS}		0	0	0	0	0	0	0	0
FERMI 2	<input type="checkbox"/>	1110	0	0	{100%NUC}	Outage: refuel outage: May 10@0900: Dugan	0	0	0	0	0	0	0	0
GW1PP 1	<input checked="" type="checkbox"/>	785	785	785	{60%NGAS/40%H2SO1L}		0	0	0	0	0	0	0	0
HBHPP 1	<input checked="" type="checkbox"/>	103	90	103	{100%LSS}+(100%2O1L)		0	0	0	0	0	0	0	0
MONPP 1	<input type="checkbox"/>	770	0	0	{65%LSW/35%MSE}+(100%2O1L)	Outage: Periodic Outage: May 6@2000: F. Wszelaki	0	0	0	0	0	0	0	0
MONPP 2	<input type="checkbox"/>	795	0	0	{65%LSW/35%MSE}+(100%2O1L)	Outage [F]: Tube leak: Apr 10@0655: Essex Derate [F]: (0) Mill Performance: Apr 22@2100: P. Fessler Derate [F]: (0) 68.7 SFWH: Jun 22@2100: P. Fessler Derate: (0) 2-2 CM in SK: Apr 7@1400: F. Wszelaki	0	0	0	0	0	0	0	0
MONPP 3	<input checked="" type="checkbox"/>	795	795	795	{65%LSW/35%MSE}+(100%2O1L)	Derate [F]: (0) No. 3 FWH Tube Leak: Jun 1@0600: P. Fessler	0	0	0	0	0	0	0	0
MONPP 4	<input checked="" type="checkbox"/>	775	775	775	{65%LSW/35%MSE}+(100%2O1L)		0	0	0	0	0	0	0	0
RRGPP 2	<input type="checkbox"/>	247	0	0	{70%LSW/30%LSS}+(100%NGAS)	Outage: Spring 2006 Per. Outage: May 24@0700: C.P. Mumaw	0	5	0	0	5	0	0	0
RRGPP 3	<input checked="" type="checkbox"/>	280	280	280	{70%LSW/30%LSS}+(100%NGAS)		0	0	0	0	0	0	0	0
STCPP 1	<input checked="" type="checkbox"/>	150	125	125	{100%LSW}		0	25	0	0	25	0	0	0
STCPP 2	<input type="checkbox"/>	162	0	0	{100%LSW}	Outage: 2006 Periodic Outage: May 22@0600: John Quaine	25	25	25	0	25	0	25	0
STCPP 3	<input checked="" type="checkbox"/>	168	125	125	{100%LSW}		0	43	0	0	43	0	0	0
STCPP 4	<input checked="" type="checkbox"/>	158	125	125	{100%LSW}		0	33	0	0	33	0	0	0
STCPP 6	<input checked="" type="checkbox"/>	321	281	321	{85%LSW/15%HSE}+(100%NGAS)		0	0	0	0	0	0	0	0
STCPP 7	<input checked="" type="checkbox"/>	450	360	386	{80%LSW/20%HSE}+(100%2O1L)	Derate [F]: (58) E CM ; Apr 17@0800: Dan Lorenzetti Derate [F]: (24) Opacity and SO3 Cond'ing: Nov 1@0000: Lorenzetti Derate [F]: (6) #7 FWHr: Nov 1@0600: Lorenzetti	0	0	0	0	0	64	0	64
TCHPP 7A	<input checked="" type="checkbox"/>	210	110	110	{60%LSW/40%MSE}+(100%2O1L)		0	100	0	0	100	0	100	0
TCHPP 8	<input checked="" type="checkbox"/>	122	100	100	{80%LSS/20%MSE}+(100%2O1L)		0	22	0	0	22	0	22	0
TCHPP 9	<input checked="" type="checkbox"/>	520	350	370	{80%LSS/20%MSE}+(100%2O1L)		150	150	150	0	150	0	150	0
Peakers	<input checked="" type="checkbox"/>	792	186	186	N/A	N/A	0	606	0	0	606	0	0	0
Totals:							175	1009	175	0	1009	64	297	64

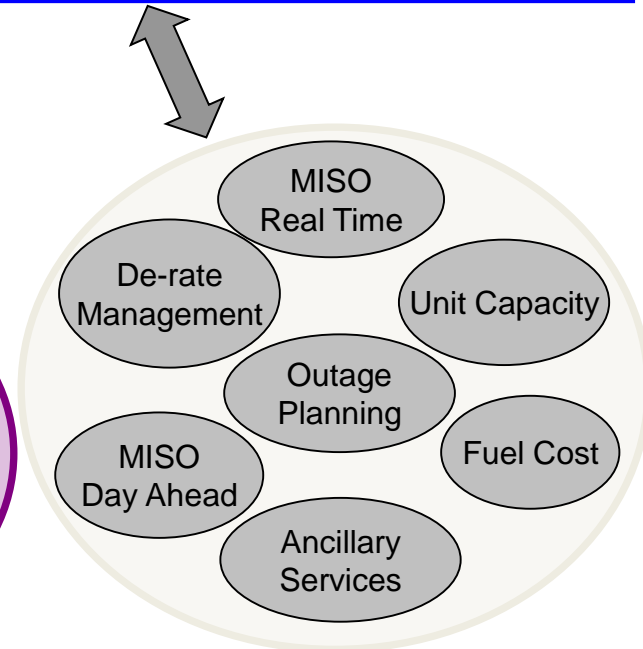
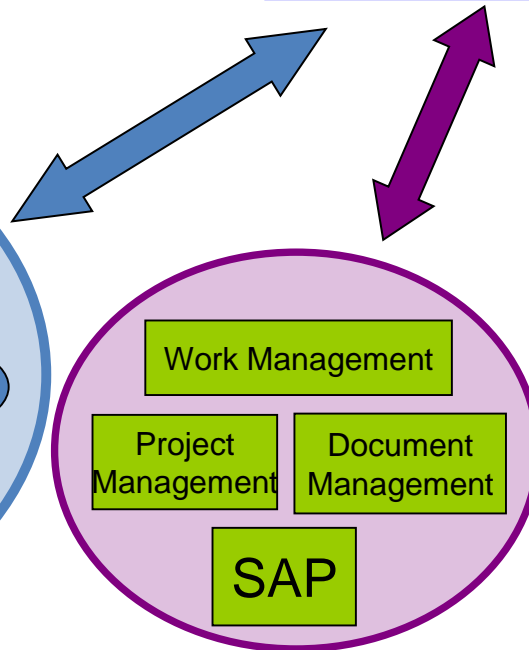
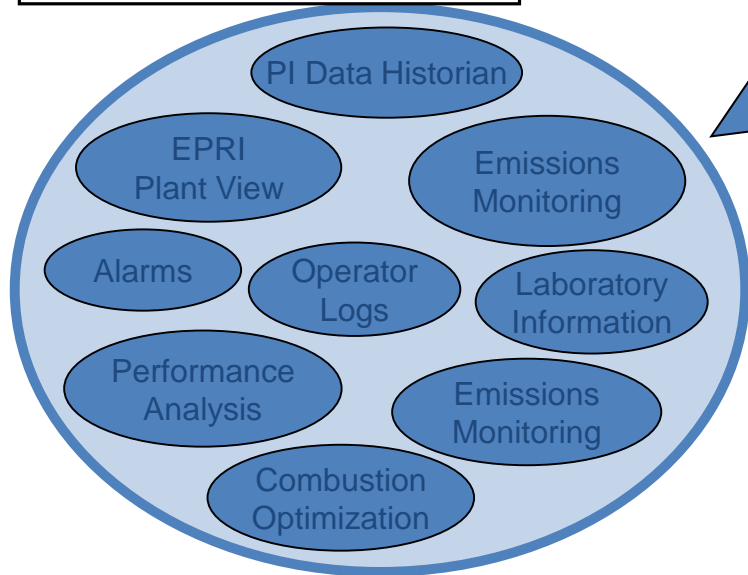
No Shortage of Information!



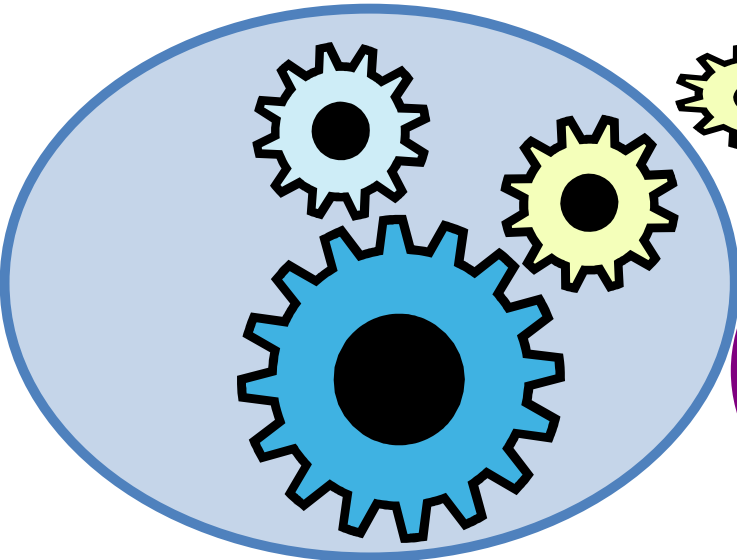
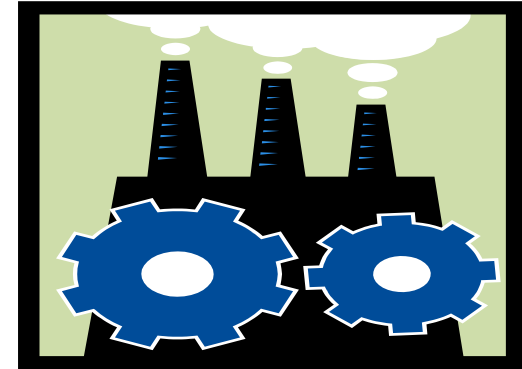
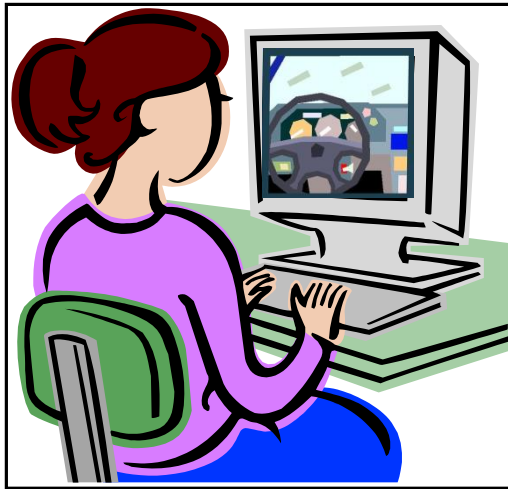
Integration Framework



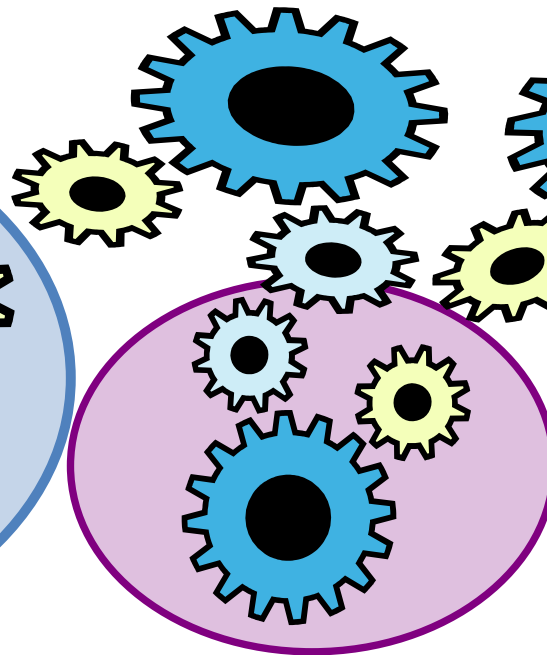
Integration Framework:
Integrated applications environment:
Consistent framework for data,
analysis, reporting and consistent
user graphical interface.



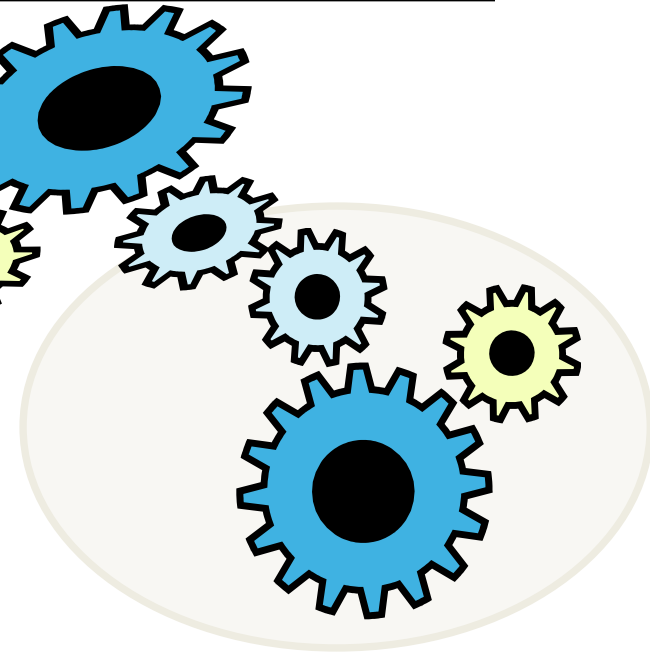
Common Structure



Process Information

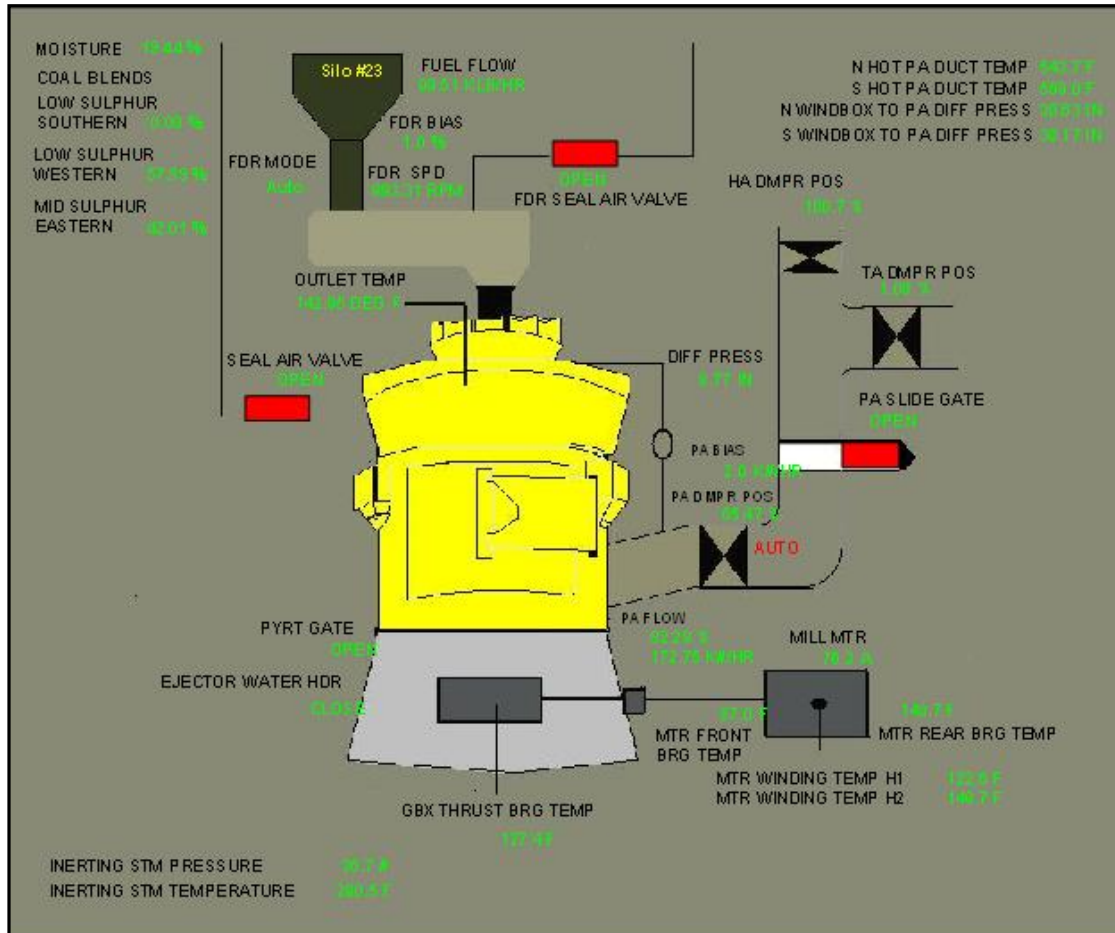


Business Systems

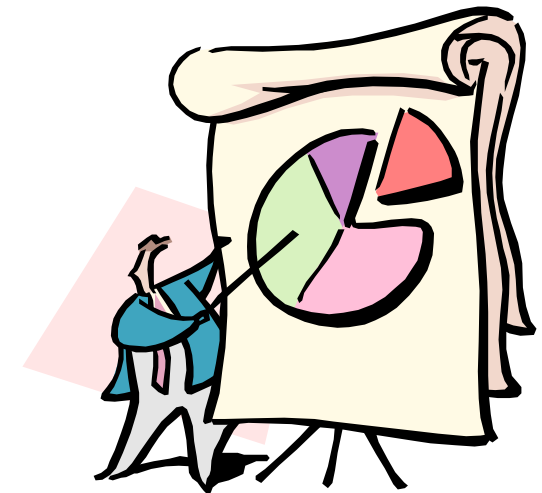


Market Data

Pulverizer Dashboard



Process Information

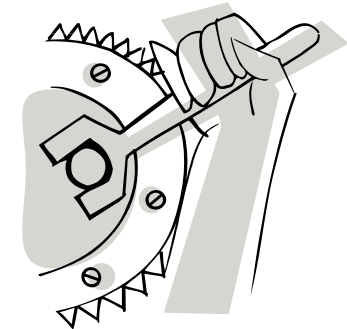


More information is need for Analysis

What information is needed?

Pulverizer

- Milling Costs
- Process Costs
- Production Costs
- EAF
- Equipment Condition Monitoring Information
- Work Performed & Work Pending
- Alarms
- LIMS
- Vibration Analysis



Consistent Reporting

- Common Methodology
- Common Structure



Unit Capacity



Alarms



EPRI PlantView



PI



P3M



Equipment Monitoring



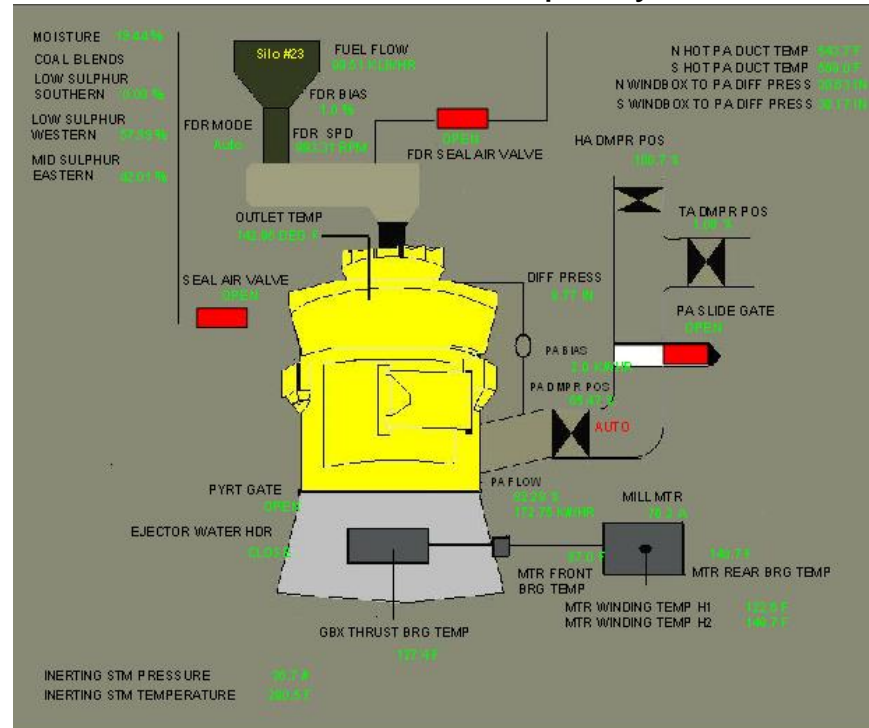
Maximo



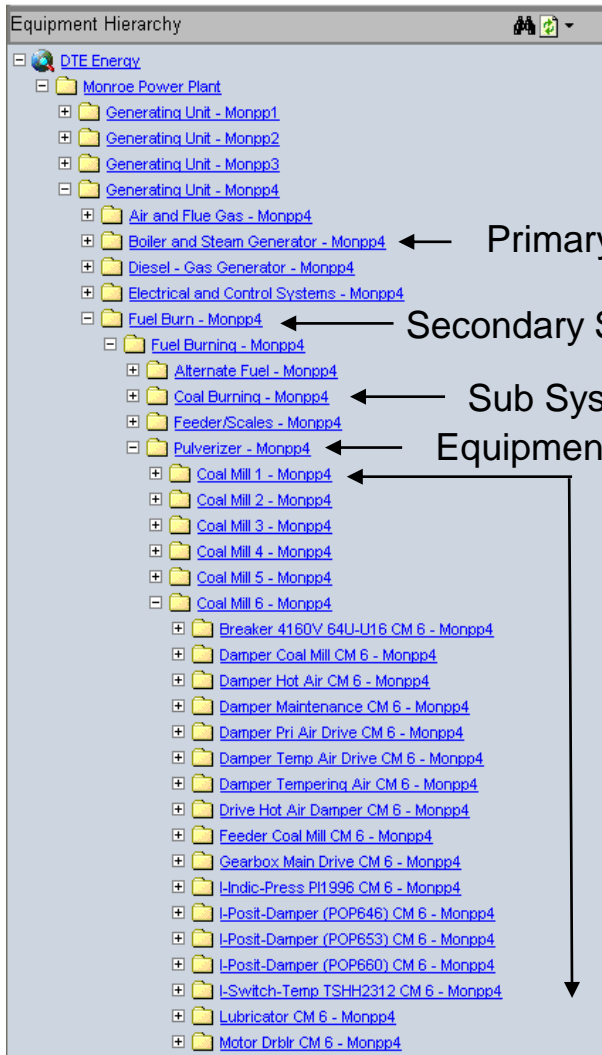
SAP



Documentum

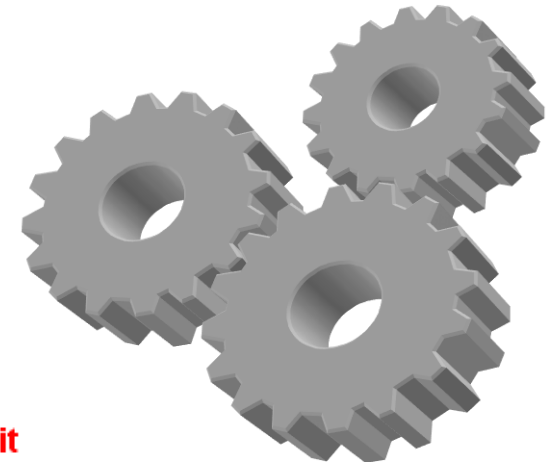


Common Thread- Equipment Hierarchy



Equipment Hierarchy

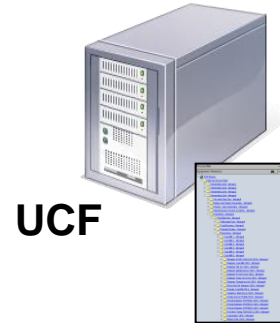
- Hierarchical System Index (HSI)
- Work Breakdown Structure (WBS)



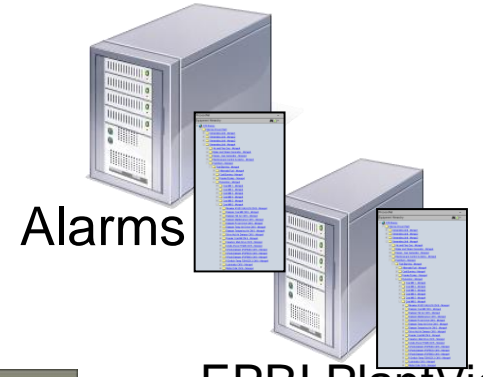
DTE Energy – Business Unit
Monroe Power Plant – Plant
Generating Unit - Monpp4 – Unit
Fuel Burn - Monpp4 – Primary System
Fuel Burn - Monpp4 – Secondary System
Pulverizer - Monpp4 – Sub System
Coal Mill 1 - Monpp4 – Equipment / Sub Equip
 Breaker 4160V 64U-U16 CM 1 - Monpp4
 Damper Coal Mill CM 1 - Monpp4
 Damper Hot Air CM 1 - Monpp4
 Damper Maintenance CM 1 - Monpp4
 Damper Pri Air Drive CM 1 - Monpp4

Consistent Reporting

- Common Methodology
- Common Structure

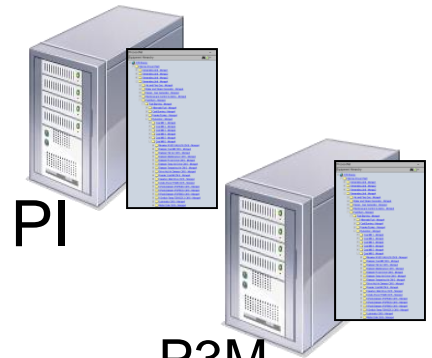


UCF



Alarms

EPRI PlantView

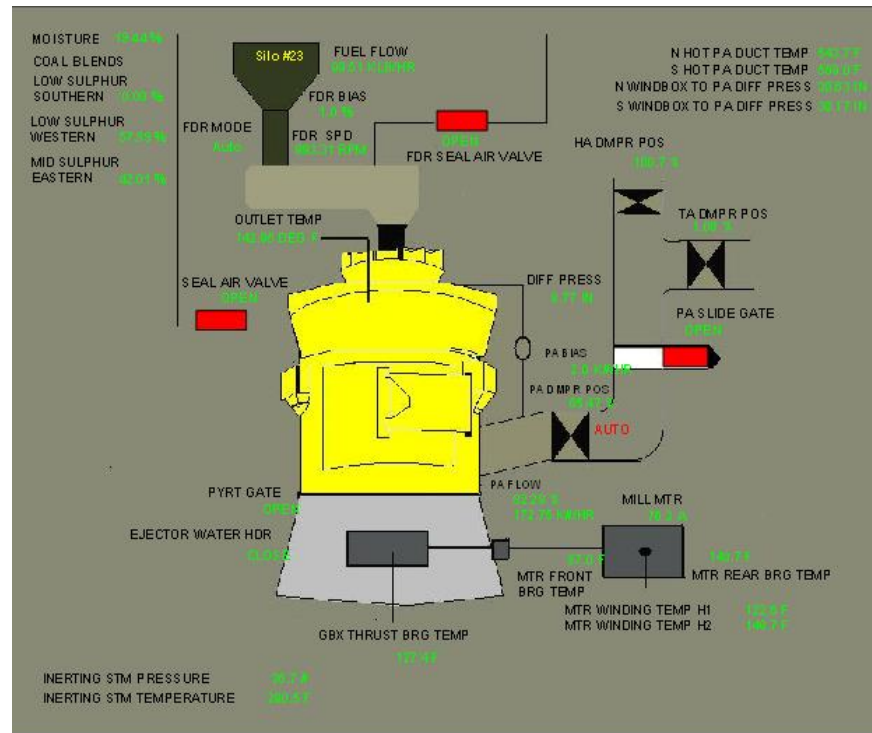


PI

P3M



Equipment Monitoring



Maximo



SAP



Documentum

Integration Framework



INPUTS

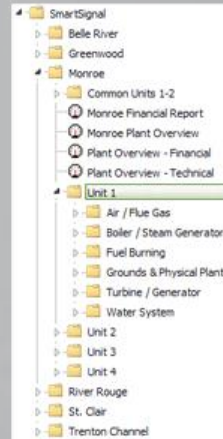
FIELD

- Boiler
- Pulverizer
- Temperatures
- Pressure
- Flows

RDBMS

- SAP
- PI-DB
- maximo
- Microsoft SQL Server
- ORACLE
- DB
- Microsoft Excel

HSI



PROCESSING KPI'S

- PI-AF**
- PI-ACE**
- PI-RtBaseLine**
- PI-SDK**

USER EXPERIENCE

FRONT END

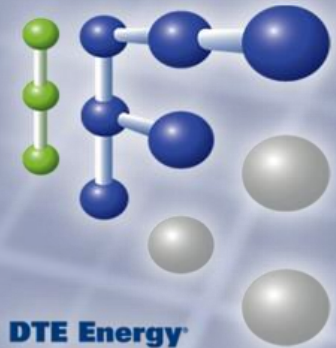
- OSIsoft**. Web Part
- OSIsoft**. ProcessBook
- Microsoft Office SharePoint
- Custom Web Reports

IMPLEMENTATION

- Training
- Online Help
- Videos

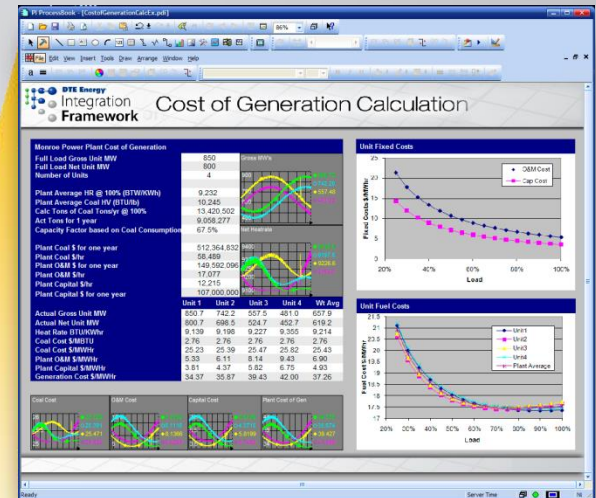
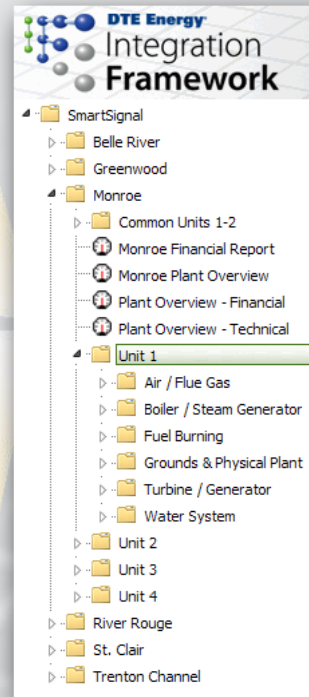
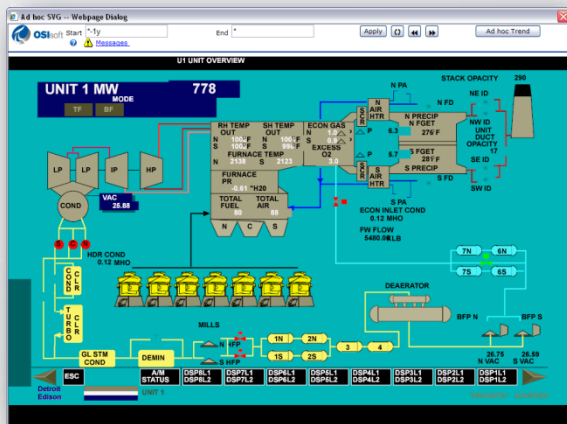
NOTIFICATIONS

- E-Mail
- Pager
- Mobile



DTE Energy
Integration
Framework

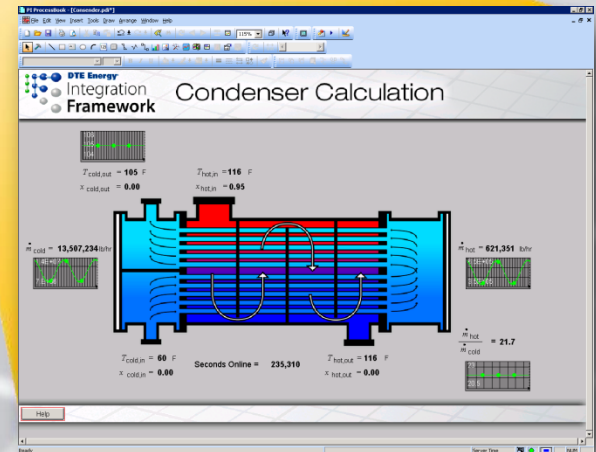
Integration Framework



Market Unit 1 - MISO Day Ahead LMP	Market Unit 1 - MISO Hourly Price
1/1/2009 12:00:00 PM	11/30/2008 2:30:00 PM
1/1/2009 1:00:00 PM	11/30/2008 3:00:00 PM
1/1/2009 2:00:00 PM	11/30/2008 3:30:00 PM
1/1/2009 3:00:00 PM	11/30/2008 4:00:00 PM
1/1/2009 4:00:00 PM	11/30/2008 4:30:00 PM
1/1/2009 5:00:00 PM	11/30/2008 5:00:00 PM
1/1/2009 6:00:00 PM	11/30/2008 5:30:00 PM
1/1/2009 7:00:00 PM	11/30/2008 6:00:00 PM
1/1/2009 8:00:00 PM	11/30/2008 6:30:00 PM
1/1/2009 9:00:00 PM	11/30/2008 7:00:00 PM
1/1/2009 10:00:00 PM	11/30/2008 7:30:00 PM
1/1/2009 11:00:00 PM	11/30/2008 8:00:00 PM
1/1/2009	11/30/2008 8:30:00 PM

Monroe MTD for Monroe YTD	August	Unit 1 MTD for Unit 1 YTD	August	Unit 1 Target for Unit 1 Year End Target	August	88.10 %		
Primary System	EAF (MTD) (%)	EAF (YTD) (%)	ROF (MTD) (%)	ROF (YTD) (%)	Process Cost (MTD \$)	Process Cost (YTD \$)	O&M Cost (MTD \$)	O&M Cost (YTD \$)
Monroe Unit 1 Total	0.0 %	0.0 %	0.0 %	0.0 %	0.0	0.0	864,324.9	0.0
Plant Feed Backflow	0.0 %	0.0 %	0.0 %	0.0 %	0.0	0.0	759,311.4	0.0
Fuel Burn	0.0 %	0.0 %	0.0 %	0.0 %	0.0	0.0	158,967.2	0.0
Boiler / Steam Generator	0.0 %	0.0 %	0.0 %	0.0 %	0.0	0.0	238,748.7	0.0
Turbine / Generator	0.0 %	0.0 %	0.0 %	0.0 %	0.0	0.0	128,627.9	0.0
Air / Flue Gas	0.0 %	0.0 %	0.0 %	0.0 %	0.0	0.0	152,989.7	0.0
Water System	0.0 %	0.0 %	0.0 %	0.0 %	X	X		
Service Air & Gas	0.0 %	0.0 %	0.0 %	0.0 %	X	X		
Electrical & Control System	0.0 %	0.0 %	0.0 %	0.0 %	X	X		
Plant Waste	0.0 %	0.0 %	0.0 %	0.0 %	X	X		
Unloading / Storage	0.0 %	0.0 %	0.0 %	0.0 %	X	X		
Switching & Start	0.0 %	0.0 %	0.0 %	0.0 %	X	X		
Diesel / Gas Generator	X	X	X	X	X	X		
Grounds & Physical Plant	0.0 %	0.0 %	0.0 %	0.0 %	X	X		

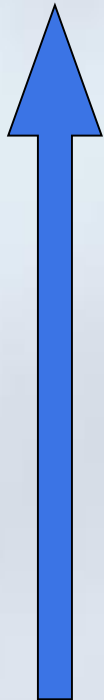
Unit 1	Net MW	778.52	Days on Line	44	Record Run/Year	233 / 1997
Monroe Unit 1 Gross Mapped (24 hours)						
Monroe Unit 1 Daily Report						



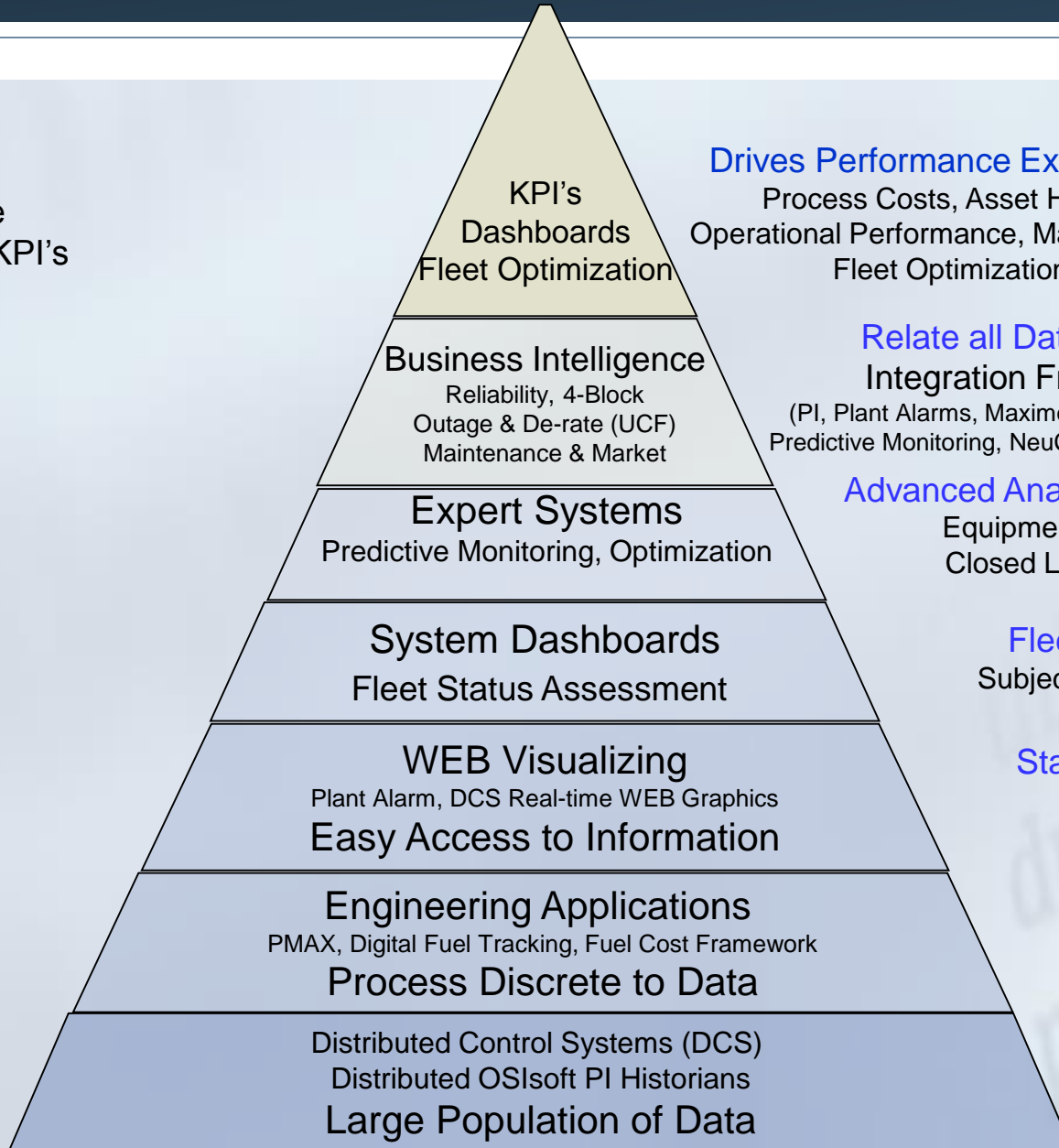
Control & Technology Framework



Actionable
Information – KPI's



Discrete data
Limited value



Drives Performance Excellence
Process Costs, Asset Health,
Operational Performance, Market Value,
Fleet Optimization

Relate all Data Sources
Integration Framework
(PI, Plant Alarms, Maximo, SAP, UCF, GADS,
Predictive Monitoring, NeuCo, LIMS, Plant View ..)

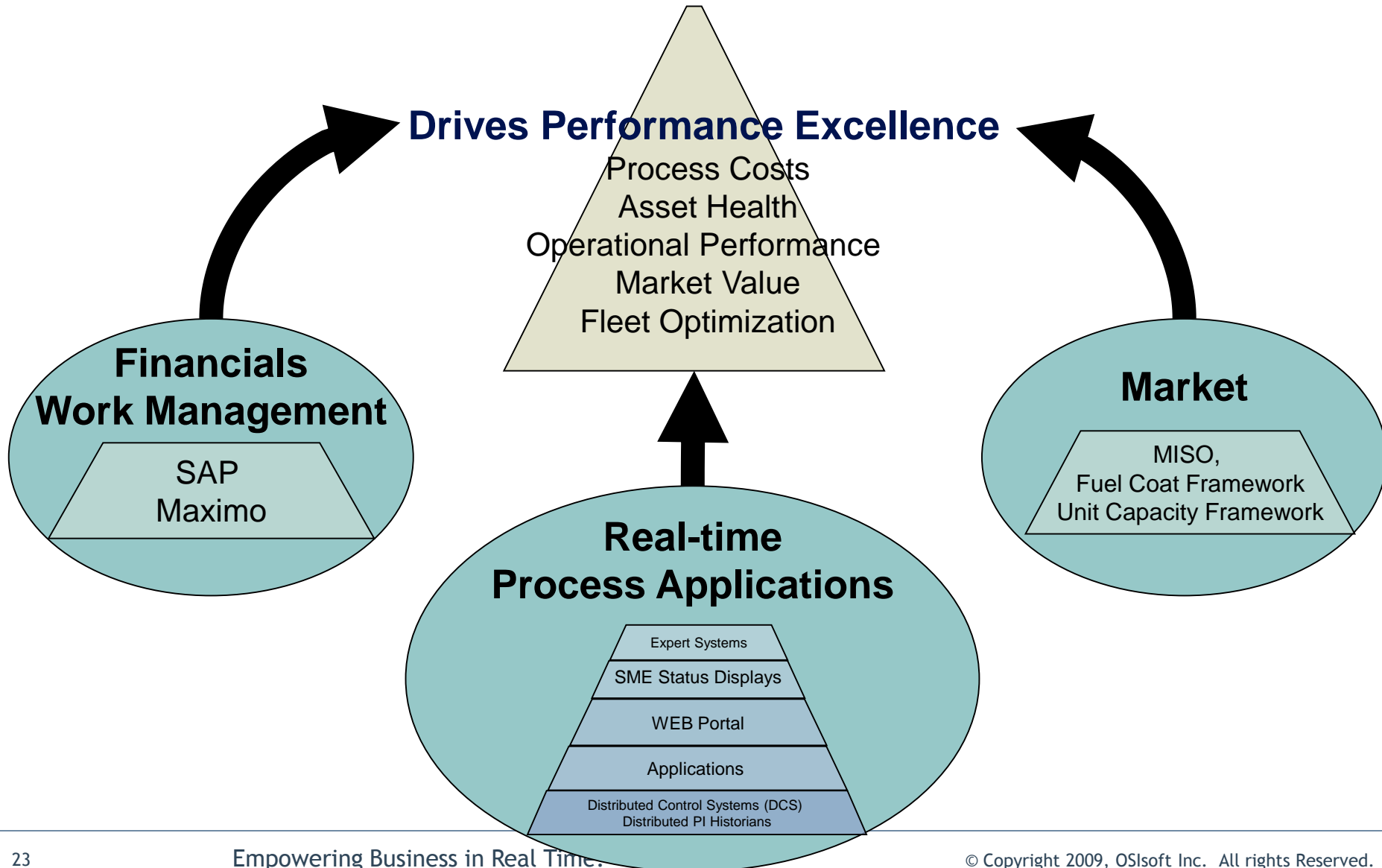
Advanced Analysis & Process Optimization
Equipment and Process Monitoring
Closed Loop Process Optimization

Fleet Drill down
Subject Matter Experts

Standard User Interface
WEB Visualization

Process Discrete Data
PMAx, DFTS, eNote,
Fuel Cost Framework,
Alarm Management

Post Event Analysis
DCS, PLC & PI





Thank you

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