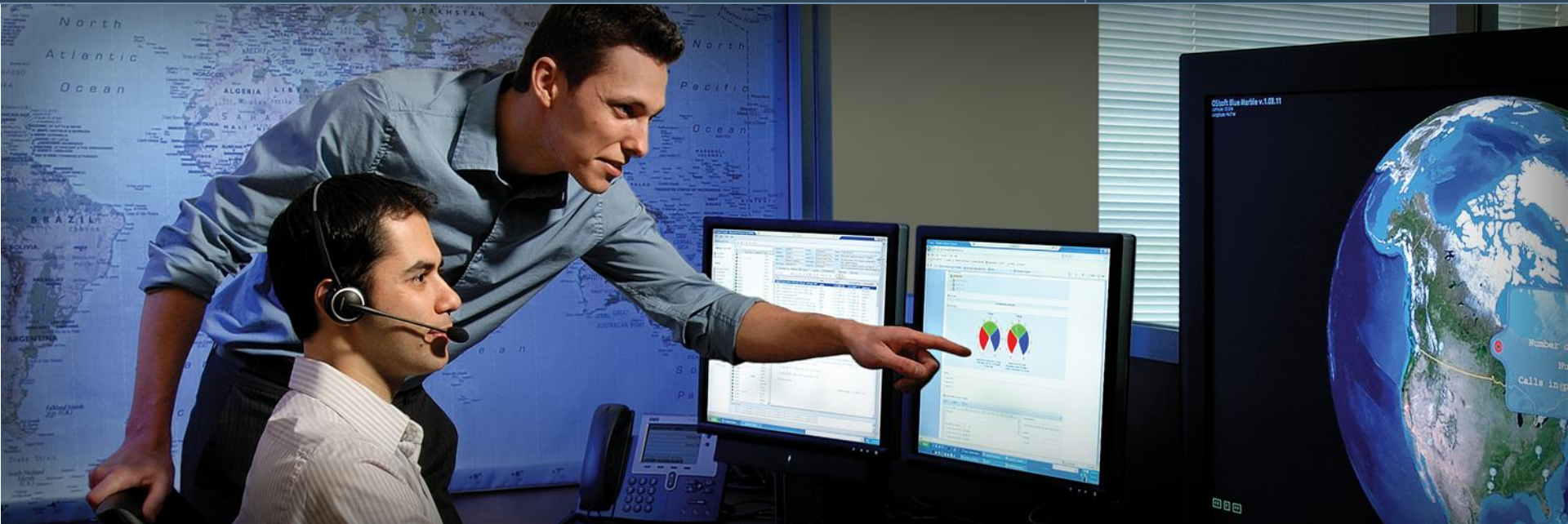


The PI System Infrastructure for Opportunity Delivery



Regional Seminar Series

Middle East

Curt Hertler OSIssoft, LLC
curt@osisoft.com

November 2-7, 2010



Empowering Business in Real Time.

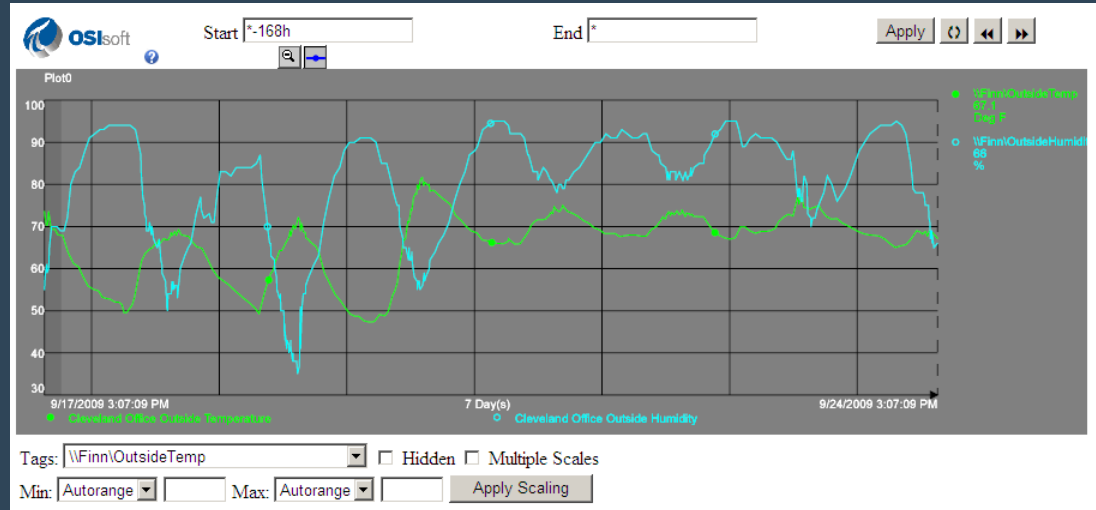
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Overview

- Enabling Awareness: *The Value of Real-Time*
- Delivering Opportunity: *The Need for Infrastructure*
- Capturing Opportunity: *Performance Intelligence and Collaboration*
- Collaborating to Improve: *The Real-Time Infrastructure in Action*

Enabling Awareness

The Value of Real-Time



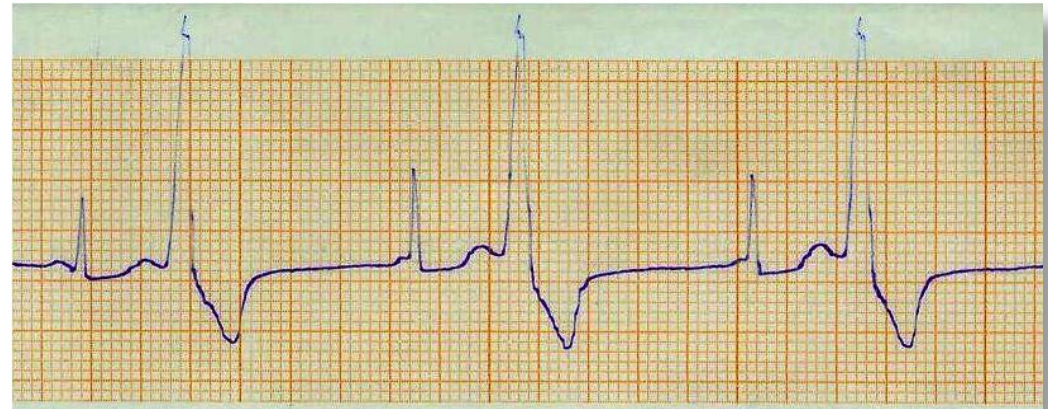
The Value of Real Time

Assessment of Condition

Forecast



Electrocardiogram



- Statement of “goodness”
- Actionable
- Critical

The Value of Real Time

Creation of Opportunity

Online Financial Market Price Quotations



Market Snapshot		
Nikkei 225	9,705.25	162.60 1.70%
Hang Seng	19,872.38	239.68 1.22%
Singapore Straits Times	2,796.29	16.71 0.60%
S&P/ASX 200	4,505.50	70.20 1.58%
Australian 10-Year Bond		5.42 0.05
Japanese 10-Year Bond		1.23 0.03
BOJ Overnight Lending Rate		.091 -0.005
Japanese GDP*		03/31 4.6%
Japanese Business Confidence**		03/31 -14.0%
Australian GDP*		06/02 0.5%

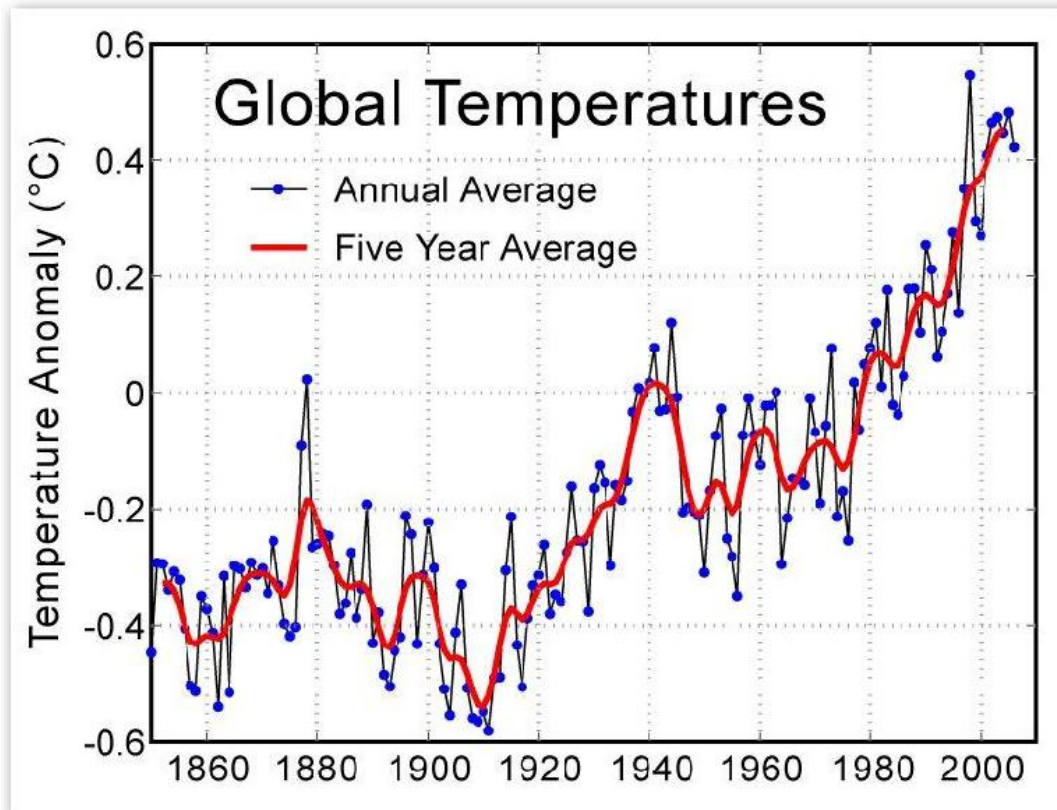
- Accessible
- Responsive
- Tactical



The Value of Real Time

Evidence of Change

Climate Change Data

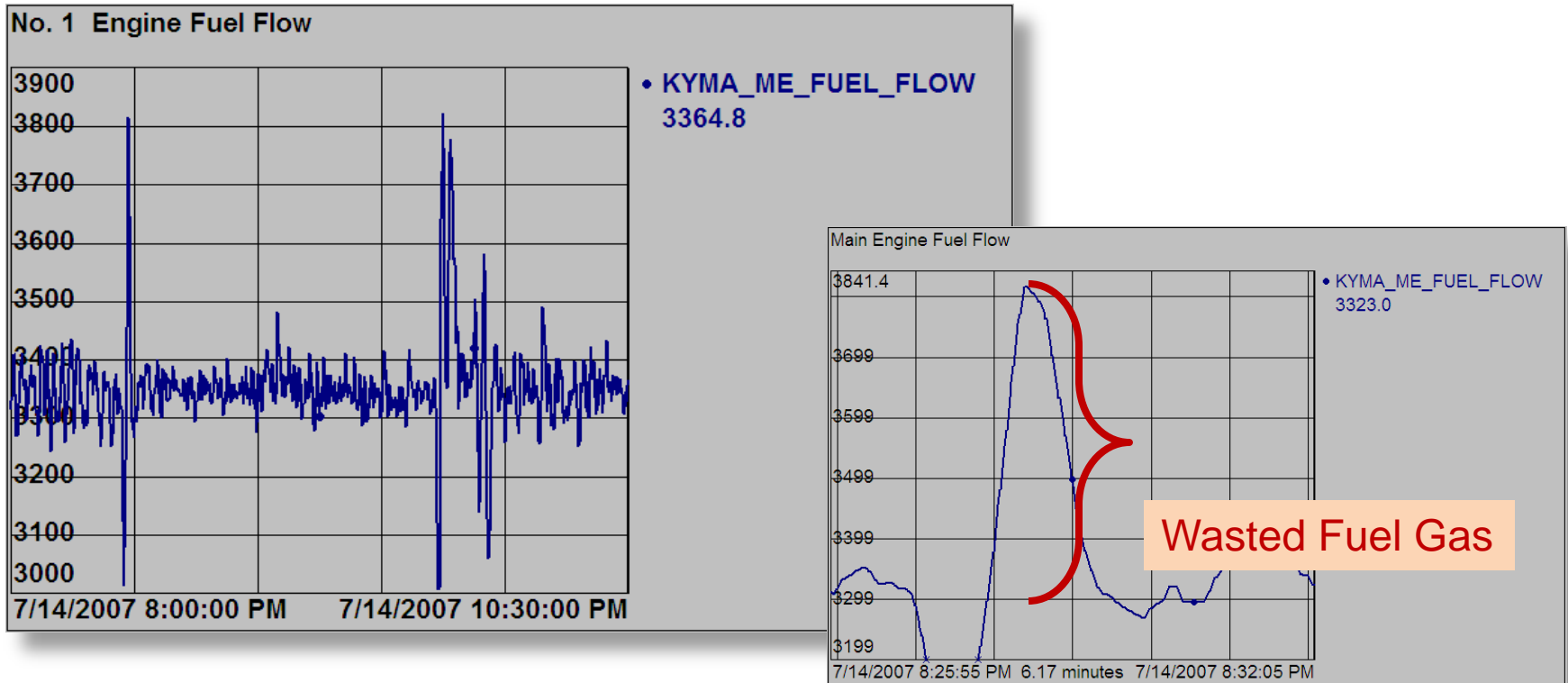


- Convincing
- Intuitive
- Impactful

The Value of Real Time

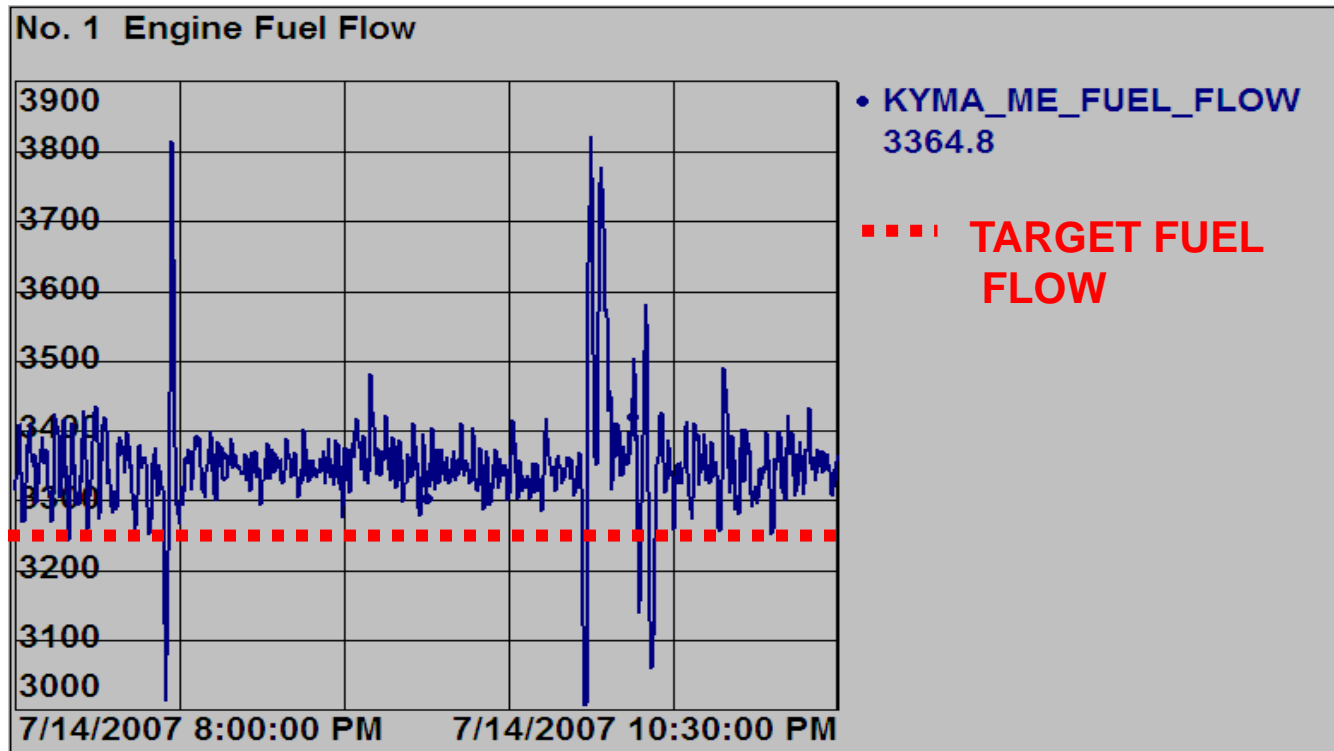
Fundamental Principle

Fuel flow spikes discovered costing \$93,000 / year.



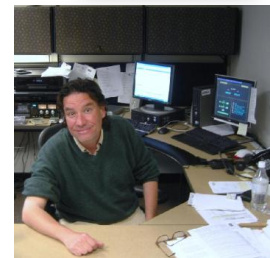
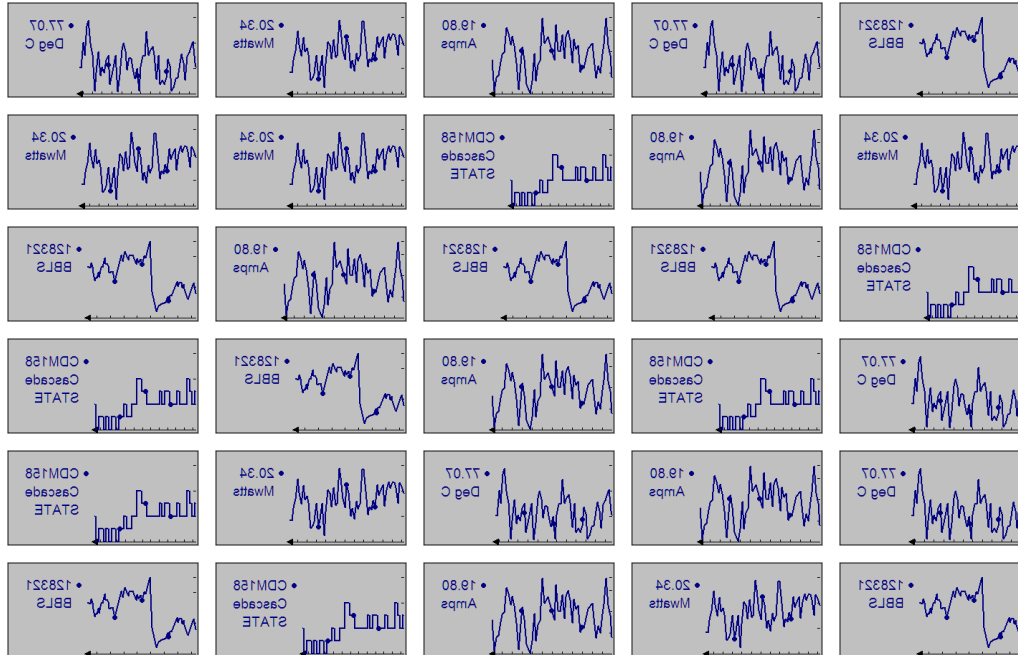
The Value of Real Time

Another Opportunity - Continuous Improvement



The Challenge of Real Time

Capturing opportunities requires the right people.



Delivering Opportunity

The Need for Infrastructure



Infrastructure: Characteristics and Expectations

Real-Time Infrastructure Delivers Opportunities

Electrical Power



Communications



Transportation



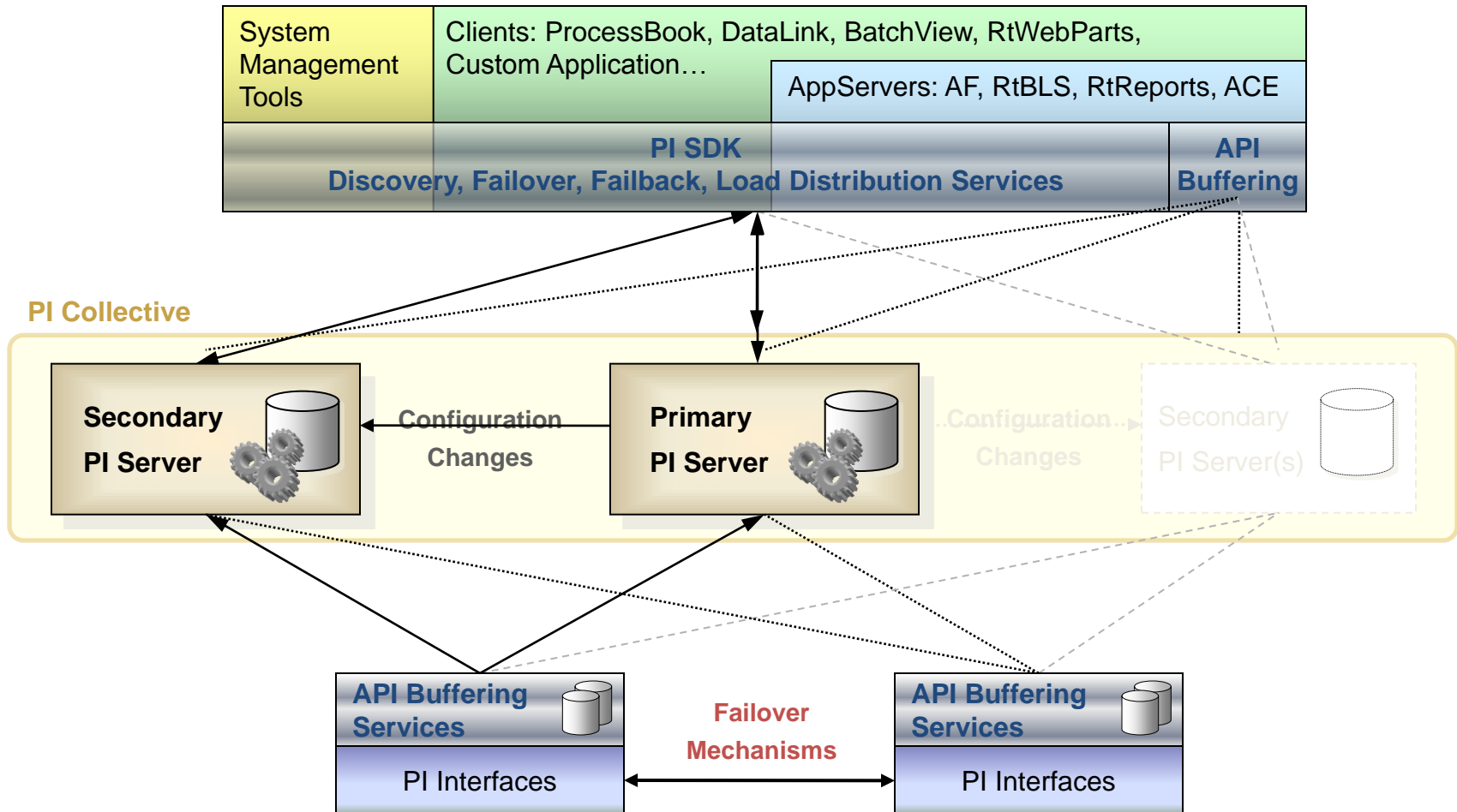
Music



- **Valuable** - delivers a recognized benefit
- **Reliable and Secure** - always available, safe and trusted
- **Accessible** - adaptable to innovation, easy to use
- **Contextual** - organized to be effective, efficient, and extendable
- **Sustainable** - must be able to last and adapt to change

Reliable and Secure Architecture

Full redundancy with Microsoft Security Model.

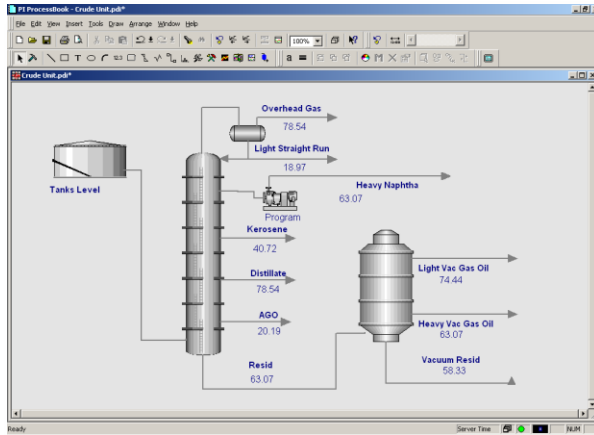


Accessible by Expected Standards

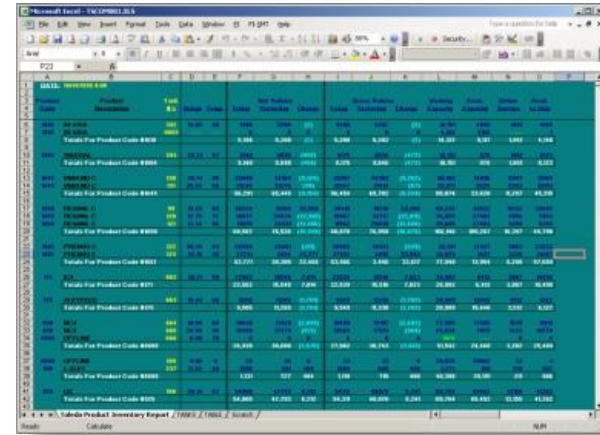
- Interfacing with over 400 different automation sources
- Compliance with Industry Standards - OPC UA, PRODML, XML, Web Services
- Query-based Access, OLEDB
- Integration with Microsoft Office Tools - Excel, VBA , .NET
- Integration with Microsoft and SAP Web Prortals
- Supports Application Development- OSIsoft vCampus

Accessible by Users

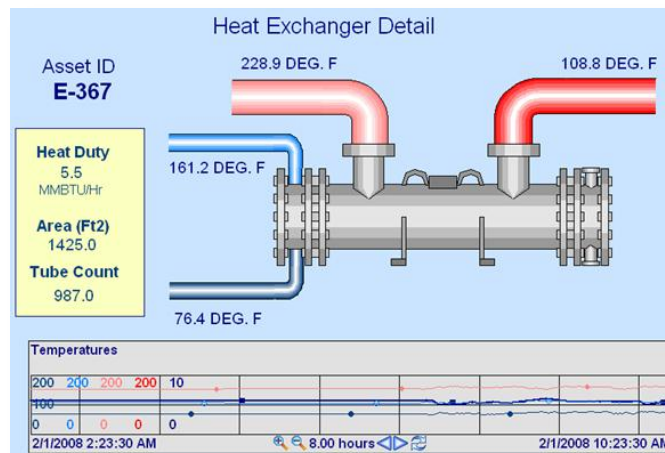
Process Context Graphics



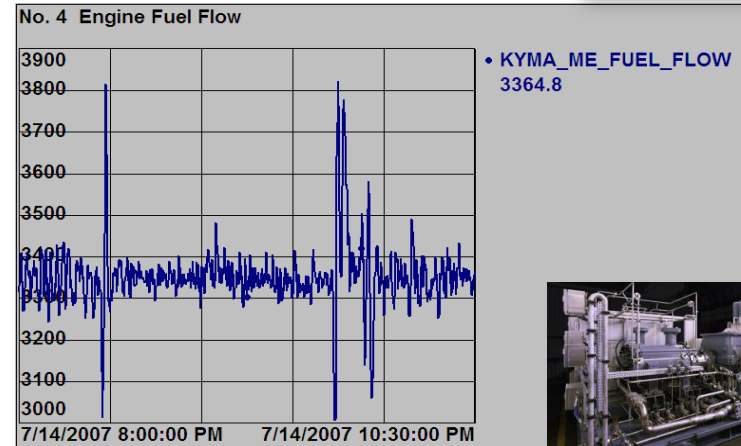
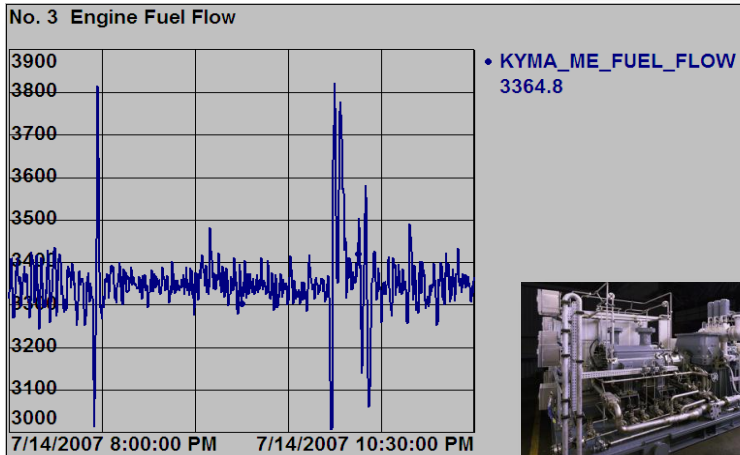
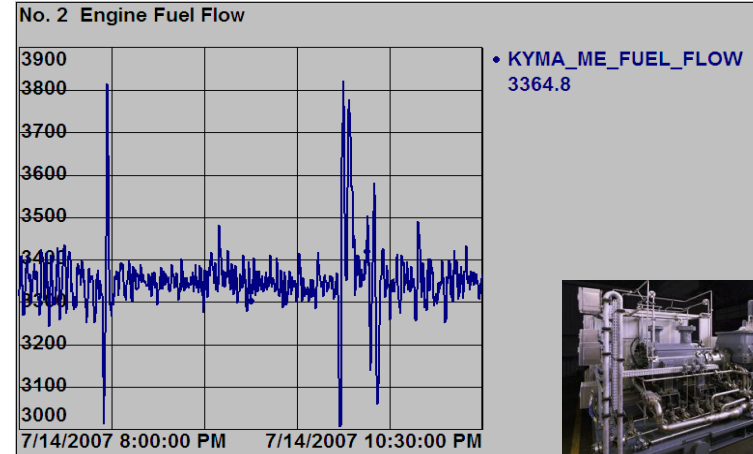
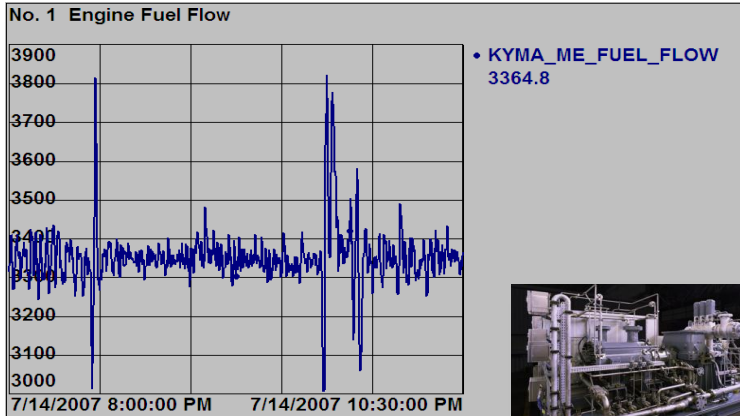
Analytical Context Spreadsheets and Reports



Performance Context Process Calculations



Contextual by Asset for Efficient Extension



Contextual for Information Integration

Asset Context

The screenshot displays the 'Heat Exchangers - PI System Explorer' application. The main window shows the details for element 'E345'. On the left, a sidebar lists other elements: E100, E239, E345 (selected), and E367. Below the sidebar are navigation options: Elements, Event Frames, Library, Unit of Measure, MyPI, Notifications, and Contacts. The main area is divided into several sections:

- General:** Contains a search bar and a table of attributes.
- Configuration Panel:** Shows 'Name: Heat Duty', 'Description:', 'Configuration Item:' (unchecked), 'Categories: Calculation', 'UOM: <None>', 'Value Type: Double', 'Value: 4.1263327280799116', and 'Data Reference: Formula'.
- Settings:** A text area containing the formula: $A=Area; B=Coefficient; C=LMTD; [(A * B * C) / 1000000]$

The attribute table in the 'General' section is as follows:

Name	Value
Calculation	
Heat Duty	4.1263327280799116
LMTD	46.746717209469935
Equipment Status	
Duty Status	OK
PI Data	
Cold Side Inlet Temp...	74.6394577026367 °F
Cold Side Outlet Tem...	152.069519042969 °F
Hot Side Inlet Tempe...	215.985565185547 °F
Hot Side Outlet Temp...	107.607040405273 °F
Specification	
Area	1300 ft2
Coefficient	67.9 ft2

At the bottom left, the text '9 Attributes' is visible. On the far left, there is a vertical label 'Re' and a mathematical symbol $Q =$. On the far right, there is a vertical label 'Data' and the word 'ed'.

Contextual for Users and Applications

The screenshot displays the PI ProcessBook interface for 'AF Exchangers.PDI'. The main window shows a 3D-style diagram of a heat exchanger with four temperature labels: 105 DEG. F (top), 147 DEG. F (left), 73 DEG. F (bottom), and 105 DEG. F (right). A yellow box on the left contains the following data:

- Asset ID: E345
- Heat Duty: 4.24 MMBTU/Hr
- Area (Ft2): 1300
- Coefficient: 67.90

Below the diagram is a 'Temperatures' table with a time-series plot:

Time	Temp 1	Temp 2	Temp 3	Temp 4
9/24/2009 3:22:29 PM	250	250	250	10
	160			
	60	60	60	0

The 'Select AF Attribute' dialog box is open, showing a tree view of the database structure. The 'Equipment' folder is expanded, and 'F-723' is selected. The 'Attribute:' list includes 'Motor Amps', which is highlighted.

Capturing Opportunity

Performance Intelligence and Collaboration



Operations Performance Scorecard

	Houston				Little Rock				Tucson			
	To Date	Today	Target	Trend	To Date	Today	Target	Trend	To Date	Today	Target	Trend
Safety	0	0	●	➔	0	0	●	➔	0	0	●	➔
Environment	99.0	98.6	●	➔	99.0	98.7	●	➔	99.1	98.8	●	➔
Energy Savings	0.4%	0.4%	▲	➔	0.5%	0.7%	▲	➔	1.5%	2.0%	●	➔
Quality	97.6	97.6	●	➔	97.5	97.5	●	➔	97.6	97.6	●	➔
Reliability	95.2	96.0	●	➔	95.3	96.2	●	➔	95.0	95.7	●	➔

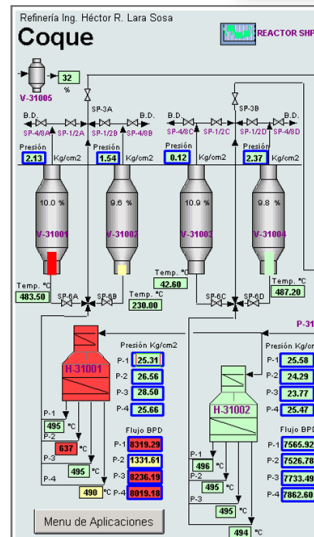
Collaboration Driven by Transparent Accountability

Accountability of Manufacturing Objectives

	PEP				PRF				PGPB Y PPQ		
	REAL (MBD)	PROM (MBD)	POM (MBD)		REAL (MBD)	PROM (MBD)	POM (MBD)		REAL (MMPCD)	PROM (MMPCD)	POM (MMPCD)
Producción Crudo				Proceso SNR	1250	1332	1260	PGPB			
Producción Total	3169	3188	3164	Cadereyta	230	223	220	Proceso de gas en plantas	4481	4358	4380
Reg. Marina Noreste	2084	2108	2073	Madero	182	145	148	Empaque	7178	7288	7237
Ligero	81	50	48	Minatitlán	170	172	172	Importaciones (2)	378	357	300
Pesado	2043	2058	2025	Salamanca	70	188	200	Exportación de gas	271	101	224
Reg. Marina Suroeste	513	524	516	Salina Cruz	303	296	235	CFE			
Ligero	328	353	390	Tula	312	310	285	Producción LPG	213	207	211
Pesado	0	0	0	Cangrejera	185	158	160	LPG en TRP	384	292	0
Superligero	185	181	125	Productos		PROM (MBD)	POM (MBD)	Producción Gasolinas Naturales	62	81	90
Reg. Sur	467	465	470	Producción gasolina		514	484	Inyección de Gas Natural Licuado	168	115	128
Ligero	328	342	347	Importación de gasolina		397	313	PPQ			
Pesado	10	11	11	Producción de combustóleo		300	296	Producción de Etileno	2870	2768	3443
Superligero	107	108	111	Inventarios bombas				Derivados aromáticos	3480	3523	2481
Reg. Norte	63	62	105	Crudo en refinerías		9088	5881	Derivados de Etileno	3021	3202	4045
Ligero	31	31	39	Combustóleo		3388	1383	Derivados de Metano	1396	1158	1430
Pesado	62	31	66					Derivados de Propileno	217	288	209
-Almto. Otros Campos	2	1	0					Inventarios de Etileno	7238		
-Merms y otros	14	14	15					Inventarios en TREC	358		
-Condensados Incorporados	0	1	1								
Producción de Gas											
Reg. Marinas	6288	6272	6154								
Reg. Sur	2213	2221	2008								
Reg. Norte	3872	3849	2643								

(2): Naco, K. Morgan, Gloria a Dios, Arguelles y Reynosa

Articulation of Performance Rules



Benchmarking Performance Against Objectives

Critical HX Monitoring									
Exchanger	Water Velocity Feet/Sec	Skin Temp Deg. F	CW Flow GPM	U-Value BTU/(hr/ft ² /deg F)	Heat Load MMBTU	Heat Flux BTU/hr/ft ²			
E-163-A	3.70	77	2237	45.5	5.1	352.1			
E-163-C	3.80	78	2298	48.0	5.8	401.1			
E-191-A	2.31	101	4360	62.8	36.6	2782.4			
E-191-B	3.08	80	4360	52.1	13.7	1027.2			
E-256-A	2.46	97	1726	117.8	6.4	1082.2			
E-256-B	2.47	89	1732	130.8	5.4	911.8			
E-256-C	2.46	84	1728	141.9	8.0	1362.3			
E-271	4.43	132	1930	153.3	40.9	9922.5			
E-943	1.79	97	249	63.3	2.6	2443.0			
E-38-A	1.81	105	3752	50.9	34.2	2378.9			
E-38-B	1.95	82	3731	48.6	13.1	980.1			
E-77-A	2.23	105	4204	61.8	36.4	2768.5			
E-77-B	2.16	84	4246	61.8	19.0	1391.1			
E-98-A	1.58	108	2986	47.3	29.3	2227.0			
E-98-B	1.54	86	3013	45.3	15.6	1141.8			

Event-based Notification of Real-time Opportunities

PI Notifications (PI System 2010)

Integration with
Microsoft
Presence
Technology

The screenshot displays an email client interface with an email from Curt Hertler. A notification window titled 'Daniel Thompson - OCS' is open, showing contact options and OCS Recipient Configuration. The configuration includes SIP Address: sip:DTompson@oba.int and presence settings for Online, Inactive, Be Right Back, Busy, Idle and Busy, Do Not Disturb, Unknown, Away, and Offline. A 'Pump Run-Time Hours' table is visible in the background, and an 'Ad hoc Trend -- Web Page Dialog' window shows a line graph with data points.

Descriptor	Current State
Kerosene Draw A	0
Kerosene Draw B	0
Hvy. Naphtha Draw A	0
Hvy. Naphtha Draw B	0

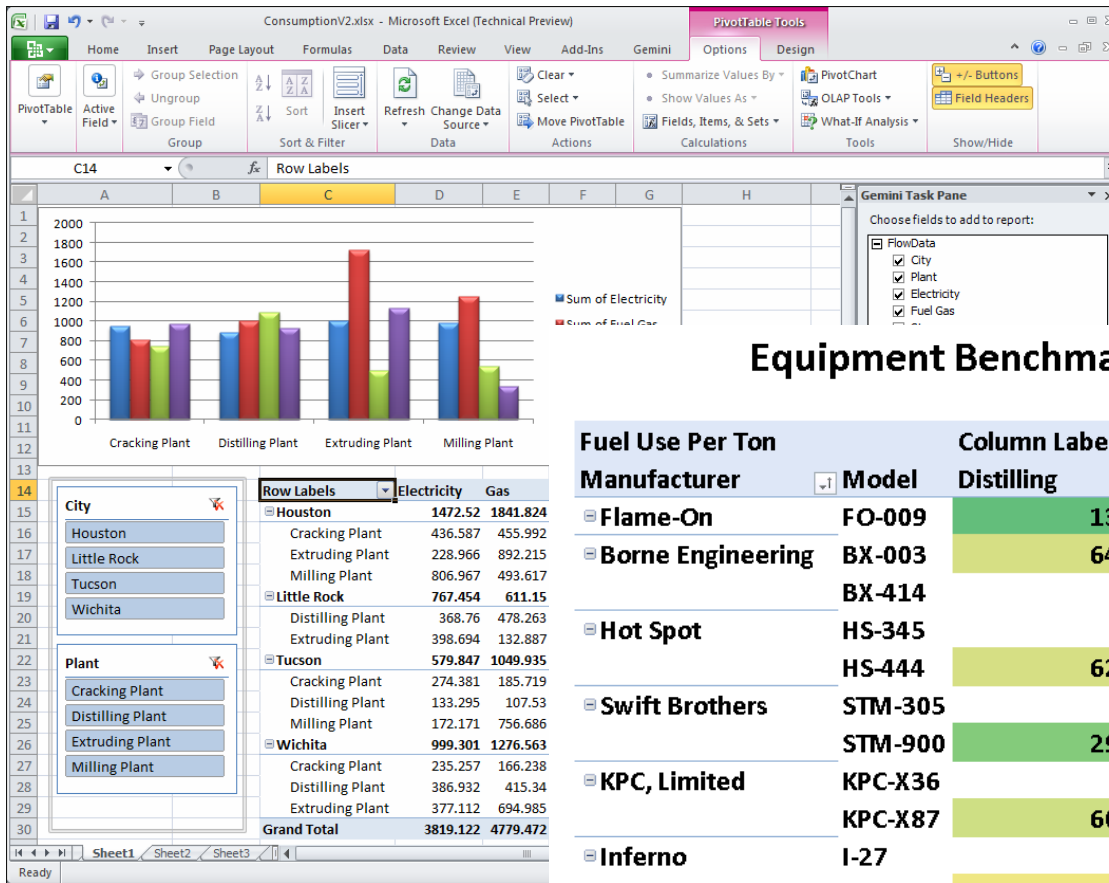
Notification Details:

- Name: Disk Space Low on Daredevil
- Server: SL3ITPIAF01
- Database: IT
- Start Time: 10/19/2009 1:20:34 PM
- Trigger Time: 10/19/2009 1:20:34 PM
- Target: \\SL3ITPIAF01\IT\Sites Depository\OAK\Servers\Daredevil

Microsoft
Office Communications
Server 2007 R2

New Performance Intelligence Tools

Microsoft Excel 2010 with PowerPivot for Data Cube Analysis



Equipment Benchmarking: Fuel Gas Efficiency

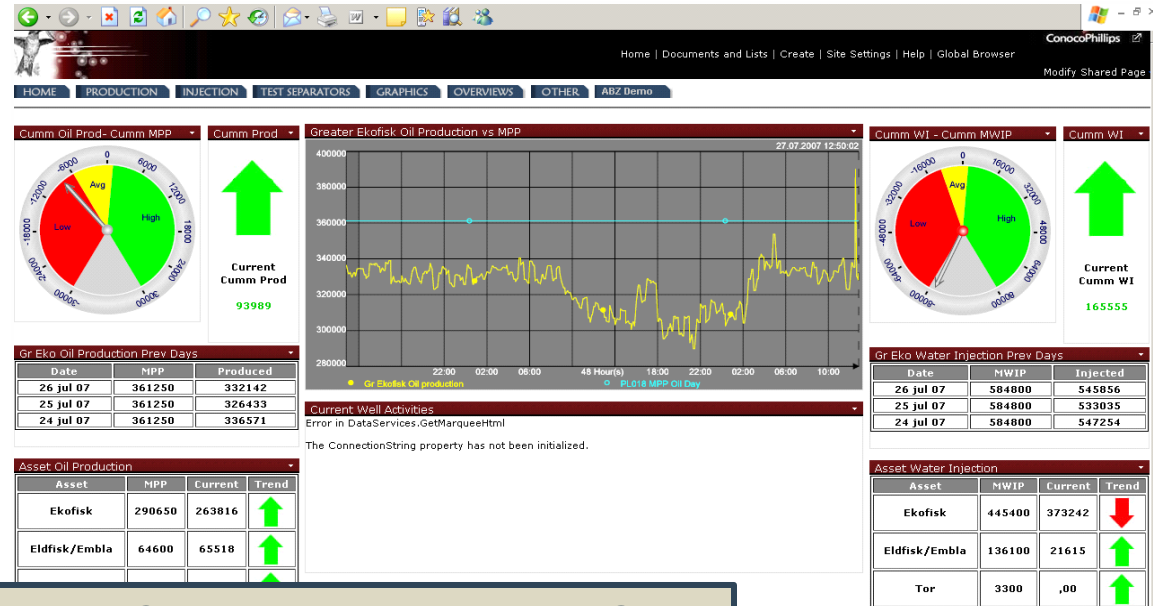
Fuel Use Per Ton		Column Labels			
Manufacturer	Model	Distilling	Extruding	Cracking	Milling
Flame-On	FO-009	132		591	322
Borne Engineering	BX-003	649	598	1,699	
	BX-414			1,975	1,684
Hot Spot	HS-345		796	512	2,422
	HS-444	624	2,699		
Swift Brothers	STM-305				873
	STM-900	291			2,902
KPC, Limited	KPC-X36		190	3,192	
	KPC-X87	604		1,801	440
Inferno	I-27		1,455		1,271
	I-56	748		405	6,393
Grand Total		560	1,056	1,405	2,000

Collaborating to Improve *The Real-Time Infrastructure in Action*



Enterprise Innovation Tools Environment for Integration and Collaboration

Well Performance Management and Alerting



Real Time Onshore/Offshore Collaboration in North Sea

- Significant Reduction in transportation and maintenance costs
- Consistent Achievement of production and efficiency targets
- Consolidated views into production and maintenance data which can be shared with Houston headquarters



Enterprise Innovation Tools

Application Integration and Collaboration

Well Test Validation

Well Tests

Hierarchy **Time Range** Start Time: *-6mo End Time: *

- GOM Deepwater
 - VK 786
 - A21 ST
 - VK741 A-8
 - VK786 A13
 - VK786 A005
 - VK786 A010 ST01
 - VK786 A012
 - VK786 A019 ST1
 - VK786 A020
 - VK786 A-1
 - VK786 A-11
 - VK786 A-15
 - VK786 A-16
 - VK786 A-17
 - VK786 A-18
 - VK786 A-2

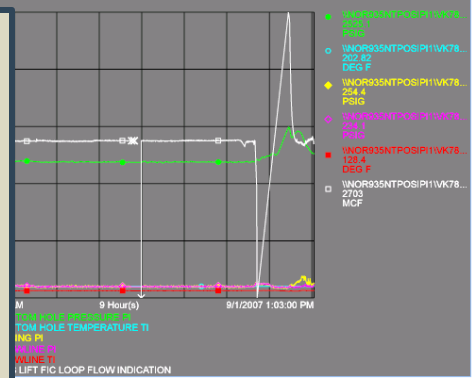
Well Test Results

WellName	TimeStamp	Status	VLP/IPR Error (%)	Duration (hrs)	Oil (STB/d)	WC (%)	GOR (scf/STB)	Choke (%)
VK786 A-4	9/5/2007 2:55:00 AM	Valid	2.5201E-02	17.57	6191		1716	0.78125
VK741 A-8	9/5/2007 2:21:00 AM	Valid	-0.48833	17	45			1.5625
VK786 A-18	9/5/2007 2:21:00 AM	Critical	15.086	17	1601		1030	2
VK786 A-16	9/3/2007 4:08:00 AM	Valid	6.6791	8.65	1590			2
VK786 A-11	9/1/2007 4:03:00 AM	Critical	-18.138	9.67	1284			3
VK786 A-4	8/30/2007 3:21:00 AM	Valid	2.5724					
VK786 A-2	8/30/2007 3:18:00 AM	Valid	3.297					
VK741 A-8	8/30/2007 3:18:00 AM	Critical	100					
VK786 A-1	8/29/2007 2:17:00 AM	Valid	-2.0589					
VK786 A-7 ST2	8/28/2007 1:42:00 AM	Critical	44.453					

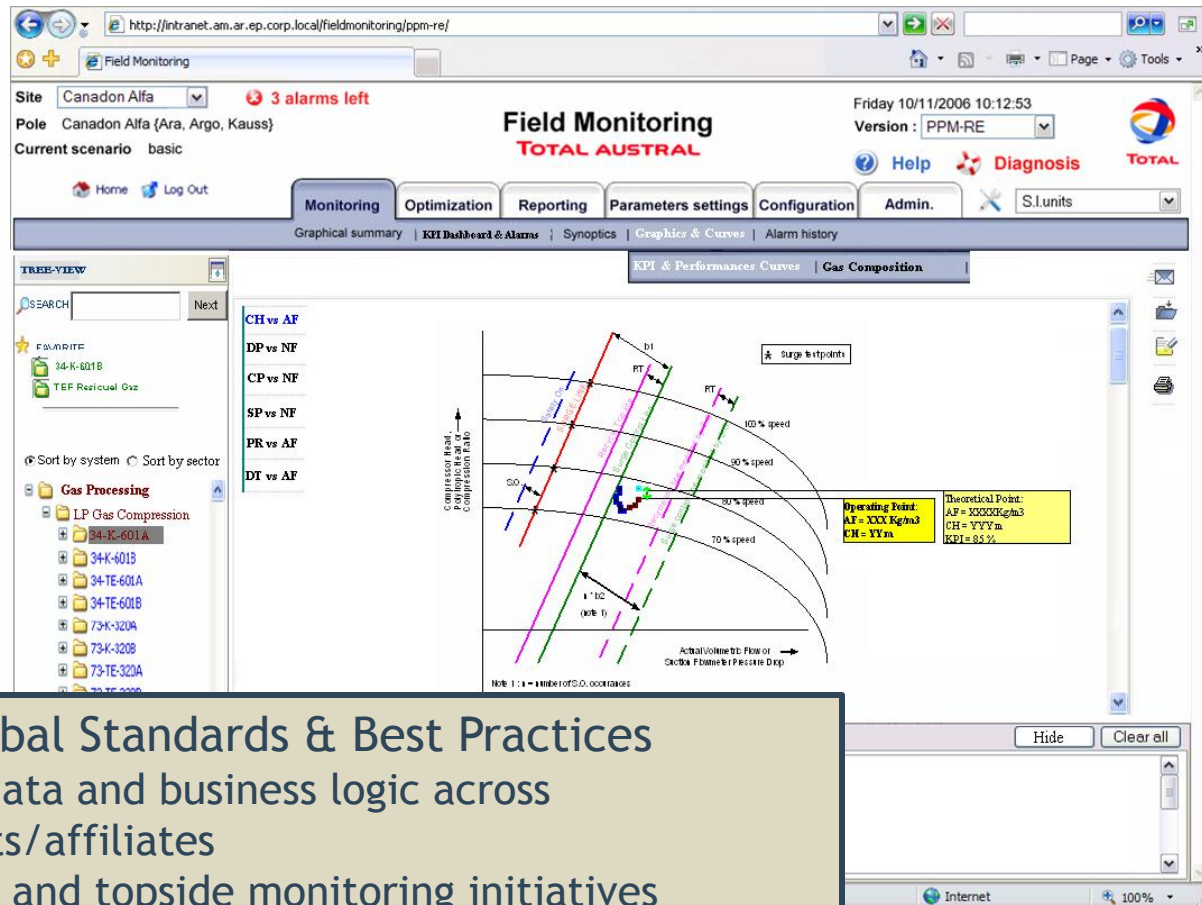
Well Test Result Trends PopUp
VK786 A-11 Start: Sep 1 2007 4:03AM - End: Sep 1 2007 1:03PM

Standard Data Infrastructure for iFields Initiative

- Common nomenclature template for cross-asset collaboration
- Allows for cross-asset efficiencies such as compressor optimization calculations
- Allows Subject Matter Experts to collaborate in common visualization environment



Pump Performance Management



Field Monitoring Global Standards & Best Practices

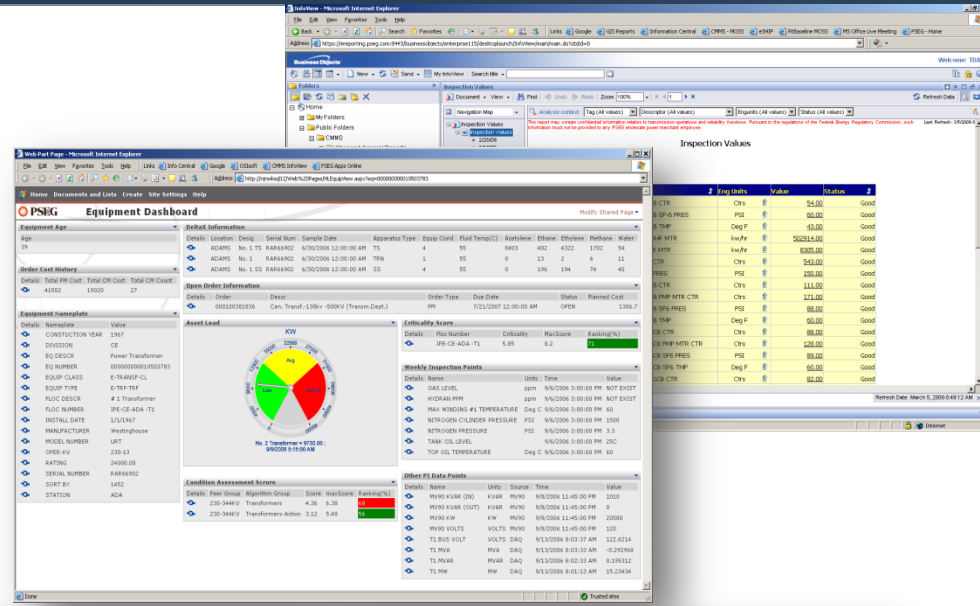
- Integration of data and business logic across 30 business units/affiliates
- Includes subsea and topside monitoring initiatives
- Common desktop visualization across assets

PSE&G: Condition Based Maintenance

“We get a detailed breakdown on equipment costs and man/hours to service that gives us important business benefits. Without the use of the PI System, it would have taken us several months to gather and analyze the information.”



Angela Rothweiler, Principal Engineer



Customer Business Challenge

- Providing the highest reliability Power Distribution is requirement
- Minimize Maintenance Costs

Solution

- Implemented automatic data collection and notifications to SAP PM
- Set up standard business rules for condition based maintenance using PI - Analytics
- Provided focused view into equipment using Portal.
- Provides Financial access to data by Business Objects query

Customer Results / Benefits

- Holds Reliability award for Mid Atlantic States for last 7 years
- Named most reliable Power Company in America
- Focused maintenance expenditures on needed targets



Fleet Optimization..... through Process Information

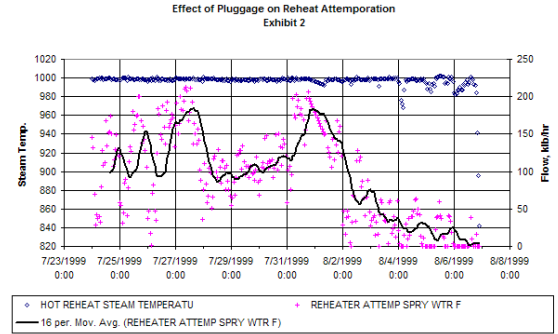
John C. Kapron, Technological Specialist
Sumanth K. Makunur, Senior Engineer
DTE Energy

OSIsoft 2007 Users Conference



History of OSIsoft PI System 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

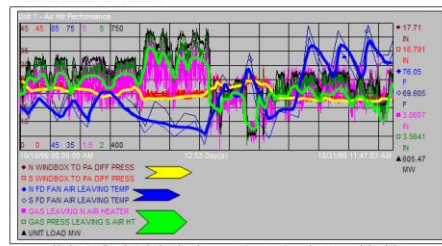


UNIT 1 – COMBUSTION PROC
(I.E., AIR HEATER PERFORMANCE VS COAL MILLS)

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.

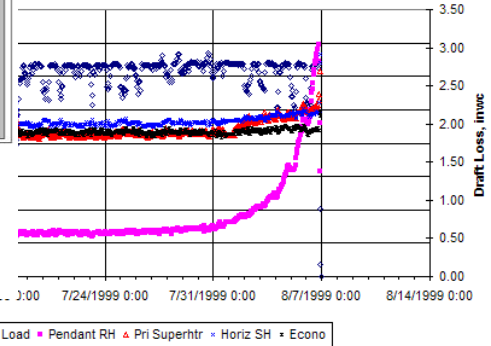


Understanding that air density changes as temperature changes and that it has an inverse effect on fan and air heater performance (i.e., as air temp. increases, efficiency of fans/air heater decrease) we can readily see in the above graph that since October 25th the **ambient air temperature** changed drastically. This was the reported time that Unit 1 coal mill output problems began to arise. As a result, **PA-to-Windbox** was reduced and coal mills removed from service in an attempt to maintain enough Hot PA (measured as **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



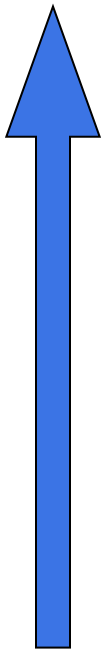
Water, Superheater, and Economizer Draft Loss
Exhibit 4



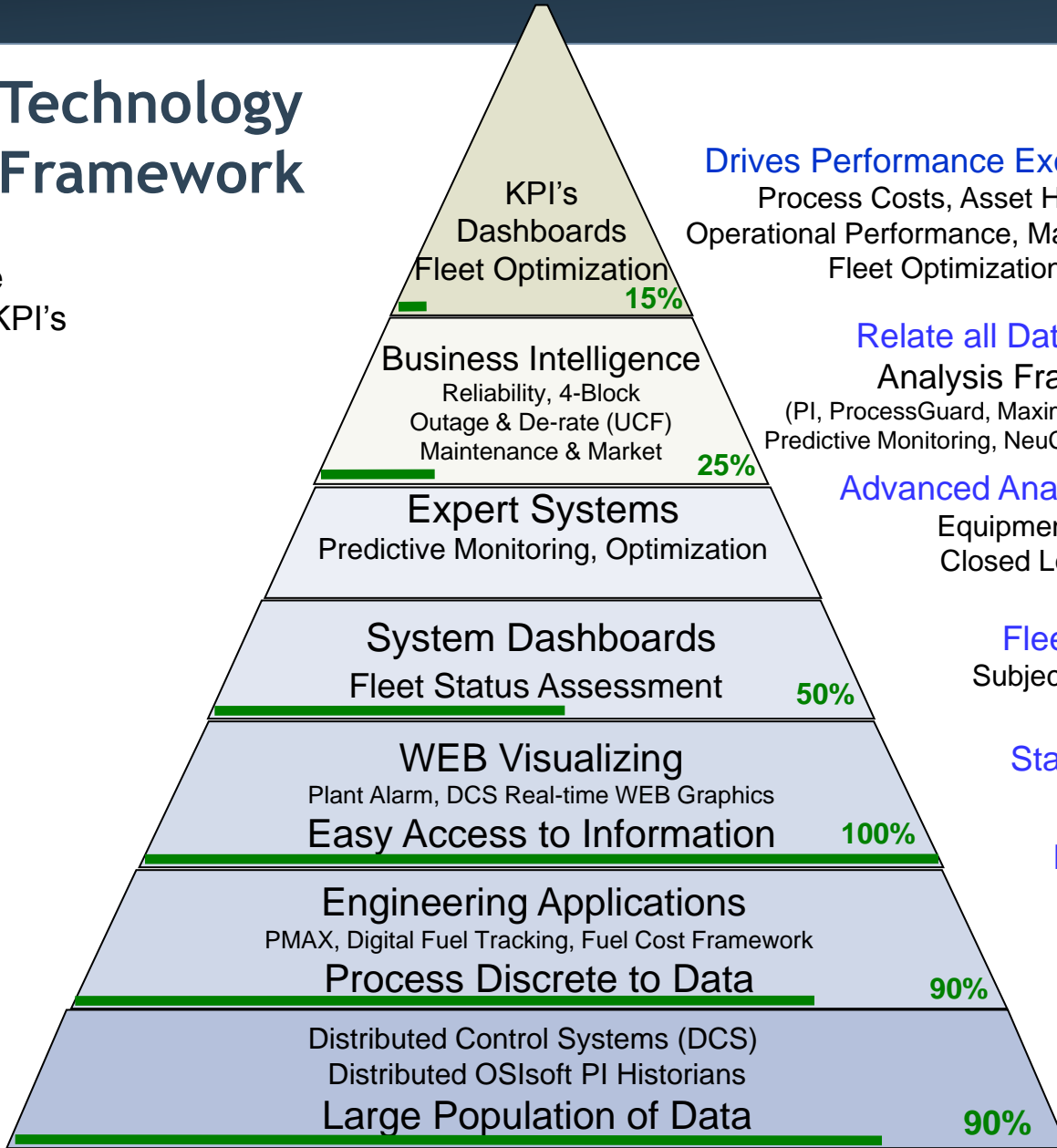


Technology Framework

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
Analysis Framework
(PI, ProcessGuard, Maximo, SAP, UCF, P3M,
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

% Complete



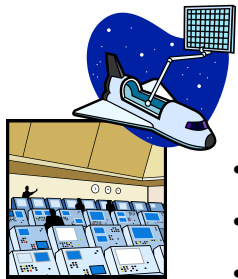
Fleet Performance Center

Performance Center – Mission

Equipment Performance Optimization of the Fossil Generation Portfolio through continuous “real time and **predictive asset condition monitoring**” to maximize the asset **market value**.

Performance Center – Vision

Fossil Generation’s Fleet-wide “**Mission Control Center**” for continuous monitoring and optimization of plant equipment performance



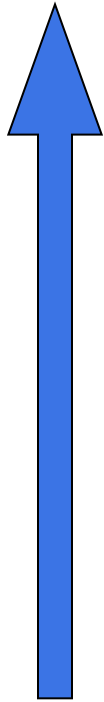
- Located in Ann Arbor Michigan
- 7x24 hour operation (February 2006).
- Plant interface with Merchant Operation Center.
- Oversight of Outage and de-rate coordination.



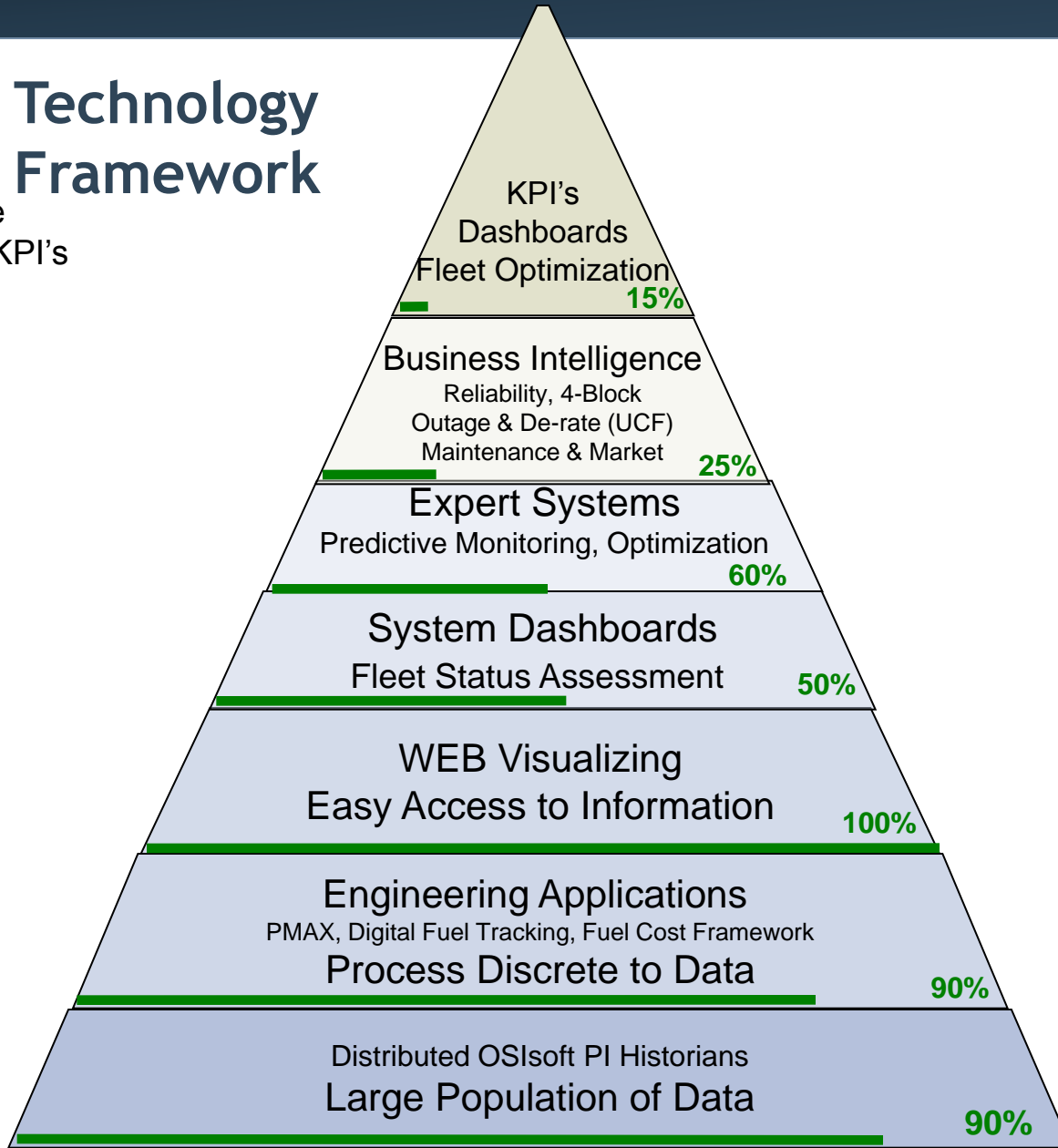


Technology Framework

Actionable Information – KPI's



Discrete data
Limited value



Annual Savings

Fleet Optimization
\$20,000,000
(Projected Savings)

\$11,000,000

\$1,000,000

\$5,500,000

\$4,500,000

\$3,000,000



Operational Excellence PEMEX

“PEMEX Pipeline Monitoring”
MAURO ARENAS NOBLE
OSIsoft Users Conference 2007

Operational Excellence Overview



Operational Excellence Solution. KPI's



Principal Reporte ejecutivo Reporte detallado											
Reporte Ejecutivo Modify Shared Page											
PEP				PREF				GPB Y PPQ			
	REAL (MBD)	PROM (MBD)	POM (MBD)		REAL (MBD)	PROM (MBD)	POM (MBD)			PROM (MMPCD)	POM (MMPCD)
Producción Crudo				Proceso SNR	1255	1332	1260	PGPB	4441		
Producción Total	3169	3169	3164	Cadereyta	230	223	220	Proceso de gas en plantas	7178		
Reg. Marina Noreste	2094	2106	2073	Madero	162	145	148	Empaque	378	4399	4380
Ligero	91	90	48	Minatitlán	176	172	172	Importaciones (2)	271	(MBD) 7286	7237
Pesado	2043	2056	2025	Salamanca	70	188	200	Exportación de gas		357	300
Reg. Marina Suroeste	515	524	516	Salina Cruz	305	296	235	CFE		101	224
Ligero	358	363	390	Tula	312	310	285		92		
Pesado	0	0	0	Cangrejera	165	159	160	Producción LPG	108	(MBD)	(MBD)
Superligero	156	161	125	Productos		PROM (MBD)	POM (MBD)	LPG en TRP	Calc Failed	207	211
Reg. Sur	467	485	470	Producción gasolina		514	484	Producción gasolinas Naturales	52783	292	0
Ligero	350	348	347	Importación de gasolina		257	313	Inyección de Gas Natural Licuado	95	81	90
Pesado	10	11	11	Producción de combustóleo		300	296	PPQ	131	115	128
Superligero	107	106	111	Inventarios bombeables				Producción de Etileno			
Reg. Norte	83	92	105	Crudo en refinarias		9098	5881	Derivados aromáticos	2870	2780	3443
Ligero	31	31	39	Combustóleo		3586	1383	Derivados de Etileno	2450	1825	2481
Pesado	62	61	66					Derivados de Metano	3021	3202	4045
-Almto. Otros Campos	2	1	0					Derivados de Propileno	1398	1156	1430
-Merms y otros	14	14	15					Inventarios de Etileno	217	226	209
-Condensados Incorporados	0	1	1					Inventarios en TREC	7236		
Produccion de Gas									325		
	(MMPCD)	(MMPCD)	(MMPCD)								
Reg.Marinas	6268	6272	6154								
Reg.Sur	2213	2221	2098								
Reg.Sur	1388	1385	1414								
Reg.Norte	2657	2656	2643								

(2): Naco, K. Morgan, Gloria a Dios, Arguelles y Reynosa



- Operating Coordination Center
 - To support logistics.
 - To coordinate events in case of out of normal operations.
 - To act as quick response center in security affairs.
 - A highly available solution required.





Thank you

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