

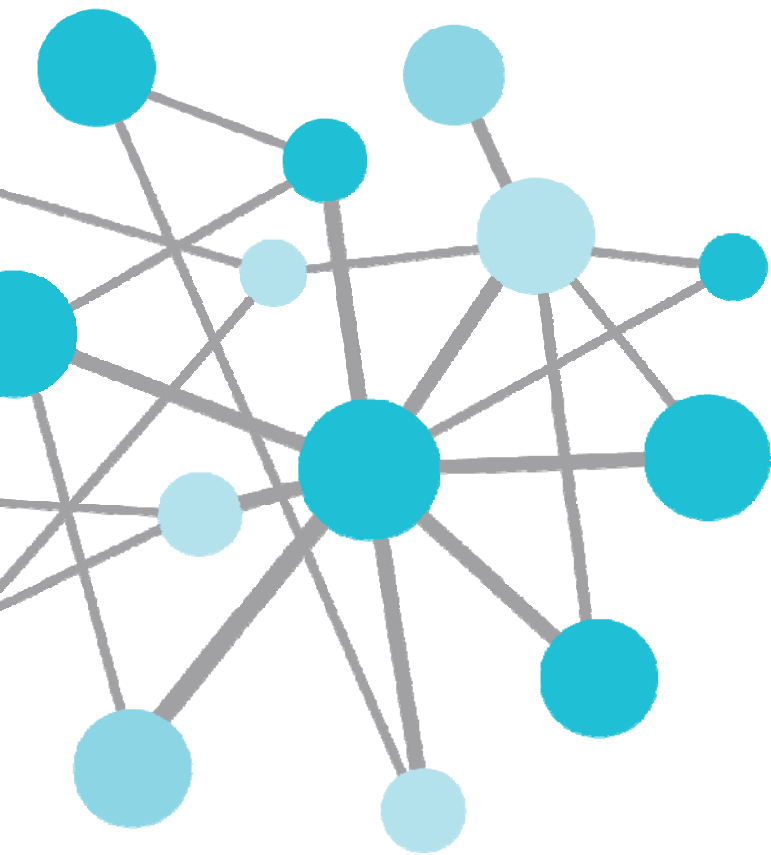
OSIsoft®

# PI SYSTEM 2014 ROADSHOW

The **Power** of **Data**

DECISION READY IN REAL-TIME

O C E A N I A



# **The PI System**

**The Foundation for Enterprise  
Analytics, Visualization, &  
Collaboration in Context**

**Business to Operations  
Value**

Presented by **Craig Harclerode**  
**Industry Principal –in O&G and Petrochemicals**

# My Journey with Technology....What an Experience!



What I used



I moved up to  
an HP Calculator  
by the time  
I graduated..

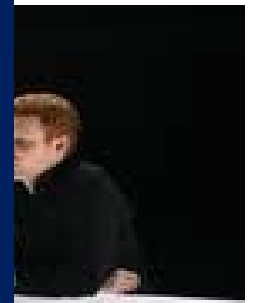
**The Power of Real-Time Data in the  
21<sup>st</sup> Century**

**Data as a Strategic Asset – Needs to  
be Managed as Such!**

**Need A Strategic Data Infrastructure**



My First Job out of College..



In the not to distant future...

# Agenda



- Business to Operations Data Value Requisites:
  - Data Consistency and Context
  - Organizational Alignment
  - Applications/Solutions Simplicity
  - Data Transformation Methodology
- “Future Proofing” of the Data Infrastructure
- Resulting Value in O&G
- Closing Comments

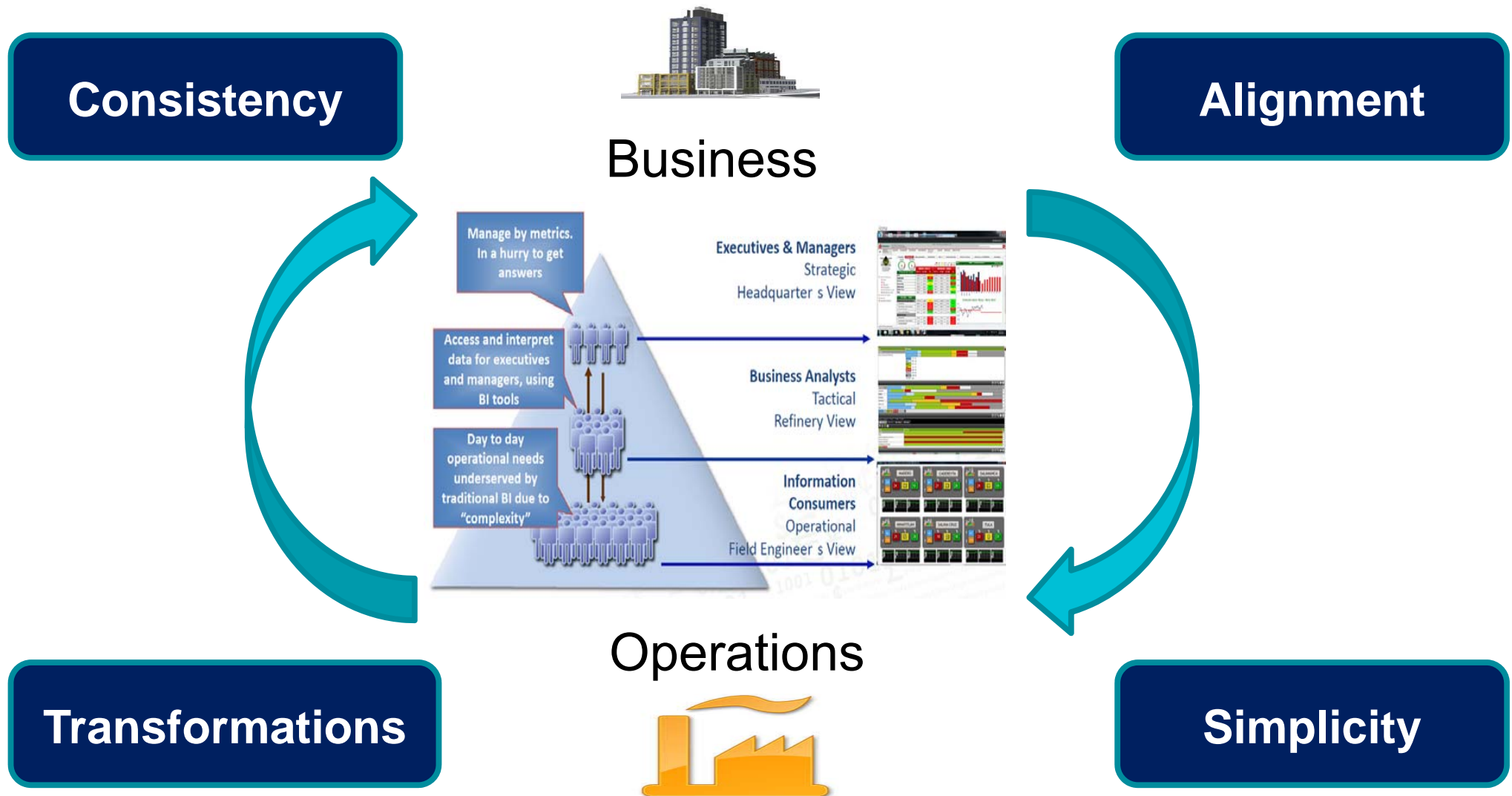


# Agenda

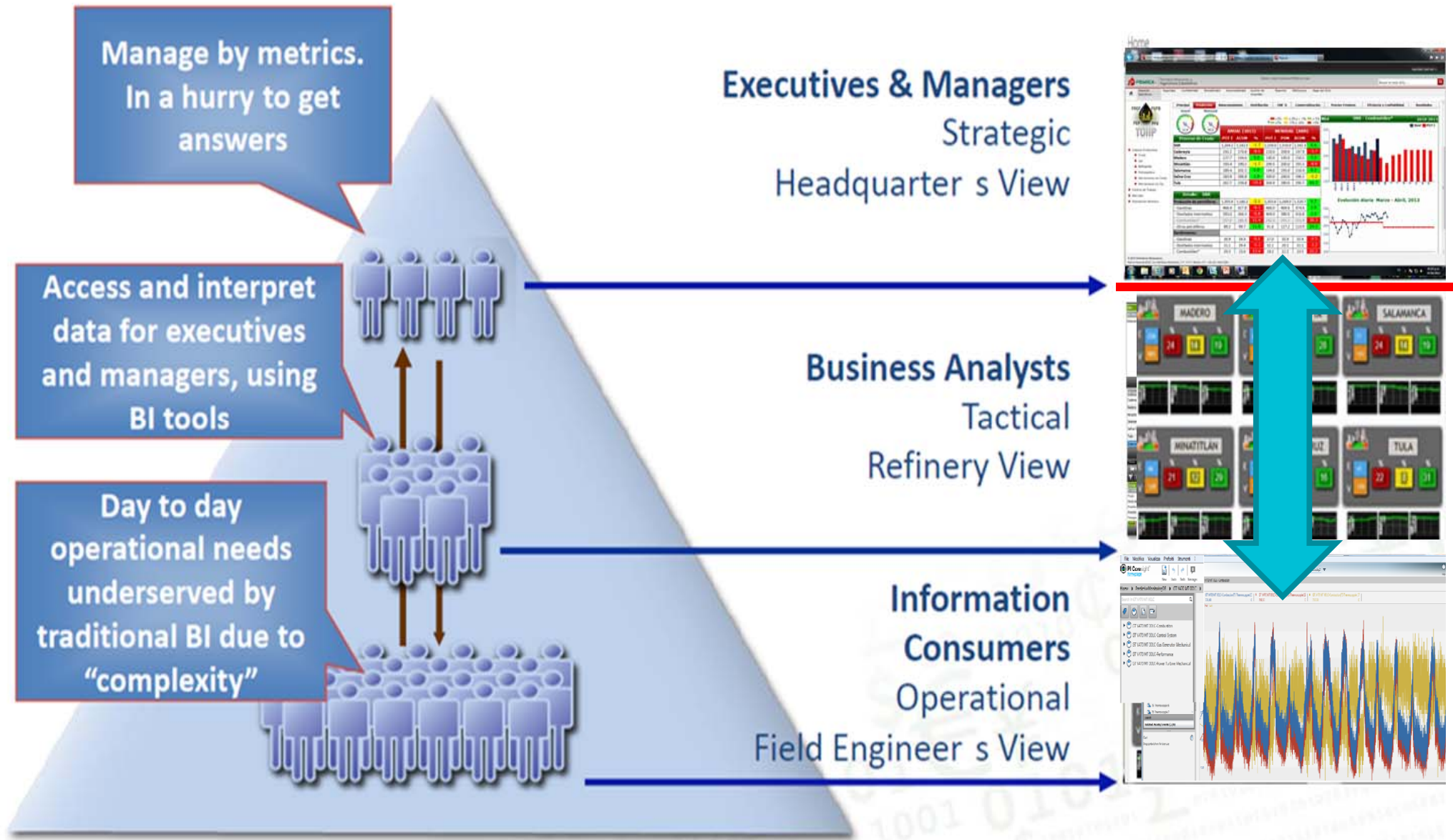


- Business to Operations Data Value Requisites:
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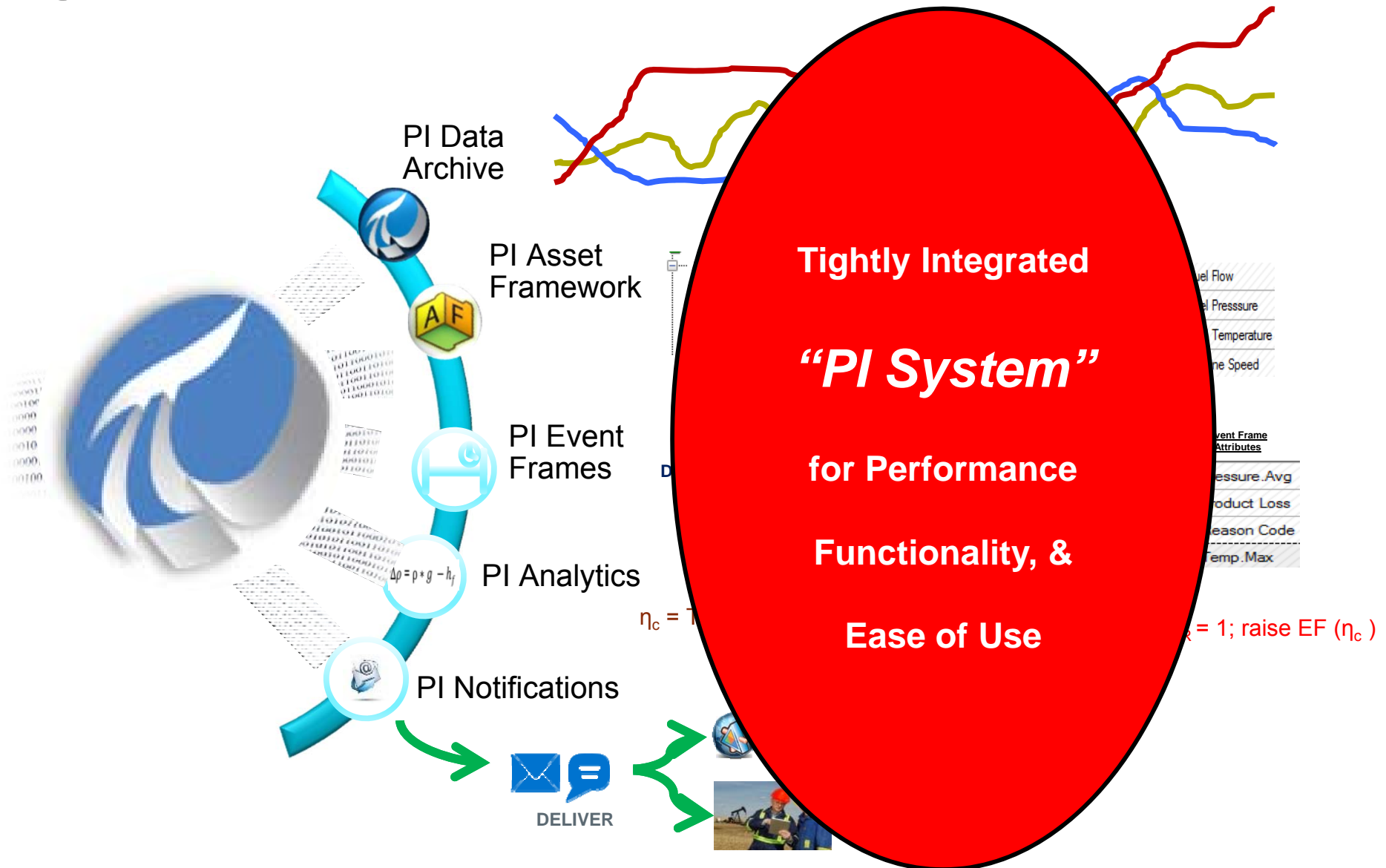
# The Need for a Data Information Infrastructure



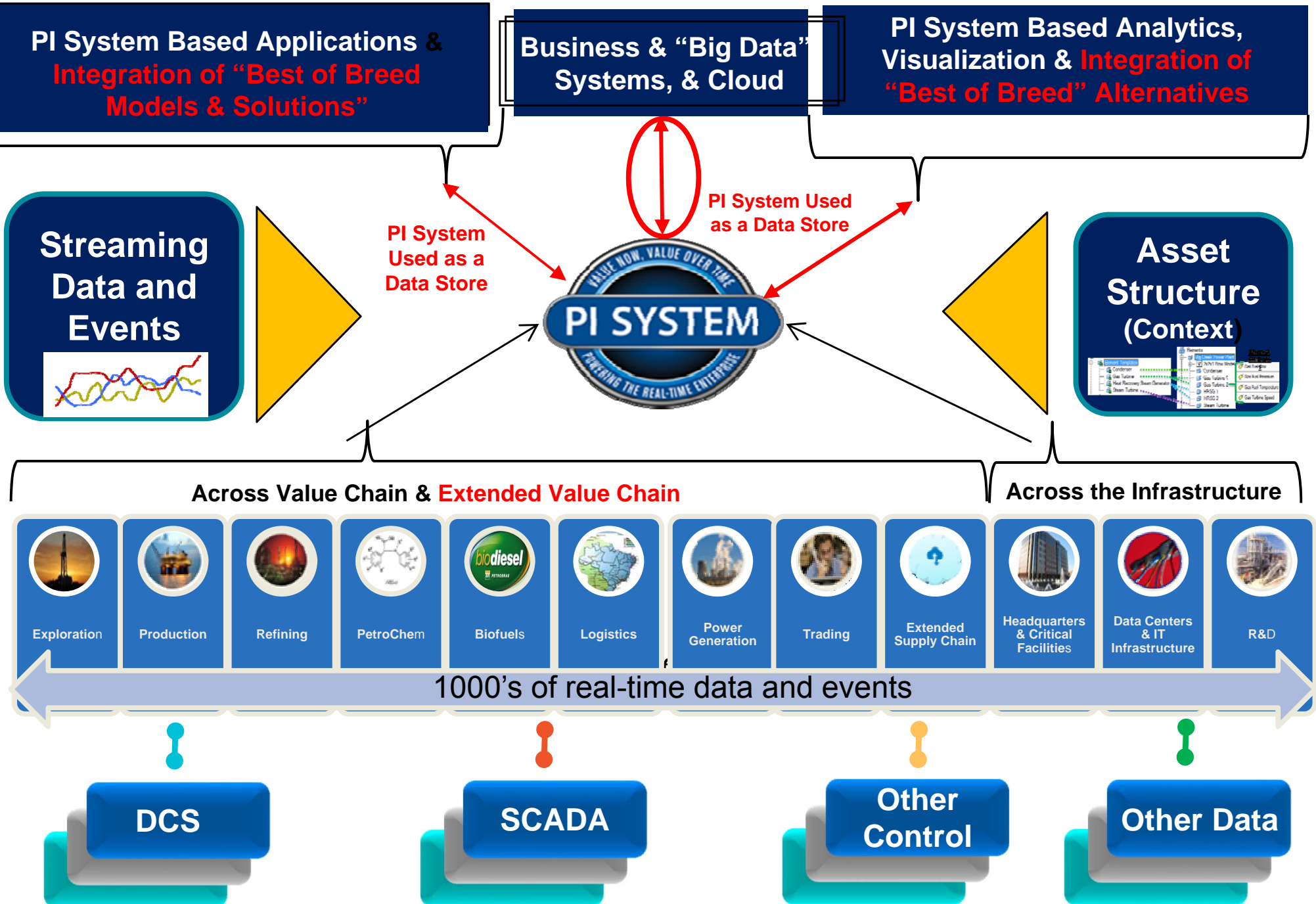
# Data and Information in Context with Integrated High Fidelity Drill Down – “Don’t Let Sexy override Functionality”



# The Foundation for Enterprise consistency, alignment, simplification, and data transformation



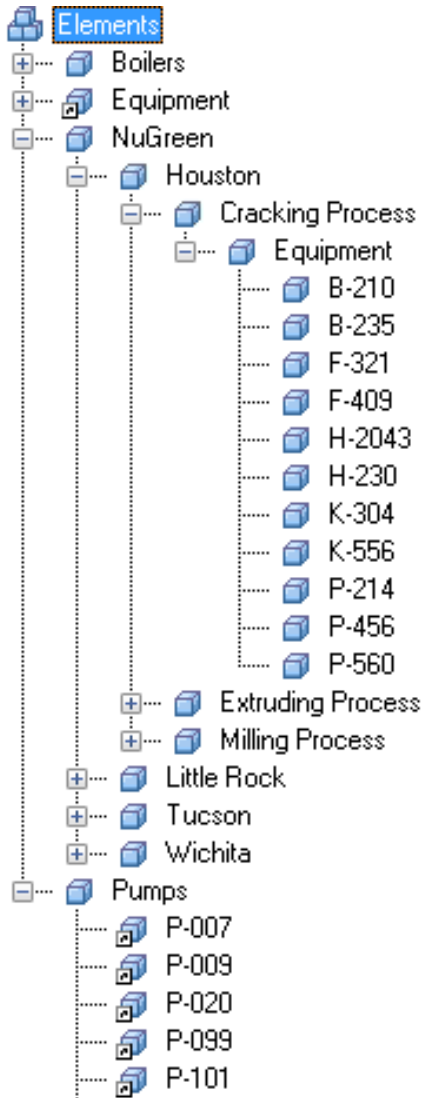
# Enterprise Consistency, Alignment, Simplification & Data Transformation





# PI Asset Framework (PI AF)

## The Foundation for Business to Operations Value



### Analyses

- Efficiency analysis
- Key Performance Indicators (KPI)

### Time-series

- In-Flow
- Pressure
- Vibration data

### Events

- Downtime
- Startup
- Failure

### Asset details

- Name
- Model
- Manufacturer

### Notifications

- High speed
- Rotor failure
- Low pressure

### External data

- Performance curves
- Last maintenance date
- Design documents
- Best operating procedures



# Example of PI-AF Templates – Scalability/ Governance

## Calculation of Compressor Heat Rate

The screenshot displays the NGT&S - PI System Explorer application. The left-hand 'Library' pane shows a tree structure with 'Element Templates' expanded, and 'HSRA-8T Unit' selected. The main window is titled 'HSRA-8T Unit' and contains a table of attributes. The 'Unit Actual Heat Rate' attribute is highlighted. On the right, the configuration panel for this attribute is shown, including fields for Name, Description, UOM, Value Type, and a formula for calculation.

**Library**

- NGT&S
  - Categories
  - Templates
    - Element Templates
      - Actual Heat Rate
      - CAT 3616 Unit
      - CB\_8V-275-C2 Unit
      - CompressorStation
      - CS\_Unit
      - GMWA Unit
      - GMWA\_Driver
      - Heat Exchanger
      - HSRA-8T Unit
      - Pipeline Efficiency
      - Regulation Station Effi
      - Solar\_Driver
      - TLA-8 Unit
      - TLAD-10 Unit
    - Model Templates
    - Transfer Templates
  - Enumeration Sets
  - Reference Types
  - Tables
    - Compressor Unit Info
    - Fuel Gas Cost
- Elements
- Event Frames
- Library
- Unit of Measure
- MyPI
- Notifications
- Contacts

**HSRA-8T Unit**

Name	Description
BMEP	
HeatRateMargin	
Max Heat Rate	
Mfg Recommended Speed	Mfg Rec Spd
Min Heat Rate	
Name	
Target Heat Rate	
Unit Actual Heat Rate	
Unit BHP	
Unit Discharge Pressure	Unit or Stage 1 Discharge Pressure
Unit Flow Rate	Unit Volume Flow Rate
Unit Fuel	Unit Fuel
Unit HR_Diff_Maintenance	Actual/Target
Unit HR_Diff_Operations	Actual/7500
Unit Pressure Differential	Discharge-Suction Pressure
Unit Speed	Unit Speed
Unit SpeedFactor	
Unit Status	Unit Running or Not
Unit Step	
Unit Suction Pressure	Unit or Stage 1 Suction Pressure
Unit Suction Temperature	Suction Temperature
Unit Temperature - Ambient	Ambient temperature at station or u

**Unit Actual Heat Rate Configuration:**

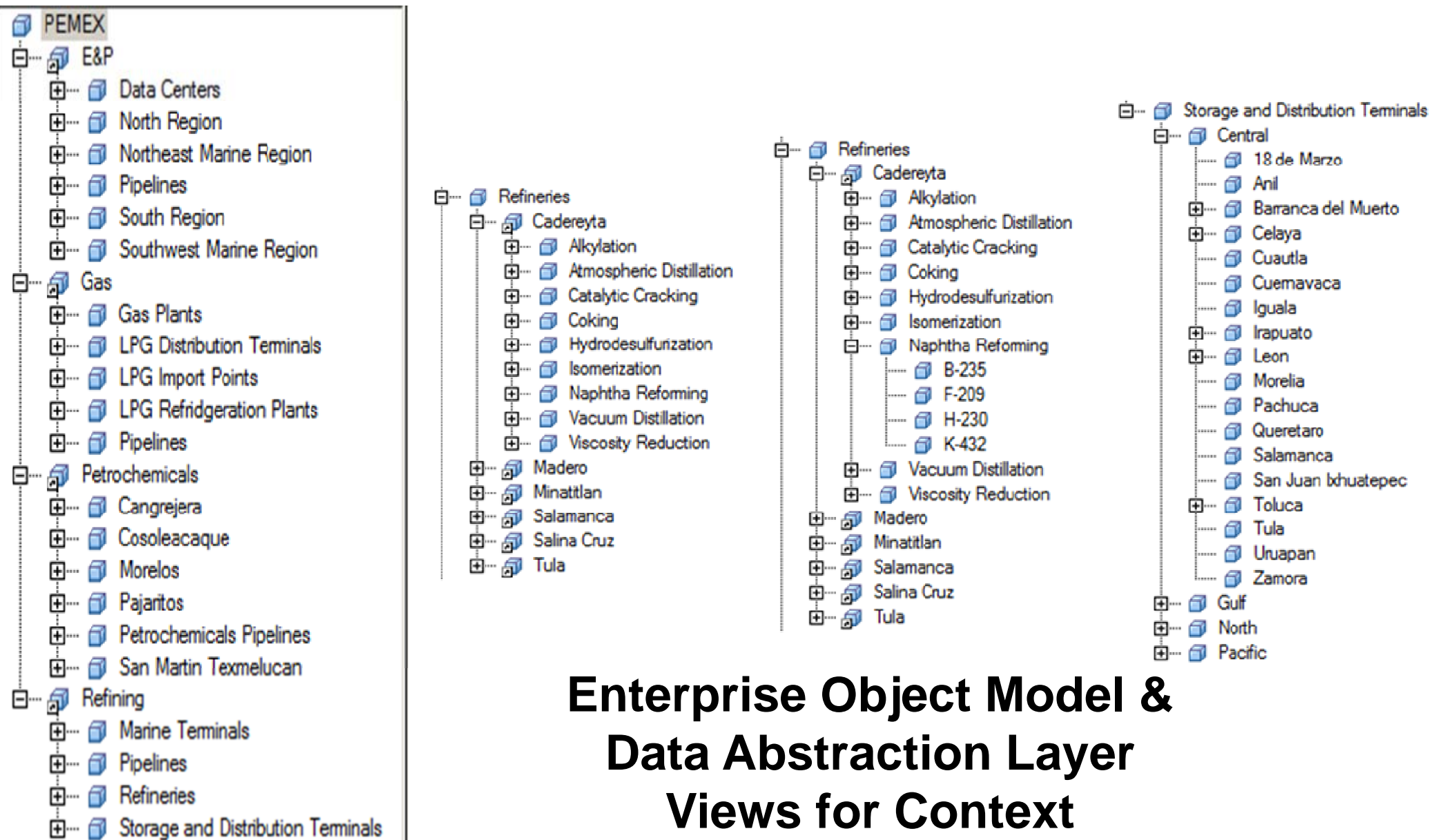
- Name: Unit Actual Heat Rate
- Description:
- Configuration Item: ☐ Indexed: ☐
- Categories:
- UOM: BTU(LHV)/BHP-Hr
- Value Type: Double
- Default Value: 0 BTU(LHV)/BHP-hr
- Data Reference: Formula
- Settings...  
$$A = \text{Unit BHP}; B = \text{Unit Fuel}; \text{UOM} = \text{MSCF}; \text{if } A \leq 50 \text{ then } 0 \text{ else } (B * (1000 * 1030 * 0.915)) / A$$

HSRA-8T Unit Modified: 7/26/2010 2:39:08 PM. 5ba8135e-7526-4ece-85d2-b11221b28dbc



# PI – AF - The Underpinning of Analytics & Visualization

## A Journey – started small, evolved over time...scalable



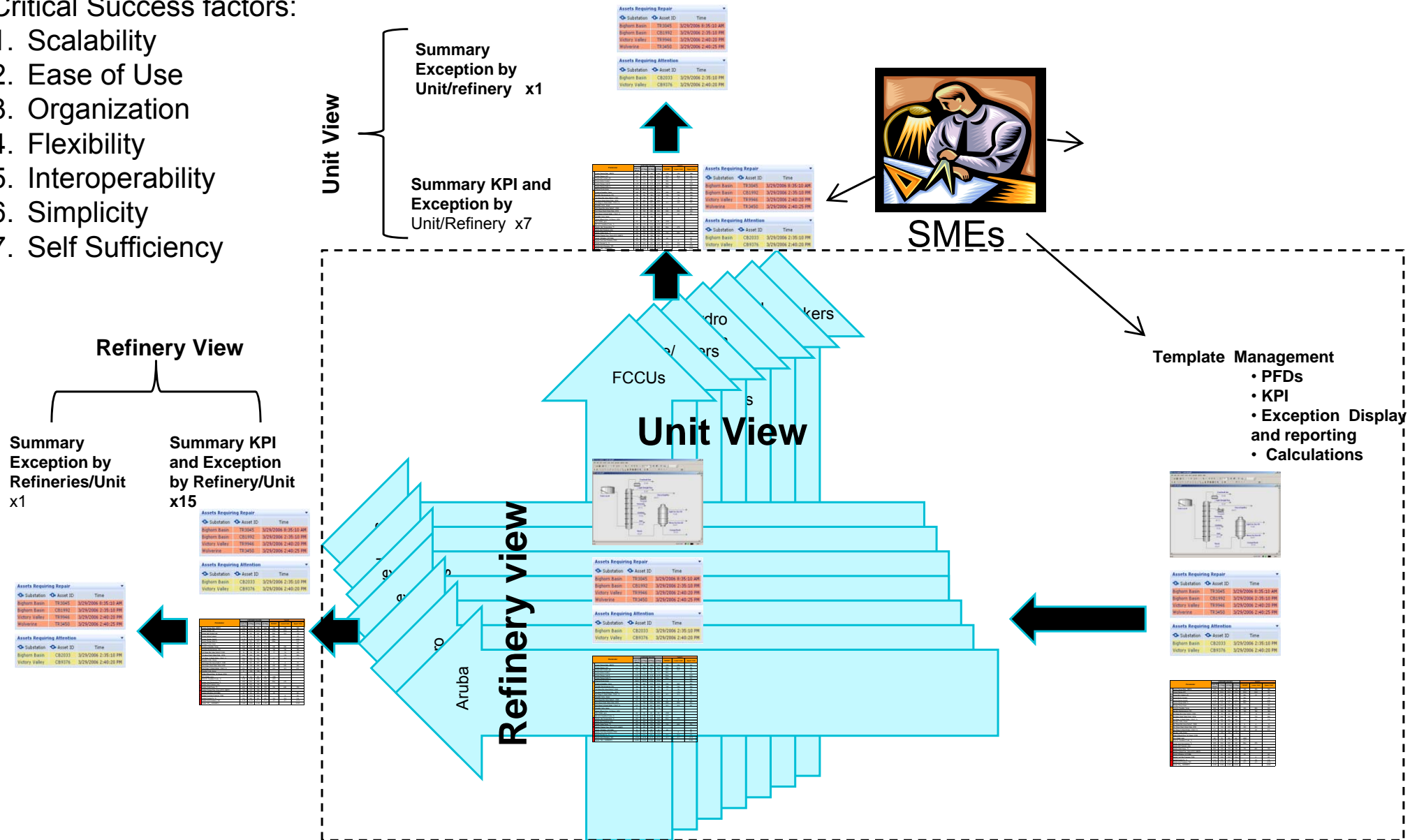
**Enterprise Object Model &  
Data Abstraction Layer  
Views for Context**



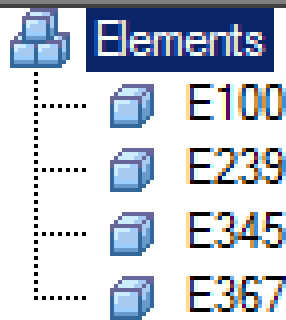
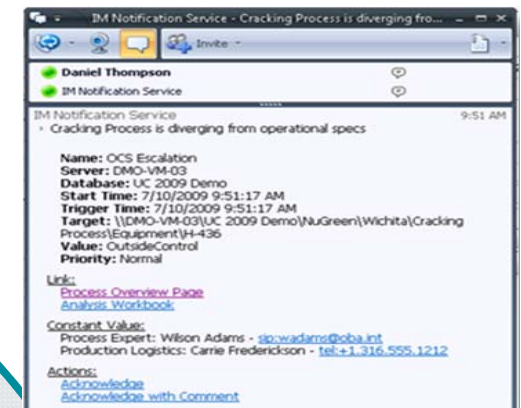
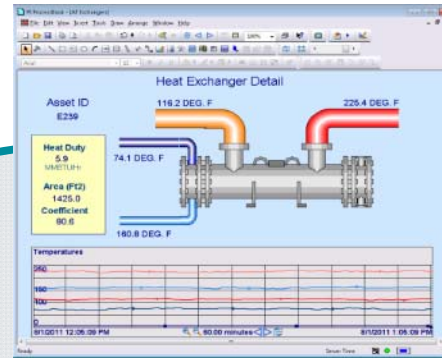
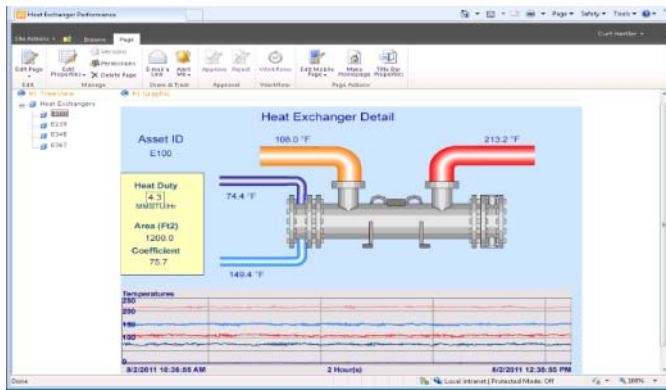
# PI AF Views to Pivot the AF Structure – Consistency, Alignment, Simple, & Data Transformation

Critical Success factors:

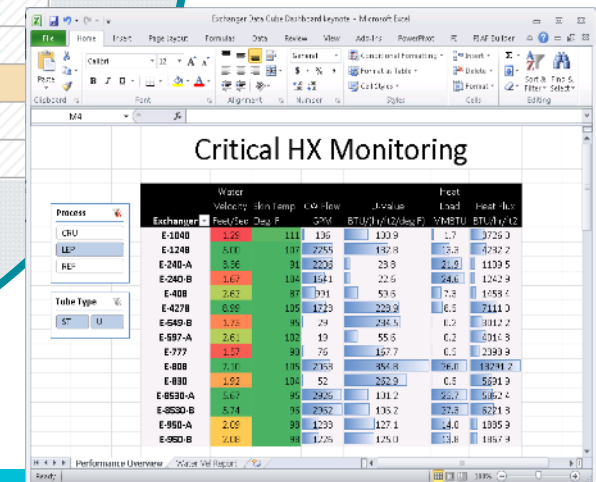
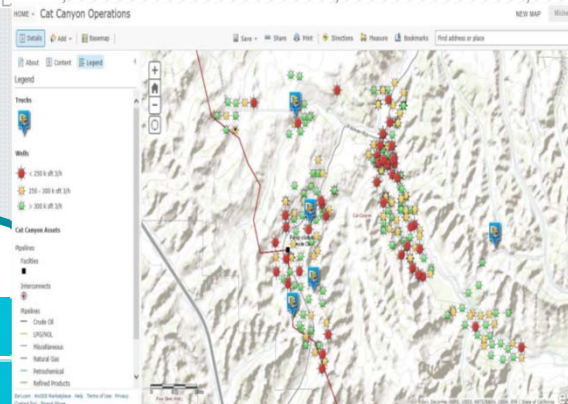
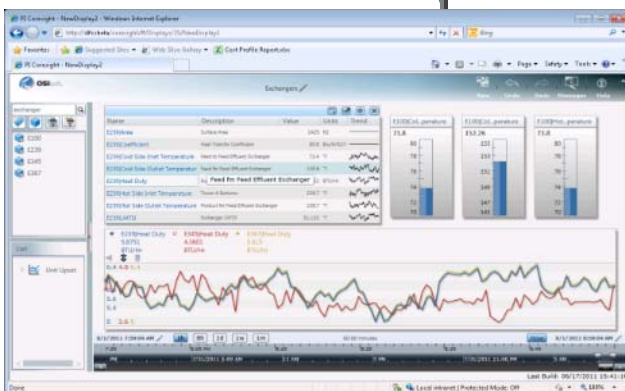
1. Scalability
2. Ease of Use
3. Organization
4. Flexibility
5. Interoperability
6. Simplicity
7. Self Sufficiency



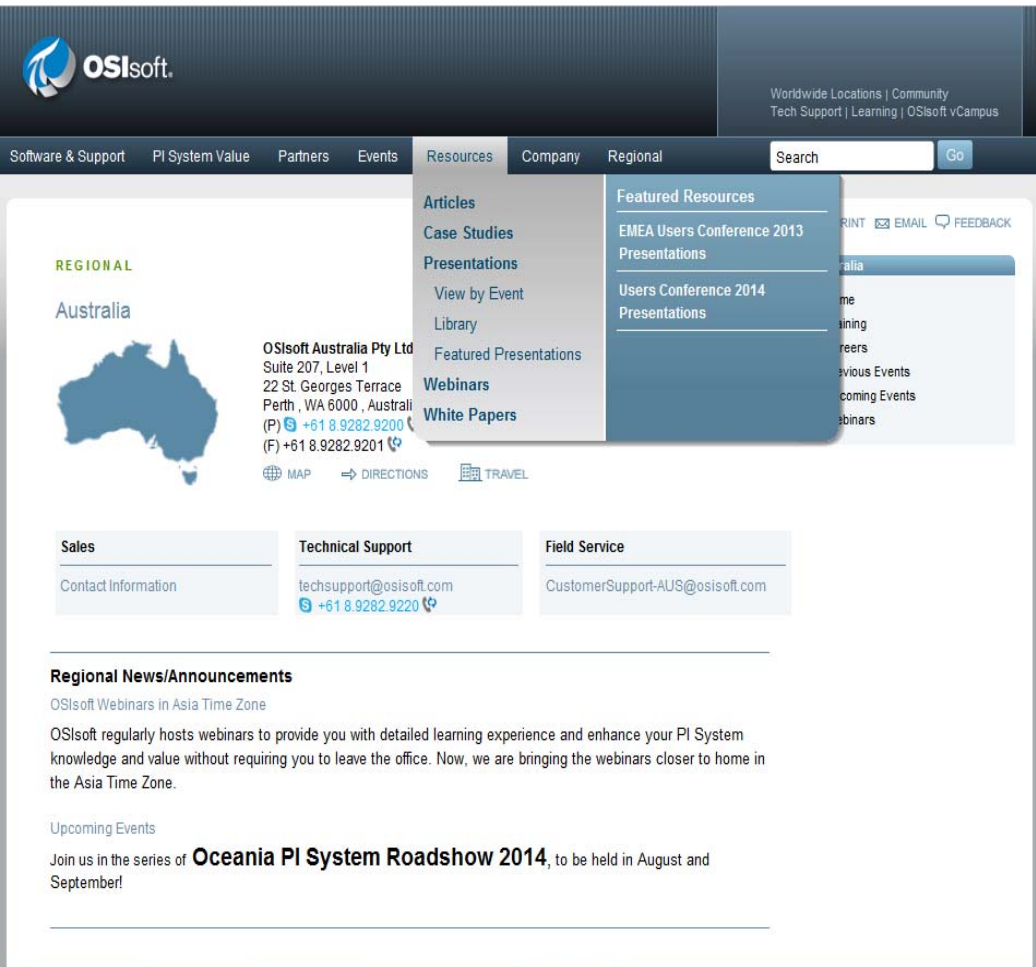
# PI AF – Consistency, Simplicity, Scalability, Alignment, and Data Transformation



Calculation			
Heat Duty	4.52496386846314 B...	BTU per hour	
LMTD	49.8387949209527 °F	degree Fahrenheit	
Performance Limits			
High Heat Duty Limit	6 BTU/Hr	BTU per hour	
Low Heat Duty Limit	4 BTU/Hr	BTU per hour	
PI Data			
Cold Side Inlet Temperature	70.0089721679688 °F	degree Fahrenheit	
Cold Side Outlet Temperature	147.653396606445 °F	degree Fahrenheit	
Hot Side Inlet Temperature	211.52458190918 °F	degree Fahrenheit	
Hot Side Outlet Temperature	108.038589477539 °F	degree Fahrenheit	
Specifications			
Area	1200 ft2	square foot	
Coefficient	75.66 BTU per F ft2 Hr	BTU per F ft2 Hr	



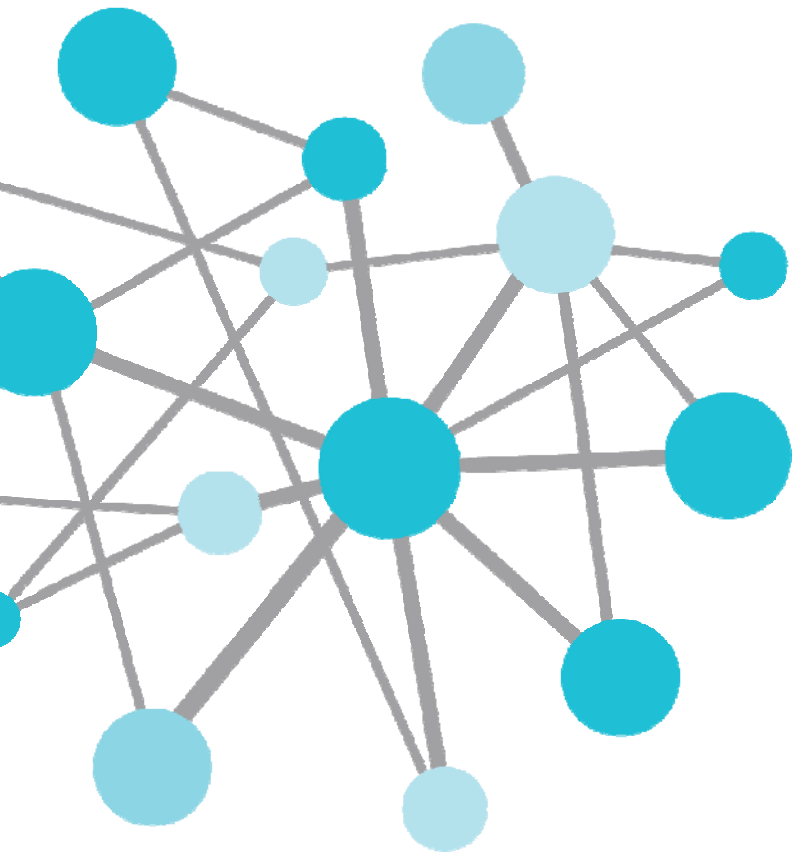
# Case Studies on the OSIsoft Website



The screenshot shows the OSIsoft website's Australia regional page. The top navigation bar includes links for Software & Support, PI System Value, Partners, Events, Resources, Company, and Regional. A search bar is located on the right. The Resources dropdown menu is open, displaying options: Articles, Case Studies, Presentations, View by Event, Library, Featured Presentations, Webinars, and White Papers. The Featured Resources section lists 'EME Users Conference 2013 Presentations' and 'Users Conference 2014 Presentations'. The main content area features a map of Australia, the company name 'OSIsoft Australia Pty Ltd', address 'Suite 207, Level 1, 22 St. Georges Terrace, Perth, WA 6000, Australia', and contact information: '(P) +61 8.9282.9200' and '(F) +61 8.9282.9201'. Below the map are links for MAP, DIRECTIONS, and TRAVEL. A sidebar on the right contains contact information for Sales, Technical Support (techsupport@osisoft.com, +61 8.9282.9220), and Field Service (CustomerSupport-AUS@osisoft.com). The bottom section is titled 'Regional News/Announcements' and includes a sub-header 'OSIsoft Webinars in Asia Time Zone'. The text states: 'OSIsoft regularly hosts webinars to provide you with detailed learning experience and enhance your PI System knowledge and value without requiring you to leave the office. Now, we are bringing the webinars closer to home in the Asia Time Zone.' It also mentions 'Upcoming Events' and 'Join us in the series of Oceania PI System Roadshow 2014, to be held in August and September!'.



This screenshot is identical to the one on the left, showing the OSIsoft website's Australia regional page. It displays the same navigation bar, Resources dropdown menu, Featured Resources, company information, contact details, and regional news/announcements section.



# Illustrative Case Study – Chevron GOM

**Data Consistency and Context**  
**Organizational Alignment**  
**Applications/Solutions Simplicity**  
**Data Transformation Methodology**

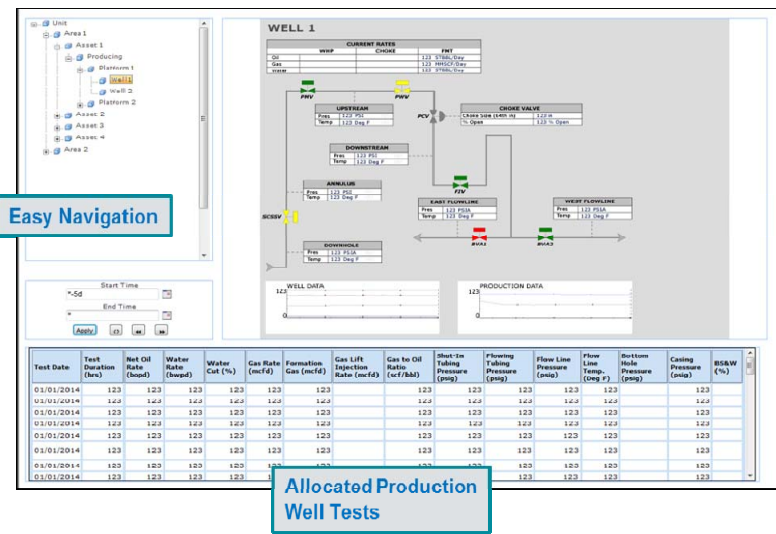


# Data Consistency and Context

*“The PI System infrastructure is fundamental to our E&P data governance and workflow. The PI System and in particular PI AF, underpins our analytics and visualization by providing asset based, normalized, and structured operational data including associated meta-data. The PI System as an enterprise data infrastructure “future proofs” our investment in our applications & solutions”*



UC2014



E&P Automation Analyst

## Business Challenge

- Data issues from E&P assets
- Legacy custom applications not scalable or maintainable
- No std tagging across E&P
- Data issues from DCS/SCADA
- No infrastructure for FOF vision

## Solution

- Evolve and expand PI System leveraging unlimited access
- **Used PI AF to normalize and structure E&P data & information**
- Developed new E&P workflow, analytics, and visualization

## Results and Benefits

- **Asset based** access and propagation of E&P data and information
- Enabled a **“best of breed”** approach to analytics and visualization tools
- **Significantly improved analytics, visualization, collaboration & Integration**

# Gulf of Mexico Business Unit (GOM) Who we are...

## ■ Overview

- Largest leaseholder in the Gulf of Mexico
- Over 500 structures
- Onshore facilities in Louisiana and Alabama
- Main headquarters in Covington, LA
- 6 shore bases

## ■ Process Control Network Overview

- Over 600 PCN servers, workstations & support machines
- Over 650 Control Systems
- Over 30 PCN Applications and 170 Utilities
- 25 historical databases
- 7 Firewalls, 150 routers and switches, 220 wireless radios



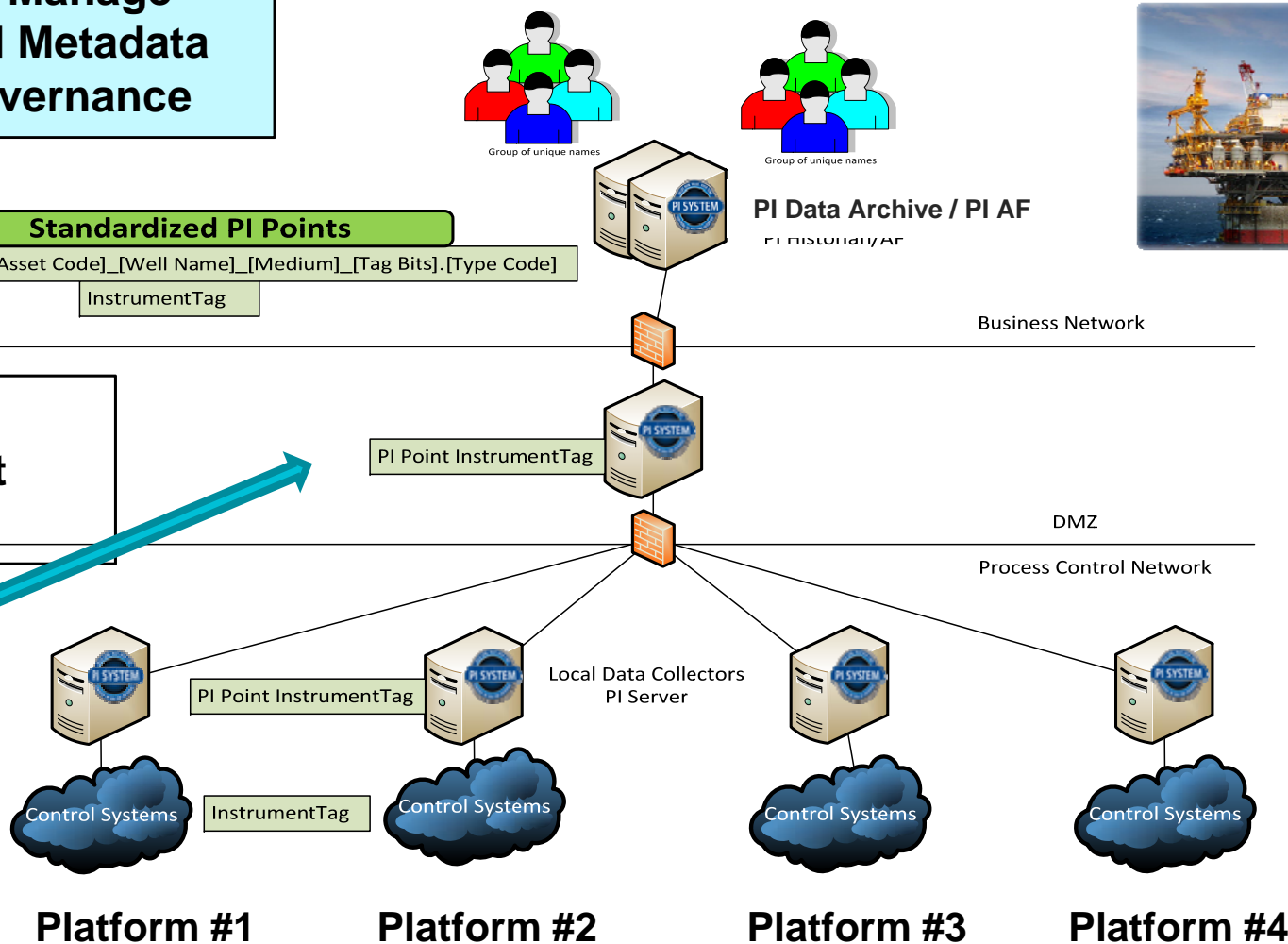


# Chevron GOM PI System Infrastructure

Using PI AF as a Data Abstraction Layer & Alias Feature to Manage Tagging and Metadata Naming Governance

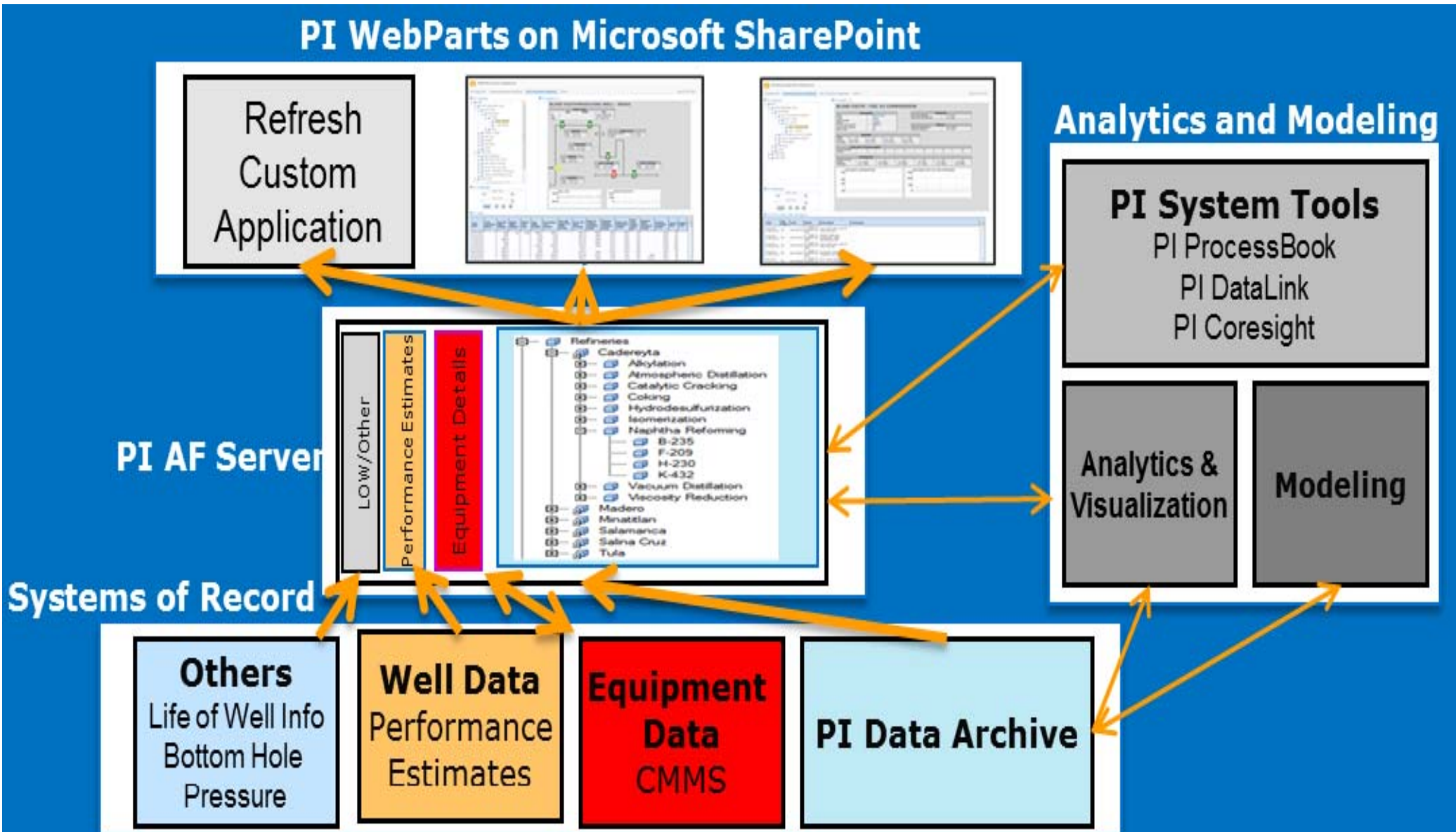
GOM Standard Tags and Asset Naming

Retention of Original Tag and Asset Naming as Required for MOC



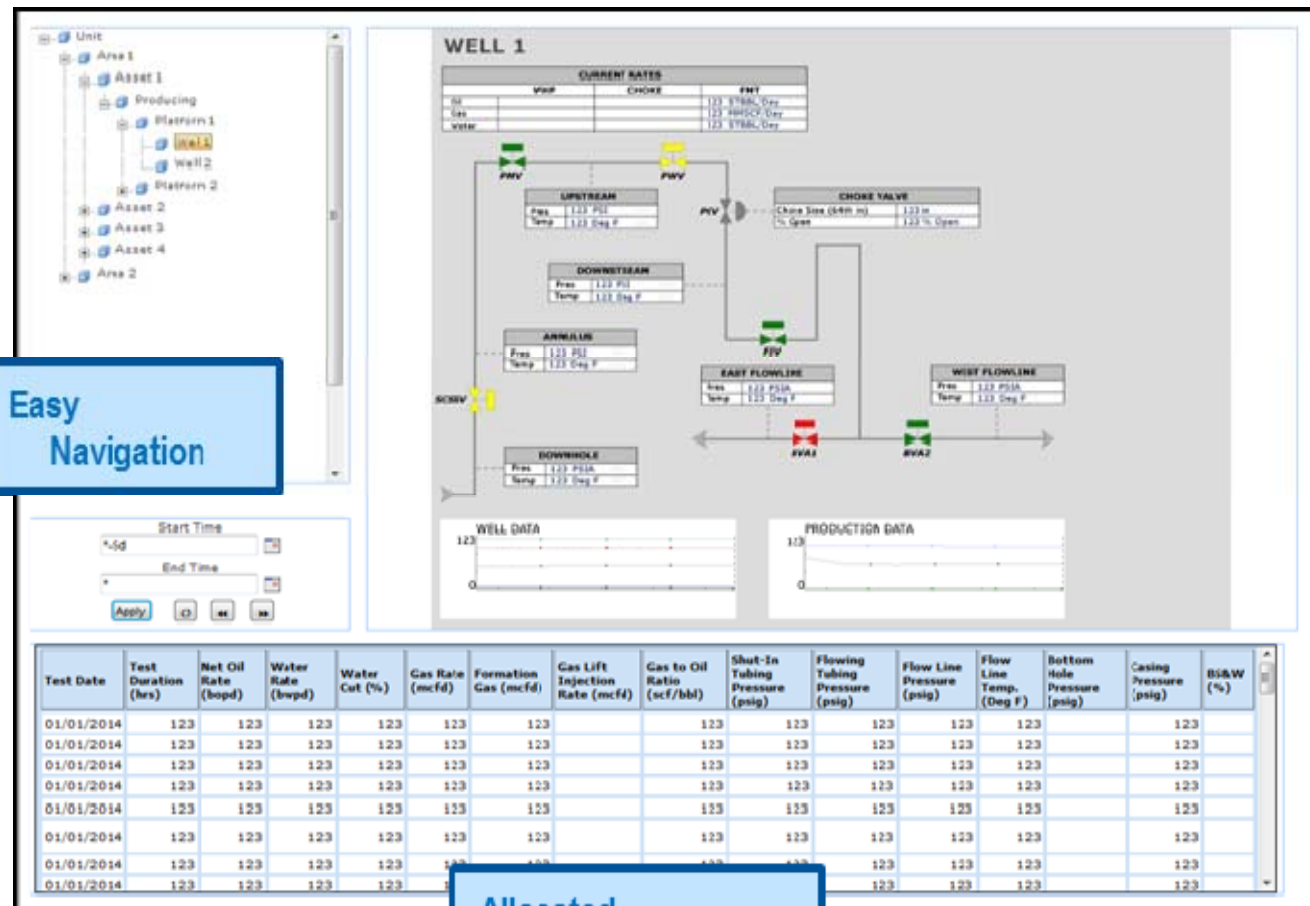


# Chevron – GOM PI System Data Infrastructure



# Chevron – Gulf of Mexico Business Unit

## Integrating Key Well Data with the PI System



### Project Benefits

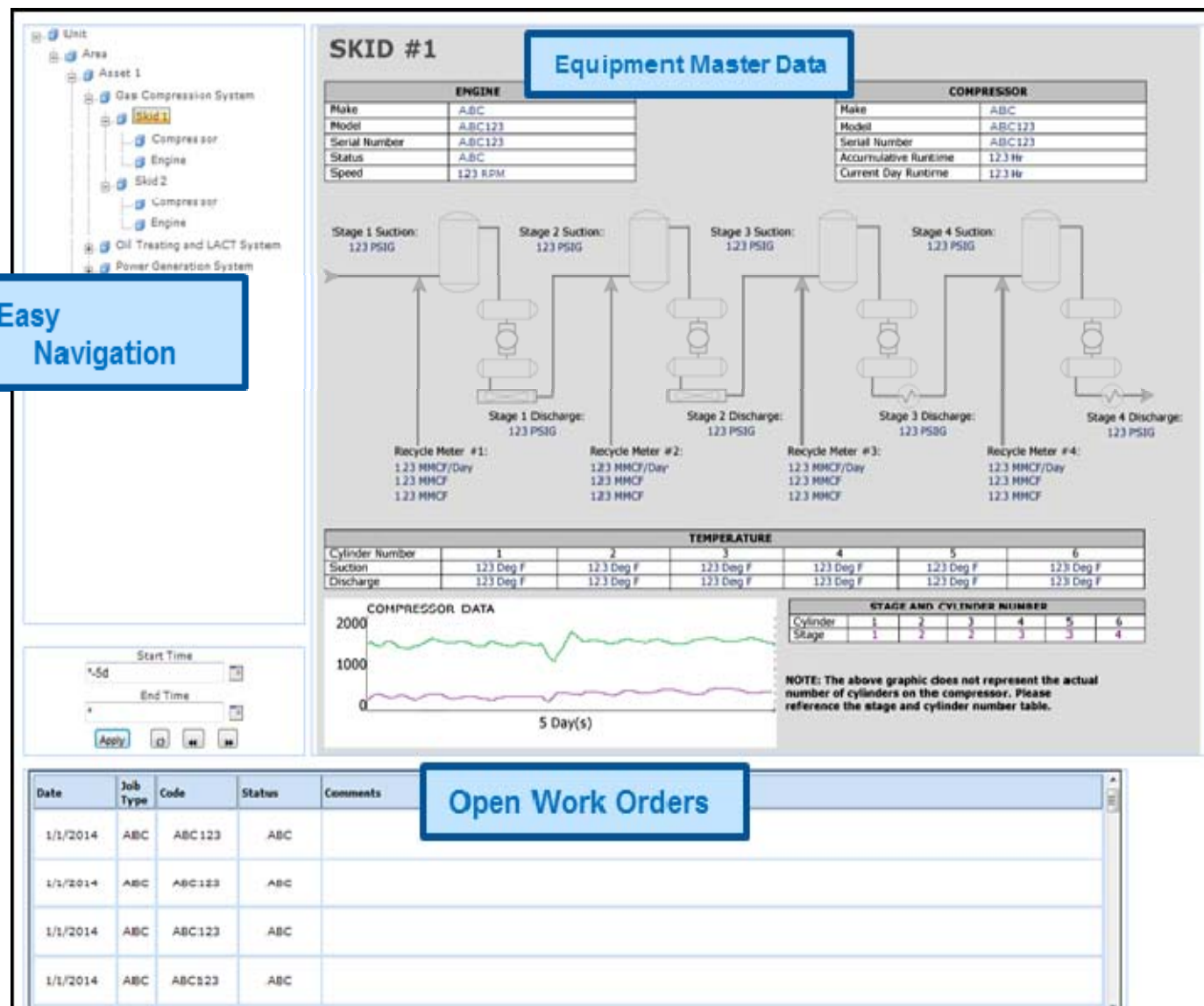
- Consistent, Reliable Real-time Data
- Standard Tags
- **Graphic Templates**
- Easy Navigation
- Allocated Production
- **Well Tests**
- Sustainable Support Model

### Deployed Well Statistics

- **Over 700 Wells**

# Chevron – Gulf of Mexico Business Unit

## Integrating Key Equipment with the PI System



### Project Benefits

Consistent, Reliable  
Real-time Data  
Standard Tags

**Std. Graphic Templates**  
**Std. Calculations/Analytics**

**Easy Navigation**

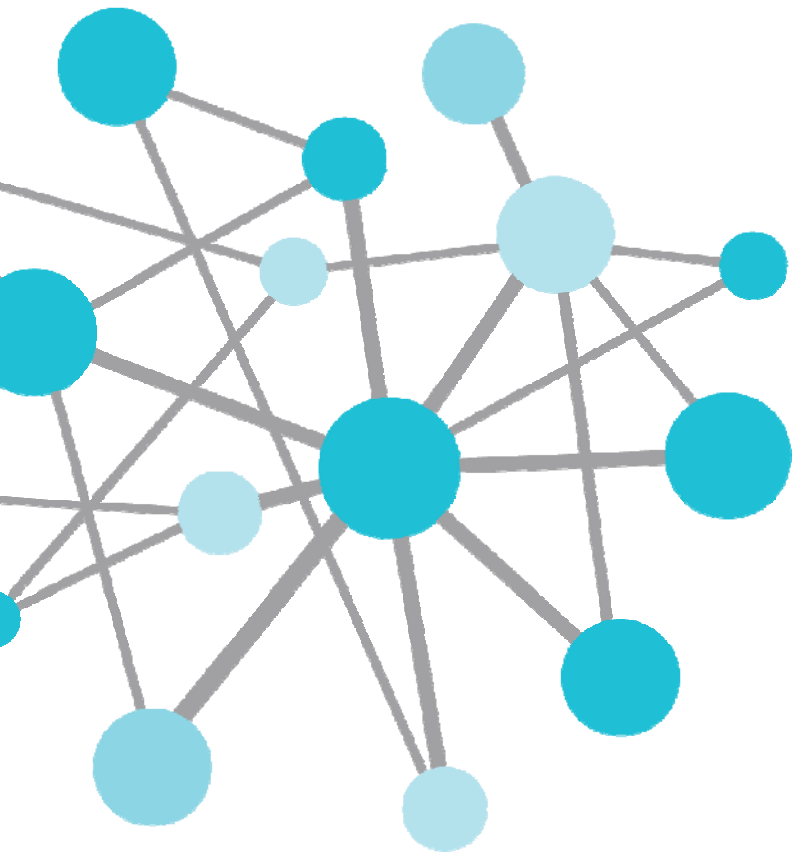
**Equipment Master Data**

Open Work Orders

Sustainable Support Model

### Deployed Equipment Statistics

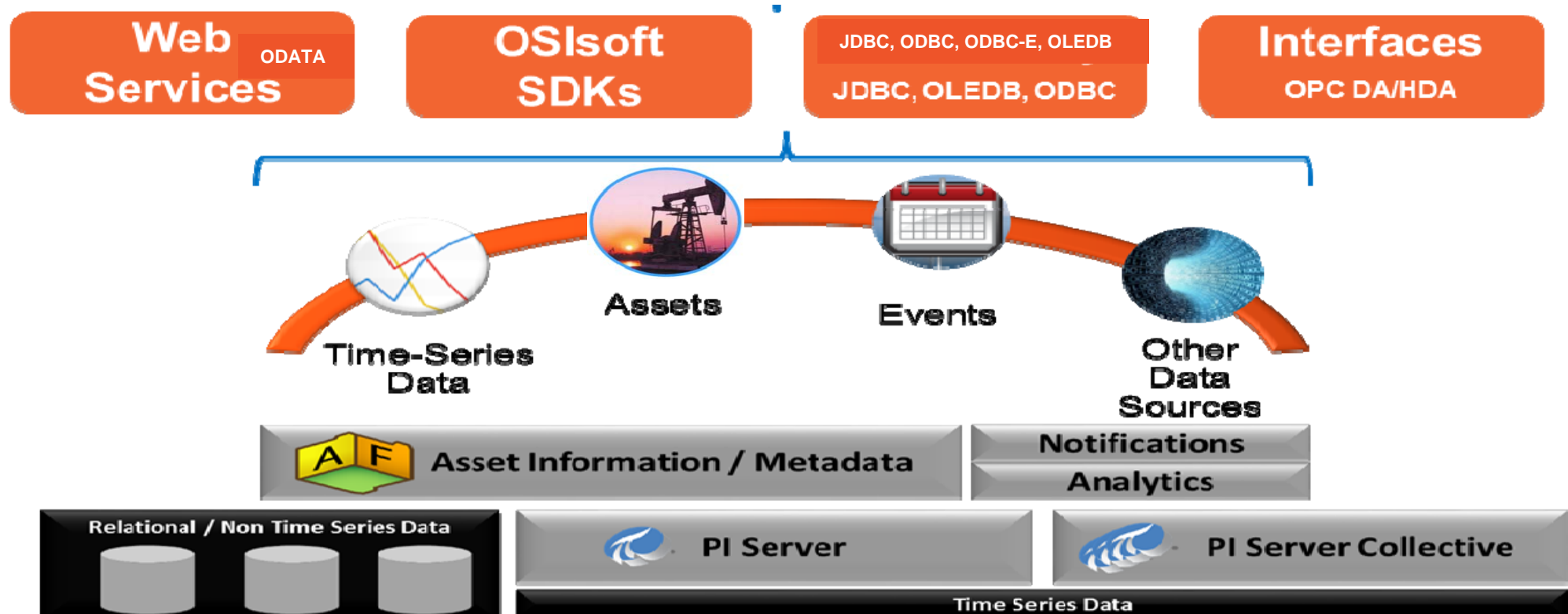
- Over 180 Compressors, Pumps, Generators**



# Illustrative Case Study – Marathon Oil

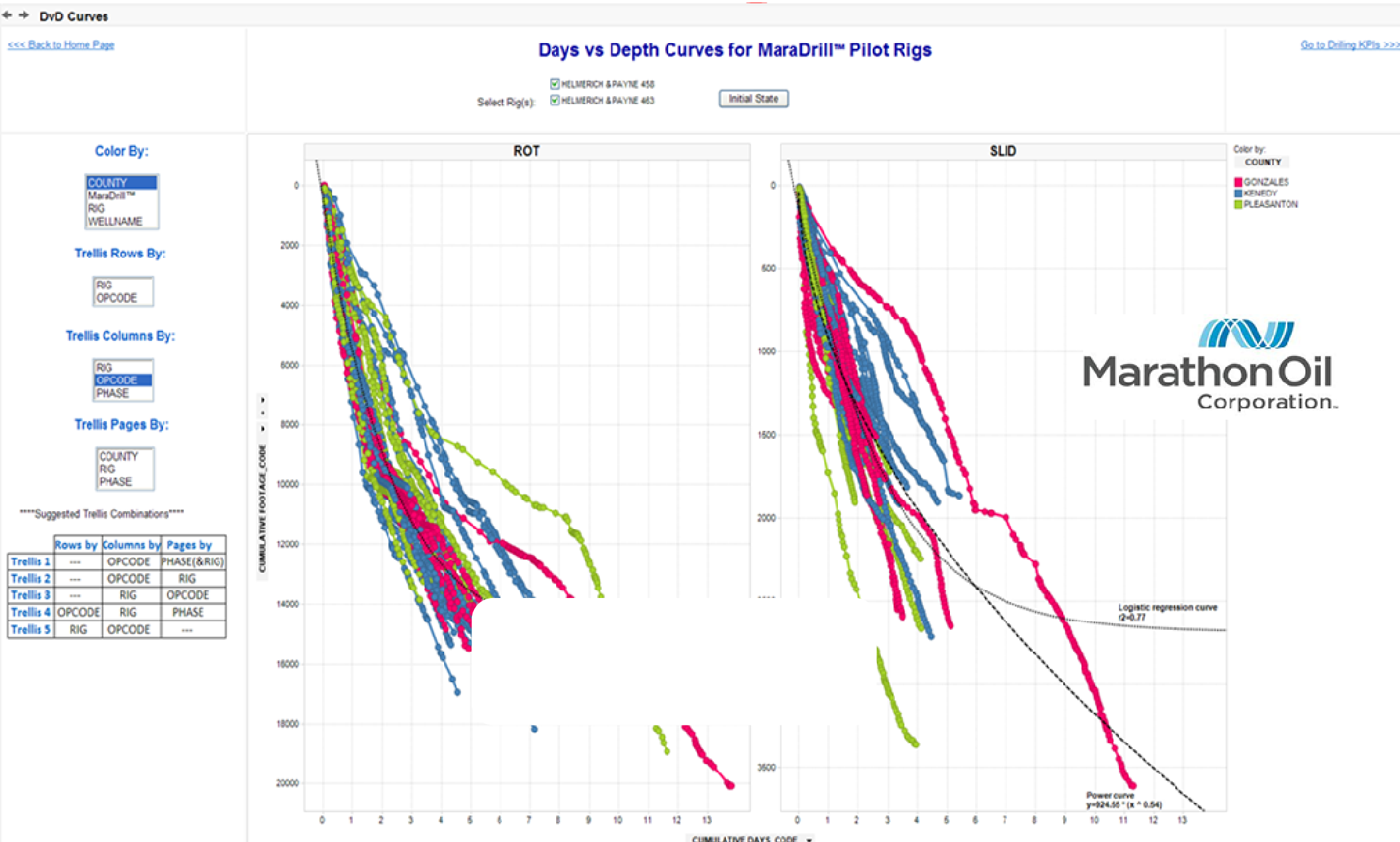
**Data Consistency and Context**  
**Organizational Alignment**  
**Applications/Solutions Simplicity**  
**Data Transformation Methodology**

# Integration of 3<sup>rd</sup> Party Analytics and Visualization Capability – Infrastructure Enabled “Best of Breed”



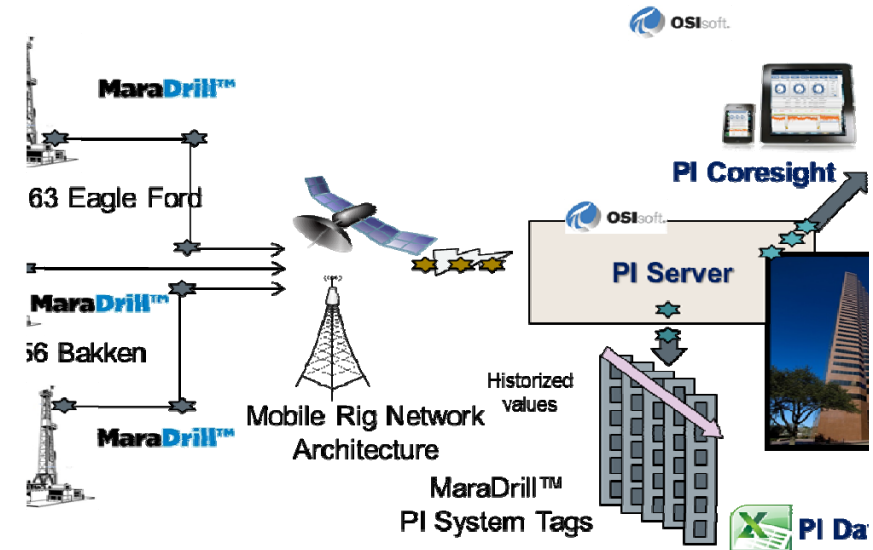
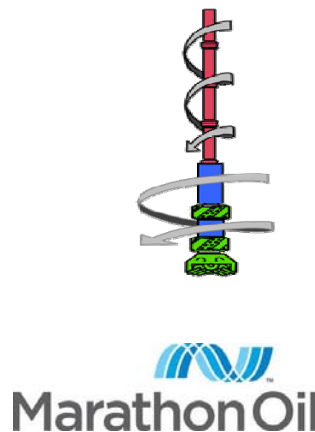
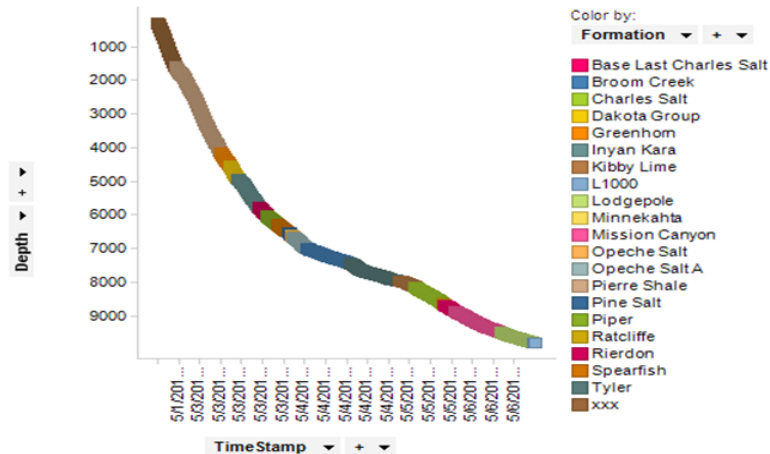


# PI System/PI AF - The Foundation for Dashboards and Workflow Integration and Business to Operations Value



# Real-Time Drilling Optimization Reduces Drilling Time and Associated Resources Usage

Days vs Depth



## Business Challenge

- Drilling time and capital well cost savings including reduction in resources
- Reduced vibration and damage to downhole tools
- Continuous optimization onsite & retrospective post-well analysis

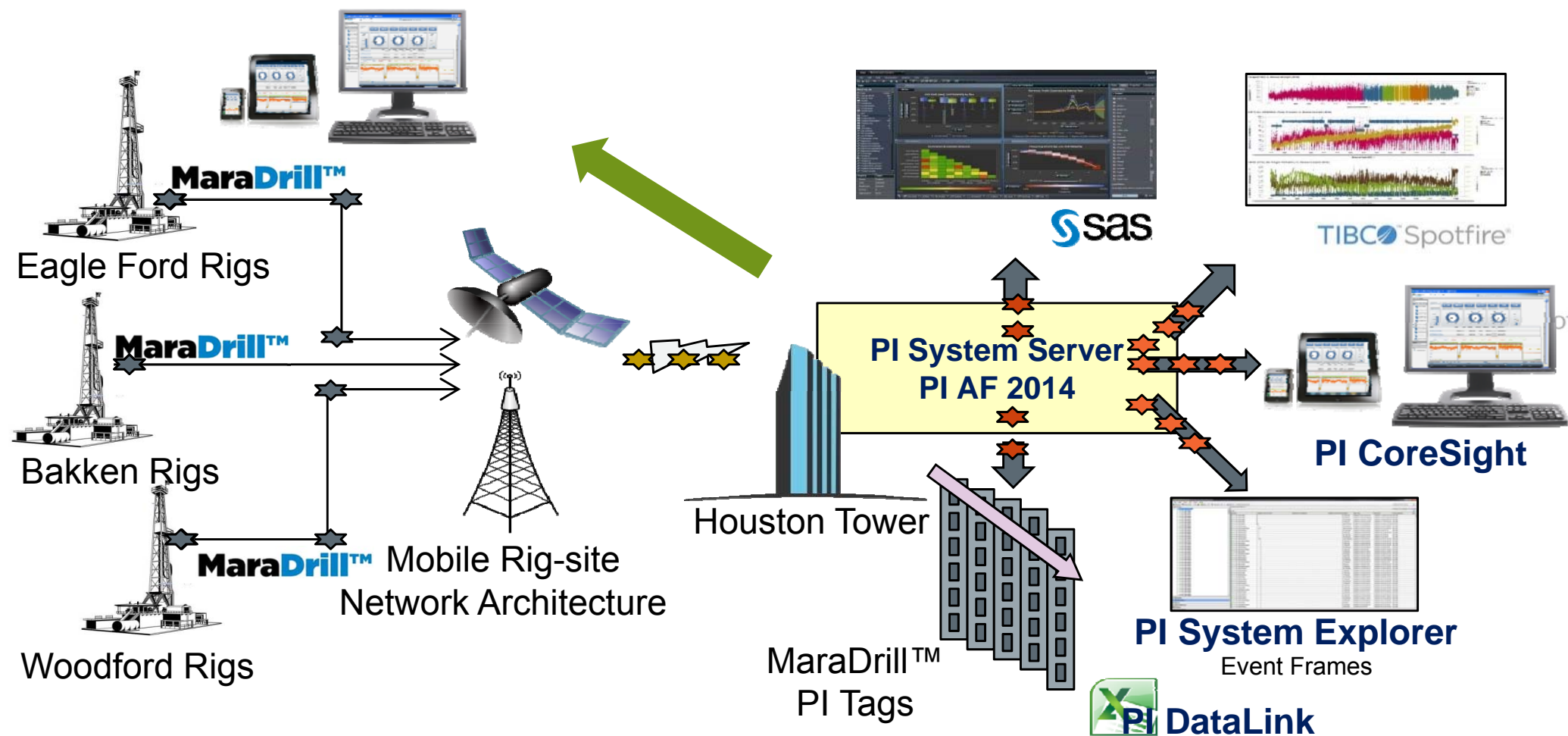
## Solution

- Installation of the PI System real-time integration and applications infrastructure
- Creation of drilling process high fidelity real-time analytics and visualization capabilities at the drill site

## Results and Benefits

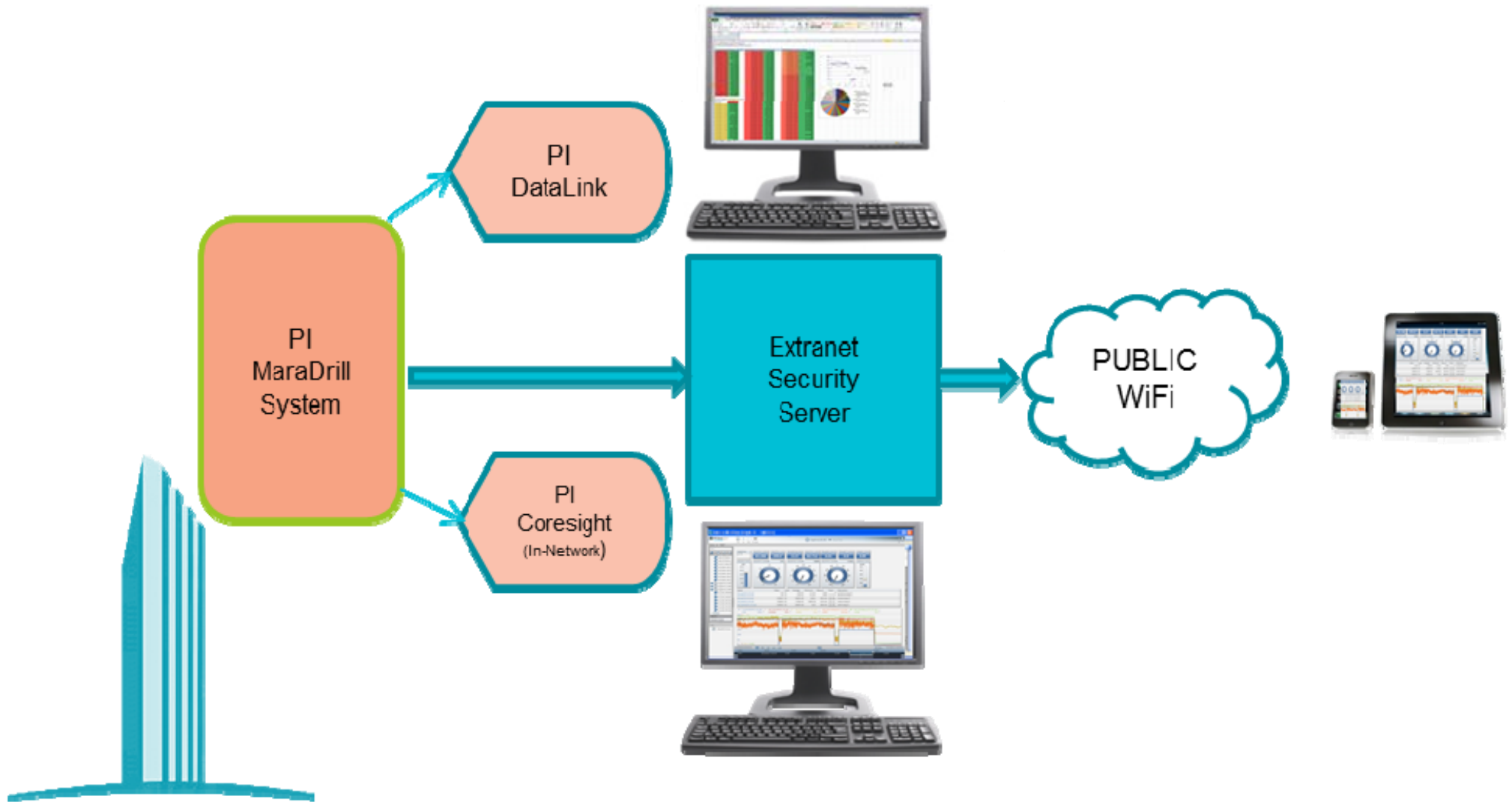
- Drilling time and capital well cost savings including reduction in resources
- Reduced vibration and damage to downhole tools
- Continuous optimization onsite and retrospective post-well analysis

# Business to Operations Value – real-time Drill Site Guidance





# PI System Visualization- Consistency



# PI Coresight – Stick-Slip Identification- Eagle Ford Rig

## Eagle Ford Rig



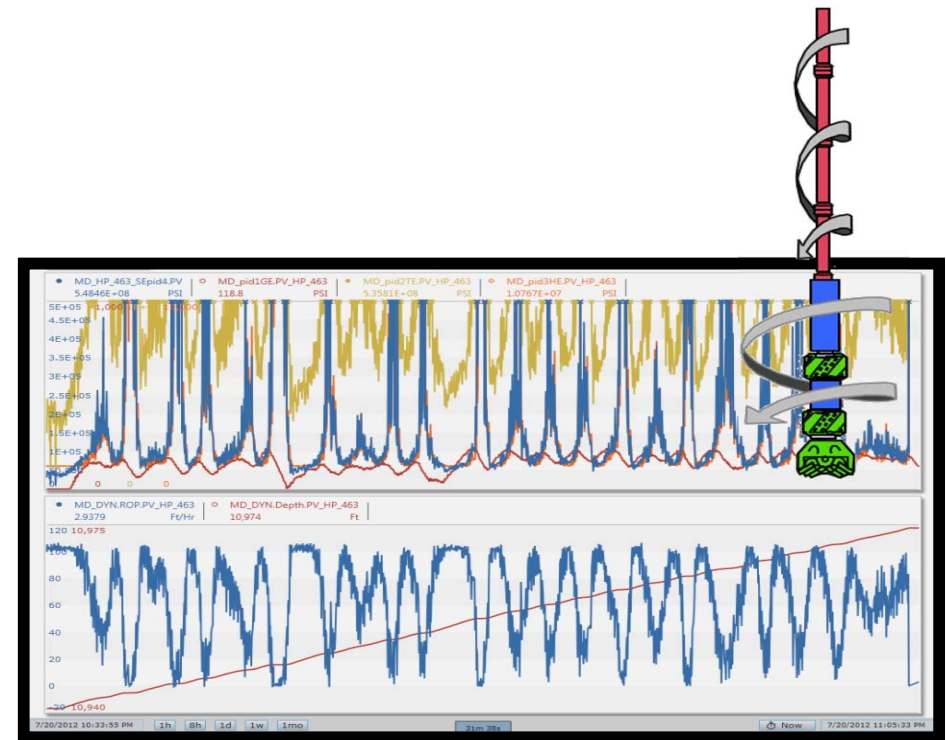
“Perfect” drilling

**Stick-slip:** Non-uniform rotation of the bit/BHA

Sticking phase → bit stops

Slipping phase → bit “breaks” free

Drillstring torsional oscillations



Stick-slip

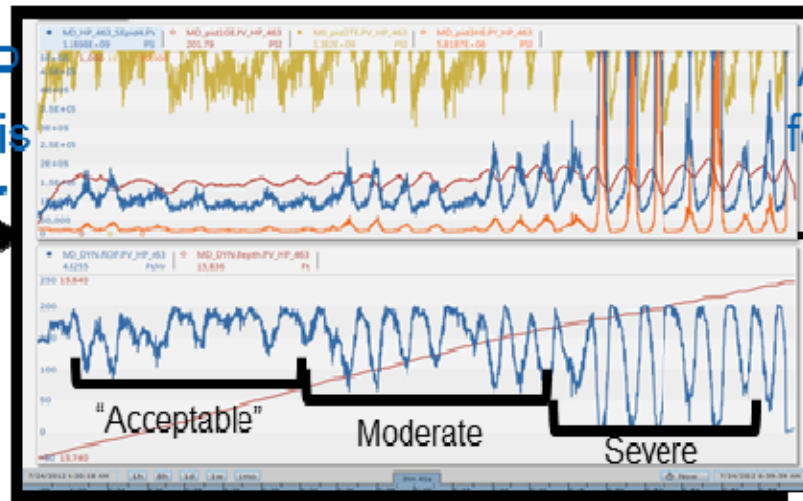
# Real-Time Optimization PI Coresight



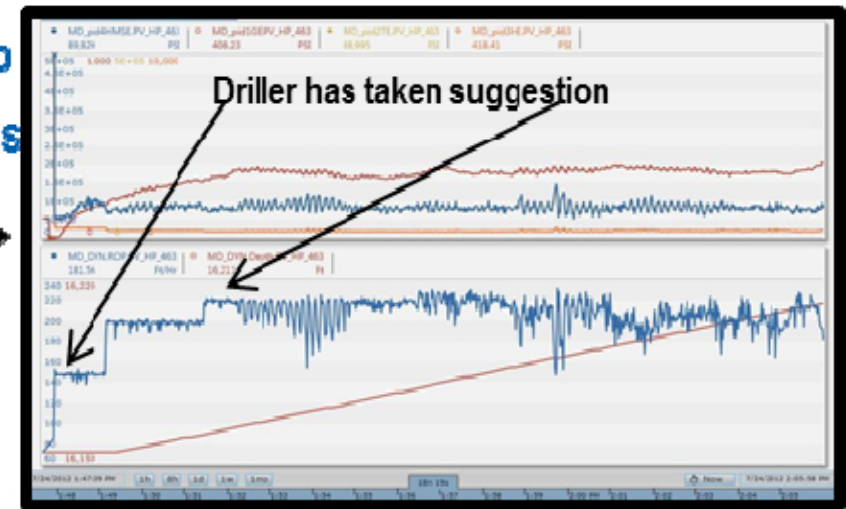
Stick-Slip Identification ...few stands later... Stick-Slip Mitigation

40% Sustained Increase in Rate of Penetration

Avg. ROP  
for stand is  
**144 ft/hr**



Avg. ROP  
for stand is  
**201 ft/hr**



# PI Coresight View with XML Data Export



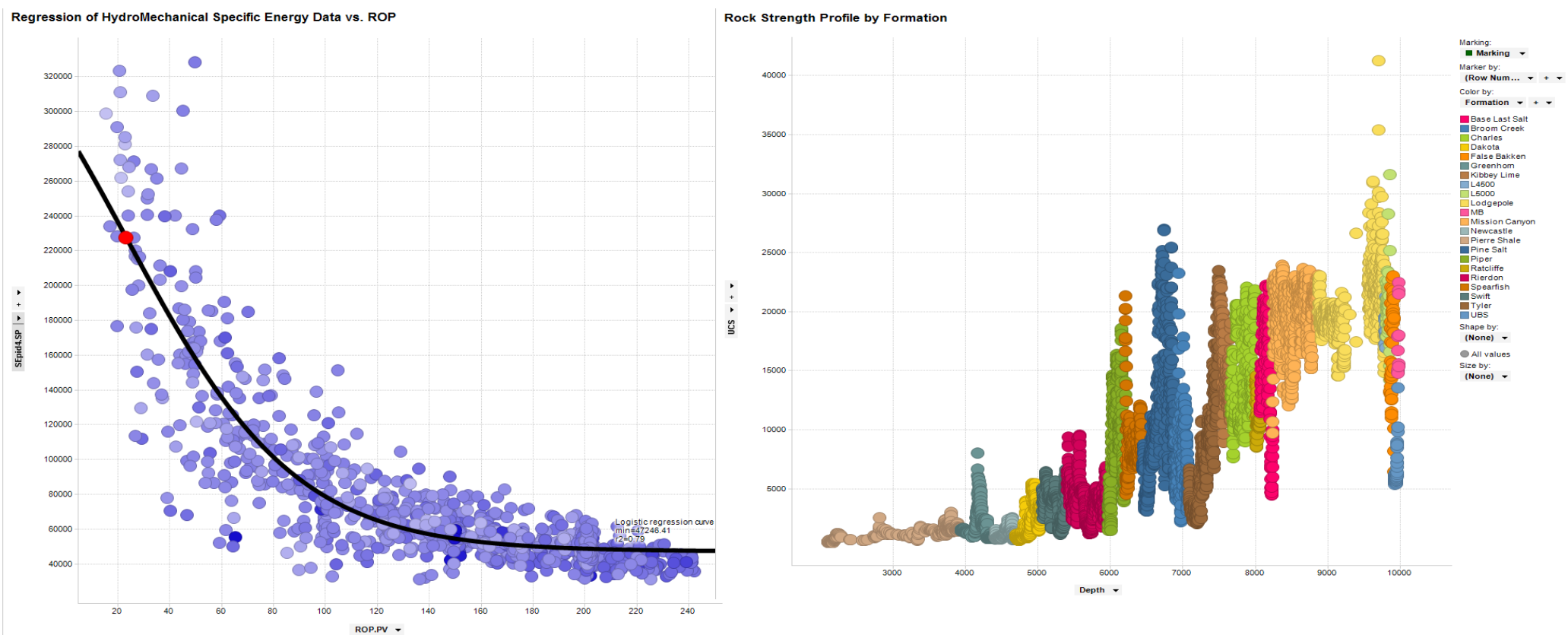
**Enables Integration with WellView data**

**Enables Integration with Spotfire visualization**



# Post-Well Science Using MaraDrill™ Data in SpotFire

Modeling the rock strength & predicting ROP's on subsequent wells in the area to improve logistics and planning

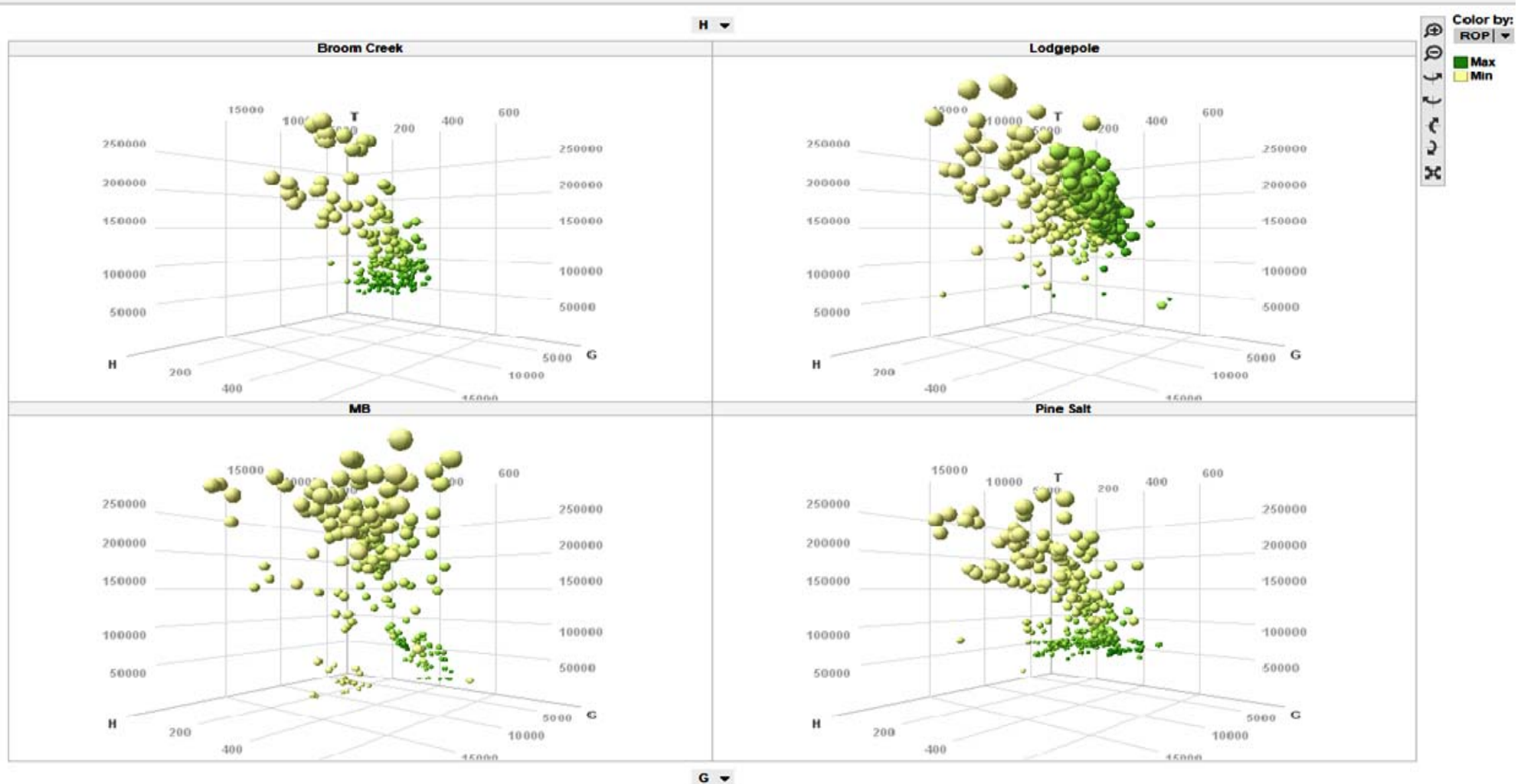


# Post-Well Science Using MaraDrill™ Data

## Formation Sweet-Spot Analysis

### 3D Scatter Plot: G vs T vs H

Sweet-Spot Analysis: Greener = Faster, Smaller = more efficient



## Drilling Rig 1



## AF Element

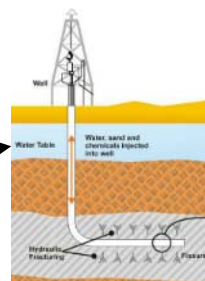
UD\_RigT1

General | Attribute Templates | Parts | Analysis Templates

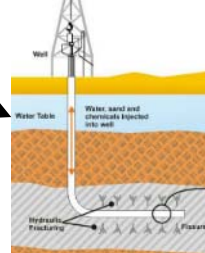
UD\_RigT1

Name	Description	Default Value
arm_sigscale	Log Scale	
APPS_MaskNumber	Mask Number	
APPS_PathName	Path Name	
Ch_LinkEventTrigger		
Ch_AccEventTrigger		
Ch_SlidingEventTrigger		
Ch_OrthoEventTrigger		
CHN_Depth	Air Depth	0 ft
CHN_Depth	Depth	0 ft
CHN_DiffPressure	Diff Pressure	0 psi
CHN_SensorPosition	Diff Pressure	0 ft
CHN_MotionLoad	Hook Load	0 lbs
CHN_ROP	ROP	0 ft/s
CHN_RPM	RPM	0 rpm
CHN_StandPipePressure	Stand Pipe Pres.	0 psi
CHN_TORQUE	Torque	0 lbf ft
CHN_VOB	VOB	0 lbs
CHN_Annual	Annular Velocity	0 ft/s
CHN_Hyds	Hydraulic Diff	0 ft
CHN_HSC	HSC	0 ft/min

## Well 1



## Well 2

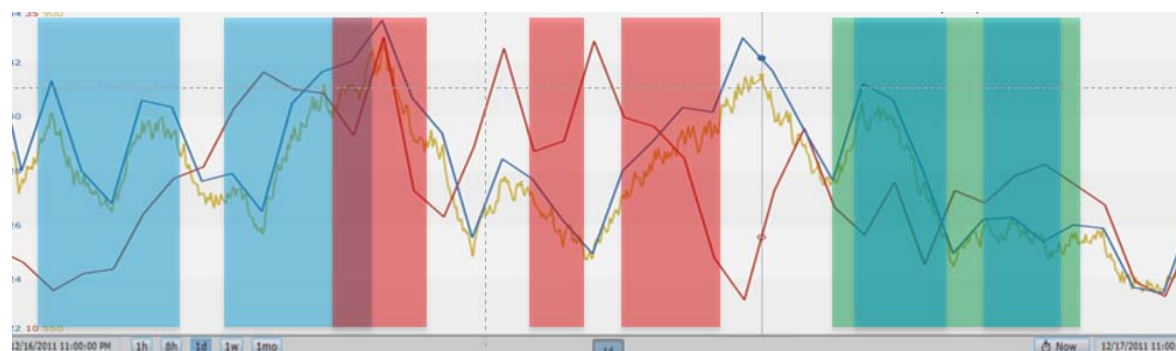


## Event Frames

Well	Activity	Start Time	End Time	Start Date	End Date
Well 1	Sliding	24:11:41:12		4/1/2014 2:00:00 AM	4/25/2014 1:41:12 PM
Sliding		0:19:00		4/1/2014 2:40:00 PM	4/1/2014 2:59:00 PM
Rotary ...		4:40:38		4/1/2014 3:33:45 PM	4/1/2014 8:14:23 PM
Sliding		0:28:30		4/1/2014 5:23:04 PM	4/1/2014 5:51:34 PM
Stick-Slip		0:03:30		4/2/2014 5:59:00 AM	4/2/2014 6:02:30 AM
Sliding		0:20:33		4/3/2014 3:42:00 AM	4/3/2014 4:02:33 AM
Rotary ...		8:10:26		4/4/2014 1:33:23 AM	4/4/2014 9:43:49 AM
Stick-Slip		0:00:51		4/5/2014 3:33:45 PM	4/5/2014 3:34:36 PM
Sliding		0:22:01		4/12/2014 10:41:10 AM	4/12/2014 11:03:11 AM

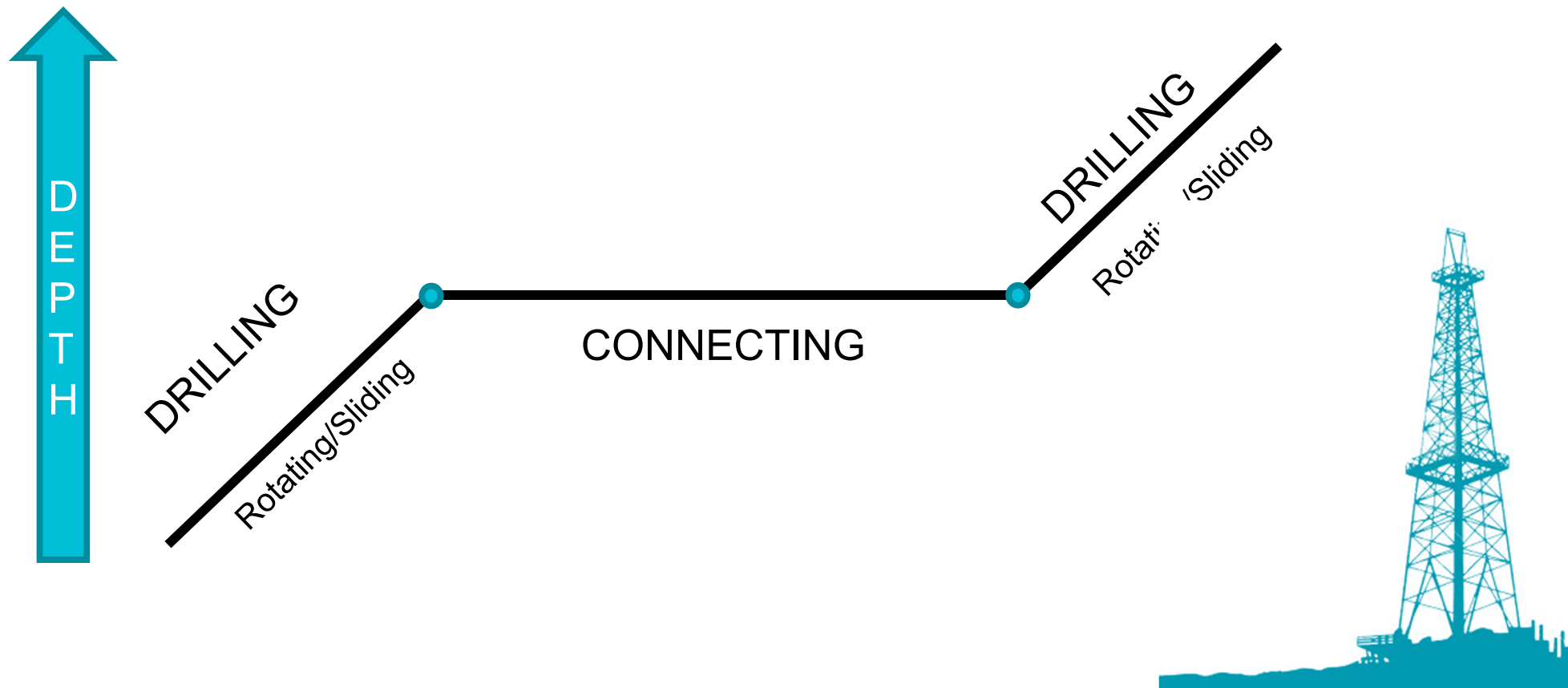
## Event Frames

	Well 2	24:00:33	4/27/2014 1:42:00 PM	5/21/2014 1:42:33 PM
	Sliding	0:18:50	4/28/2014 2:40:10 PM	4/28/2014 2:59:00 PM
	Rotary ...	7:40:38	4/29/2014 3:33:45 PM	4/29/2014 11:14:23 PM
	Sliding	1:11:30	5/1/2014 3:23:04 PM	5/1/2014 4:34:34 PM
	Stick-Slip	1:23:35	5/2/2014 5:39:00 AM	5/2/2014 7:02:35 AM
	Sliding	0:23:00	5/3/2014 5:32:30 AM	5/3/2014 5:55:30 AM
	Rotary ...	8:49:59	5/4/2014 1:33:23 AM	5/4/2014 10:23:22 AM
	Stick-Slip	0:11:29	5/5/2014 4:43:45 PM	5/5/2014 4:55:14 PM
	Sliding	10:41:00	5/6/2014 10:41:10 AM	5/6/2014 9:22:10 AM
	Sliding	0:35:04	5/7/2014 8:40:20 AM	5/7/2014 9:15:24 AM



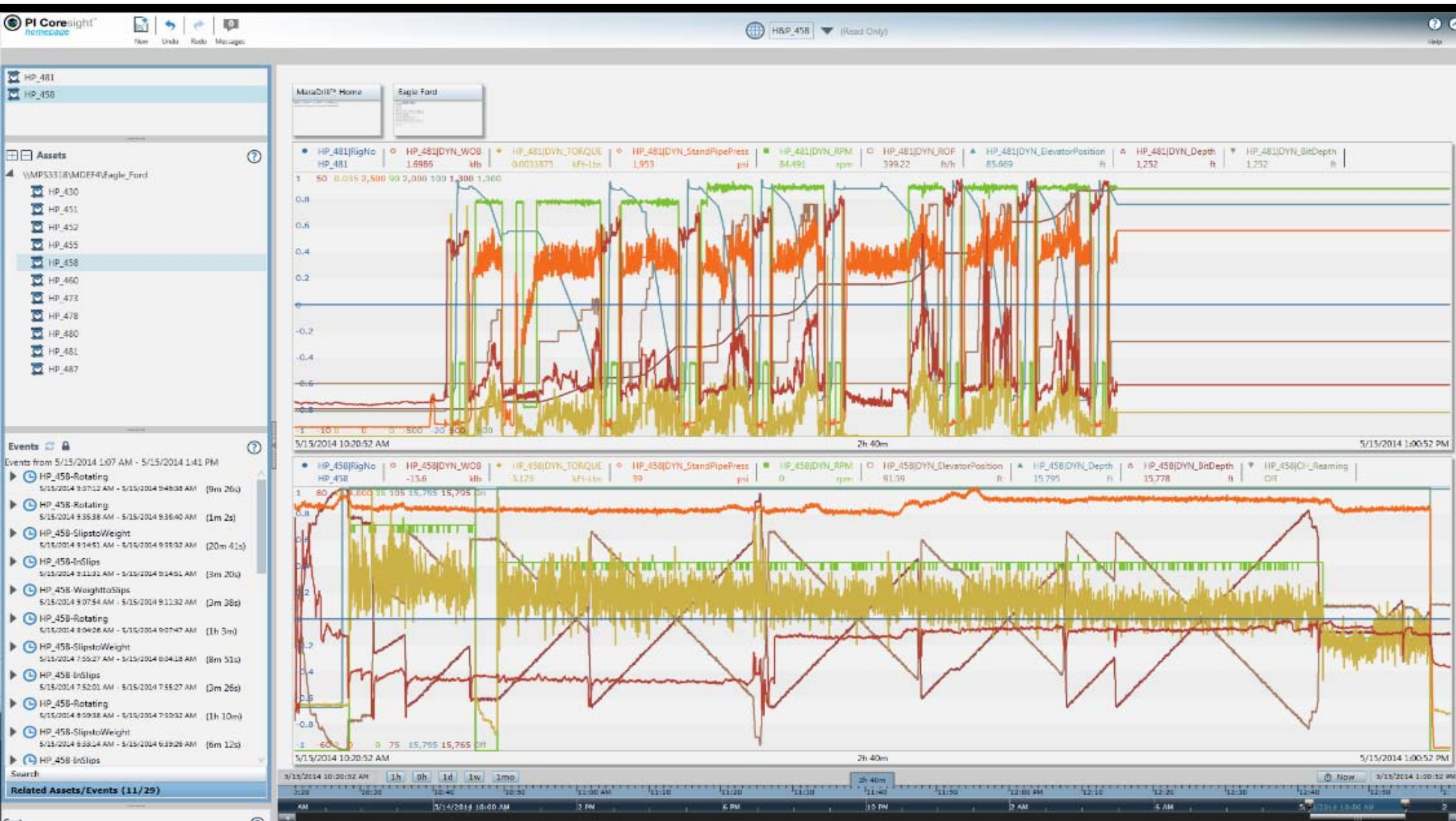
# Major Drilling Events

– Looking for Sources of Idle Time

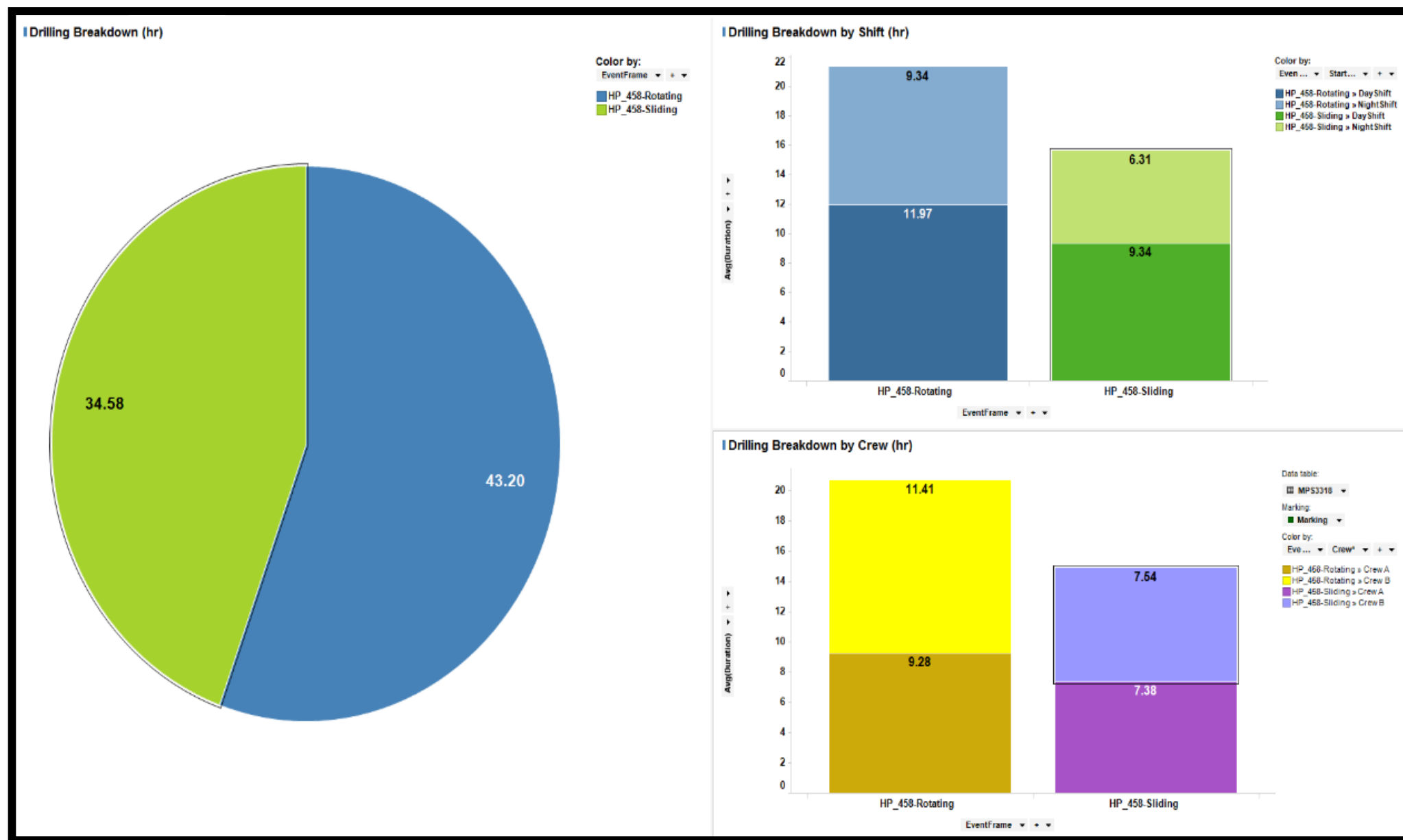


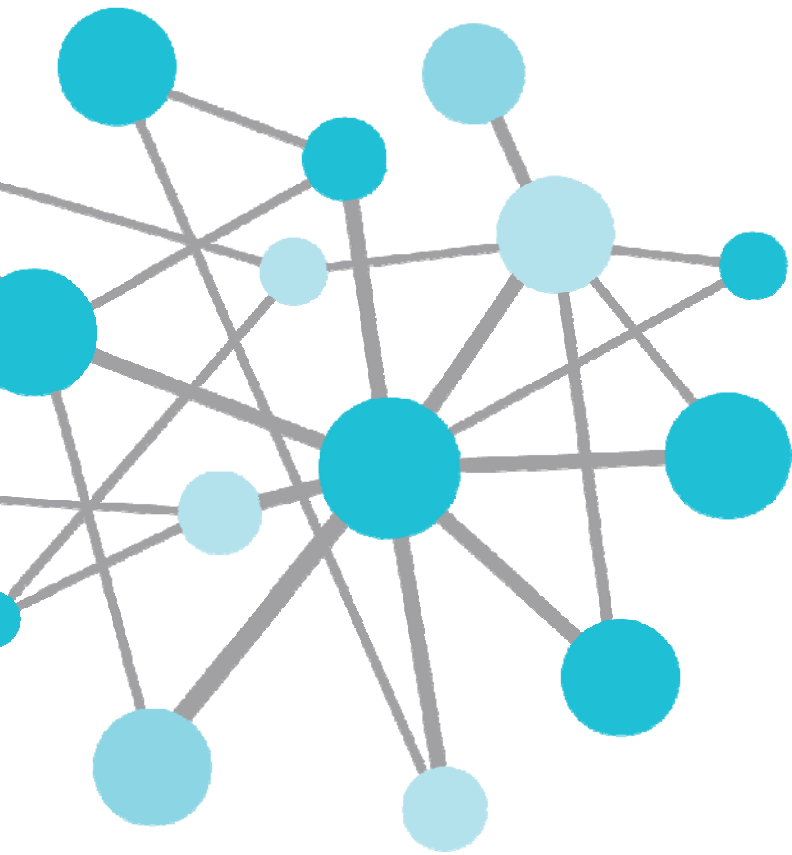


# Self Serve Analytics & Visualization, Mobility.....Consistency, Alignment, Simplicity, and in Context – Drilling Events



# Microsoft Power BI for Advanced Analytics

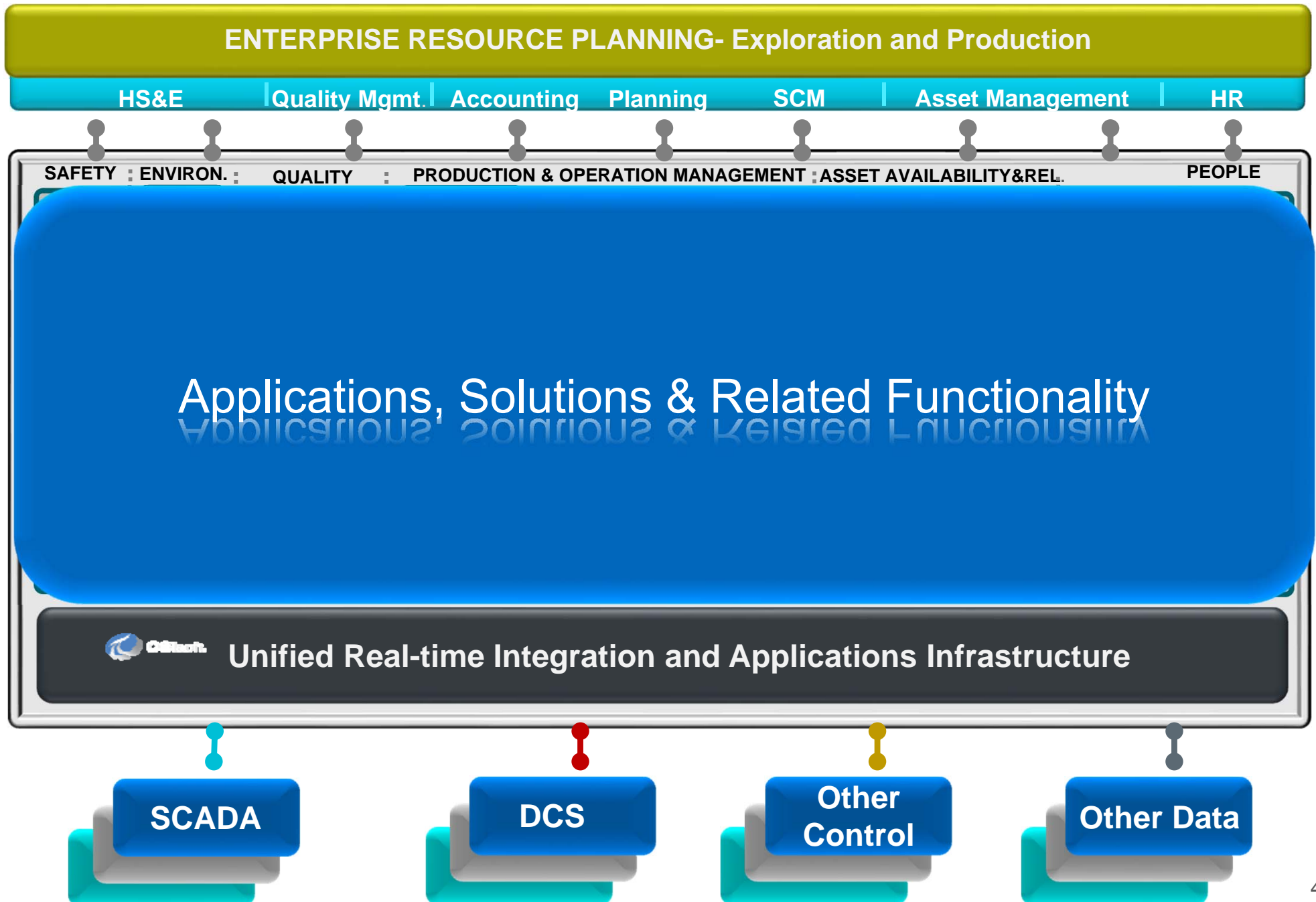




# Illustrative Case Study – Talisman Energy

**Data Consistency and Context**  
**Organizational Alignment**  
**Applications/Solutions Simplicity**  
**Data Transformation Methodology**

# Moving Applications to & Integrating Solutions with the Data Infrastructure – Simplification & Standardization



# Decomposition of Typical “CBM Solution”

(note: concept can be applied to a majority of solutions)

## Asset Management CBM “Solution”

### Gather Asset Information

Temperature  
Flow  
Pressure  
Vibration  
# of start/stops, etc.

**PI Archive**

### Transform into “Condition” Information

Efficiency (%)  
Design vs Actual  
Rate of Change  
Cycles per period

**PI PE, PI AF,**

### Perform Analysis Rules - CBM

Time in Service  
Total Volume  
Performance DvA  
Max T or Vib

**PI AF, PI ACE**

### Perform analytics, visualization, propagation:

KPIs  
Visuals  
Reports  
Applications

**PI AF, PI Notifications**

### Integrate into work flow Systems

(ie Maximo, SAP, Meridian)

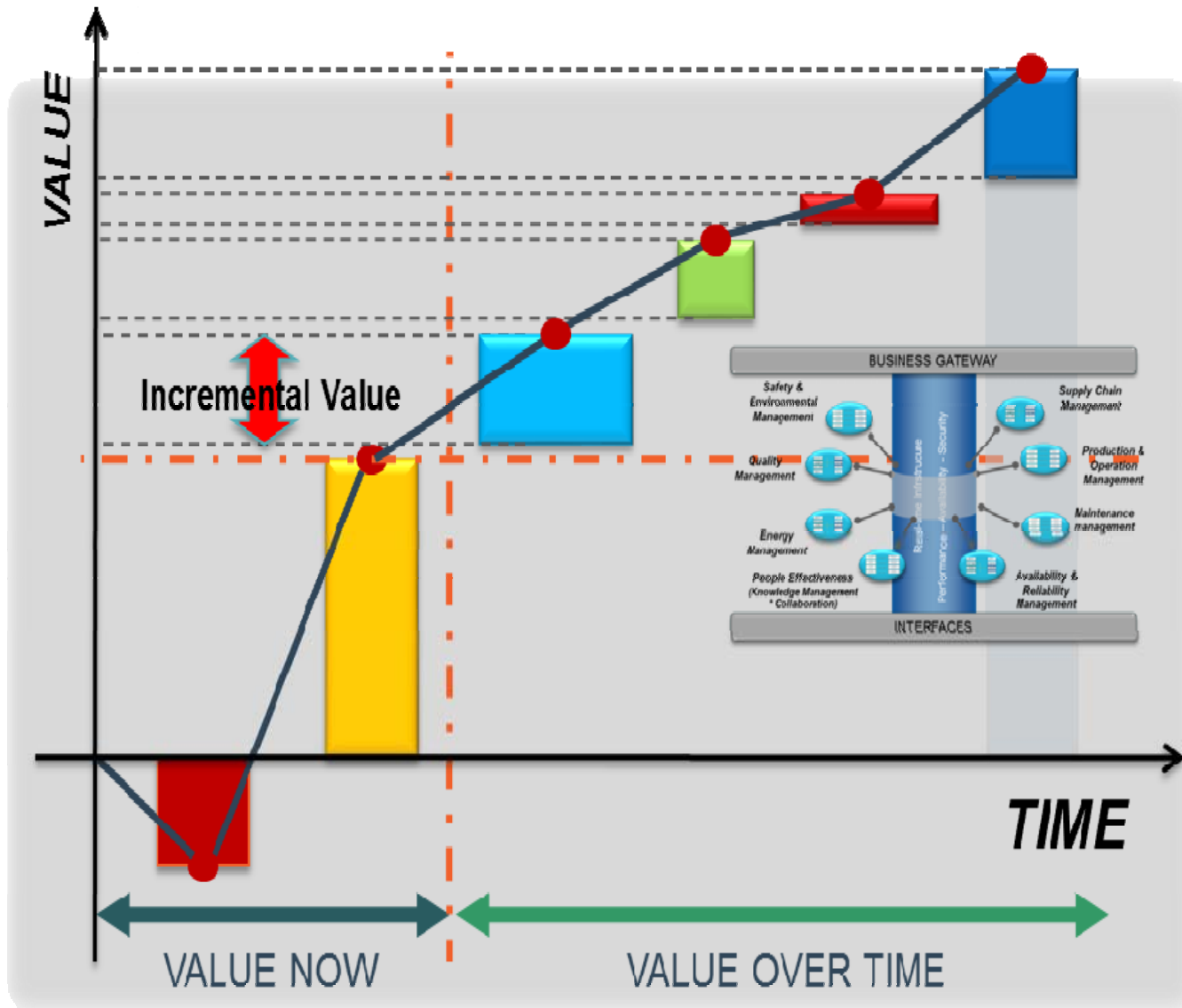
**PI System Access**

Functionality Configured in the PI System Infrastructure





# An Infrastructure Approach

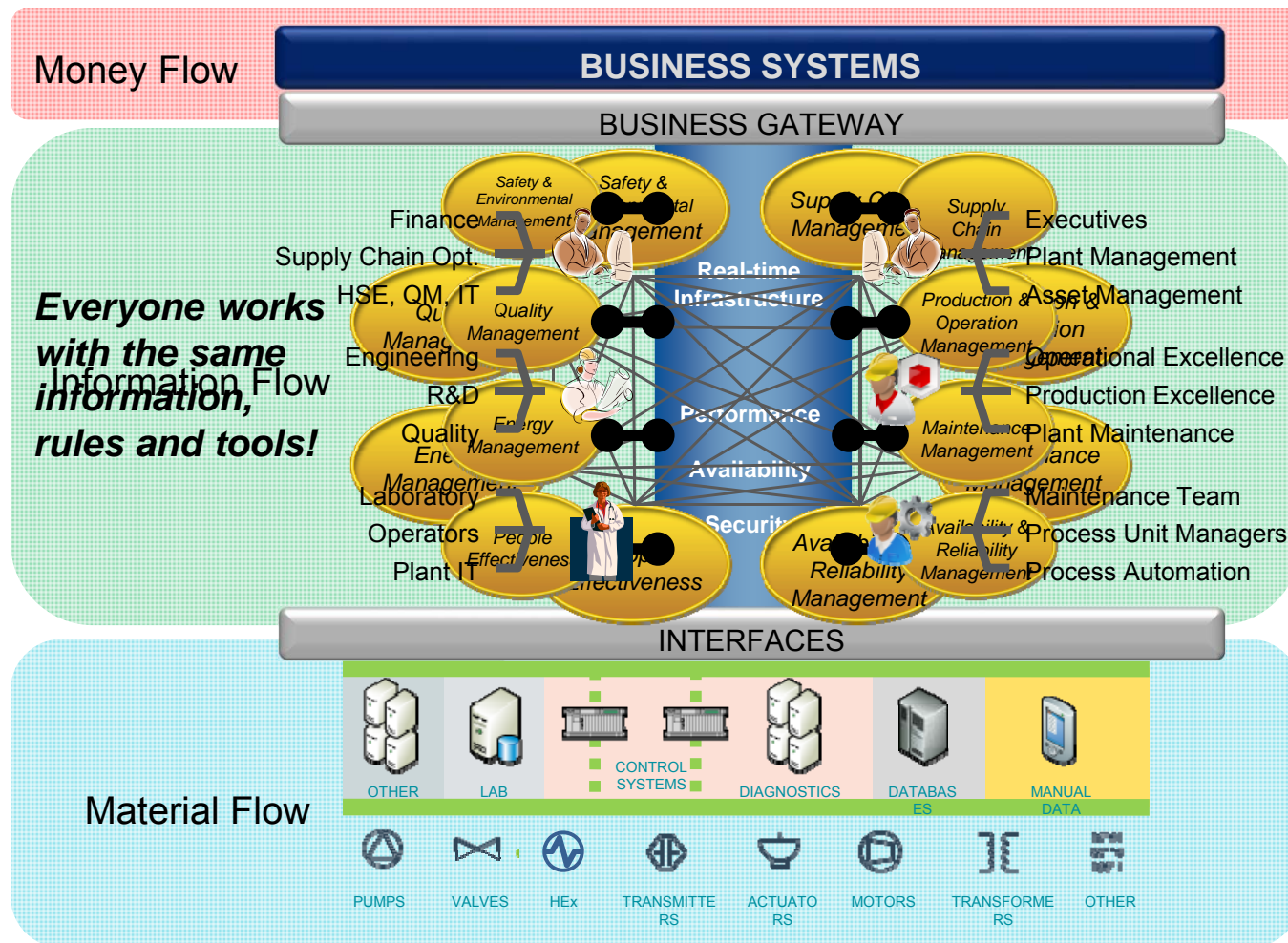


- ← Performance Management
- ← Environmental Reporting
- ← Equipment Health Mgmt.
- ← Operations Management

← Initial Infrastructure Value

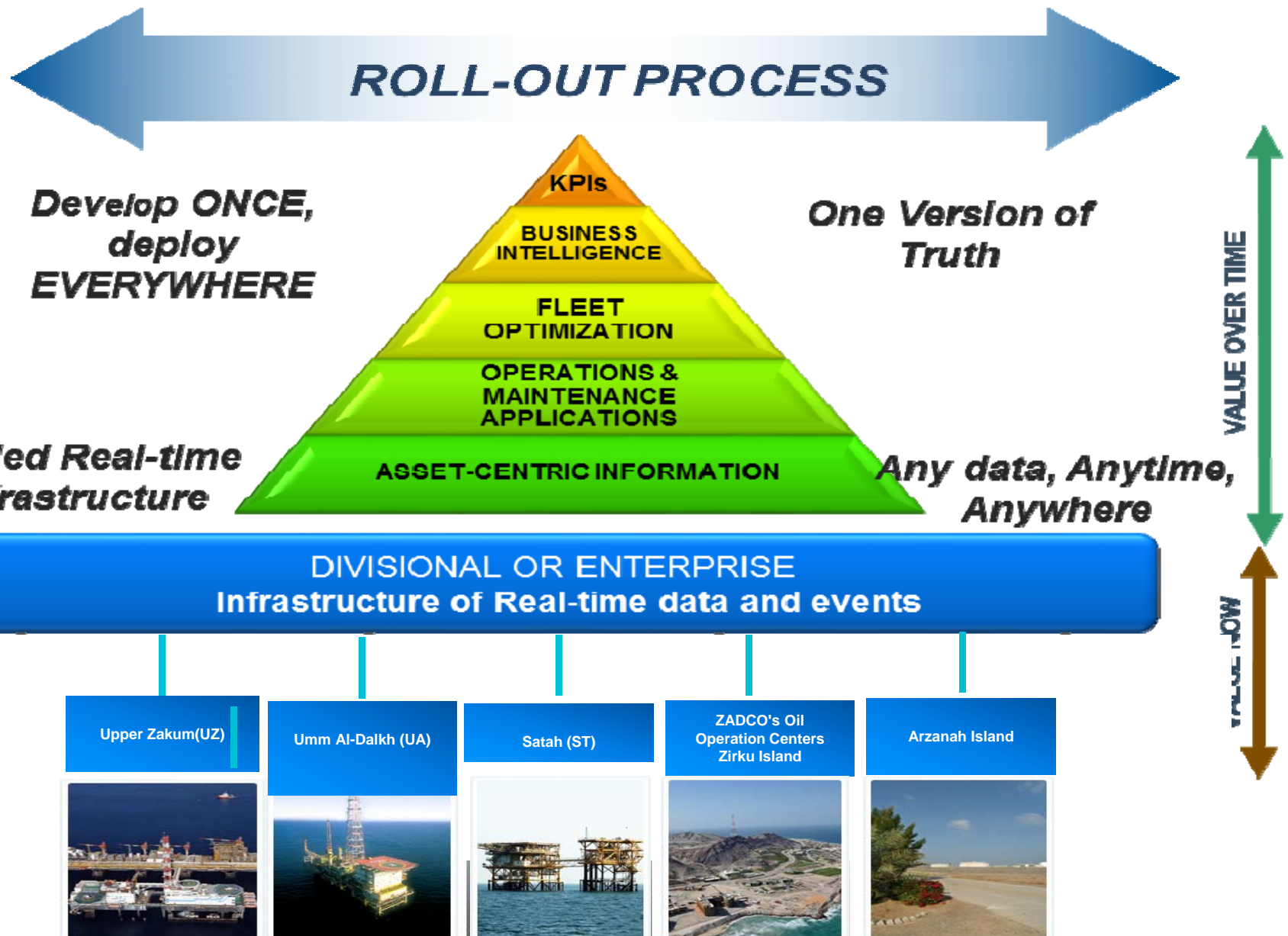
← Infrastructure Initial Investment

# Enablement of Business to Operations Value

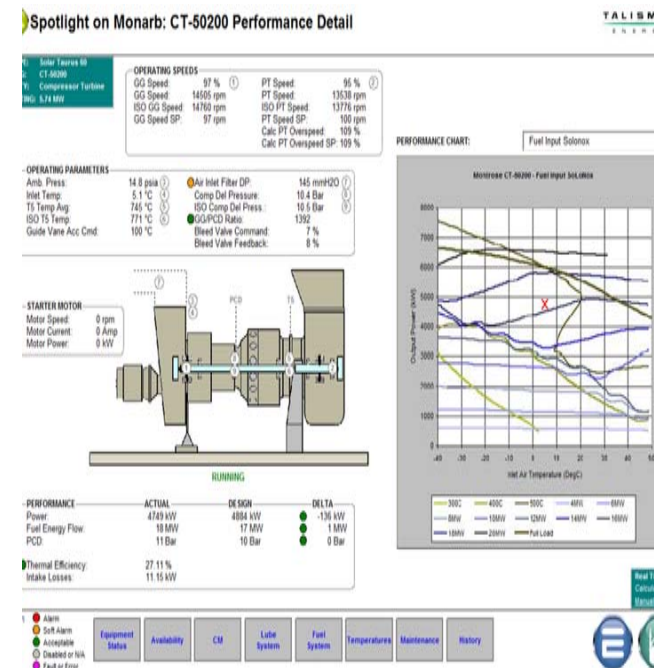
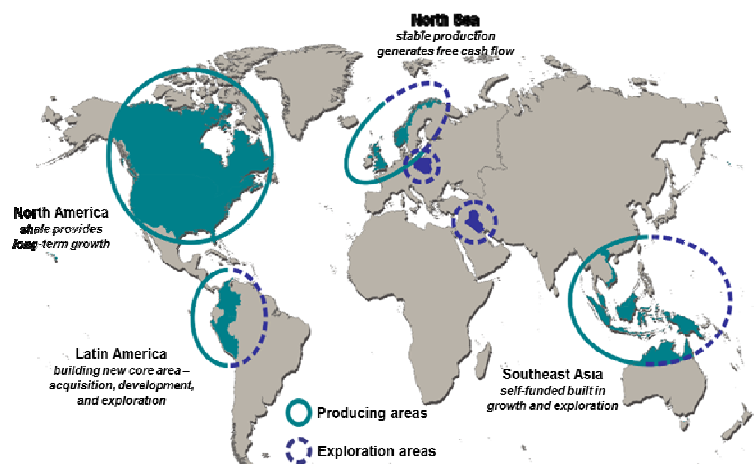


# Infrastructure, to harness the Power of Data

*Implementing Strategic Initiatives on Enterprise Scale*



# Real-Time Monitoring of 2,900 Safety, Production, and Water Critical Pieces of Rotating Equipment



## Business Challenge

- Consistency in displays, calculations, process points, and operating points
- Continuous monitoring of live and derived values against alarm limits and thresholds
- Improved overall production by reducing critical rotating equipment failures

## Solution

- Creation of a PI System based solution – SPOTLIGHT to monitor 2900 critical pieces of equipment – in 6 months
- Goals:
- Improve reliability Reduce production losses from rotating equipment
- Improve rotating equipment integrity

## Results and Benefits

- Globally consistent, aligned, and simplified application
- Ability to scale and replicate to other assets
- Saved 220K BPD of lost production from avoidance of incident in first 6 months

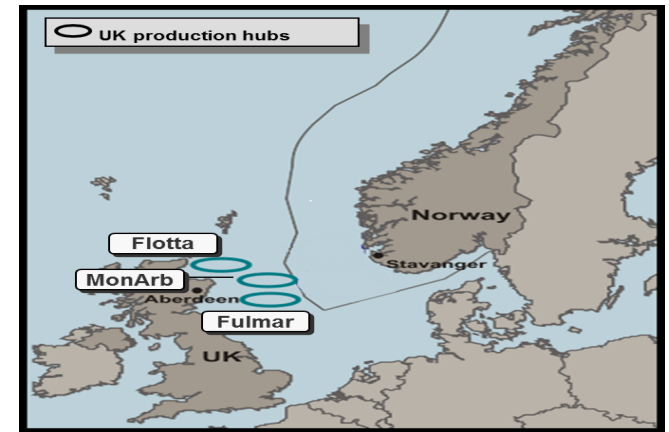
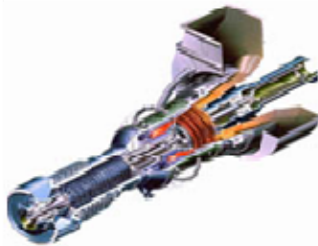


# Business Challenge

## Offshore – 8 Production Platforms

### Safety Critical Equipment

- 39 Diesel Drive Fire Pumps
- 6 Electric Drive Fire Pumps
- 8 Hydraulic drive fire pumps
- 15 Emergency Power Generation Packages
- 26 Bilge / Ballast Pumps
- 53 Other Safety Critical Pumps



### Production Critical Equipment

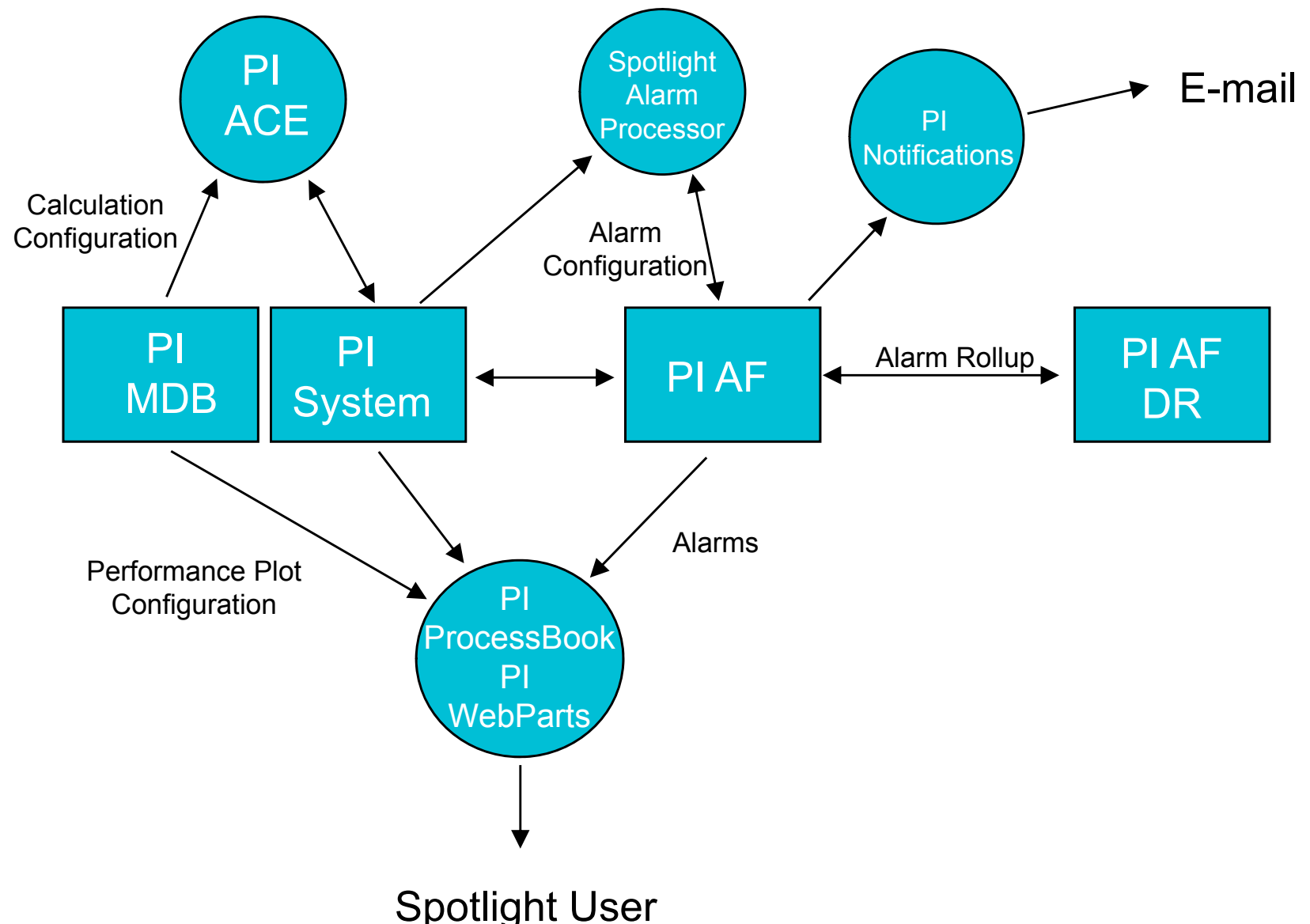
- 56 Gas Turbines
- 40 Gas Compressors
- 9 Diesel Engines for Main Power Generation
- 27 Main Water Injection, P.W. & Artificial Lift Pumps
- 35 Main Oil Line Pumps
- Circa 2711 Operational Pumps



A total of **2831** pieces of Major Rotating Equipment



# Spotlight Architecture



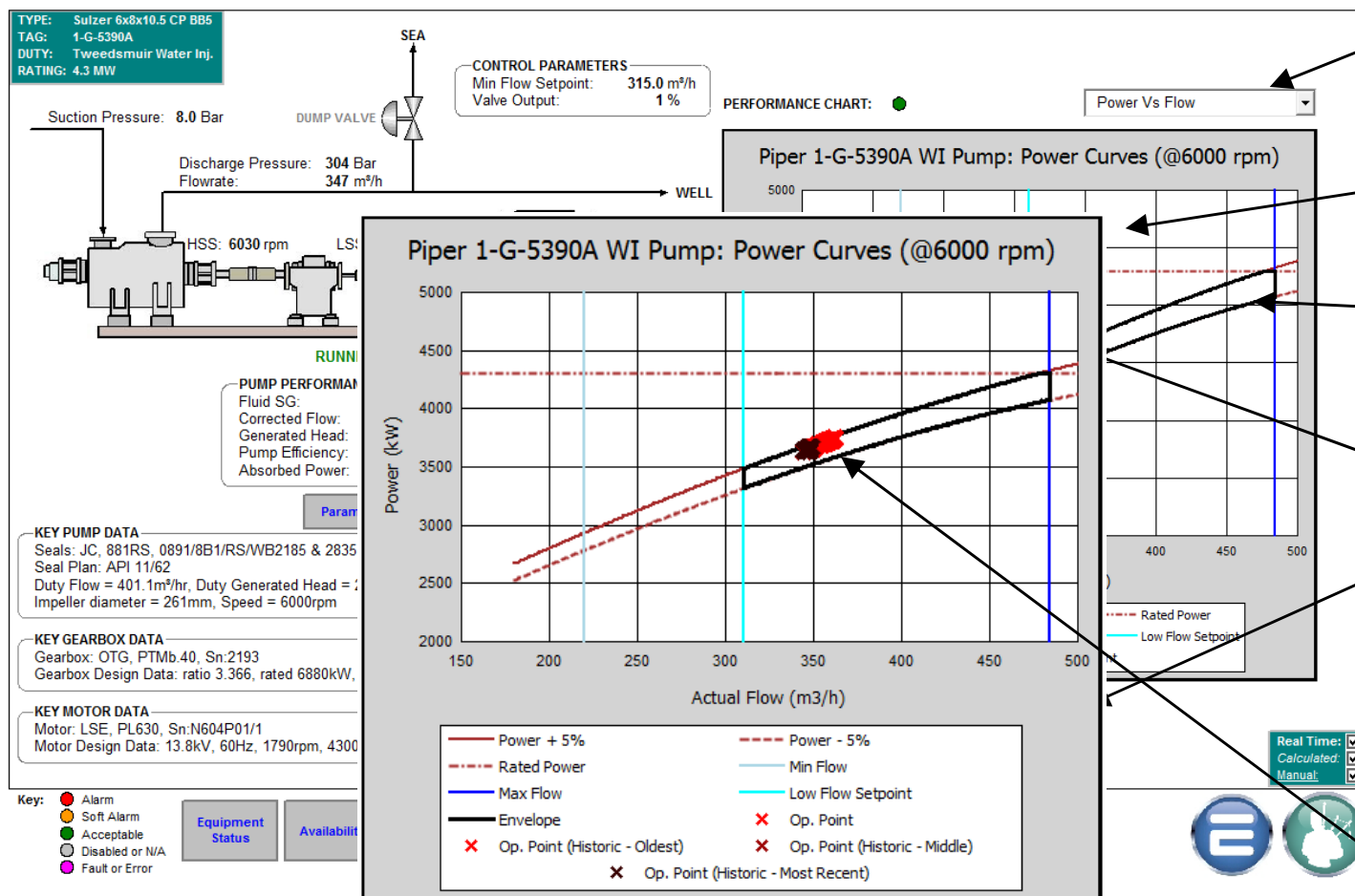
Spotlight User



# Spotlight Display - Performance

## Spotlight on Piper B: 1-G-5390A Performance Detail

TALISMAN  
ENERGY



User can select different charts associated with this item

Chart showing performance constraints

Operating Envelope

Current operating point

View operating point history over varying time periods

Operating point "cloud" shows history

# KPIs with High Fidelity “Live” Drill Down



## Spotlight on Rotating Equipment: Piper Overview

TALISMAN  
ENERGY

Overview	Auk	Bleo Holm	Buchan	Claymore	Clyce	Flotta	Fulmar	MonArb	Piper	Satire	Tartan				
Gas Compression								Main Oil Line							
	Run	Avail.	Perf.	CM	Lube	Seal	Maint		Run	Avail.	Perf.	CM	Lube	Seal	Maint
K-3110A								1-G-2600A							
K-3110B								1-G-2600C							
K-3110C								1-G-2310A							
K-3210A								1-G-2310B							
K-3210B								Water Injection							
K-3210C									Run	Avail.	Perf.	CM	Lube	Seal	Maint
K-3310A								1-G-5390A							
K-3310B								1-G-5370A							
Power Generation								1-G-5370B							
	Run	Avail.	Perf.	CM	Lube	Temp	Maint	1-G-5370C							
P-8000A															
P-8000B															
P-8000C															
P-8000D															

Traffic light shows  
rolled up alarm  
status for each  
sub-display

Links to detailed  
displays for each  
item of equipment

Links to other  
asset overviews

# Consistency in KPIs, Alarms, & Transformations



Database Query Date Back Check In Refresh

**Elements**

Elements  
Buchan  
Compressors  
C-2030-1

General Child Elements Attributes Ports Version

Filter

Name	Value
Alarm Input	0
Current Alarm State	Process Inhibit
Current Alarm State Value	3
Current Priority	Process Inhibit
Current Priority Value	3
H Alarm	True
Limit Priority	Warning
Limit Value	0.3
HH Alarm	True
Limit Priority	Alarm
Limit Value	0.4
Inhibit	False
L Alarm	False
Limit Priority	Warning
Limit Value	0
LL Alarm	False
Limit Priority	Alarm
Limit Value	0
Process Inhibit	True
User Inhibit	False

Na Inhibit  
De Monitored E  
Co Process Inp  
Ca Running Ec  
De User Inhibit  
Va  
Va  
Da

Asset/Equipment Tree Structure

Individual Equipment (run indicators, etc.)

Displays (alarm rollup for summary)

Individual Alarms (allows more than one alarm type per measurement)

Alarm limits configuration

Process inhibit (run state)  
User inhibit (cascaded down)

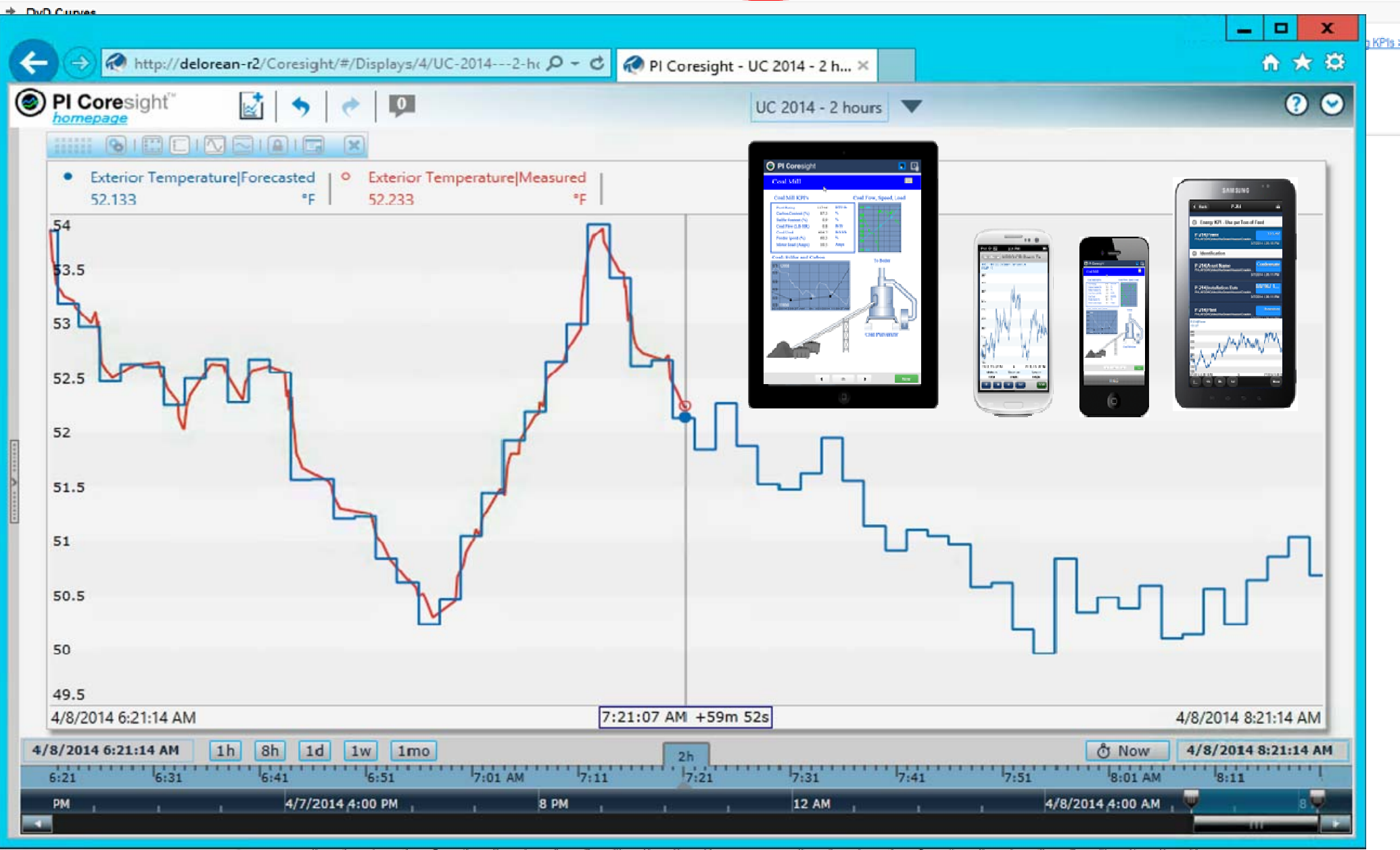
# Agenda



- Business to Operations Data Value Requisites:
  - Data Consistency and Context
  - Organizational Alignment
  - Applications/Solutions Simplicity
  - Data Transformation Methodology
- “Future Proofing” of the Data Infrastructure
- Resulting Value in O&G
- Closing Comments

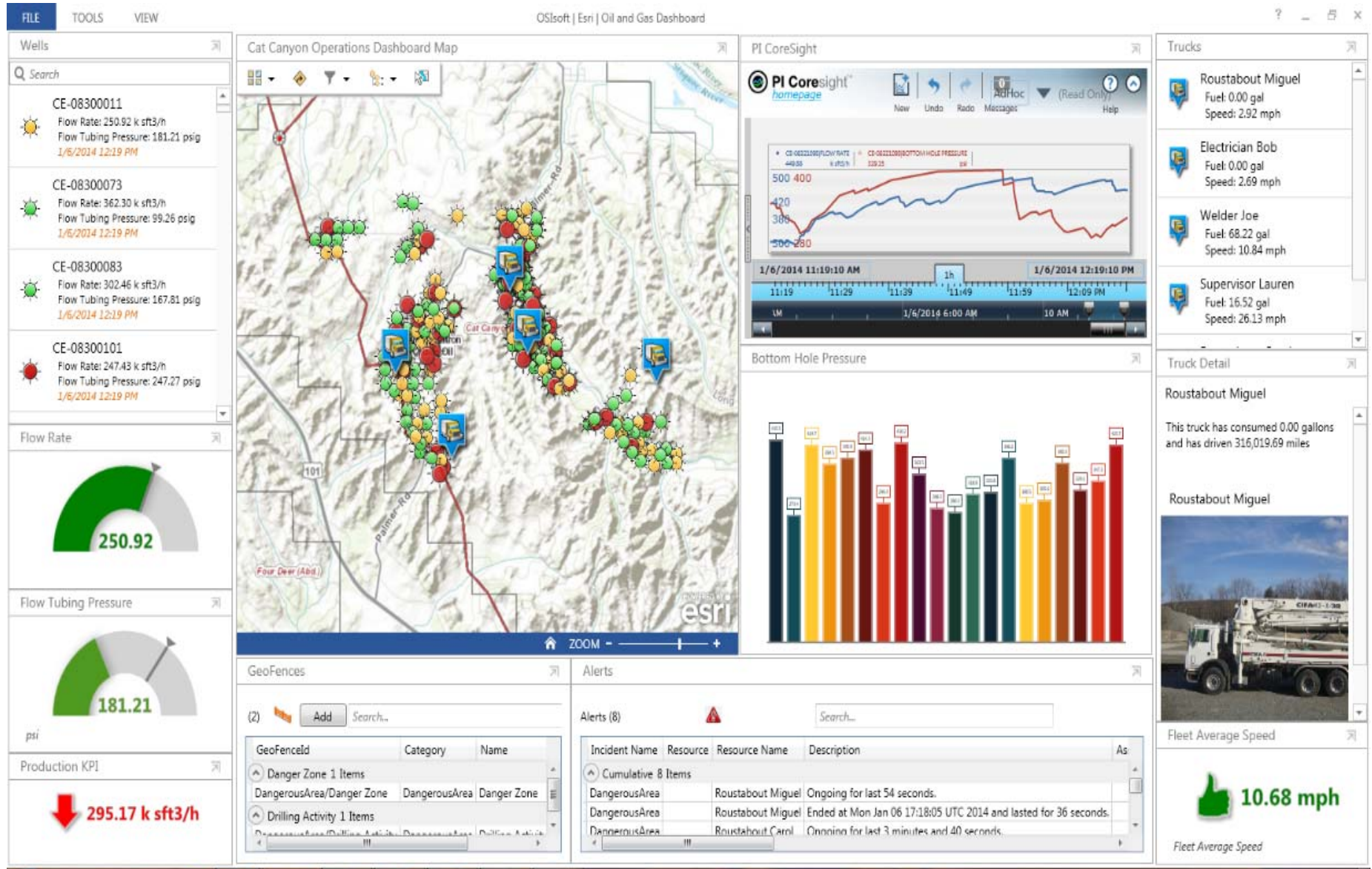


# Future Data – Operational Performance and Model Accuracy



# PI Integrator for Esri ArcGIS

Jump





# Microsoft BI and the PI System

## Extending Analytics and Visualization to the Enterprise

Gas Well Production Report - Excel

FILE HOME INSERT PAGE LAYOUT FORMULAS DATA REVIEW VIEW ADD-INS DATA EXPLORER PI DATALINK PIAF Builder POWERPIVOT ANALYZE DESIGN

Calibri 11 A A

Font Alignment Number Styles Cells Editing

B7 X ✓ fx Field J1

Monthly Gas Well Production to Target  
Exploration and Production Division

	Marine Region			North Region			South Region		
	MSCF	% Target	Target % Status	MSCF	% Target	Target % Status	MSCF	% Target	Target % Status
Field J1	1,577,597	93.12 %	●				1,577,598	99.79 %	●
Field J2	1,779,856	93.71 %	●				1,779,857	91.74 %	●
Field J3	1,969,446	95.14 %	●				1,654,016	94.82 %	●
Field J4	2,421,120	95.61 %	●				2,421,120	93.20 %	●
Field J5	723,875	92.63 %	●				723,875	98.16 %	●
Field 101	3,196,148	95.11 %	●						
Field 105	3,848,336	96.38 %	●						
Field 201	2,962,537	98.55 %	●						
Field 210	1,750,906	100.79 %	●						
Field 211	1,426,471	98.21 %	●						
Field 300	1,492,600	94.74 %	●						
Field 301	4,281,977	94.72 %	●						
Field 302	1,684,247	91.63 %	●						
Field 304	2,205,850	93.70 %	●						
Bagre				1,841,490	87.82 %	●			
Blue				1,251,376	100.69 %	●			
Brown				1,495,303	94.88 %	●			
Gold				1,496,741	95.88 %	●			
Maroon				1,662,188	100.31 %	●			
Purple				4,537,183	94.83 %	●			
Red				1,900,530	93.47 %	●			
Yellow				1,871,050	99.36 %	●			
Terminal 2D				1,841,491	94.28 %	●			
Grand Total	31,320,966	95.47 %	●	17,897,351	95.55 %	●	8,156,466	94.91 %	●

Production Performance Summary Production vs. Target Gas Production Field Analysis Geographical ...

READY 100%

# “High Fidelity” Business Intelligence (BI) With Microsoft

Gas Well Production Report - Excel

FILE HOME INSERT PAGE LAYOUT FORMULAS DATA REVIEW VIEW ADD-INS DATA EXPLORER PI DATALINK PI AF Builder POWERPivot ANALYZE DESIGN

Clipboard Font Alignment Number Styles Cells Editing

B7 Field J1

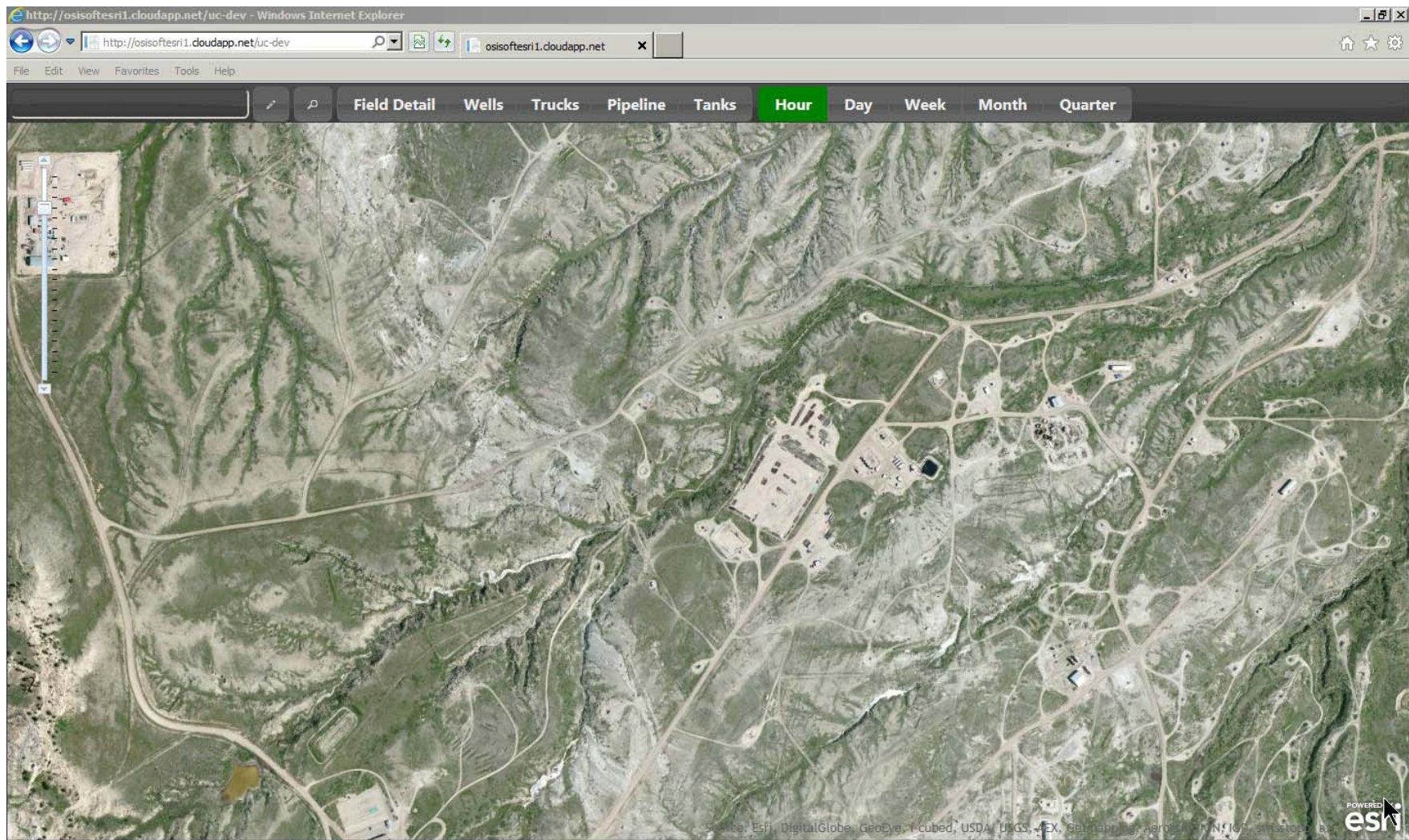
Monthly Gas Well Production to Target									
Exploration and Production Division									
Marine Region				North Region			South Region		
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Production Performance Summary Production vs. Target Gas Production Field Analysis Geographical ...

READY

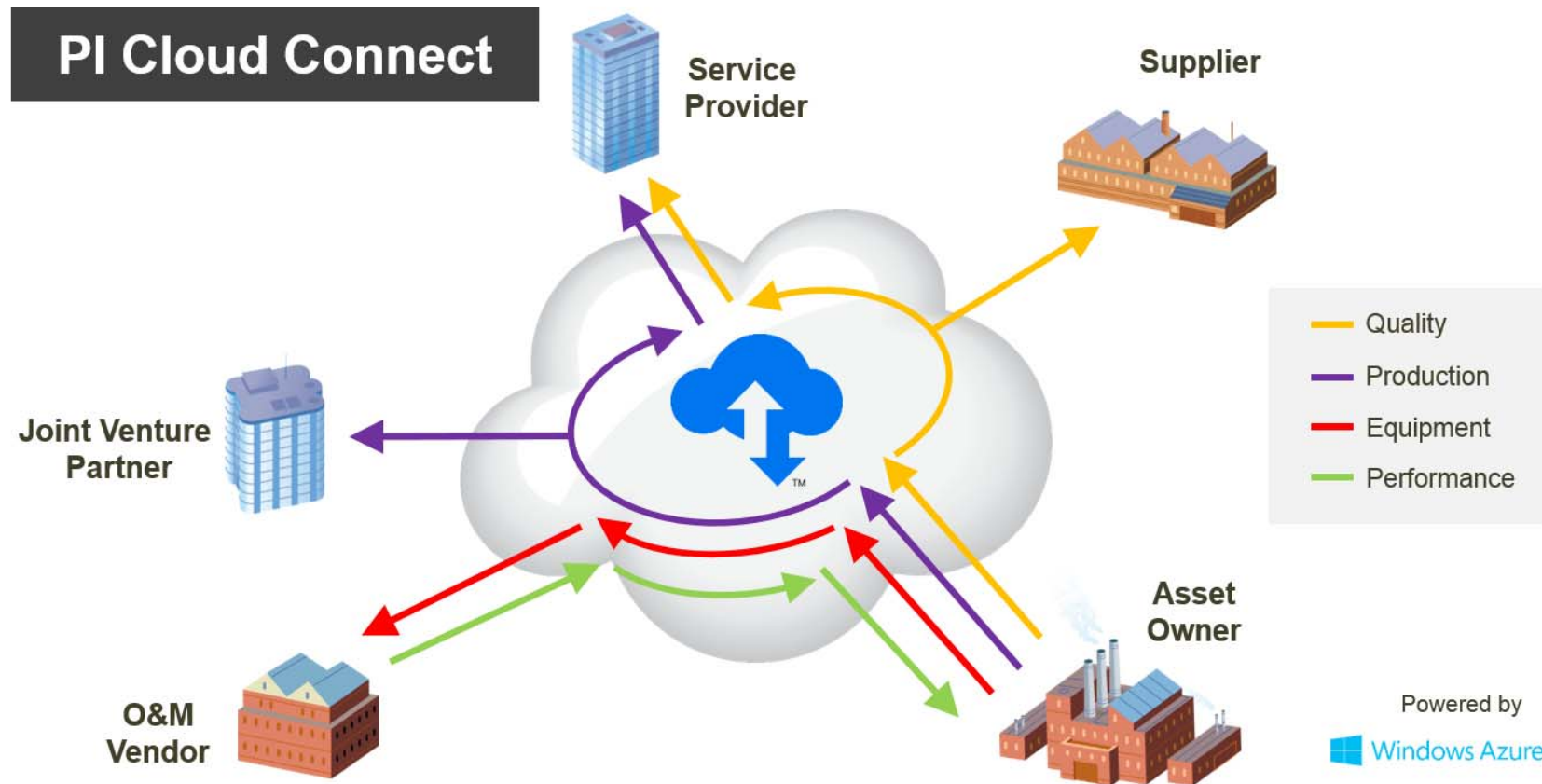


# Geospatial Integration with “High Fidelity” BI





# Cloud Services



# Agenda



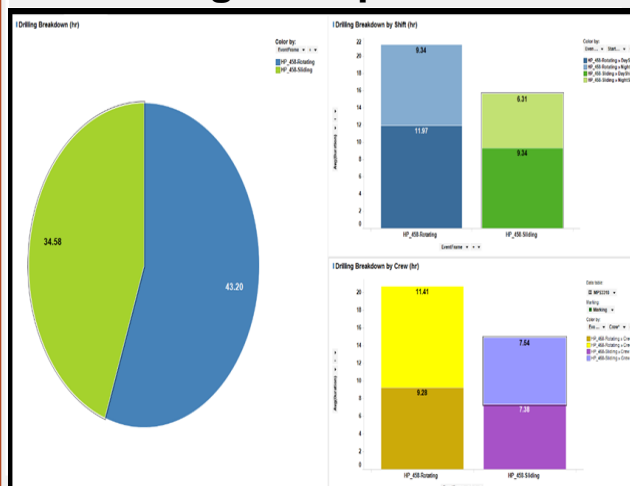
- Business to Operations Data Value Requisites:
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# Enabling Op Ex in All Areas of E&P/Logistics

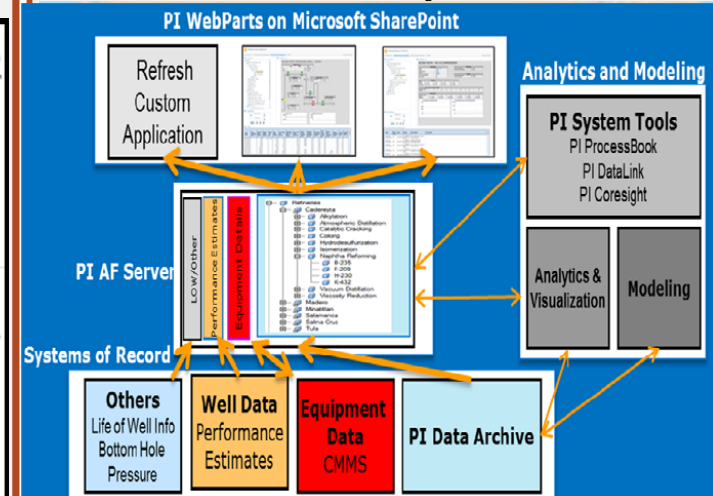
## Asset Performance, Reliability, & Portfolio Management



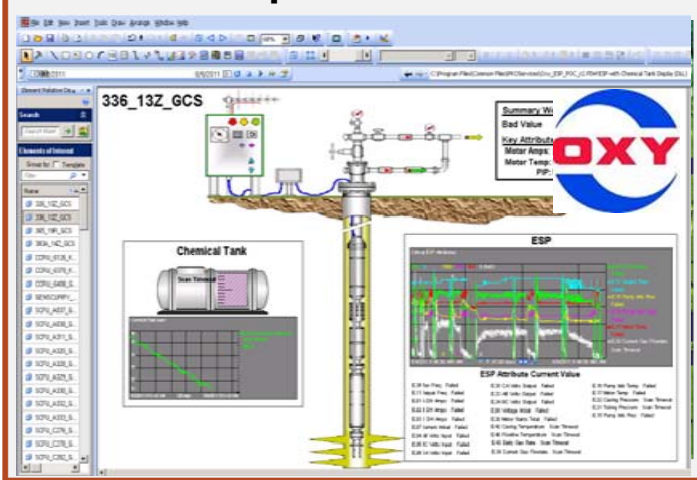
## Drilling and Completion Oversight & Optimization



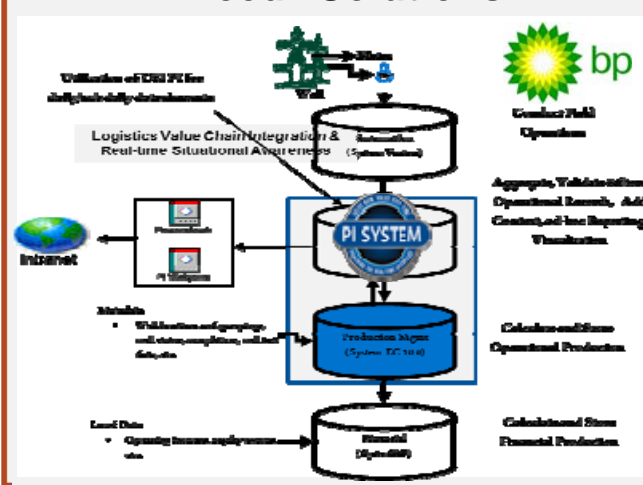
## Production Operational Excellence & Optimization



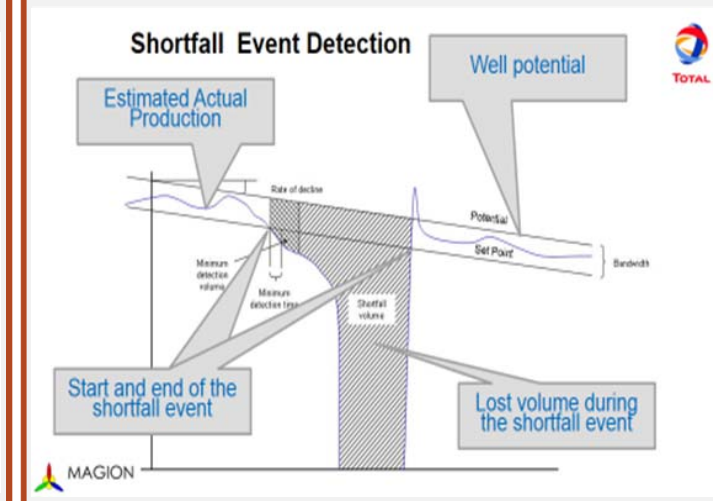
## Artificial Lift Reliability and Optimization



## Augmentation of "Best of Breed" Solutions



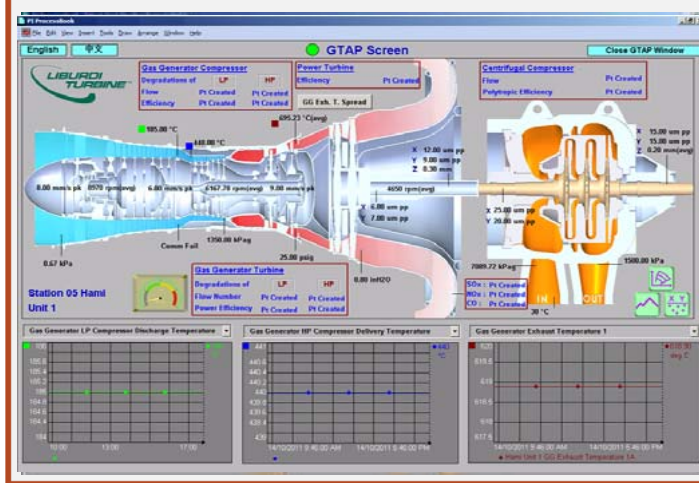
## Integration with E&P Analytics & Visualization/Post Well Science





# Enabling Op Ex in All Areas in O&G Logistics

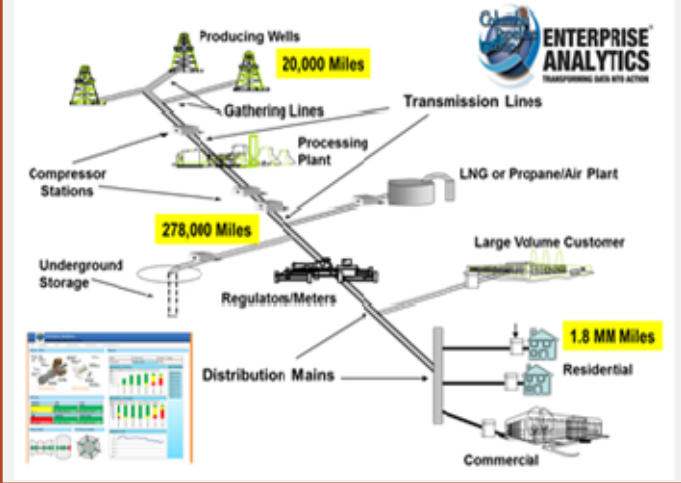
## Asset Performance, Reliability, & Portfolio Management



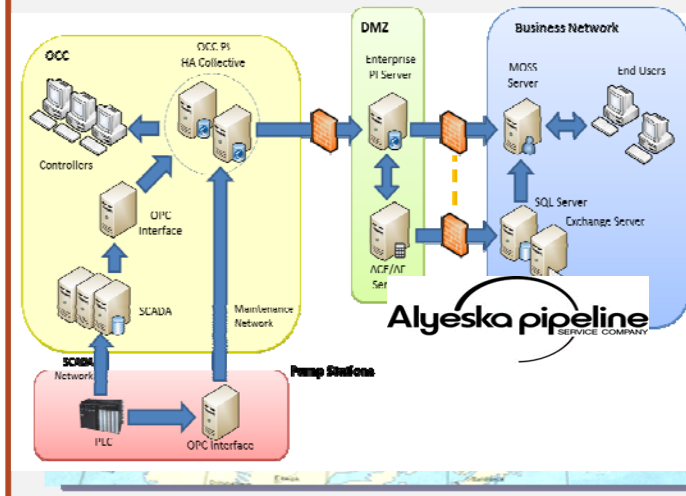
## Geospatial Integration "Real-Time & Space"



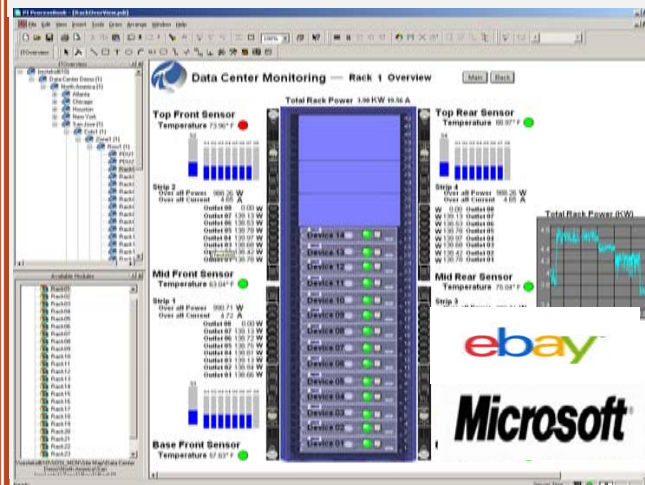
## Gas Value Chain Integration & RT Situational Awareness



## SCADA/DCS Augmentation



## IT/SCADA Infrastructure Energy & Reliability Mgmt

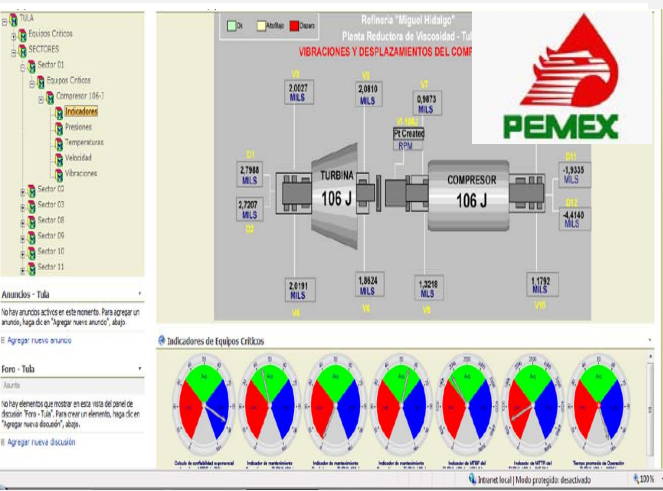


## Compliance Reporting, Environmental & Energy Mgmt.

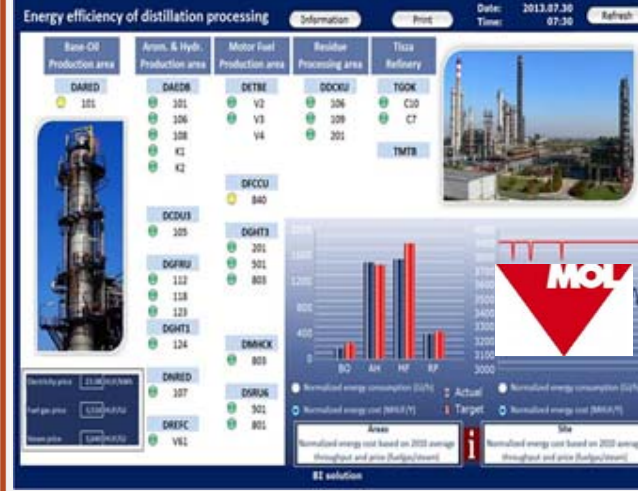
TOTAL PHYSICAL PIPELINE SUMMARY				LINEPACK SUMMARY			
Volume	Energy	GL	Ch	Volume	Energy	GL	Ch
201705.1	8145.2	1055282.1	872214.3	201705.1	8145.2	1055282.1	872214.3
Actual Receipts	48120.0	1828.4	185448.6	170443.2	-182.1	4.7	-202.4
Actual Deliveries	28750.0	1385.4	171948.3	182128.9	-4848.2	-164.1	-6834.4
Actual Fuel and Utility Gas	18671.1	66.4	73287.7	73286.8	27.0	1.0	-108.4
SCHEDULED VOLUMES SUMMARY				CURRENT COMPRESSOR STATION OPERATING CONDITIONS			
Volume	Energy	GL	Ch	Compressor	Status	Speed	Section Pressure
201705.1	1534.1	18837.41	170443.2	Blanchard H&C	Ready to Start	8171	84.1
Total Scheduled Receipts	48120.0	1828.4	185448.6	Blanchard H&C L1	Running	8171	84.1
Total Scheduled Deliveries	28750.0	1385.4	171948.3	Blanchard H&C L2	Ready to Start	8171	84.1
Total Scheduled Fuel and Utility Gas	18671.1	66.4	73287.7	Blanchard H&C L3	Running	8171	84.1
CANADIAN PIPELINE PHYSICAL SUMMARY				Blanchard H&C L4	Running	8171	84.1
Volume	Energy	GL	Ch	Blanchard H&C L5	Running	8171	84.1
201705.1	1534.1	18837.41	170443.2	Blanchard H&C L6	Running	8171	84.1
Actual Receipts	48120.0	1828.4	185448.6	Blanchard H&C L7	Running	8171	84.1
Actual Deliveries	28750.0	1385.4	171948.3	Blanchard H&C L8	Running	8171	84.1
Actual Fuel and Utility Gas	18671.1	66.4	73287.7	Blanchard H&C L9	Running	8171	84.1
ESTIMATED CANADIAN PIPELINE IMBALANCE				Blanchard H&C L10	Running	8171	84.1
Volume	Energy	GL	Ch	Blanchard H&C L11	Running	8171	84.1
201705.1	1534.1	18837.41	170443.2	Blanchard H&C L12	Running	8171	84.1
Delivery Imbalance	1022.0	36.4	18837.41	Blanchard H&C L13	Running	8171	84.1
Fuel and Utility Gas Imbalance	43.0	1.0	18837.41	Blanchard H&C L14	Running	8171	84.1
USA PIPELINE PHYSICAL SUMMARY				Blanchard H&C L15	Running	8171	84.1
Volume	Energy	GL	Ch	Blanchard H&C L16	Running	8171	84.1
201705.1	1534.1	18837.41	170443.2	Blanchard H&C L17	Running	8171	84.1
Actual Receipts	48120.0	1828.4	185448.6	Blanchard H&C L18	Running	8171	84.1
Actual Deliveries	28750.0	1385.4	171948.3	Blanchard H&C L19	Running	8171	84.1
Actual Fuel and Utility Gas	18671.1	66.4	73287.7	Blanchard H&C L20	Running	8171	84.1
ESTIMATED USA PIPELINE IMBALANCE				Blanchard H&C L21	Running	8171	84.1
Volume	Energy	GL	Ch	Blanchard H&C L22	Running	8171	84.1
201705.1	1534.1	18837.41	170443.2	Blanchard H&C L23	Running	8171	84.1
Delivery Imbalance	1022.0	36.4	18837.41	Blanchard H&C L24	Running	8171	84.1
Fuel and Utility Gas Imbalance	43.0	1.0	18837.41	Blanchard H&C L25	Running	8171	84.1

# Enabling Operational Excellence in Hydrocarbon Processing

## Asset Performance, Reliability, & Portfolio Management - CBM



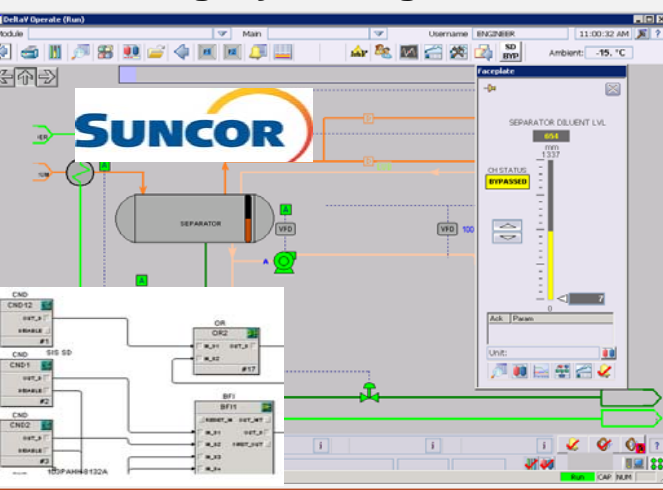
## Environmental, Energy & Utilities Management



## Ops Visibility, Reporting & Analytics, YA, “live” KPIs, & Model Based PvA

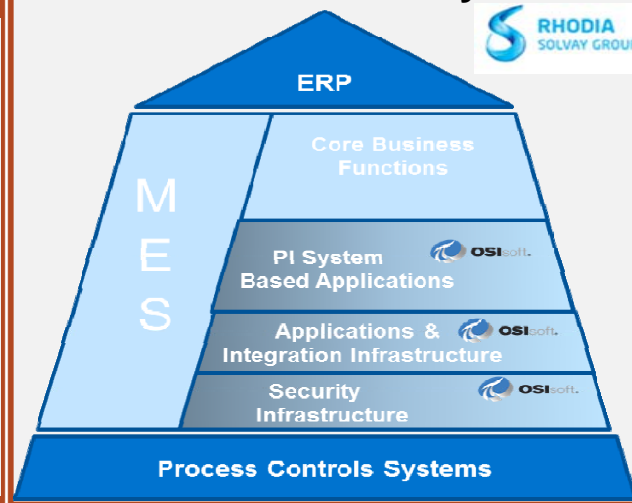


## Safety & Reactive/Proactive Integrity Management

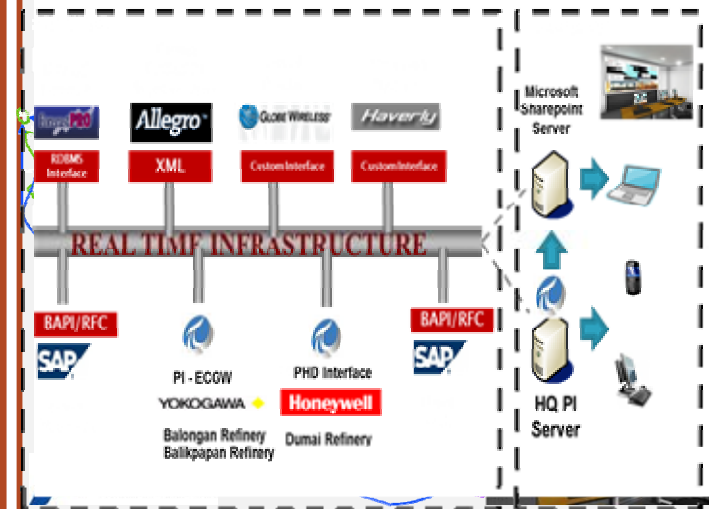


## Infrastructure for MES

### MES AND The PI System



## Value Chain Integration & Real-time Situational Awareness



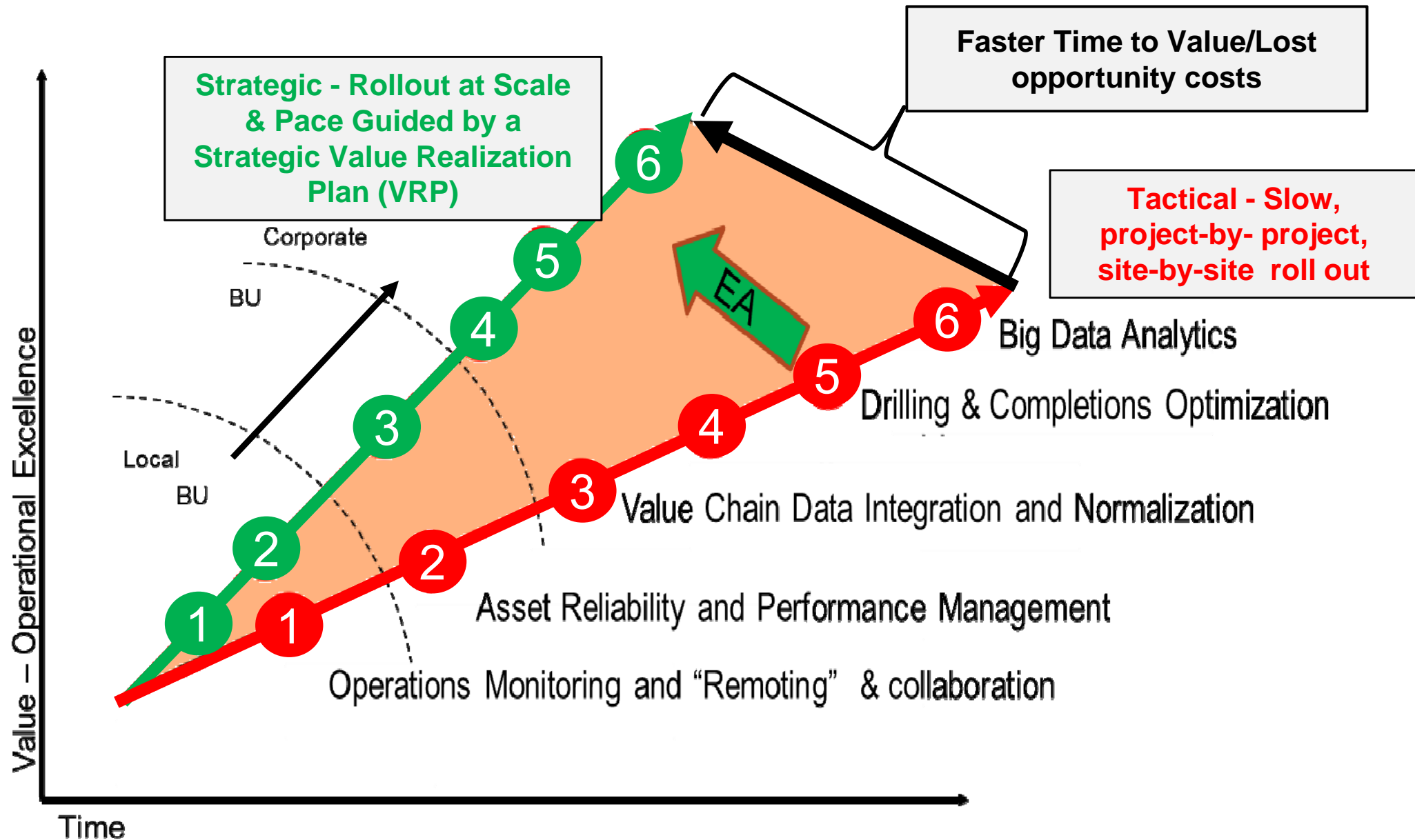


# Agenda



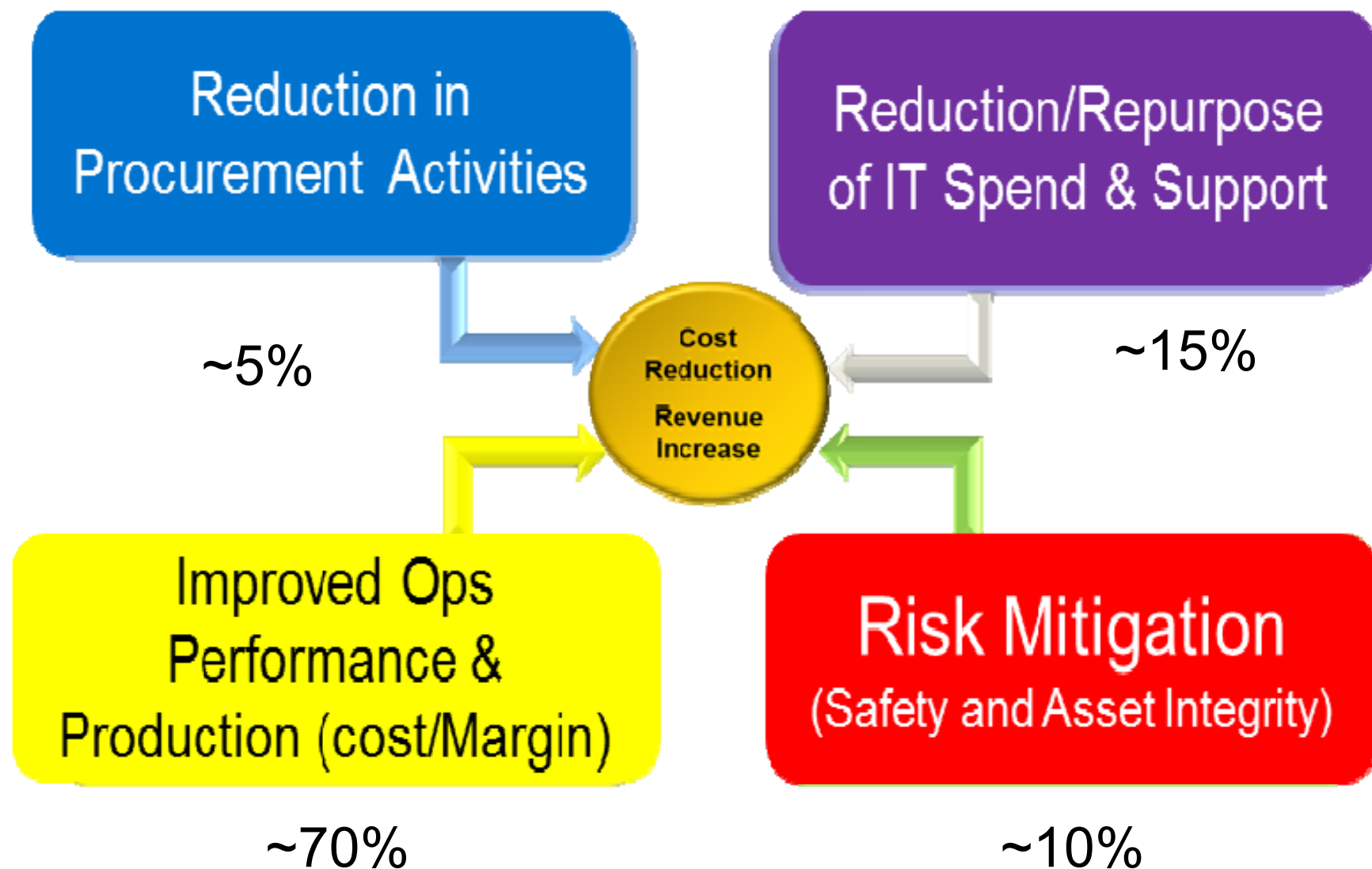
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# Accelerating the Benefits of Operational Excellence



# Possible Business Case Framework for an EA

% of total EA benefits



Note: Estimate from the 1,100 case studies that can be found on the web.. Your results may differ

# Key Takeaways....



- The key to Business to Operations Value is data :
  - Consistency
  - Alignment
  - Simplicity
  - Transformation in the infrastructure vs applications, solutions, and business systems where possible
- Infrastructure vs Custom applications & Solution approach
- PI AF can be and is a strategic enabler
- The PI System Future Proofs the data infrastructure
- The EA is a way to accelerate the benefits from your PI System

# Craig Harclerode

[charclerode@osisoft.com](mailto:charclerode@osisoft.com)

Industry Principal

OSIsoft





# THANK YOU

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