

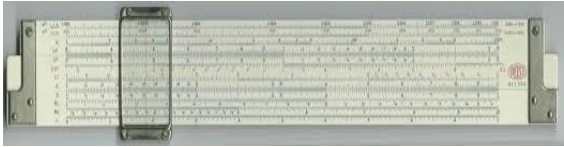
# The Global Energy Revolution

## Taking Advantage of the Inflection Point with the PI System as a Strategic Data Infrastructure

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



# My Career & Technological Change - What a Ride!



What I used in College as a Freshman



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



My First Job out of College..



In the not to distant future...



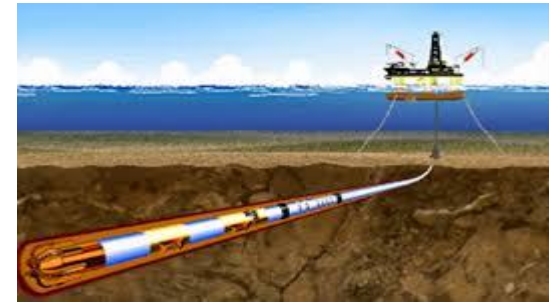
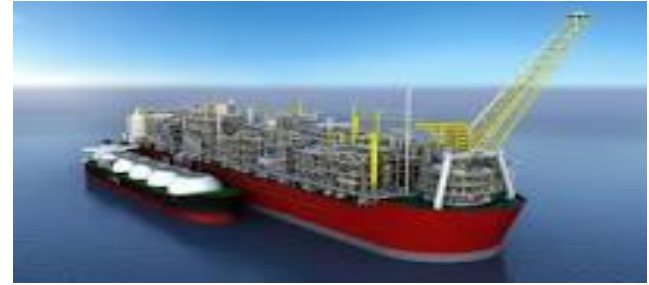
# Agenda



- Implications of “Shale” Revolution
- The Perfect Storm ...and Inflection Point in the Importance of Data and Information
- Key New Capabilities of the PI System for O&G
- Areas of Value Generation in O&G
- The PI System - From Tactical to Strategic

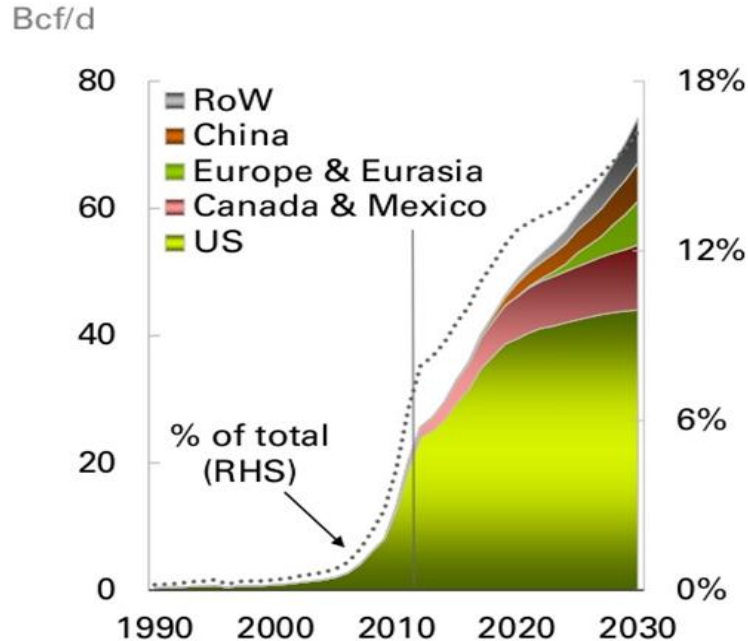
# Advances in E&P Technology are Reshaping the Global Energy Environment

- Horizontal Drilling
- Completions
- Deep Water Drilling & Production
- Well and well bore automation
- “Smart” in everything
- Asset capabilities
- And Much more.....

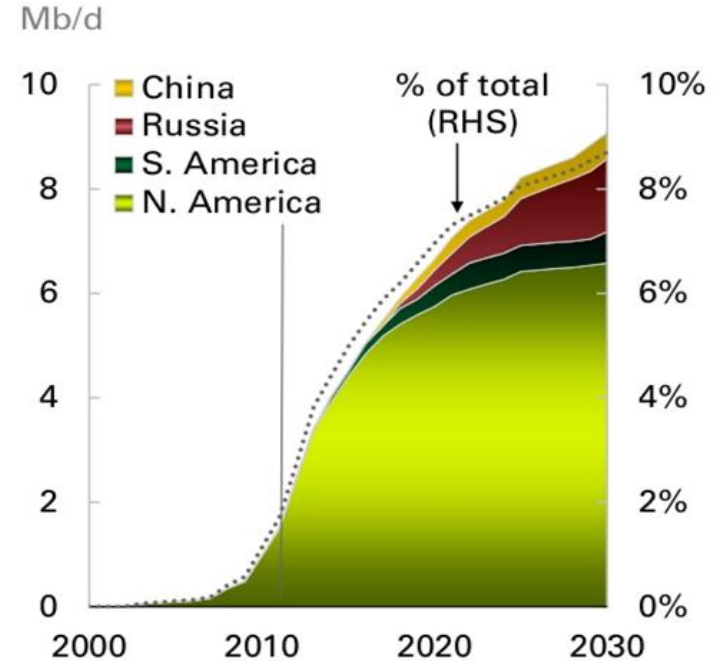


# NA Shale - Changing the Global Energy Balance

## Shale gas production



## Tight oil output

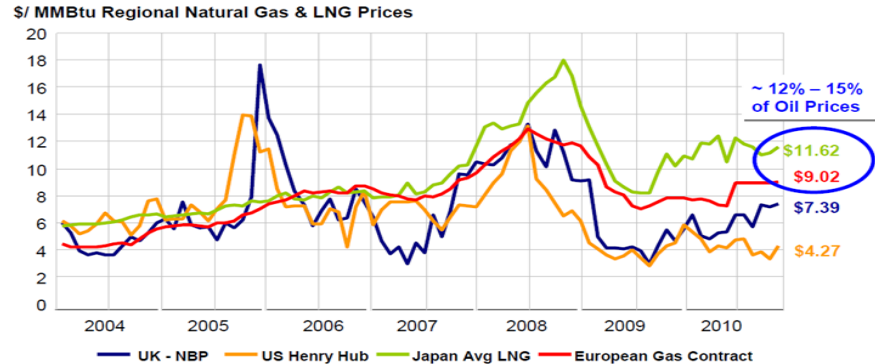


# Movement Towards a Global Price for Gas

Facilitated by Improvements in Logistics and Gas Transportation (LNG)

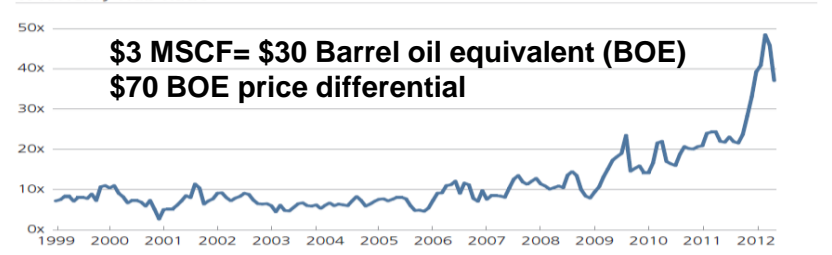
## Impact

1. Power Generation/T&D/Utilities
2. Transportation
3. Petrochemicals
4. Metals, Mining, and Metallurgy
5. Energy Intensive Manufacturing
6. Many more.....



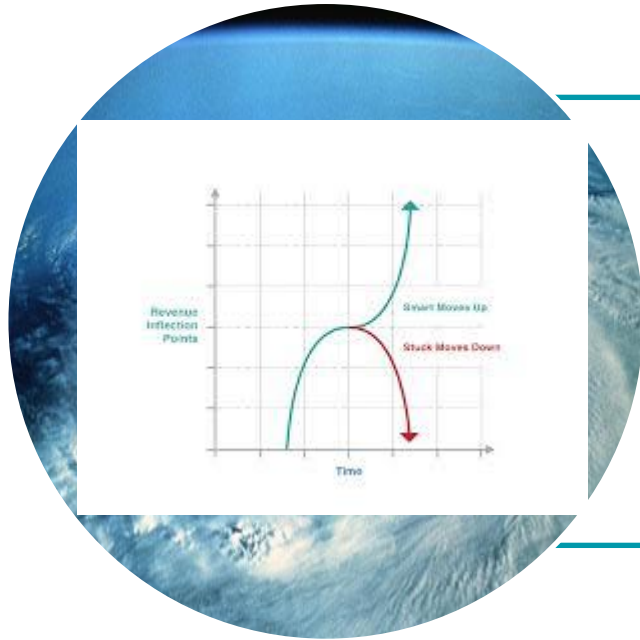
Source: PIRA, Platts

**FIGURE 3: CRUDE OIL AND NATURAL GAS PRICE RATIO SOARS**  
WTI/Henry Hub Ratio



Source: Bloomberg, "Record Oil-Gas Ratio May Spur Truck-Fuel Shift." From 1999 to 2009, the price of oil typically traded 8 to 12 times that of natural gas, but in 2012 the ratio skyrocketed to 50:1.

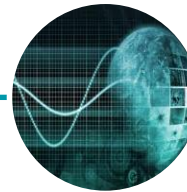
# The Perfect Storm.....and Inflection Point



Technological Forces

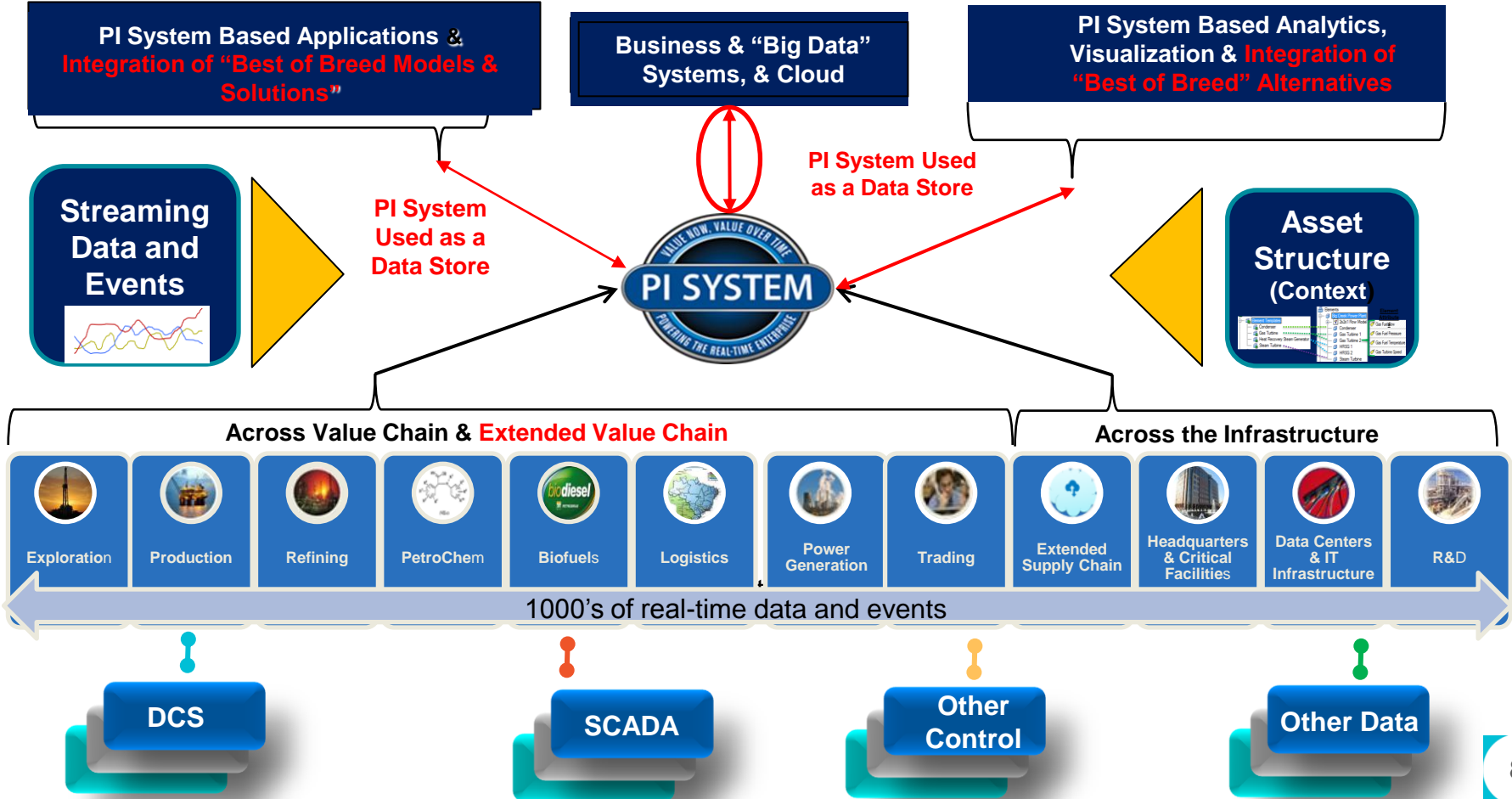


Shale Revolution Forces



Industry Forces

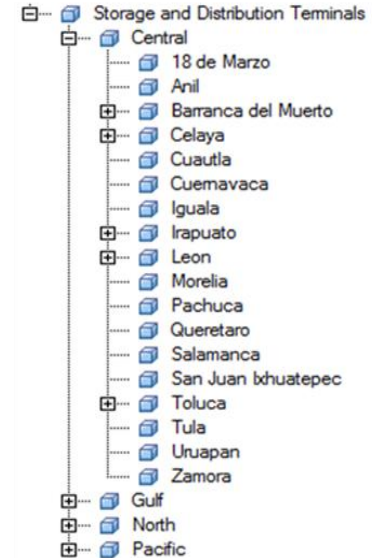
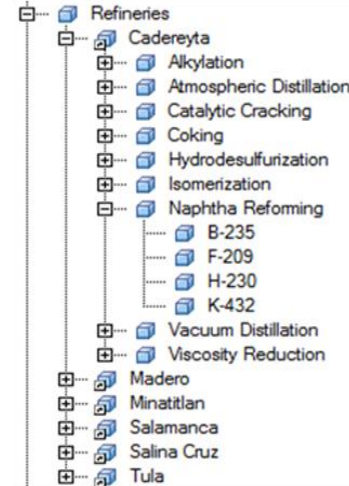
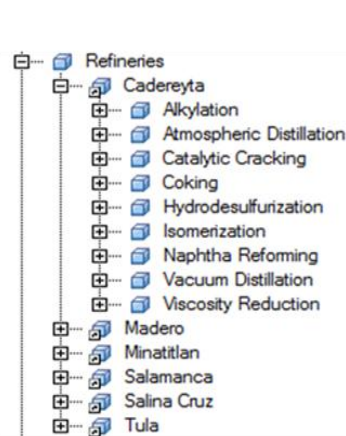
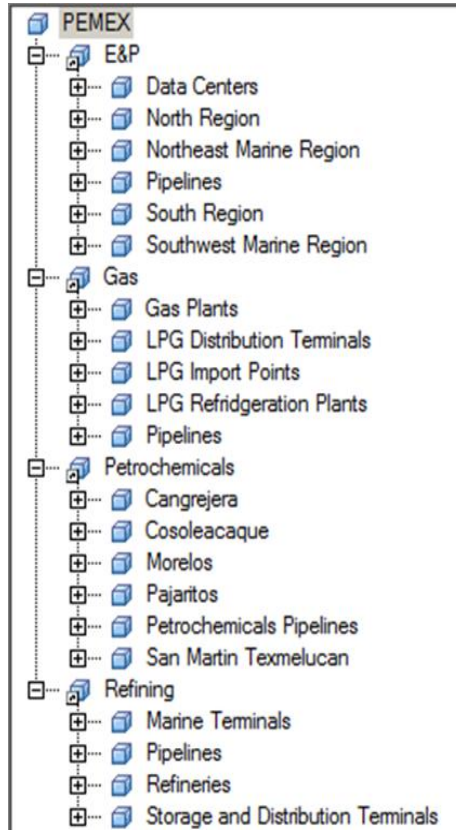
# Strategic Data Infrastructure for the Enterprise





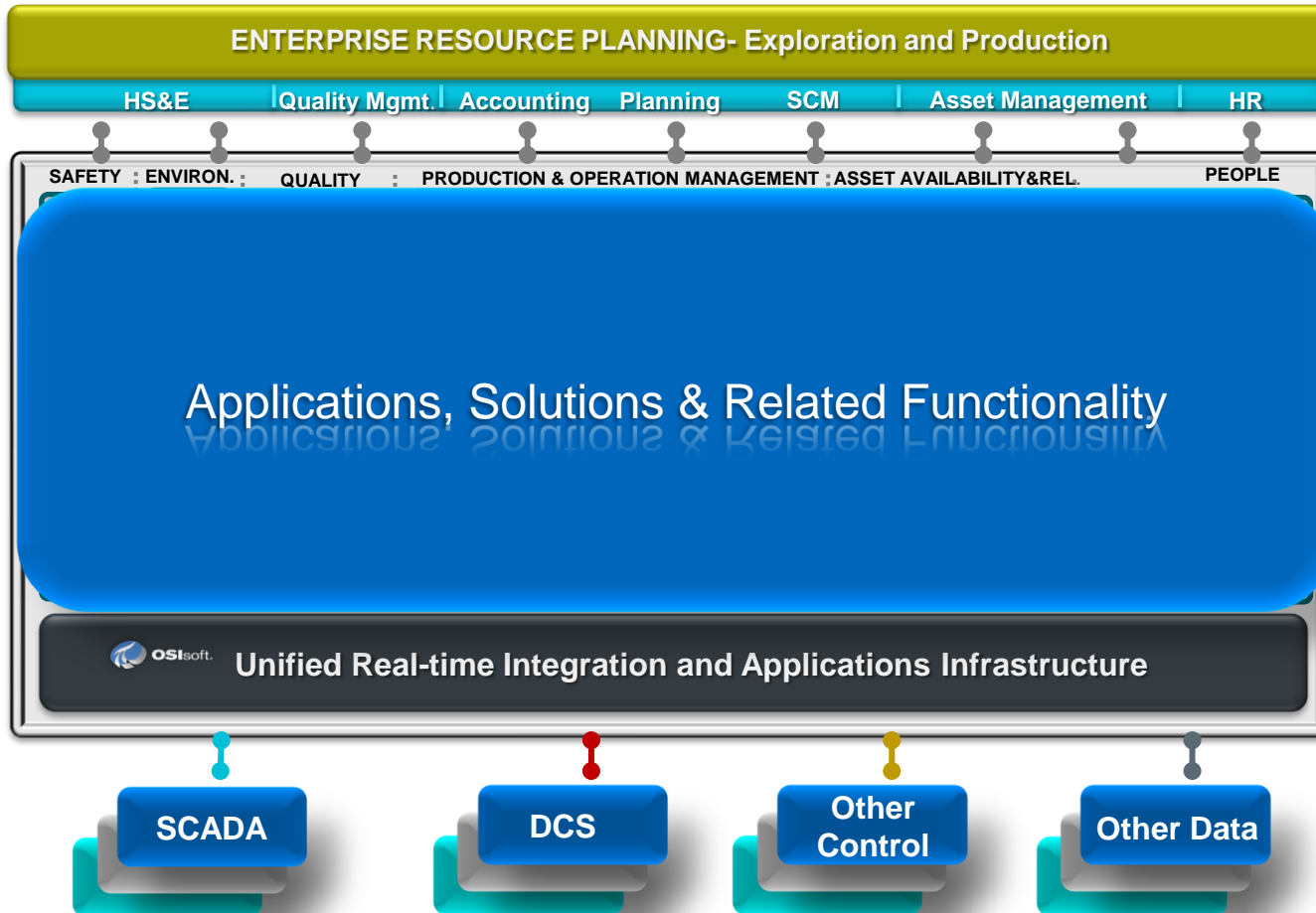
# PI AF - The Underpinning of Analytics & Visualization

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



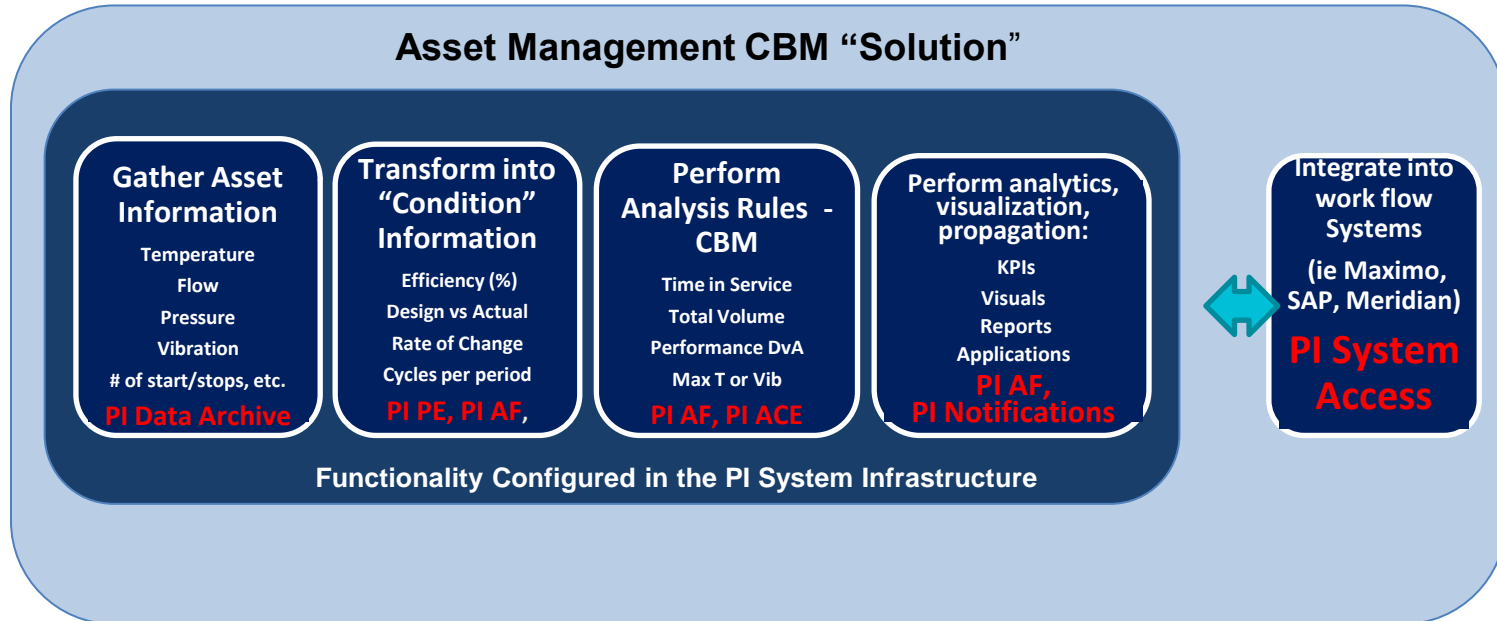
**Enterprise Object Model &  
Data Abstraction Layer  
Views for Context**

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

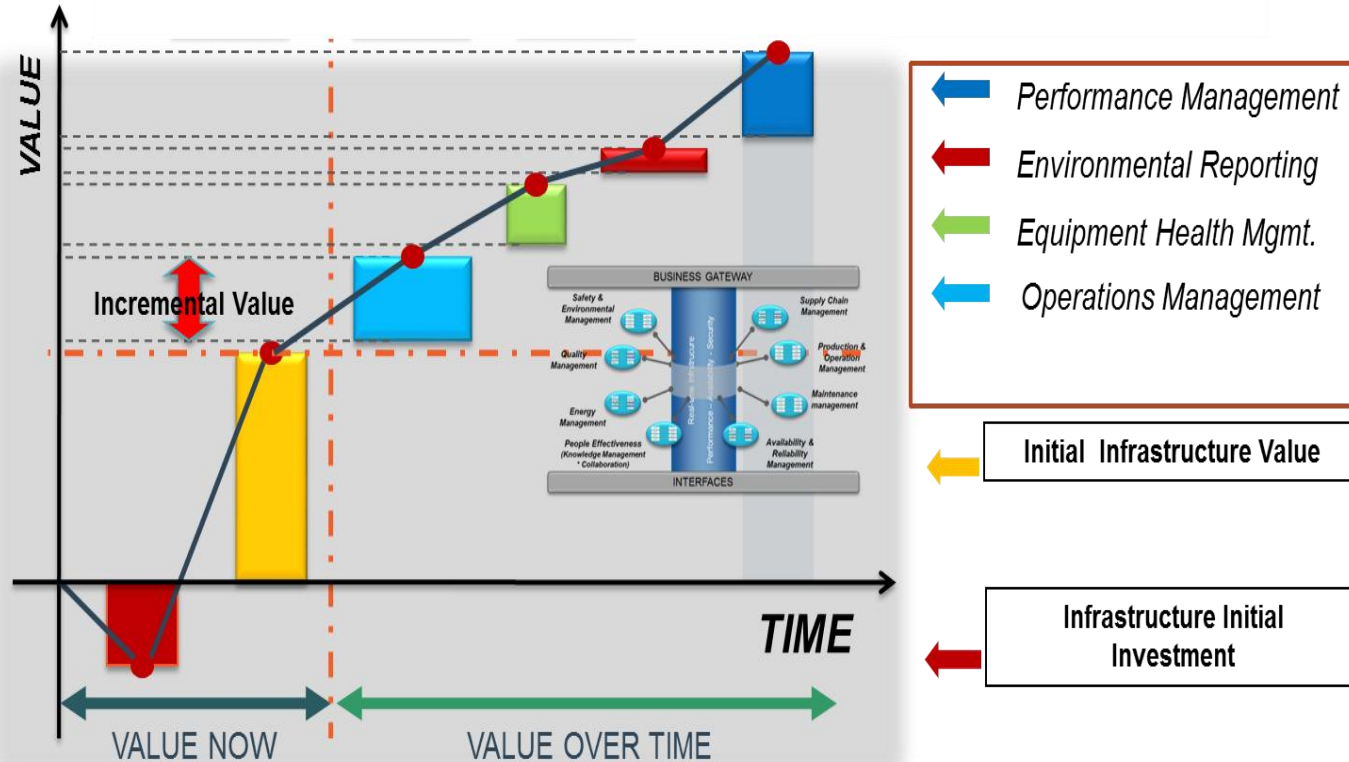


# Decomposition of Typical “CBM Solution”

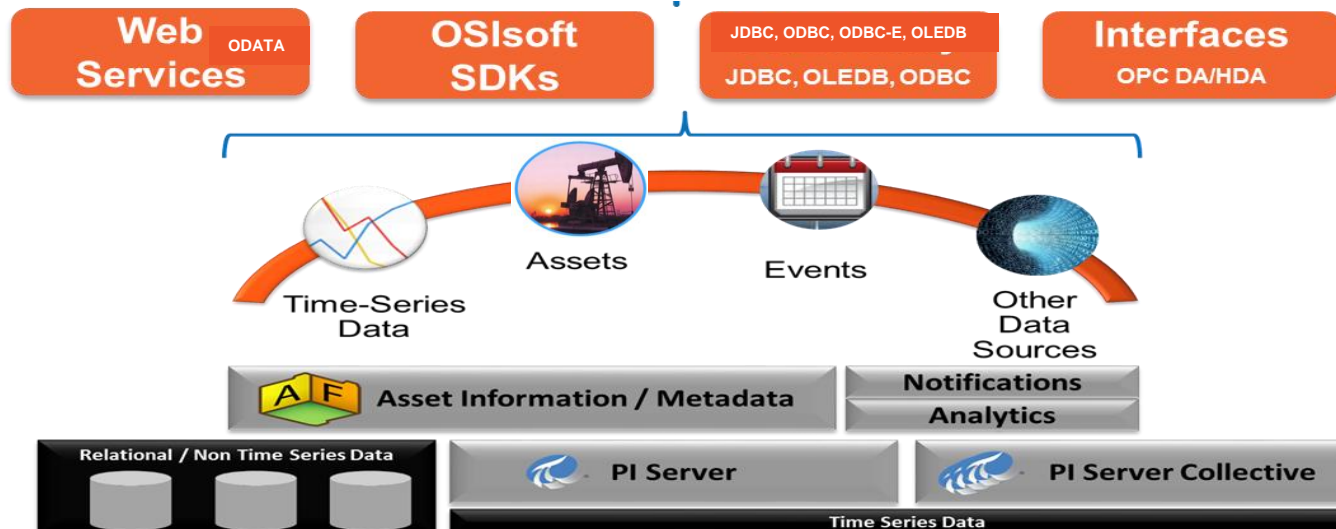
(note: concept can be applied to a majority of solutions)



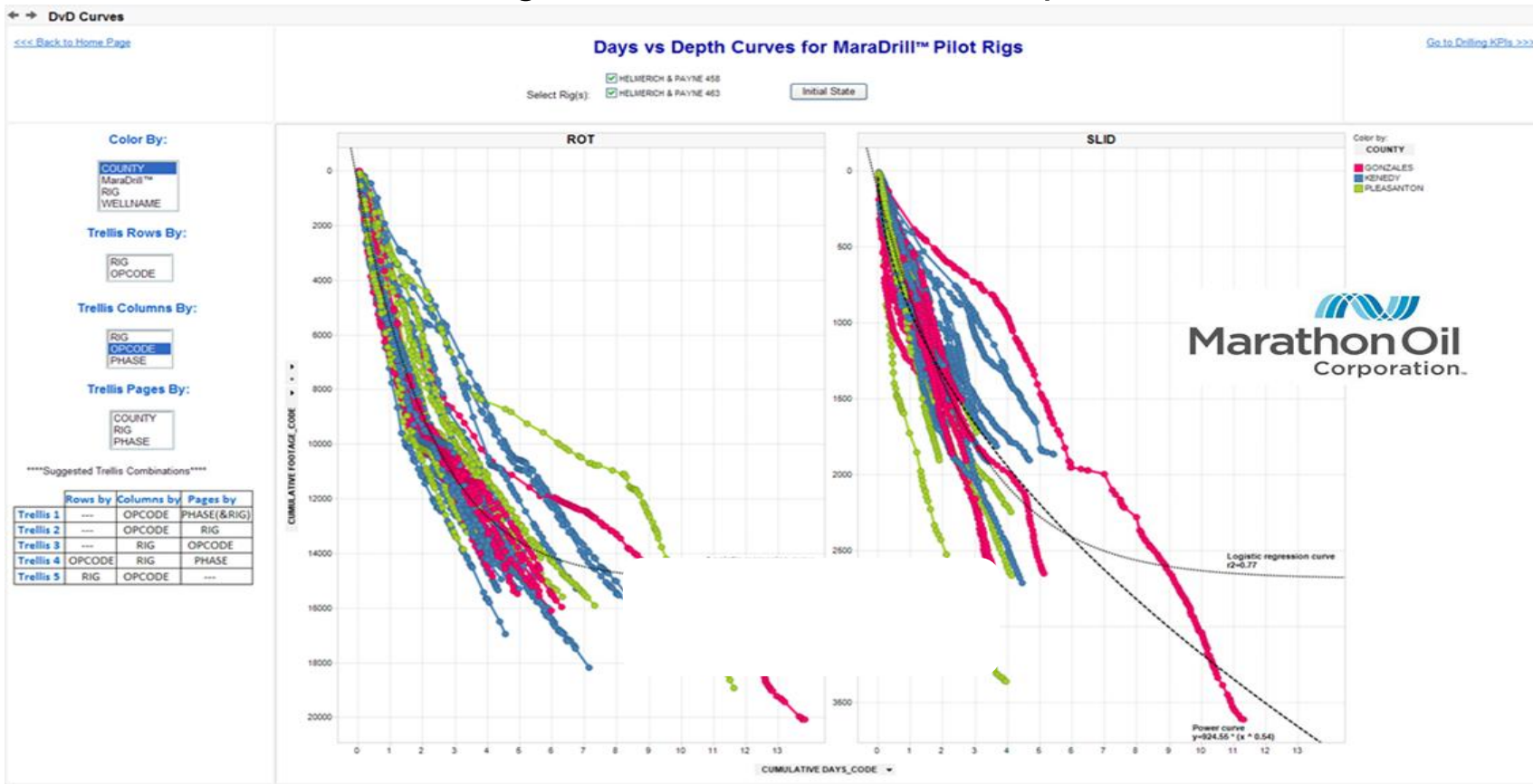
# An Infrastructure Approach



# 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



# Future Data – Operational Performance and Model Accuracy





# PI Integrator for Esri ArcGIS

OSIsoft | Esri | Oil and Gas Dashboard

FILE TOOLS VIEW
?

Wells

Search

- CE-08300011  
Flow Rate: 250.92 k sft3/h  
Flow Tubing Pressure: 181.21 psig  
1/6/2014 12:19 PM
- CE-08300073  
Flow Rate: 362.30 k sft3/h  
Flow Tubing Pressure: 99.26 psig  
1/6/2014 12:19 PM
- CE-08300083  
Flow Rate: 302.46 k sft3/h  
Flow Tubing Pressure: 167.81 psig  
1/6/2014 12:19 PM
- CE-08300101  
Flow Rate: 247.43 k sft3/h  
Flow Tubing Pressure: 247.27 psig  
1/6/2014 12:19 PM

Flow Rate

250.92

Flow Tubing Pressure

181.21

psi

Production KPI

295.17 k sft3/h

Cat Canyon Operations Dashboard Map

GeoFences

GeoFenceId	Category	Name
^ Danger Zone 1 Items		
DangerousArea/Danger Zone	DangerousArea	Danger Zone
^ Drilling Activity 1 Items		

Alerts

Alerts (8)

Incident Name	Resource	Resource Name	Description	As
^ Cumulative 8 Items				
DangerousArea		Roustabout Miguel	Ongoing for last 54 seconds.	
DangerousArea		Roustabout Miguel	Ended at Mon Jan 06 17:18:05 UTC 2014 and lasted for 36 seconds.	
DangerousArea		Roustabout Carol	Ongoing for last 3 minutes and 40 seconds.	

PI CoreSight

Bottom Hole Pressure

Trucks

- Roustabout Miguel  
Fuel: 0.00 gal  
Speed: 2.92 mph
- Electrician Bob  
Fuel: 0.00 gal  
Speed: 2.69 mph
- Welder Joe  
Fuel: 68.22 gal  
Speed: 10.84 mph
- Supervisor Lauren  
Fuel: 16.52 gal  
Speed: 26.13 mph

Truck Detail

Roustabout Miguel

This truck has consumed 0.00 gallons and has driven 316,019.69 miles

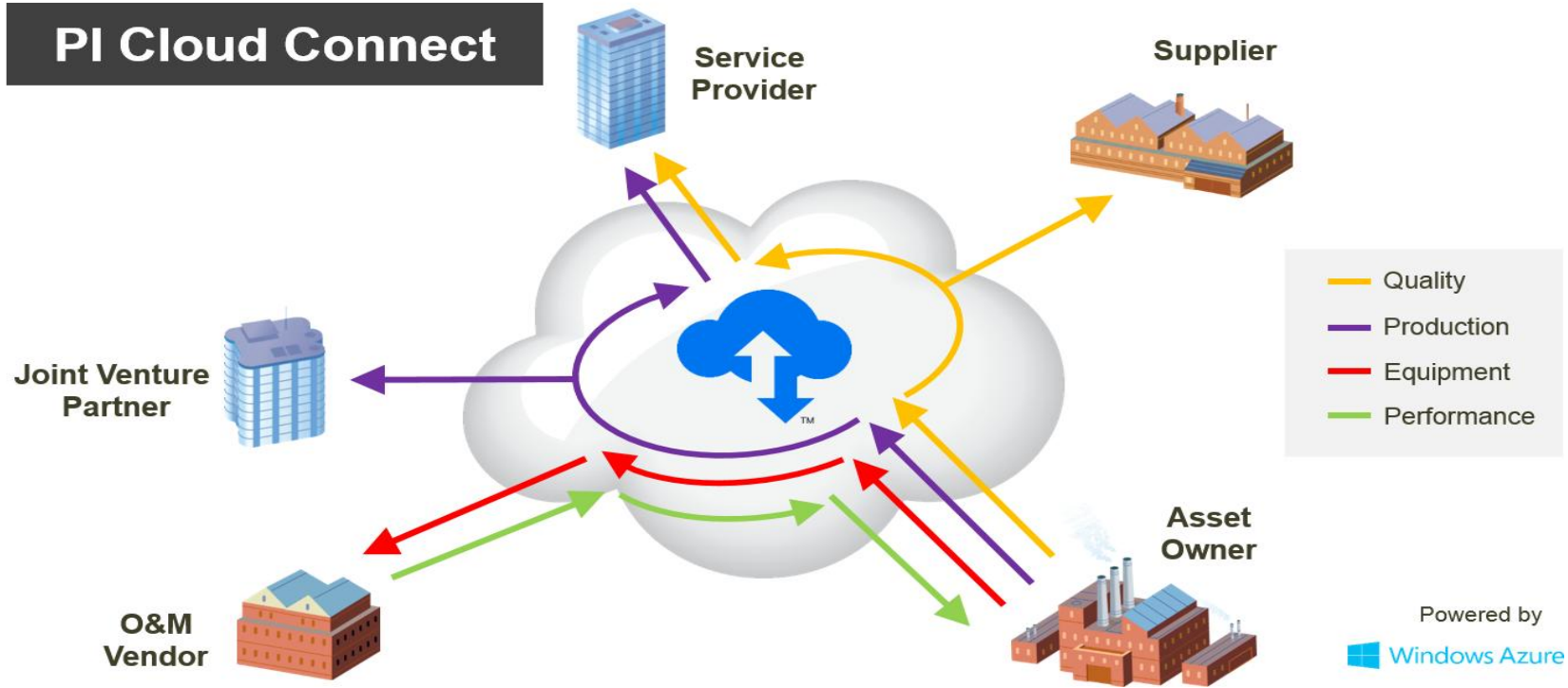
Fleet Average Speed

10.68 mph

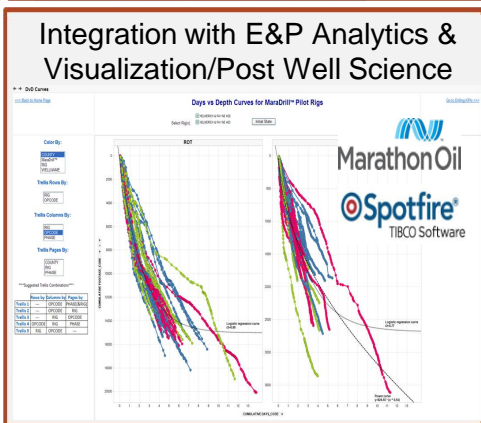
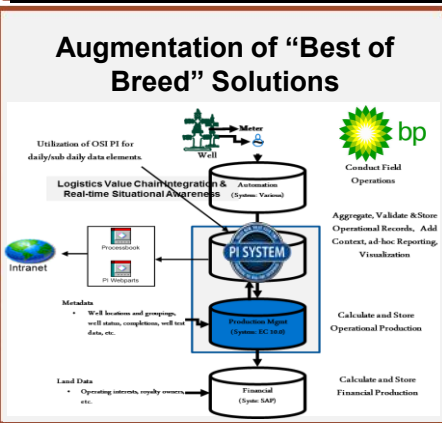
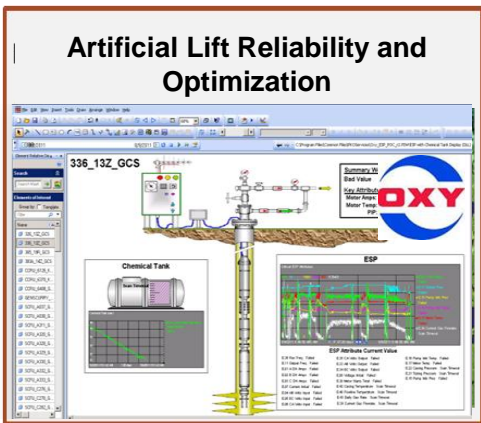
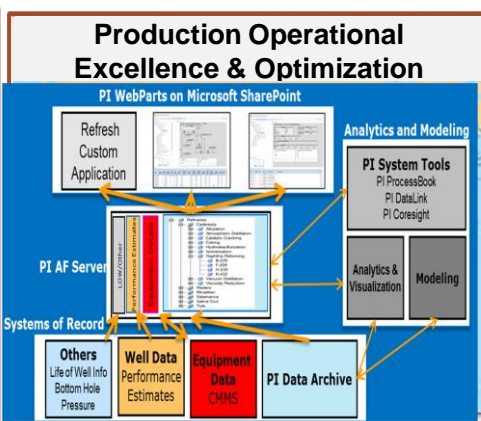
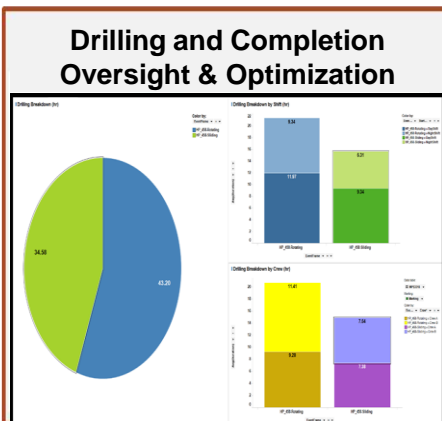
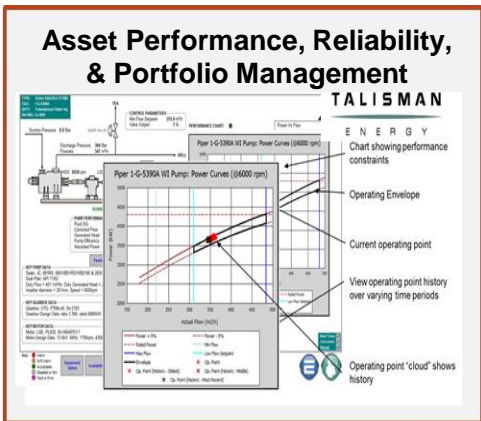
Fleet Average Speed



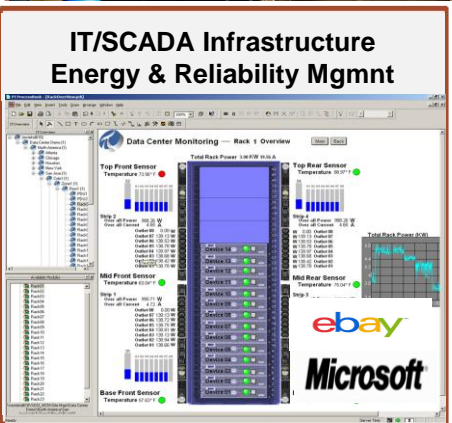
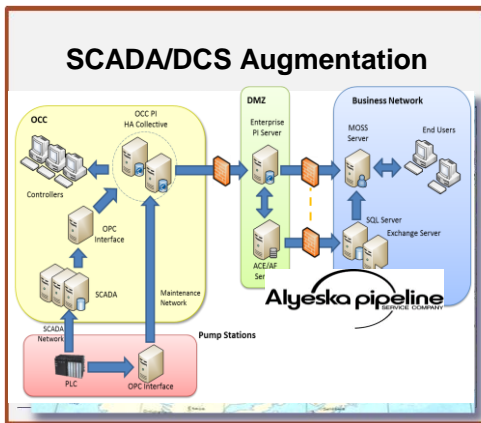
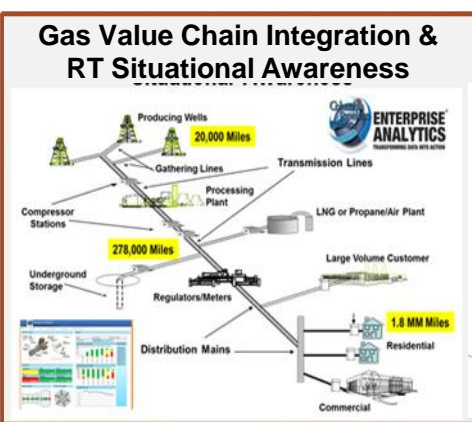
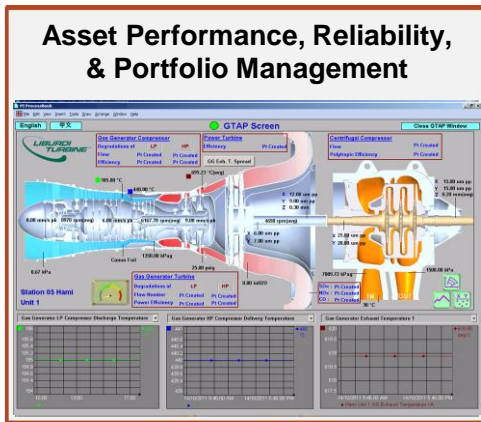
# Cloud Services – Extending the O&G Value Chain



# Examples of PI System Value in Upstream O&G



# Examples of PI System Value in Midstream O&G



### Compliance Reporting, Environmental & Energy Mgmt.

The table provides a detailed summary of pipeline performance, including sections for 'TOTAL PHYSICAL PIPELINE SUMMARY', 'SCHEDULED VOLLMERS SUMMARY', 'CANADIAN PIPELINE PHYSICAL SUMMARY', 'ESTIMATED CANADIAN PIPELINE IMBALANCE', 'USA PIPELINE PHYSICAL SUMMARY', and 'ESTIMATED USA PIPELINE IMBALANCE'. Each section includes columns for Volume, Energy, and other metrics. The 'aliance pipeline' logo is also present.

# Examples of PI System Value in Downstream O&G

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

Release 'Miguel Rangel' from 'Procesos de Refinación' on 2013/12/20 07:36

VERIFICACION Y DESPLAZAMIENTO DEL COMANDO

PEMEX

Asset Performance, Reliability, & Portfolio Management - CBM

### Environmental, Energy & Utilities Management

Energy efficiency of distillation processing

2013/12/20 07:36

MOC

Environmental, Energy & Utilities Management

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

Refinery Scorecard

Time: 03 Dec 2013

Chevron

Process Performance

Unit	Actual	Target	Variance	Unit	Actual	Target	Variance
DCU	0.1	0.0	0.1	DCU	0.1	0.0	0.1
DCU2	0.1	0.0	0.1	DCU2	0.1	0.0	0.1
DCU3	0.1	0.0	0.1	DCU3	0.1	0.0	0.1
DCU4	0.1	0.0	0.1	DCU4	0.1	0.0	0.1
DCU5	0.1	0.0	0.1	DCU5	0.1	0.0	0.1
DCU6	0.1	0.0	0.1	DCU6	0.1	0.0	0.1
DCU7	0.1	0.0	0.1	DCU7	0.1	0.0	0.1
DCU8	0.1	0.0	0.1	DCU8	0.1	0.0	0.1
DCU9	0.1	0.0	0.1	DCU9	0.1	0.0	0.1
DCU10	0.1	0.0	0.1	DCU10	0.1	0.0	0.1
DCU11	0.1	0.0	0.1	DCU11	0.1	0.0	0.1
DCU12	0.1	0.0	0.1	DCU12	0.1	0.0	0.1
DCU13	0.1	0.0	0.1	DCU13	0.1	0.0	0.1
DCU14	0.1	0.0	0.1	DCU14	0.1	0.0	0.1
DCU15	0.1	0.0	0.1	DCU15	0.1	0.0	0.1
DCU16	0.1	0.0	0.1	DCU16	0.1	0.0	0.1
DCU17	0.1	0.0	0.1	DCU17	0.1	0.0	0.1
DCU18	0.1	0.0	0.1	DCU18	0.1	0.0	0.1
DCU19	0.1	0.0	0.1	DCU19	0.1	0.0	0.1
DCU20	0.1	0.0	0.1	DCU20	0.1	0.0	0.1

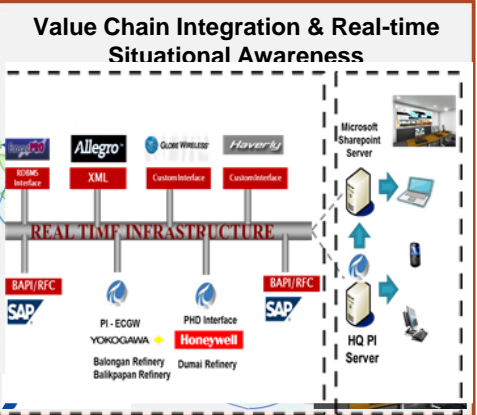
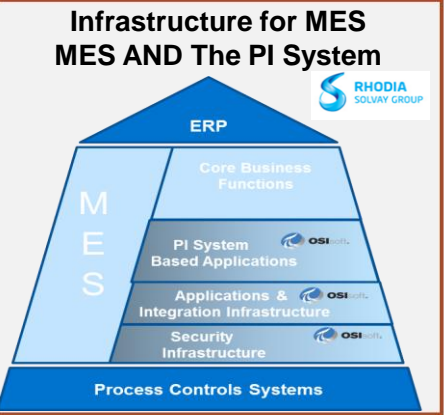
Ops Visibility, Reporting & Analytics, YA, "live" KPIs, & Model Based PvA

### Safety & Reactive/Proactive Integrity Management

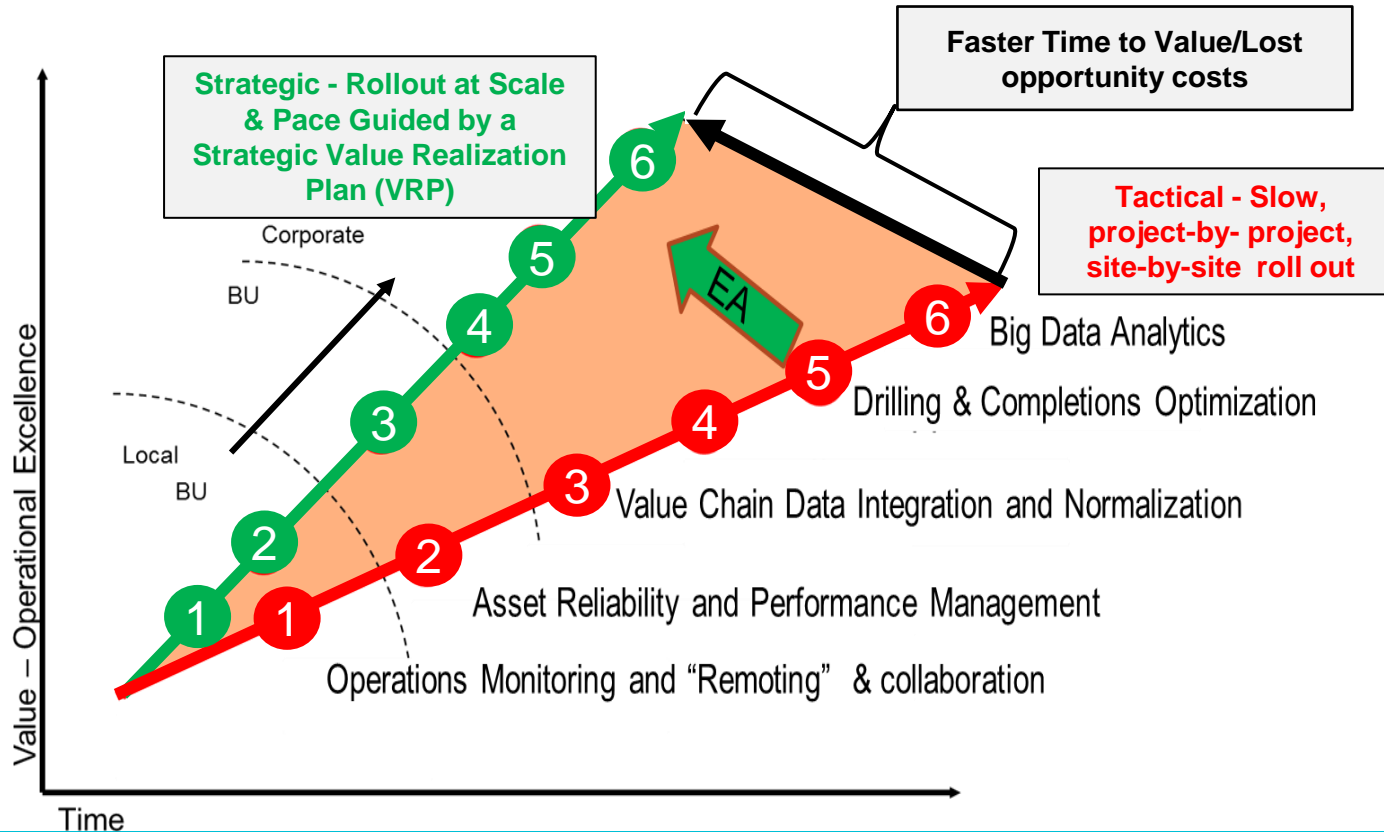
Model Operator Client

SUNCOR

Safety & Reactive/Proactive Integrity Management



# Accelerating the Benefits of Operational Excellence





# Closing Comments..

- Technological Advances Supported by Rising Demand/Price Channing the Global Energy Equation
- Exponential growth in data – volume, velocity, & variability
- The Perfect Storm – an Inflection Point
- Data is strategic in the 21<sup>st</sup> Century
- The EA - moving from tactical to strategic data infrastructure
- What is the cost of not managing your data strategically?

# What does the Next 20 years Hold?



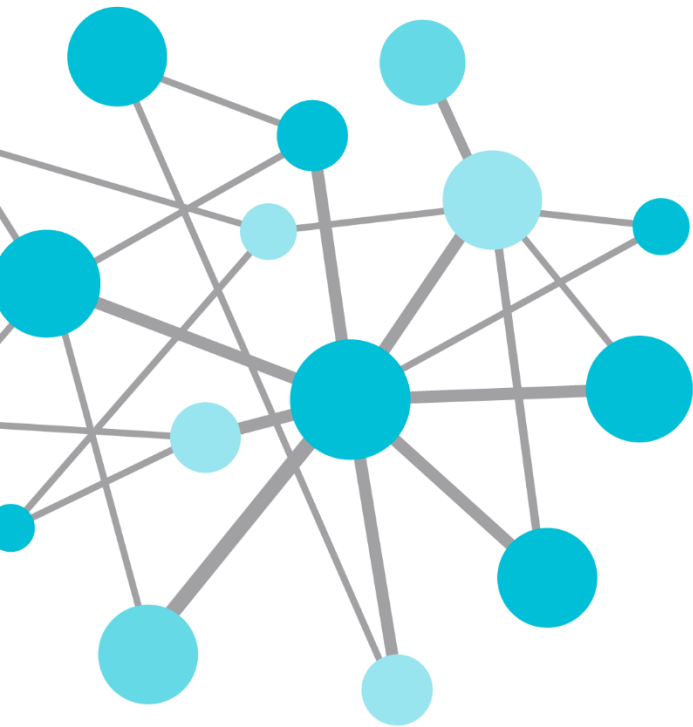
The PI System as  
a Strategic Data  
Infrastructure

In the not to distant future...

# Craig Harclerode

- [charclerode@osisoft.com](mailto:charclerode@osisoft.com)
- Industry Principal O&G and Petrochemicals
- OSIsoft, LLC



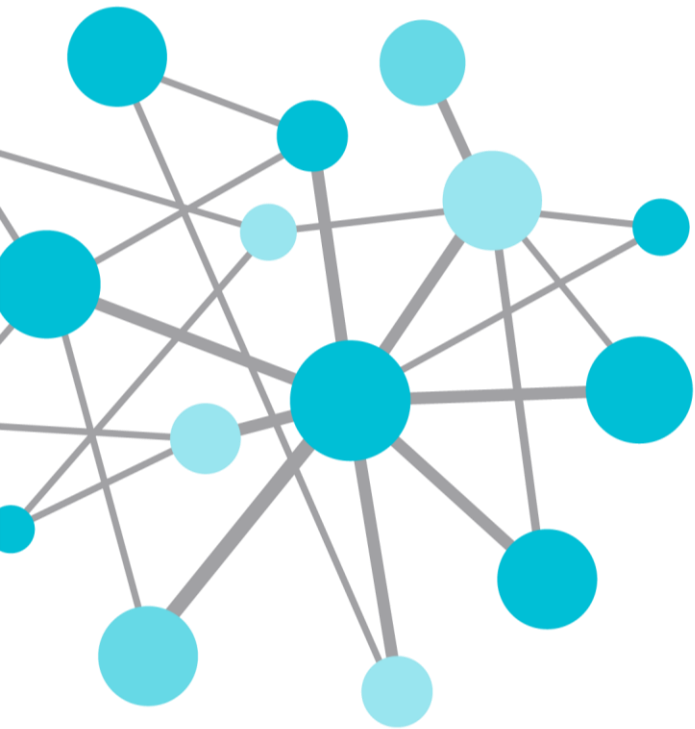


# Questions

Please wait for  
the **microphone**  
before asking  
your questions



State your  
**name &  
company**



THANK  
YOU

Brought to you by  **OSIsoft.**

# Please don't forget to...

Complete the online survey for  
this session

[eventmobi.com/emeauc14](http://eventmobi.com/emeauc14)



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#UC2014



# PI System New Innovations...

Continuous Improvement & Assimilation of New Technology into the Infrastructure



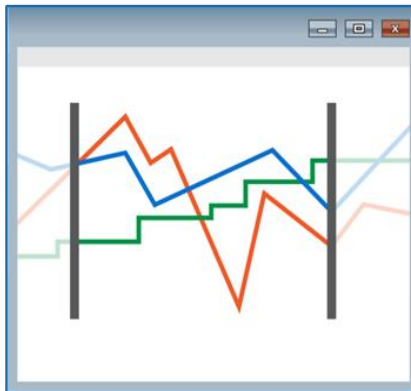
## Scale

- More data
- Faster performance
- More robust



## Asset-Centric

- Manage data via asset context
- Reuse many times



## Event Frames

- Identify and use important events and related data



## Visualization

- Many roles
- Different formats
- Any device

“Future Proofing Your Investment in the PI System Infrastructure”

# Technology ...Challenges & Opportunities



**Data & Cyber  
Security**



**Big Data**



**The Cloud**



**Wireless,  
Networks,  
Advanced  
Sensors,  
IoT**



**Mobility and  
Social  
Collaboration**

**Leveraging the PI System to Solve Challenges and Leverage Technology Trends**

# Impact of The Shale Revolution - Growing Business Challenge



**Logistics  
Integration**

**Situational  
Awareness**



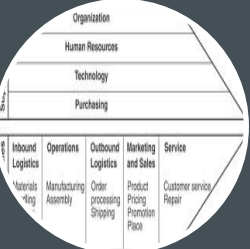
**Big Data**

**Volume**

**Velocity**

**Variability**

**Complexity**




**Value Chain  
&  
Extended  
Value Chain  
Integration**

Organization				
Human Resources				
Technology				
Purchasing				
Inbound Logistics	Operations	Outbound Logistics	Marketing and Sales	Service
Materials Handling	Manufacturing Assembly	Order processing Shipping	Product Pricing Promotion Price	Customer service Repair



**MAD Activity**

**Mergers  
Acquisitions  
Divestitures**



**Time  
Sensitivity  
of  
Opportunity**

← **Leveraging the PI System to Solve Challenges and Leverage Technology Trends** →

# Industry Challenges – Technological Globalization

## Collapse of Time, Space, and Access to Information



**Asset Safety,  
Reliability,  
Integrity, &  
Performance  
Management**

**Risk Mitigation**



**Cost  
Reduction**

**Energy  
Maintenance  
IT  
Chemicals**



**Profitability**

**Utilization  
Yields  
Hydrocarbon  
loss  
Production  
Optimization**



**Regulatory  
Compliance  
&  
Maintaining  
Social  
License to  
Operate**



**Human  
Capital  
Optimization**

**Leveraging the PI System to Solve Challenges and Leverage Technology Trends**



# Infrastructure, to harness the Power of Data

Implementing Strategic Initiatives on Enterprise Scale

