Enterprise Agreement at Noble Energy

Presented by Chris Jardine, Joe Hill, Mike Maguire

noble energy

Agenda

- Company Overview
- Journey to an EA
- PI System Global Update
- Building a Foundation
- Big Data and Analytics
- Strategy Deployment
- Q&A

Noble Energy Inc.

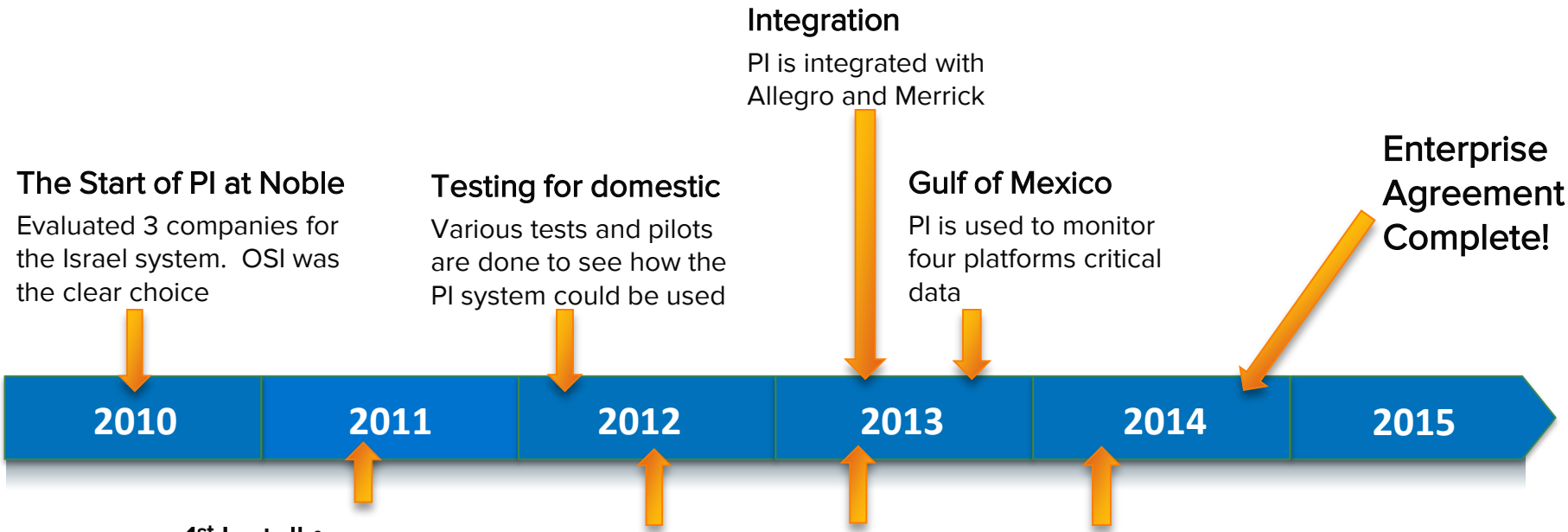
Noble Energy At A Glance
(Pro forma for Rosetta Resources acquisition)

- Year-end 2014 proved reserves: 1.7 BBoe
- Projected 2015 capital program: ~$3.1 billion
- Projected 2015 production: ~340 MBoe/d
- NYSE: NBL

Driven by our purpose - *Energizing the World, Bettering People's Lives.*
We believe in safely and responsibly providing energy to the world through oil and natural gas exploration and production, while positively influencing the lives of our stakeholders.

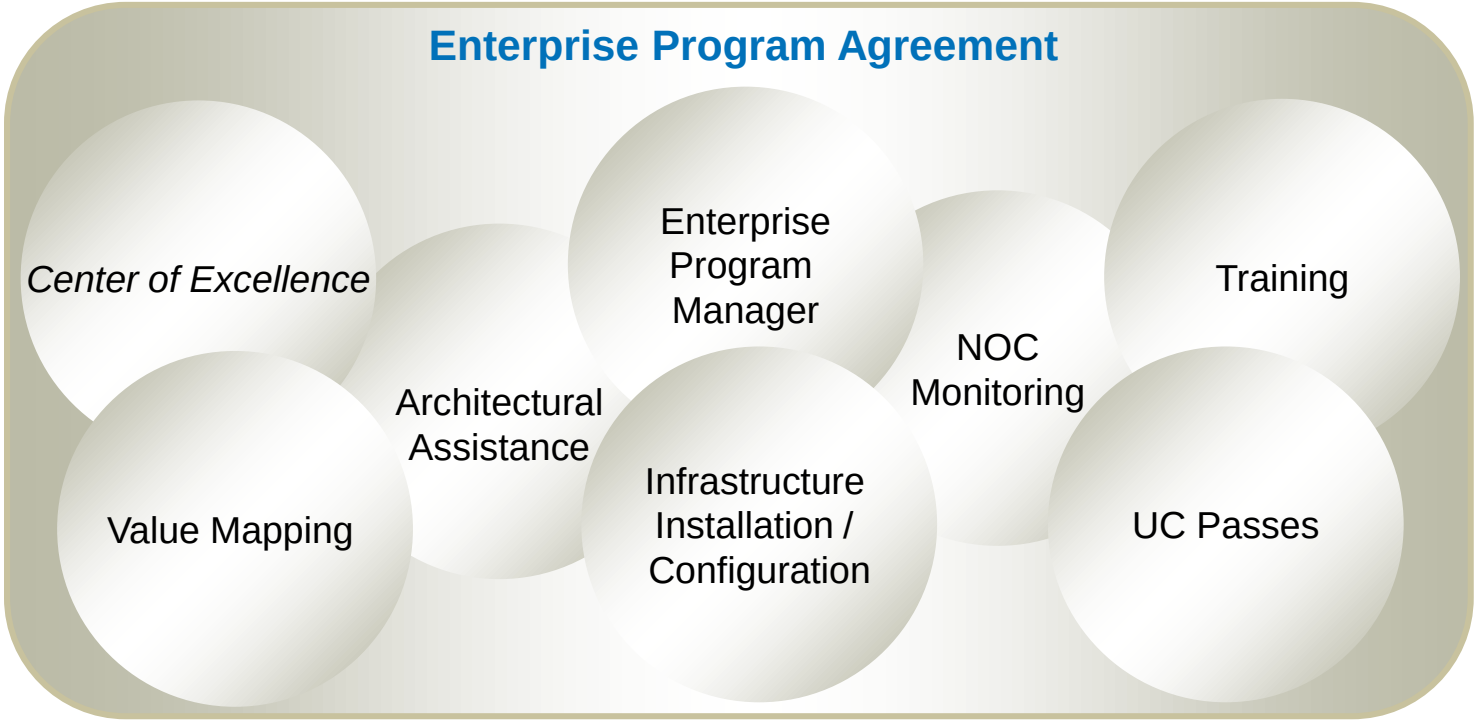
Journey to an EA

Journey to an Enterprise Agreement



Enterprise Program Agreement

Under an executed EPA, customers have access to a cumulative knowledge base built upon 25 years as an industry leader. **Available services include:**



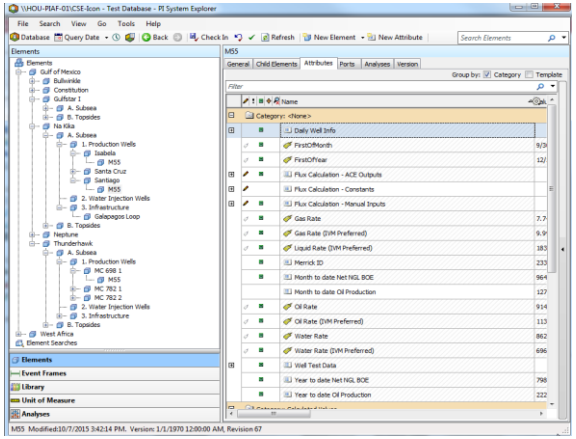
PI System Offshore & International

Gulf of Mexico Real Time Data Modeling and Visualization Initiative

COMPANY and GOAL

This project shows the flexibility of the PI system and how it can integrate with other 3rd party application

noble energy



CHALLENGE

Comparing data from multiple systems (PI, ProCount, Petex) was tedious and time consuming

- Difficult to find information using tag names
- Flux calculations are performed on different versions of spreadsheet and there is no historical context to the results

SOLUTION

Integration and visualization of ProCount and Petex data into PI

- Standardized AF models for subsea wells and separator systems
- Consistent element-relative view of subsea wells and separator systems for different fields
- Automation and historization of flux calculations in PI

RESULTS

Monitor production assets, support decision making, production allocation, reservoir modeling and forecasting, and production optimization

- Leverage framework to proactively notify deviations against norm/predicted behavior

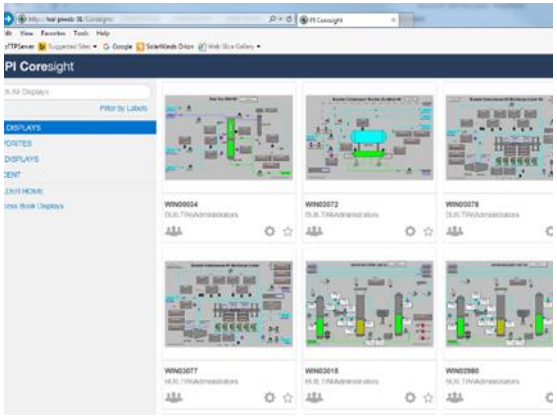
Eastern Mediterranean

Hardware Refresh, Expand User Experience, Training and Support, Security

COMPANY and GOAL

Infrastructure upgraded and tag counts increased:

- Ashdod Original 3,000; Currently 16,000
- Tamar Original 3,000; Currently 26,000



CHALLENGE

- Reactive vs. proactive monitoring
- Cannot easily share PI System outputs
- Servers at breaking point of failure
- HMI system updates not reflected in PI System
- Lack of remote monitoring capability and security

SOLUTION

- Implement new architecture and HW/SW to support
- Capture new tags and HMI screens
- Setup waterfall
- Build Process Book screens
- Provide hands on training

RESULTS

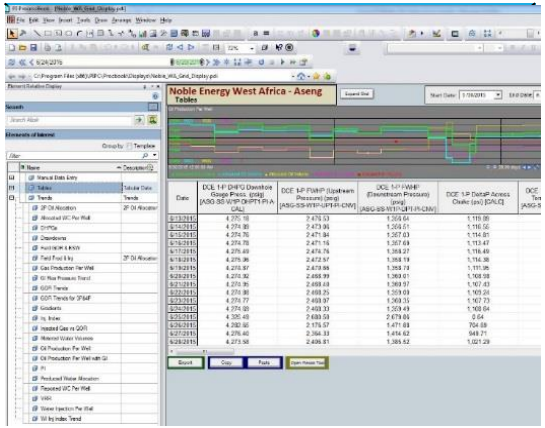
- Proactive monitoring and alerts of issues
- Better tools to share information with less technical team members
- Higher infrastructure reliability, availability, and security
- Upgraded system software and equipment tags (44k tags from 6k)

West Africa

Voidage Replacement ProcessBook Grid Application

COMPANY and GOAL

The Voidage Replacement ProcessBook Grid application is a custom developed ProcessBook display specifically for Noble Energy's West Africa team



CHALLENGE

- Needed robust production allocation system
- Needed system for tracking BHPs, PIs and reservoir voidage replacement
- Current spreadsheet method was cumbersome and running into program limitations

SOLUTION

- AF Data Modeling – Asset modeling and data organization using AF
- Custom spreadsheet tab to enter all of your manual data and upload it to PI – A "one stop shop" for entering data manually
- AF Calculations – Moving all spreadsheets calculations in to AF

RESULTS

- Much easier and faster to update required manual input data
- No concern with wrong formulas crashing spreadsheets, estimated vs actual PI data
- Easy to export data for partner updates, simulation updates and performance trend updates

PI System U.S. Onshore

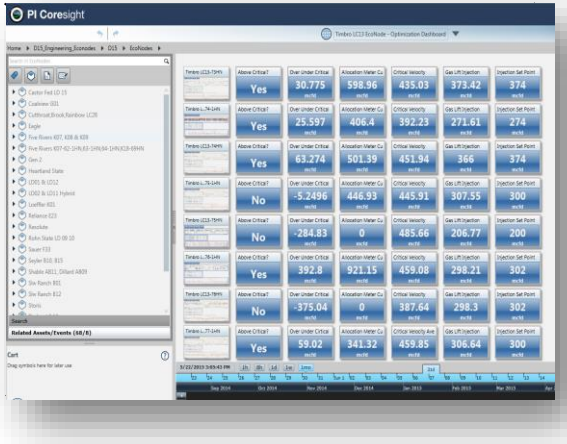
United States Operations

Gas Lift Optimization

COMPANY and GOAL

Manage a large well set by exception rather than a top-down/brute force method. Increase efficiency and confidence in well diagnosis and optimization.

Value has increased substantially!"



CHALLENGE

- Lack of dedicated system/solution to analyze and optimize gas lift
- No management by exception available
- No tracking mechanism for optimization
- Due to reduction in staff, group efficiency gains are a must

SOLUTION

- Real time calculations using measured data to define gas lift optimization
- Optimization Dashboard – allows for management by exception
- Allows single solution for all of production engineering

RESULTS

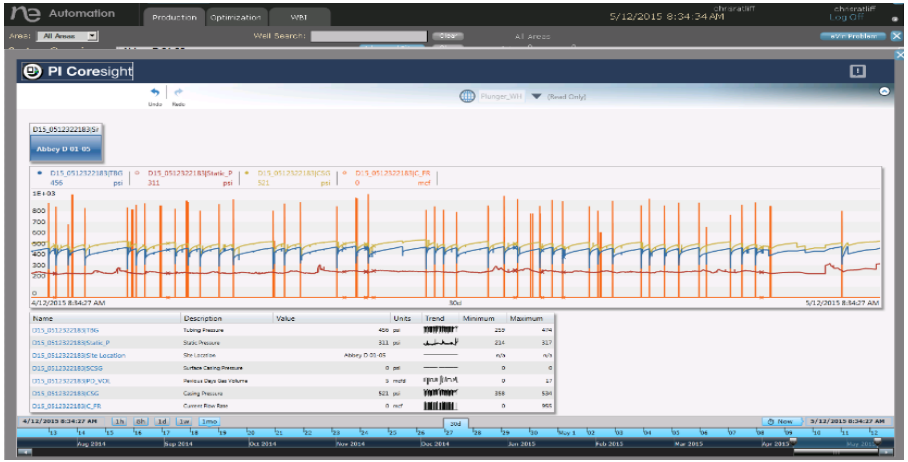
- Enhanced engineer efficiency
- Increase in well optimization
- Transparent tracking tool for gas lift optimization
- >30% time savings per engineer

United States Operations

Quick Wins

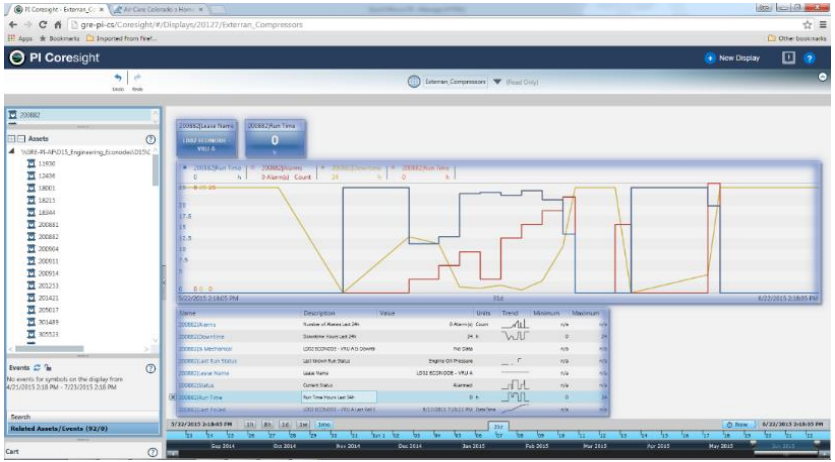
Plungers

- Capturing critical data for analytics / performance.
- PI Coresight displays built, providing mobility.
- Engineers now have the ability to view full history of each well.



Vendor Compressor Report

- Allowing for better tracking, including runtimes, mechanical issues, alarming and communications.
- Providing key data to EHSR for state regulations.
- Reducing costs, maintenance, and downtimes.

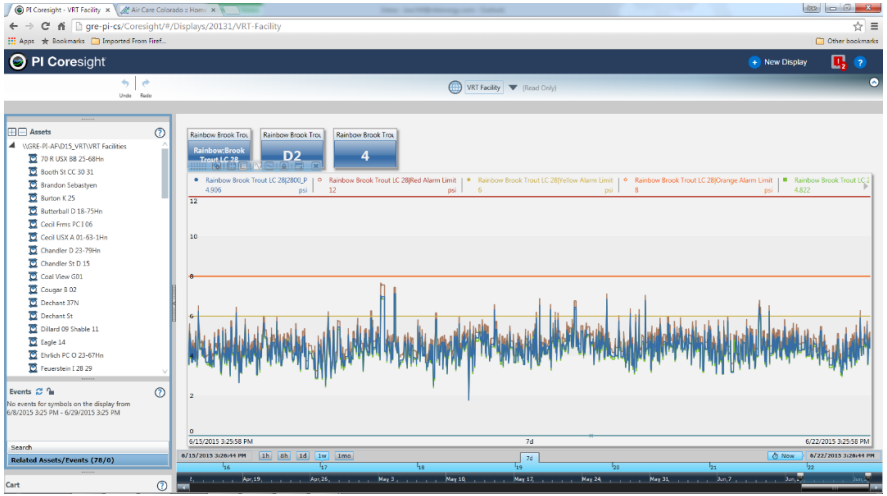


United States Operations

Quick Wins continued

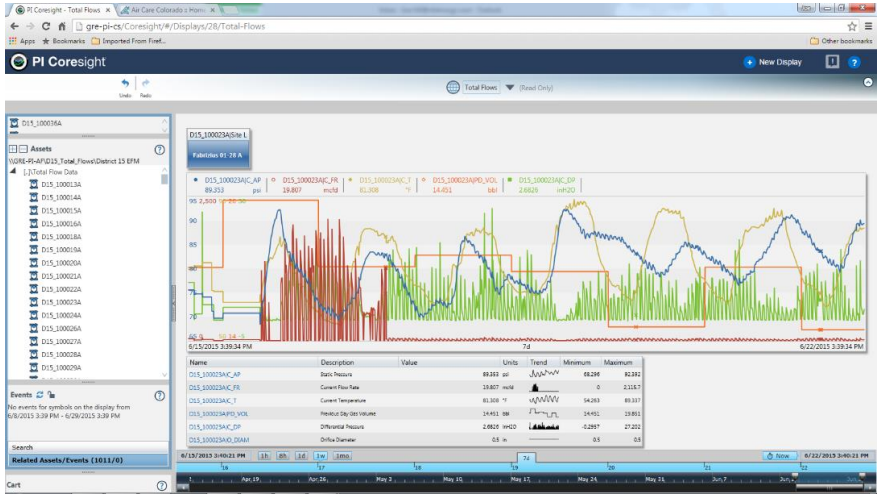
Vapor Recovery Tower

- Pressure monitoring of locations to ensure safety on sites.
- Enabling mobile solution to monitor VRT pressures.
- High level of visibility on pressures at critical locations.



Total Flows

- Capturing EFM data for analysis.
- Providing trending to SCADA using PI Coresight.
- Provides better tracking of well performance.
- View changes made to wells to increase production.

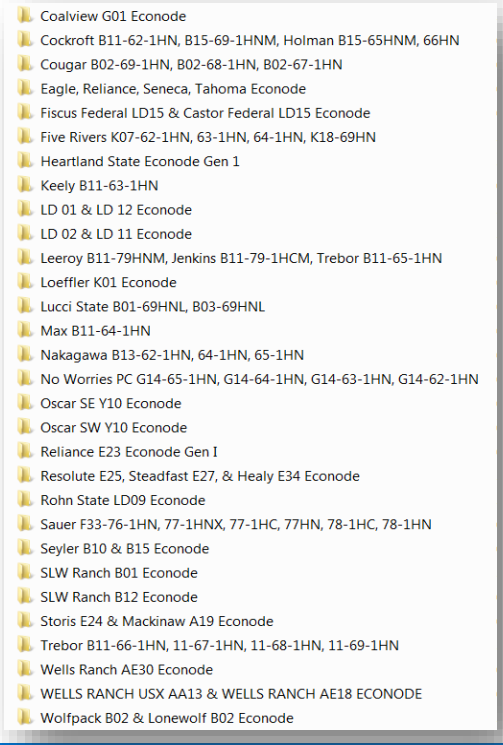


United States Operations

Quick Wins continued

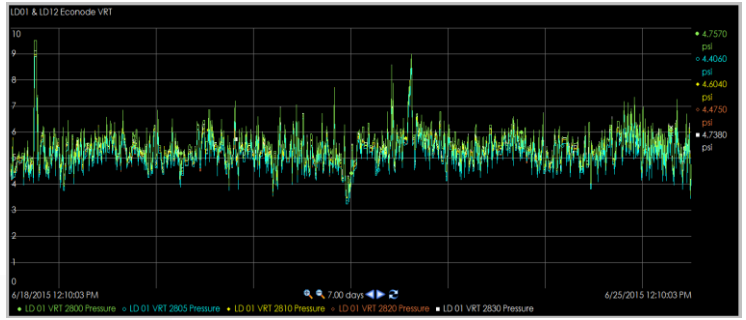
Facility Displays – Process Book

- Central network location for Process Book Screens
- Over 30 Sites templated
- Displays are customized depending on the production method



Templates and Views – Process Book

- Developed templates for building facility displays in Process Book help to standardize views.
- Training provided to use Process Book and Datalink
- Developed standard trend settings to accommodate those who are colorblind.

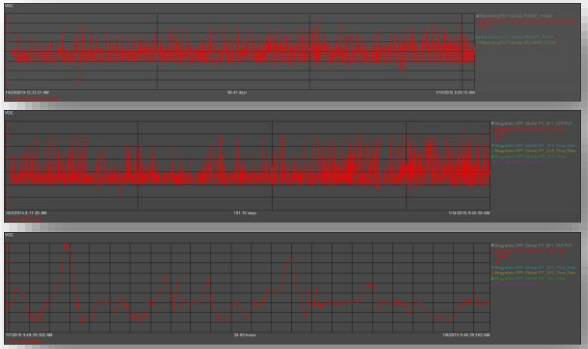


GEN 1 ECONODE .PDI
GEN 2 ECONODE.pdi
GEN 3 ECONODE.pdi
GL or GL with Plunger NON-ECONODE FACILITY.pdi
VRT .PDI

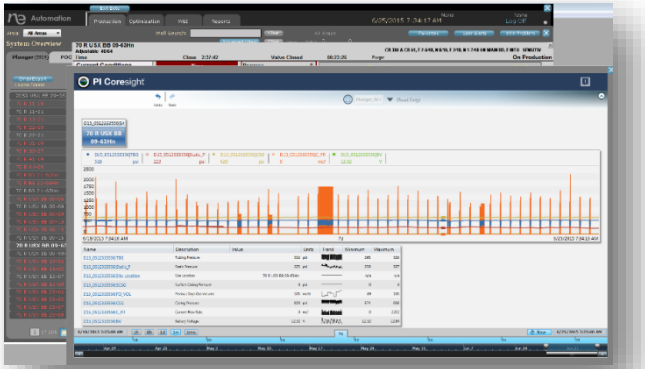
United States Operations

Quick Wins continued

OPF Team Troubleshooting



Coresight in Intouch



OCC

Building a Foundation

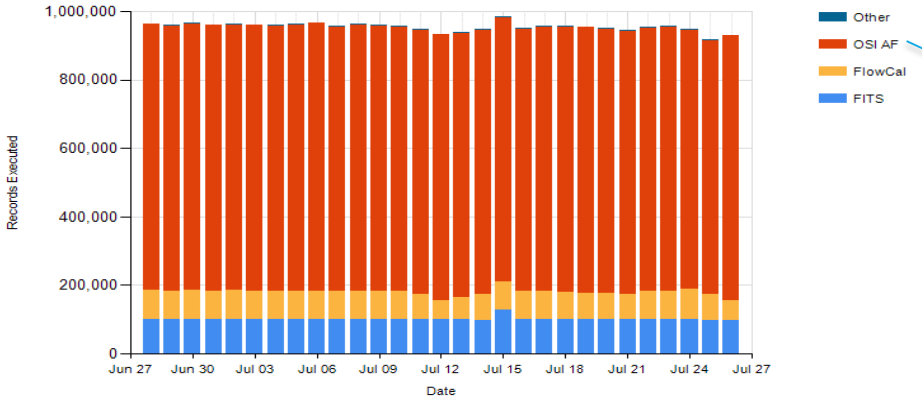
Data Acquisition/Reporting

Priority	Data Category	Approx # of Data Items	Data Attributes Available	Data Attributes Tagged	Design Complete	Implement Complete
1	Coriolis Meters	700	8	4	15-Apr	15-Mar
2	ESP - Electric Submersible Pump	9	13	13	15-Apr	15-Mar
3	Flowback Data	NA	20	13	15-Apr	15-Jan
4	Frac Monitoring	260	3	3	15-May	15-Feb
5	Plungers	7,129	300	12	15-Apr	15-Apr
6	Pump Off Controller (POC)	288	300	4	15-Apr	15-Feb
7	Tanks	5,000	7	3	15-Apr	15-Jan
8	Total Flows (DCP Owned)	3,945	5	5	15-Apr	15-Jan
9	Total Flows (Noble Owned Gas Measurement Meters)	1,652	50	7	15-Apr	15-Jan
10	VRT - Vapor Recovery Tower	168	4	1	15-May	15-Mar
11	Compressors Down Time	92	7	7	15-May	IP
12	Separators	707	4	4	15-Apr	15-Apr
13	Flare Systems					NS
14	LACT Unit - Lease Agreement Custody Transfer					NS
15	VOC Incinerator Systems - Oil Production Tank					NS
16	VOC Incinerator Systems - Water Production Tank					NS
17	VRU - Vapor Recovery Unit					NS

Total # of tags (and counting!)

- Marcellus 18,460
- GOM, EMBU, WBU 80,000
- DJ Basin 246,547

PAO Daily Transactions to Merrick

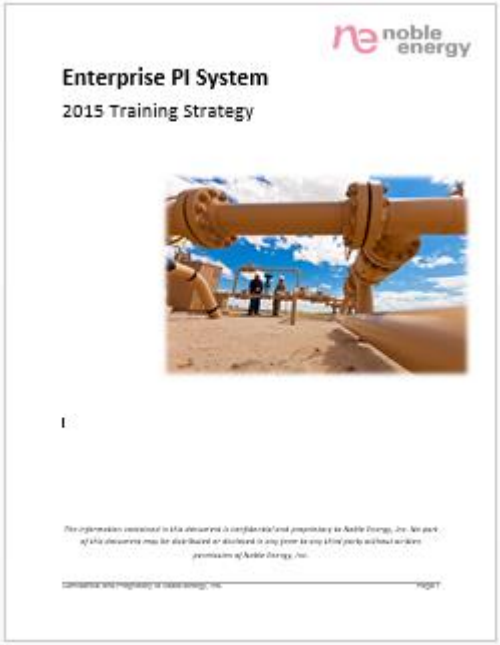


Vast majority of data from PI System!

PI System Training/Workshops

Giving users confidence in their abilities to maximize value of the PI System

Course	Location	#	Audience
Visualizing PI System Data *March 3-4* *April 14-15*	Houston	19	Well engineering Drill engineering Reservoir engineering Operational readiness
Visualizing PI System Data *March 10-11*	Greeley	11	Production engineering Enterprise systems Well engineering
Gas Life Optimization Workshop *March 17-19*	Denver	10	Production engineering Enterprise systems Well engineering
Building PI System Assets and Analytics with PI AF *April 6-9*	Denver	5	Enterprise Systems
Analyzing PI System Data *July 6-8*	Israel	8	Well engineering Drill engineering



Training Strategy Created

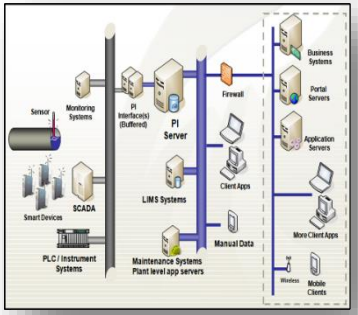
"The course was extremely valuable and I am happy to have dedicated the two full days for this course"

"...it gave me a better understanding on the importance of PI and it importance to the industry. This understanding of PI will assist me tremendously in my role."

Ongoing Work

PI System Support Team continues enterprise work activities

Security and Architecture

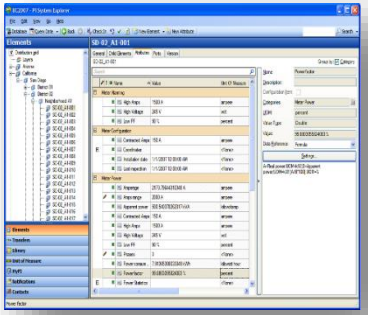


- *Implementing To BE Architecture*
- *Timing: 2015 3rd and 4th quarters*

Global Production Support

- *Implementing global support processes and procedures (including NOC)*
- *Timing: 2015 3rd quarter*

Asset Framework



- *Develop and deploy global enterprise AF*
- *Timing: 2015 3rd and 4th quarters*

Use Case Identification and Implementation

- *Identifying projects that achieve 2015 strategic objectives, plan, and implement*
- *Timing: Ongoing*

Noble's EA

Why the Enterprise Agreement (2014 Justification)

- Business is changing
- Cost vs Benefit Proposition
- Asset Based (Tactical) vs Enterprise Based (Strategic)
- Predictable cost structure for Enterprise Platform
- Value Proposition – Use Cases, and Data as an Asset!

Why the Enterprise Agreement (2015 Justification)

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- !!!!!!

Strategic Direction

Vision for Noble to Fully Leverage the EA?

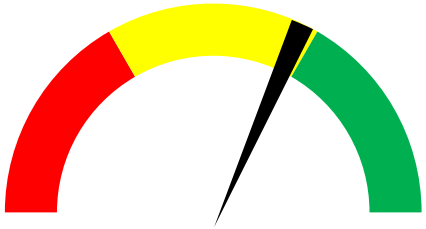
Human Intuition and Expertise

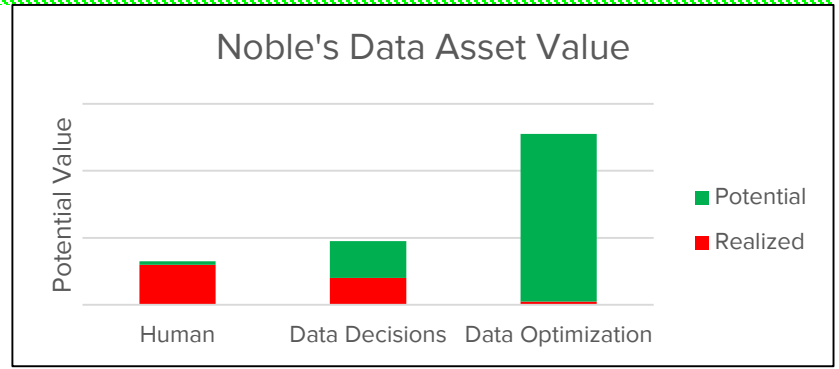
Using Data to Make Decisions

Data Executes Decisions

Data Utilized as an Asset

Noble Progression Level





Tactical Project Delivery Engine to Strategic Operations Framework for Noble Data

- Balance delivery and execution with guided strategic direction
  - Do our projects align with our operations technology strategy?

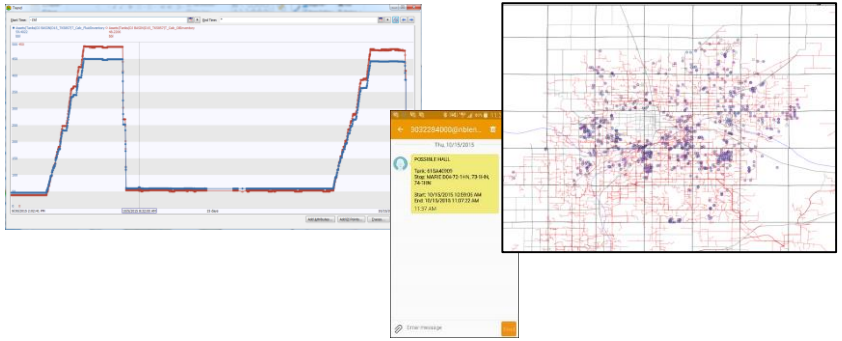
- Quickly, efficiently and repeatedly “light up” innovation and value
  - Leverage/reuse, celebrate and showcase wins
  - Freedom for users, less burden on IT – Go for it!

- Right tool, right time, right action
  - Thoughtful decisions on delivery, toolset, audience, outcomes

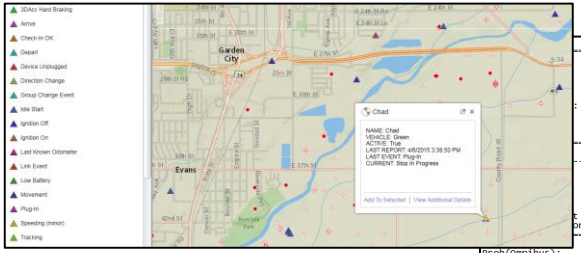
- Continuous Improvement in regard to data stewardship, best practices
  - Develop more robust operations data management and architecture
  - Move away from “all or none,” or “command and control” data structure and access

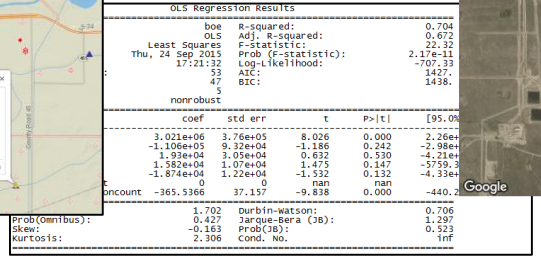
- Ease of execution – speed of business – quicker, easier (!!!!!!)

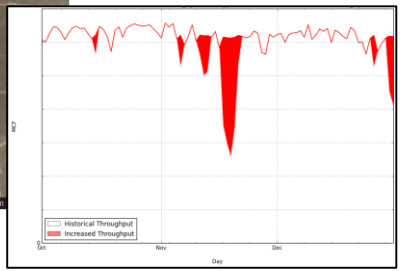
The Path Ahead



- Optimization
- Corporate Process Optimization
- Situational awareness
- Re-examine current thinking
- Advanced Analytics (simulation, algorithms, models, statistical)
- Big Data and Advanced Analytics
- **Partnership with OSIsoft and their strategic partners**







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감사합니다

谢谢

Danke

Gracias

Merci

Thank You

ありがとう

Спасибо

Obrigado

Q&A

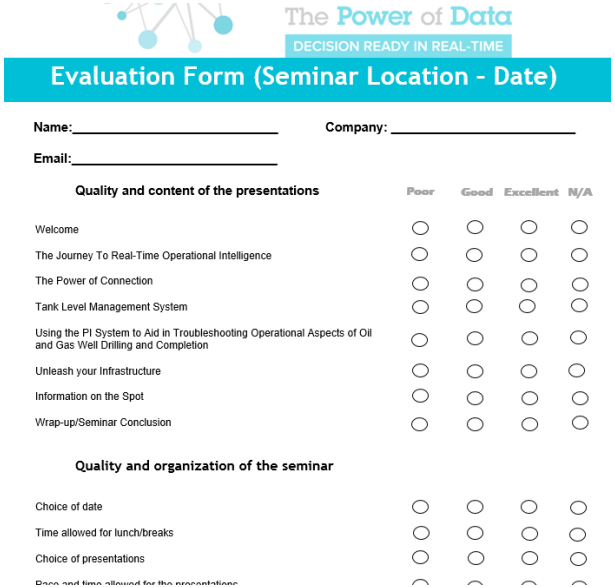
Questions

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

State your **name & company**

Please don't forget to…

Complete the Survey for this session



The Power of Data

DECISION READY IN REAL-TIME

Evaluation Form (Seminar Location - Date)

Name:_____ Company: _____

Email:_____

Quality and content of the presentations	Poor	Good	Excellent	N/A
Welcome	○	○	○	○
The Journey To Real-Time Operational Intelligence	○	○	○	○
The Power of Connection	○	○	○	○
Tank Level Management System	○	○	○	○
Using the PI System to Aid in Troubleshooting Operational Aspects of Oil and Gas Well Drilling and Completion	○	○	○	○
Unleash your Infrastructure	○	○	○	○
Information on the Spot	○	○	○	○
Wrap-up/Seminar Conclusion	○	○	○	○

Quality and organization of the seminar				
Choice of date	○	○	○	○
Time allowed for lunch/breaks	○	○	○	○
Choice of presentations	○	○	○	○
Pace and time allowed for the presentations	○	○	○	○