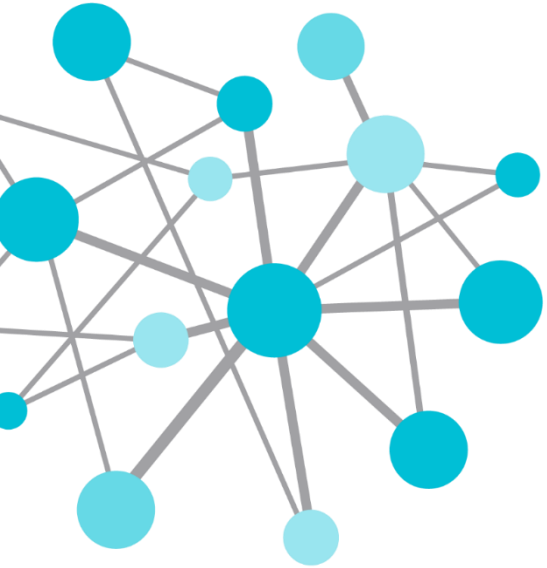


Noble Energy's Path to Operational Excellence

Presented by **Joe Hill, Sr. Enterprise Systems Analyst**
Shawn Cole, Sr. Automation Foreman

noble energy

Noble Energy

Energizing the world, Bettering People's Lives

- Over 80 years in the Oil and Gas industry
- Independent producer around the world
- Leaders in Environment, health, safety and Energy teamwork
- Business Partner of Choice

Implementing the PI System:

Change the way we operate domestically and globally

- Become a data driven company
- Increase production
- Have reliable and consistent automation systems
- Where Wonderware fits (SCADA)
- Where OSIsoft PI System fits (Data Management)

The Start of PI Sytem at Noble

Evaluated 3 companies for the replacement of Israel Cygnet system and for a system that would be able to scale and become the standard for Noble

Testing for domestic

Various tests and pilots are done to see how the PI System could be used domestically (DTS, etc)

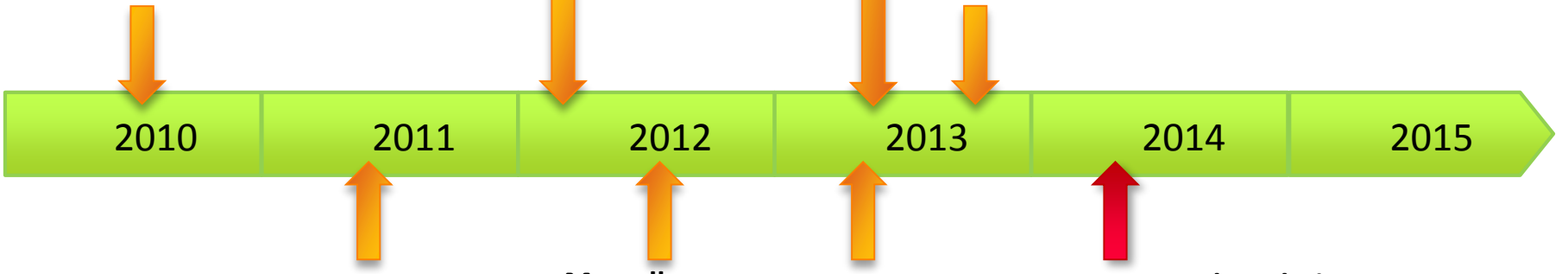
Integration

PI System is integrated with Allegro and Merrick

Gulf of Mexico

PI System is used to monitor Galapagos and Ticonderoga

Neptune Spar and Thunderhawk to be added



1st Install

Replaced Cygnet for system monitoring at Mari-B and AOT.

Installed PI System on Aseng FPSO prior to start up.

Marcellus Implemented

Tamar and Alen

The PI System was essential in monitoring the startup of both Tamar and Alen

PI AF and Analytics

Build PI AF structure to support data needs and analytics for multiple departments and Bus

DJ Integrated to Merrick

Current State of our PI Systems

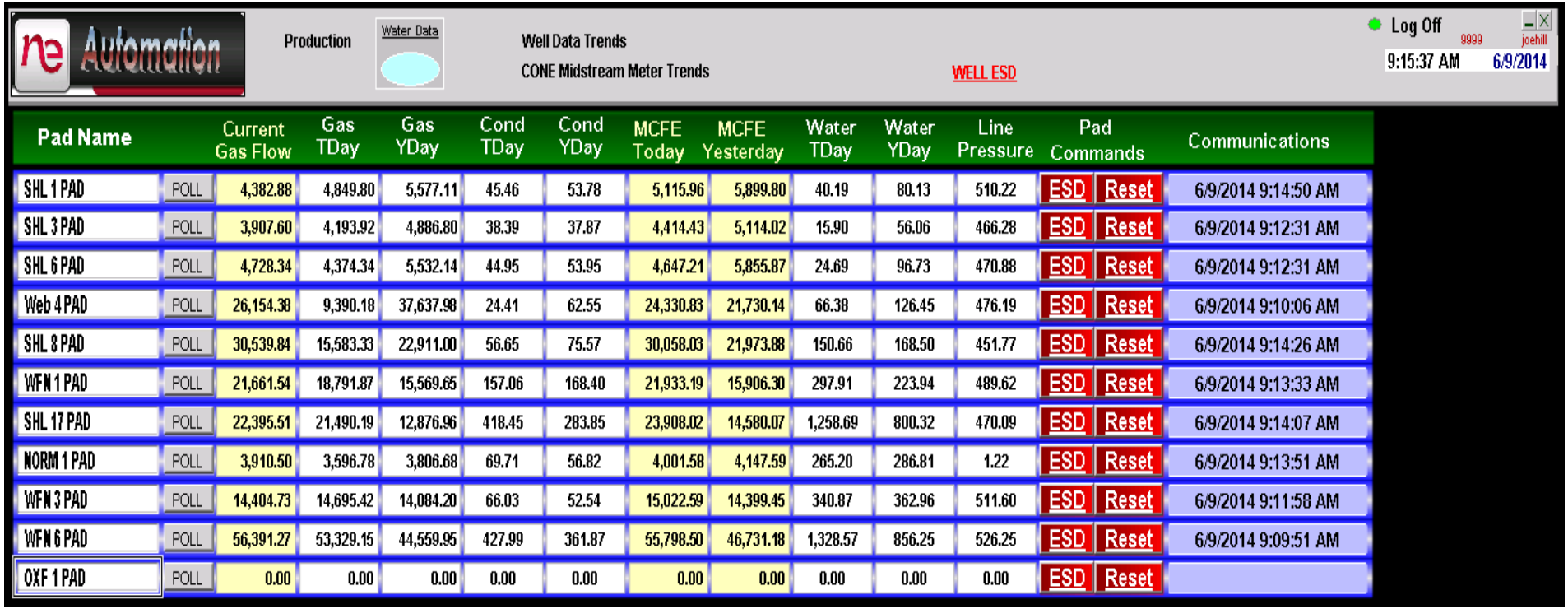
Noble Global Presence:

- Eastern Mediterranean
- Gulf of Mexico
- West Africa
- Pennsylvania
- Colorado (in progress)

1. Providing Seamless Real Time Data
2. Daily Production Reporting
3. Primary Tool Used for Optimization and Production Metrics
4. One Source Record for all Departments

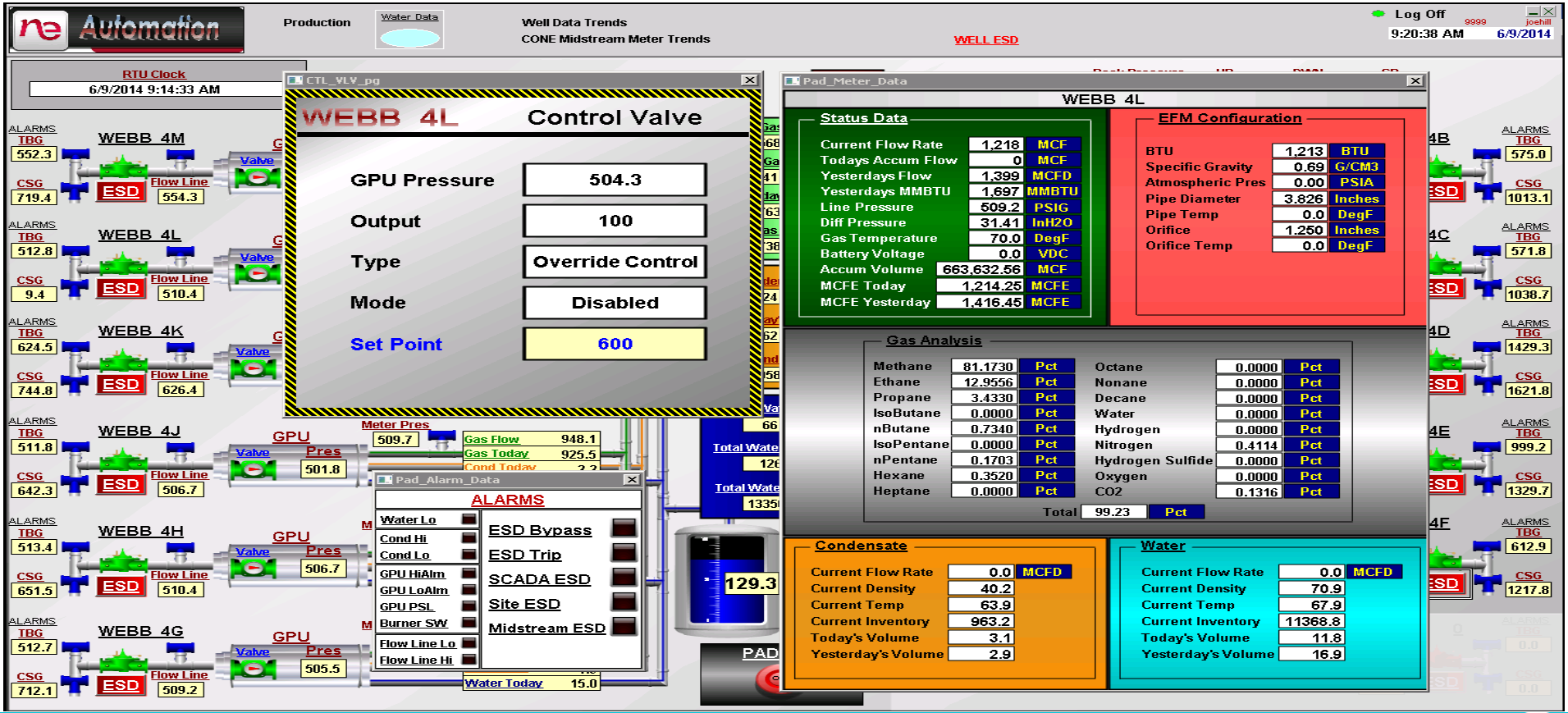
Wonderware (SCADA)

Provides a High level view for Production Foremen and Operators



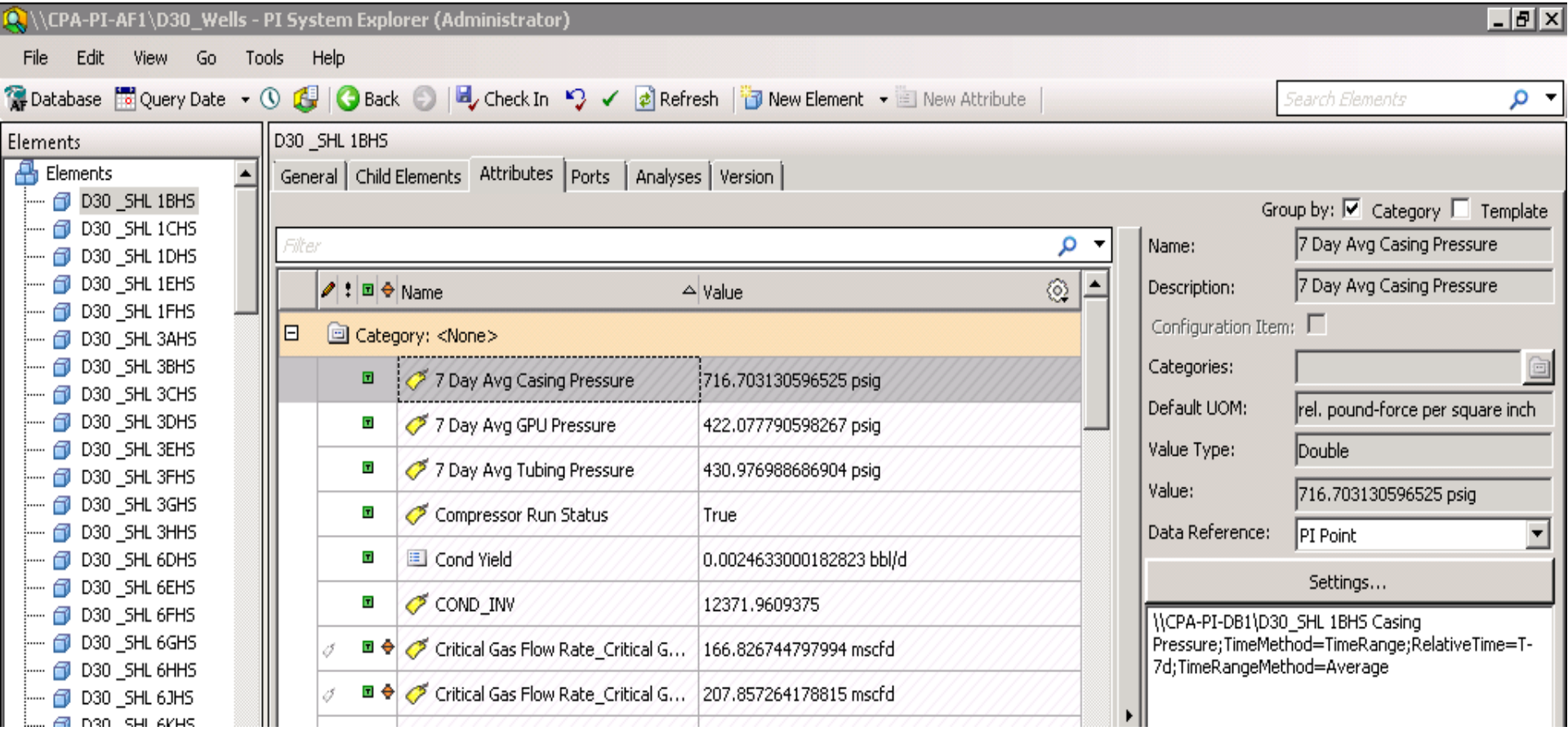
Pad Name		Current Gas Flow	Gas TDay	Gas YDay	Cond TDay	Cond YDay	MCFE Today	MCFE Yesterday	Water TDay	Water YDay	Line Pressure	Pad Commands		Communications
SHL 1 PAD	POLL	4,382.88	4,849.80	5,577.11	45.46	53.78	5,115.96	5,899.80	40.19	80.13	510.22	ESD	Reset	6/9/2014 9:14:50 AM
SHL 3 PAD	POLL	3,907.60	4,193.92	4,886.80	38.39	37.87	4,414.43	5,114.02	15.90	56.06	466.28	ESD	Reset	6/9/2014 9:12:31 AM
SHL 6 PAD	POLL	4,728.34	4,374.34	5,532.14	44.95	53.95	4,647.21	5,855.87	24.69	96.73	470.88	ESD	Reset	6/9/2014 9:12:31 AM
Web 4 PAD	POLL	26,154.38	9,390.18	37,637.98	24.41	62.55	24,330.83	21,730.14	66.38	126.45	476.19	ESD	Reset	6/9/2014 9:10:06 AM
SHL 8 PAD	POLL	30,539.84	15,583.33	22,911.00	56.65	75.57	30,058.03	21,973.88	150.66	168.50	451.77	ESD	Reset	6/9/2014 9:14:26 AM
WFN 1 PAD	POLL	21,661.54	18,791.87	15,569.65	157.06	168.40	21,933.19	15,906.30	297.91	223.94	489.62	ESD	Reset	6/9/2014 9:13:33 AM
SHL 17 PAD	POLL	22,395.51	21,490.19	12,876.96	418.45	283.85	23,908.02	14,580.07	1,258.69	800.32	470.09	ESD	Reset	6/9/2014 9:14:07 AM
NORM 1 PAD	POLL	3,910.50	3,596.78	3,806.68	69.71	56.82	4,001.58	4,147.59	265.20	286.81	1.22	ESD	Reset	6/9/2014 9:13:51 AM
WFN 3 PAD	POLL	14,404.73	14,695.42	14,084.20	66.03	52.54	15,022.59	14,399.45	340.87	362.96	511.60	ESD	Reset	6/9/2014 9:11:58 AM
WFN 6 PAD	POLL	56,391.27	53,329.15	44,559.95	427.99	361.87	55,798.50	46,731.18	1,328.57	856.25	526.25	ESD	Reset	6/9/2014 9:09:51 AM
OXF 1 PAD	POLL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	ESD	Reset	

Real time view of field and detail information of pad / wells allows for control of field and remote well optimization

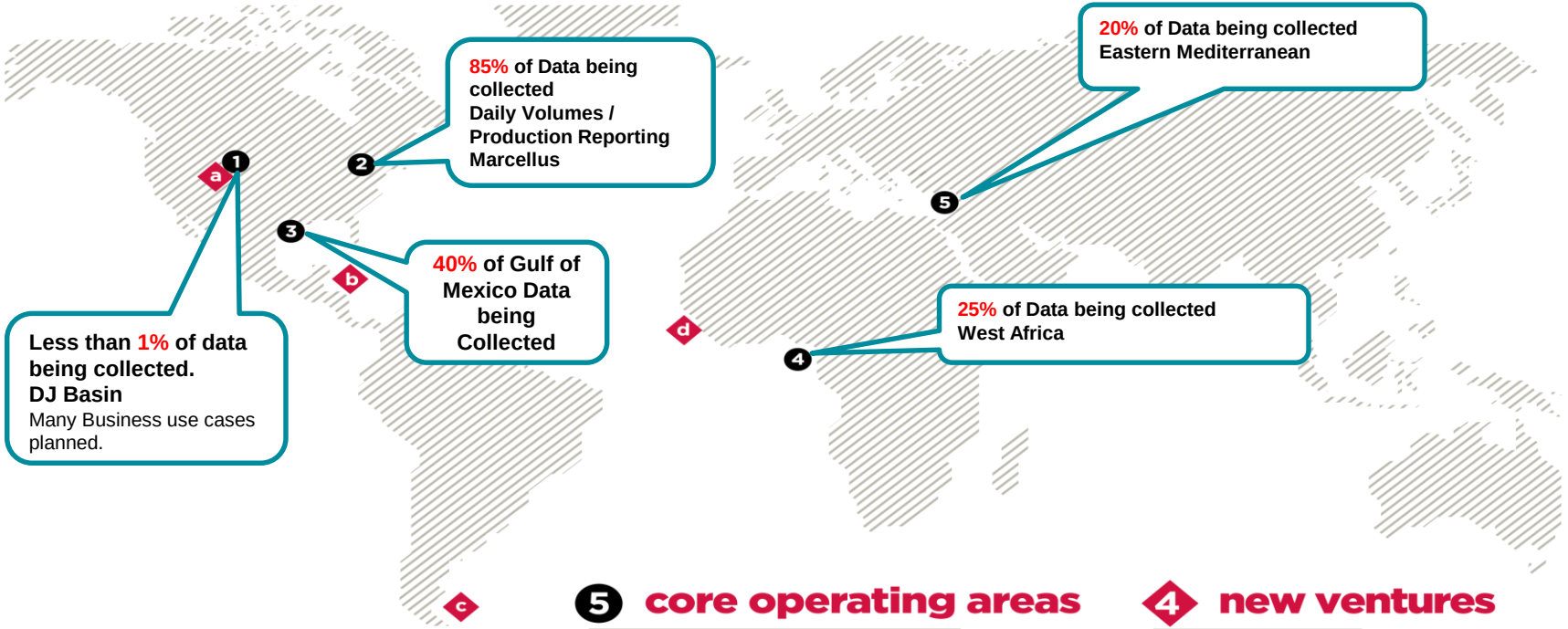


Trend and data analysis using PI Coresight embedded into InTouch

PI AF Elements and Attributes



Core Area Crucial Data Collection today:



5 core operating areas

1. Denver-Julesberg Basin
2. Marcellus Shale
3. Gulf of Mexico
4. West Africa
5. Eastern Mediterranean

4 new ventures

- a Nevada
- b Nicaragua
- c Falkland Islands
- d Sierra Leone

Marcellus Fully Integrated System

- Management
- Production, Accounting
- Engineering
- Automation, Managers
- Operators & Foremen

DISTRICT 30 TREND DISPLAYS

MBU Field Summary Trends | MBU Gas Meter Variance Trends | MBU Produced Water | Majorsville EFM | Morning Report | Oxford Frac Monitor | PENS 1 Frac Monitor

MBU Field Summary

	Line Pressure	Flow Rate	Gas TDY	Gas YDY	Oil TDY	Oil YDY	Water TDY	Water YDY	MCFE YDY	BOE YDY
SHL 1	391.26	6,190.27	5,540.88	6,035.64	42.15	42.66	56.89	79.47	7,390.06	1,231.68
SHL 3	372.41	8,687.65	7,930.84	8,449.81	56.61	45.36	72.15	91.30	10,259.85	1,709.97
SHL 6	381.39	5,746.75	5,364.49	5,756.55	40.47	38.39	59.44	75.14	7,034.57	1,172.43
SHL 8	351.01	31,555.26	30,482.48	35,104.58	47.06	53.93	301.98	356.92	41,817.20	6,969.53
WEB 4	382.48	25,258.38	24,511.07	25,915.07	32.62	22.78	186.43	173.56	30,768.32	5,128.05
WFN 1	376.96	23,276.64	22,268.77	23,504.13	112.66	109.43	317.82	341.39	28,438.44	4,739.74
SHL 17	353.98	25,054.59	24,257.62	24,740.60	335.59	337.98	1,158.51	1,231.44	31,271.28	5,211.88
WFN 3	388.07	8,911.56	8,302.06	3,462.80	65.81	69.70	313.43	223.45	4,511.22	751.87
MBU North Totals	374.69	134,681.10	128,658.21	132,969.19	732.97	720.23	2,466.65	2,572.67	161,490.94	26,915.16
NORM 1	463.15	1,637.32	890.26	652.22	9.82	17.75	145.11	77.69	877.44	146.24
MBU Totals	384.52	136,318.41	129,548.47	133,621.41	742.80	737.98	2,611.76	2,650.36	162,368.37	27,061.40

SHL Area

SHL 1 Well Trends | SHL 1 Pad Total Trends
SHL 3 Well Trends | SHL 3 Pad Total Trends
SHL 6 Well Trends | SHL 6 Pad Total Trends
SHL 8 Well Trends | SHL 8 Pad Total Trends
SHL 17 Well Trends | SHL 17 Pad Total Trends

WEB Area

WEB 4 Well Trends | WEB 4 Pad Total Trends

WFN Area

WFN 1 Well Trends | WFN 1 Pad Total Trends
WFN 3 Well Trends

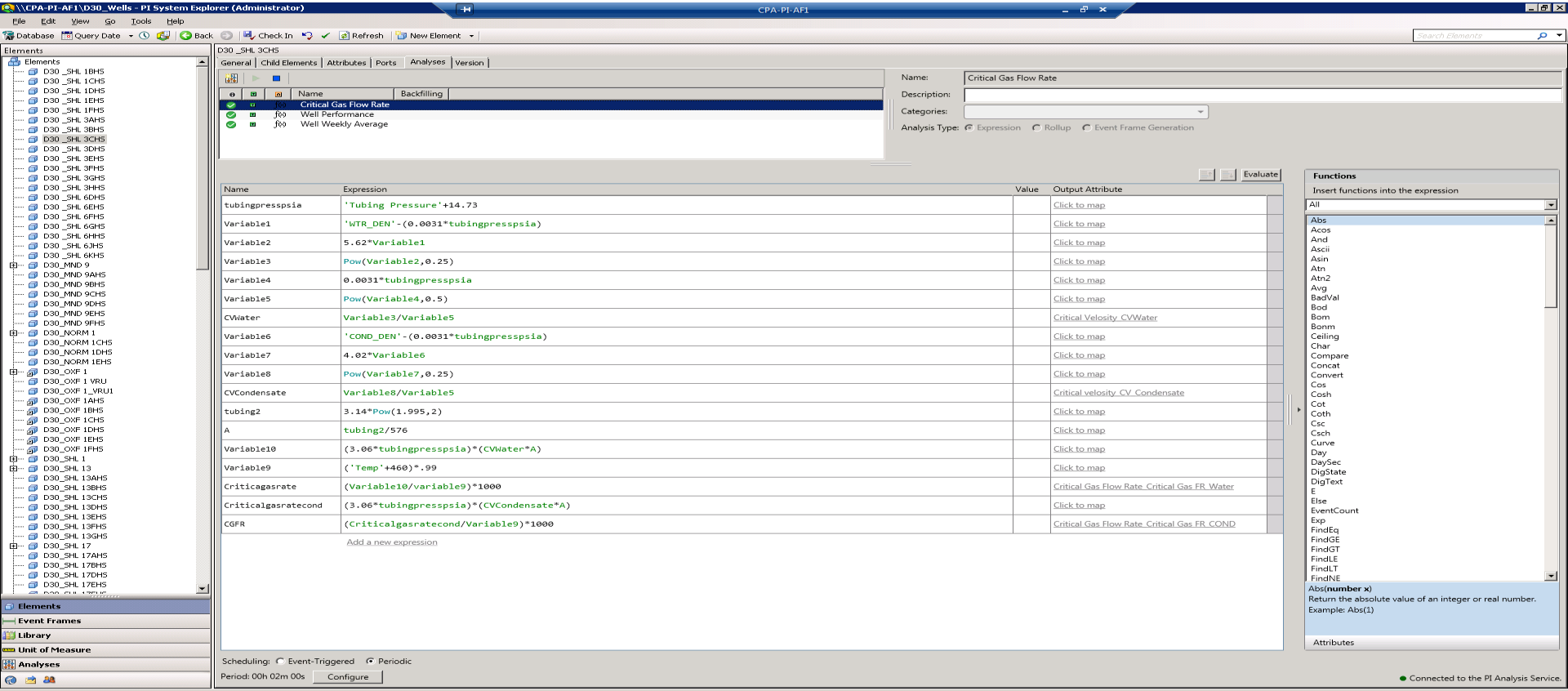
NORM Area

NORM 1 Well Trends | NORM 1 Pad Total Trends

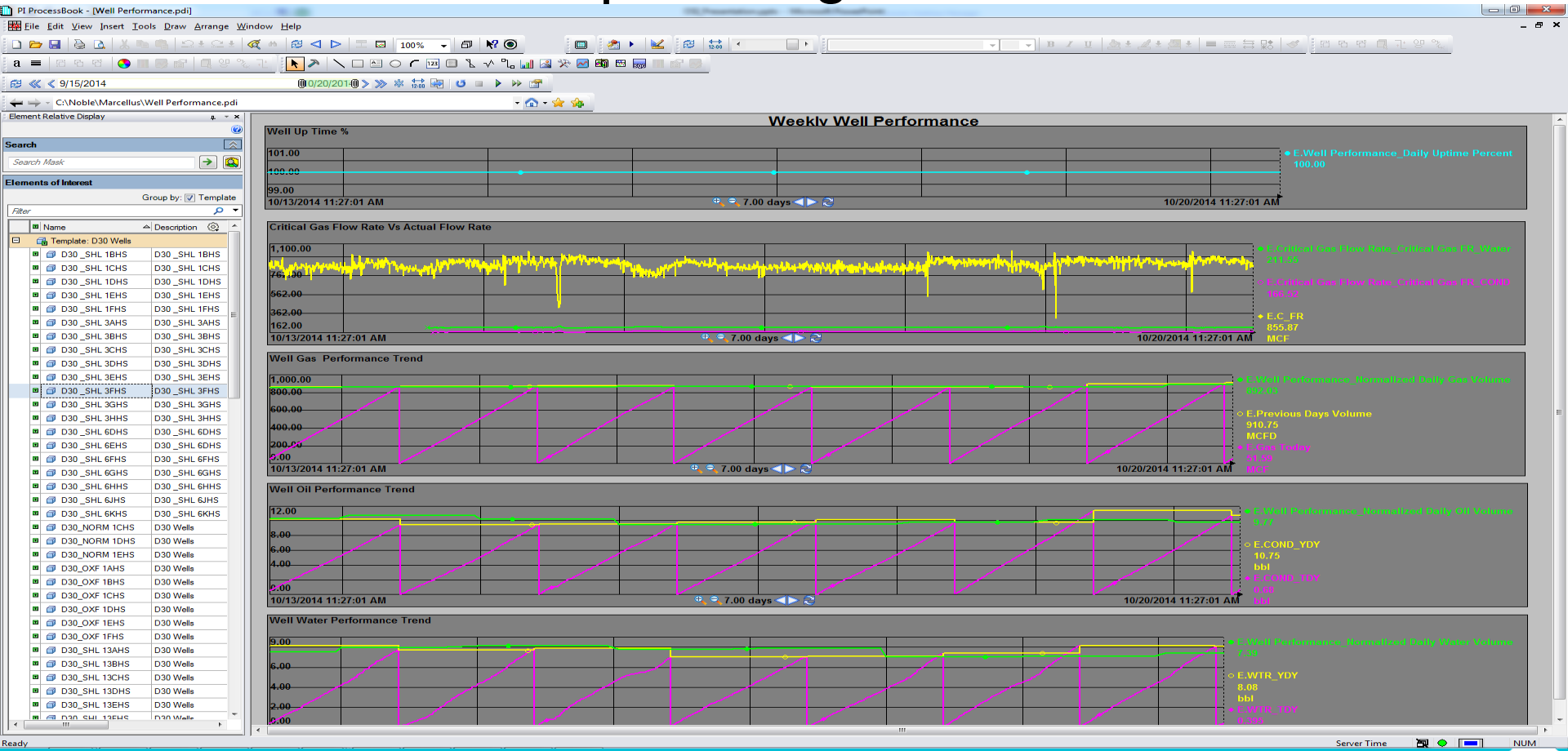
Field Automation → **Communications** → **SCADA** → **PI System Enterprise Solution** → **Production Reporting**

Kepware TECHNOLOGIES | Wonderware InTouch. | MERRICK SYSTEMS

PI AF Analyses



Optimizing Wells



Recent Major Project where the PI System was implemented prior to startup

- The PI System was used to monitor the startup of Aseng, Tamar, and Alen
  - Aseng – with the PI System in place engineers were able to increase production by an estimated 10,000 Barrels of Oil a day!
  - Tamar – the PI System was used to remote monitor key information during startup – pictured below

Next Steps

- Get PI Event Frames rolled out
- Get an OSIsoft Enterprise Agreement (EA) signed and delivered!
- Focus on making our PI System **THE** primary source of record for production data
- One version of the truth globally

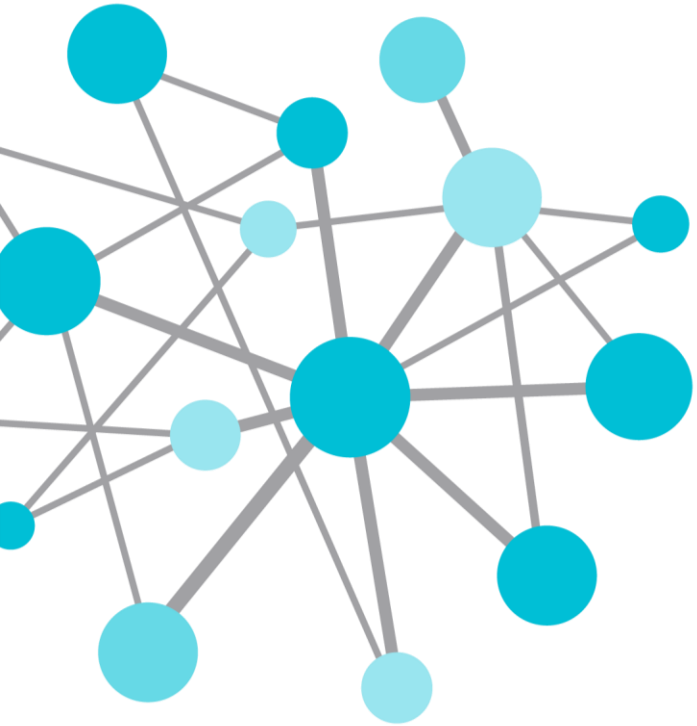
Pursuit of an Enterprise Agreement (EA)

- Recruit champions
- Provide business use cases
- Prove the value of the PI System (ROI)

Questions

Please wait for the microphone before asking your question

Please state your name and your company



THANK YOU

Brought to you by OSIsoft.

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