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April 4-8, 2016 | San Francisco

TRANSFORM
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Path to Premier Through Reliability 3.0

Presented by **Keary Rogers**
Ionut Buse



Agenda

- ➡ Industry and Company Overview
- ➡ Business Challenges
- ➡ Project Infrastructure Overview
- ➡ Present Strategy
- ➡ Past Success
- ➡ Future Project Plans

North American Foot Print

Pipeline

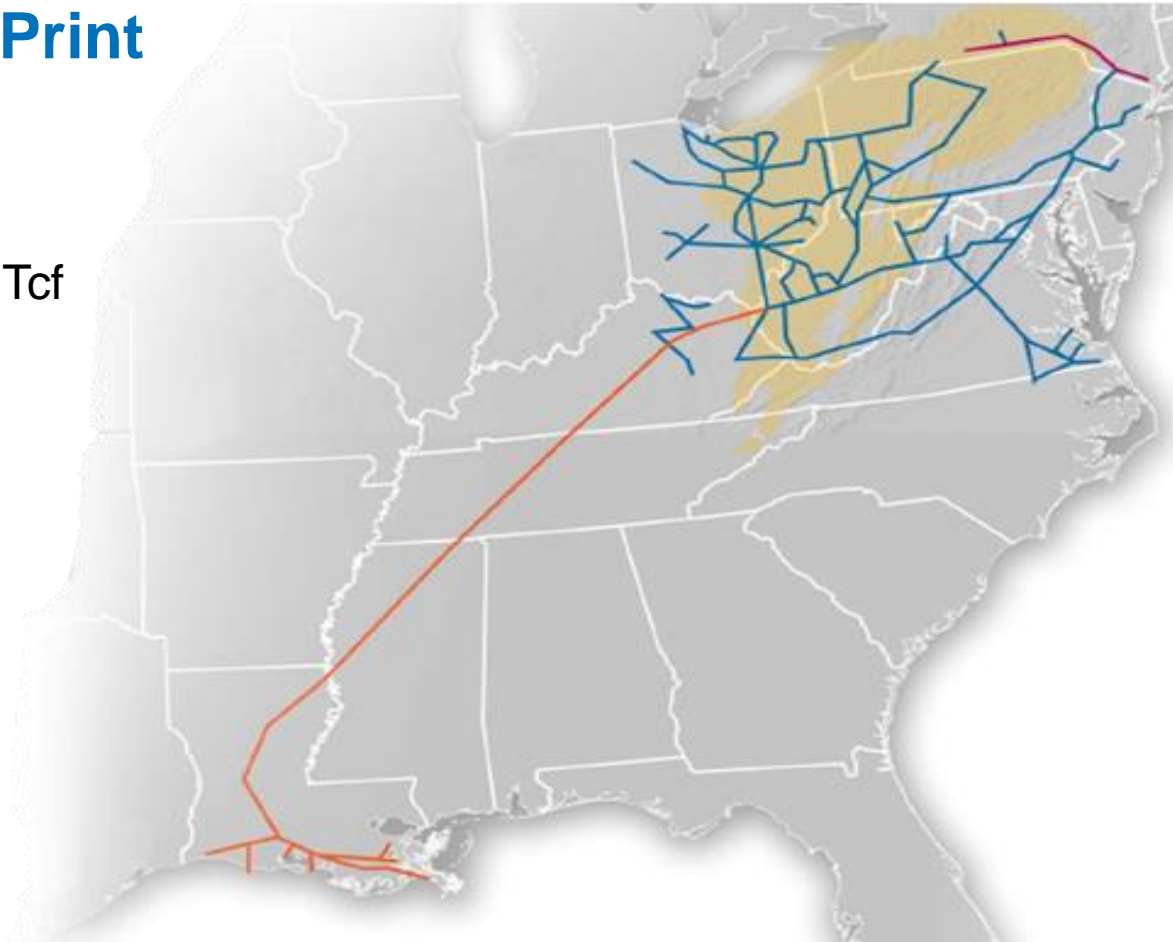
- More than 15,000 Miles
- Delivers Approximately 1.3 Tcf per Year

Compression

- 1.2 Million Horsepower
- 100+ Stations

Storage

- 4.7 Bc/d Deliverability
- 37 Storage Fields in Four States



CPG Expansion ~\$6B Inventory of Regulated Projects

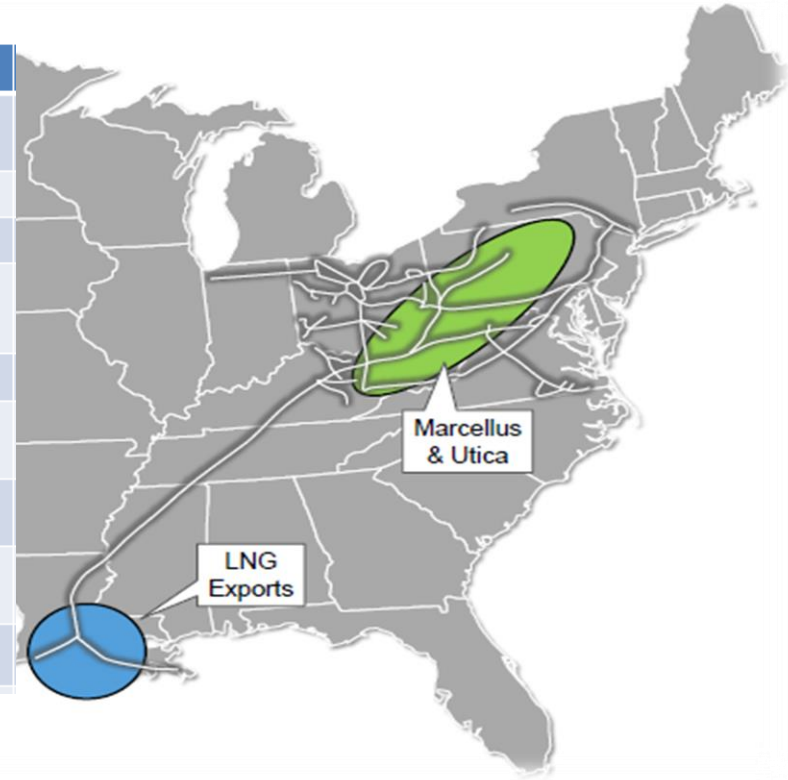
Pipeline

- 350+ Miles of New Pipeline

Compression

- 1+ Million New Horsepower
- 40+ New Compression Units
- 16+ New Stations

(\$MM)	Project
\$275	East Side Expansion
\$25	AEP Big Sandy
\$50	Utica Access
\$1,420	Leach XPress
\$380	Rayne XPress
\$310	Cameron Access
~\$850	WB XPress
\$2,000	Mountaineer XPress
\$700	Gulf XPress



Business Challenges

!

Rapid Expansion of our Compression Fleet

!

Increased Number and Variety of Gas Streams

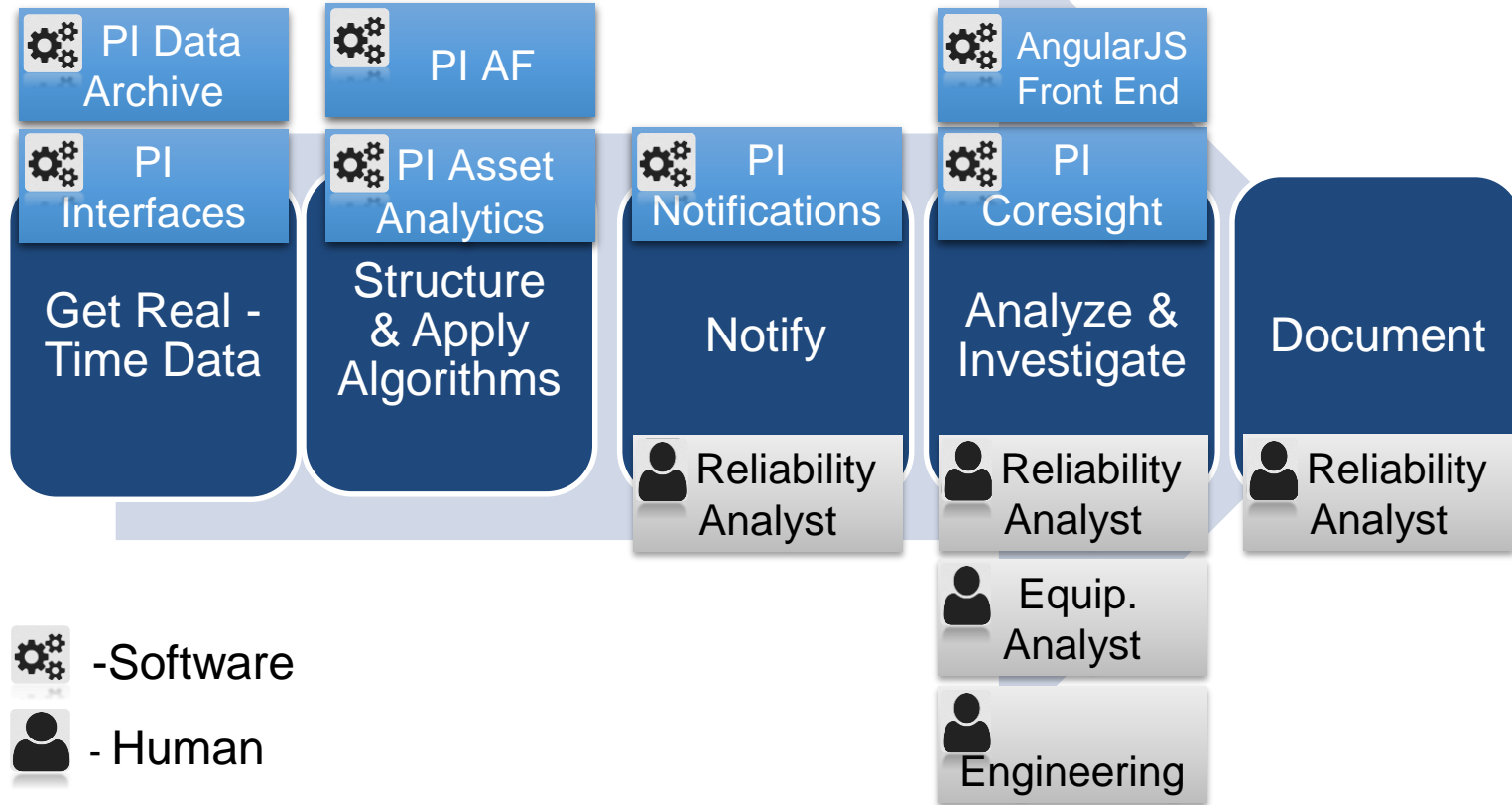
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AF Model Flexibility for Upcoming Expansion

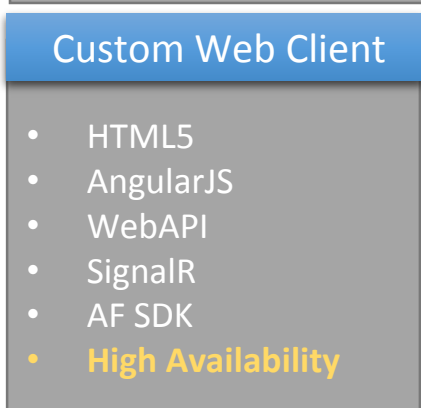
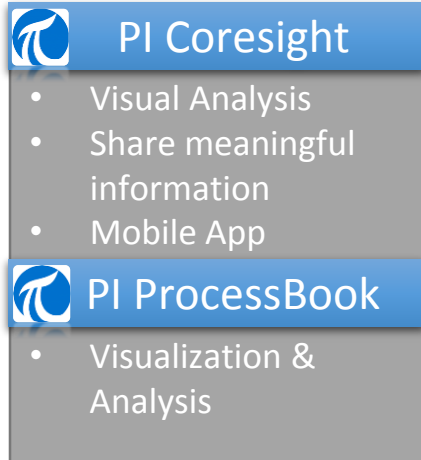
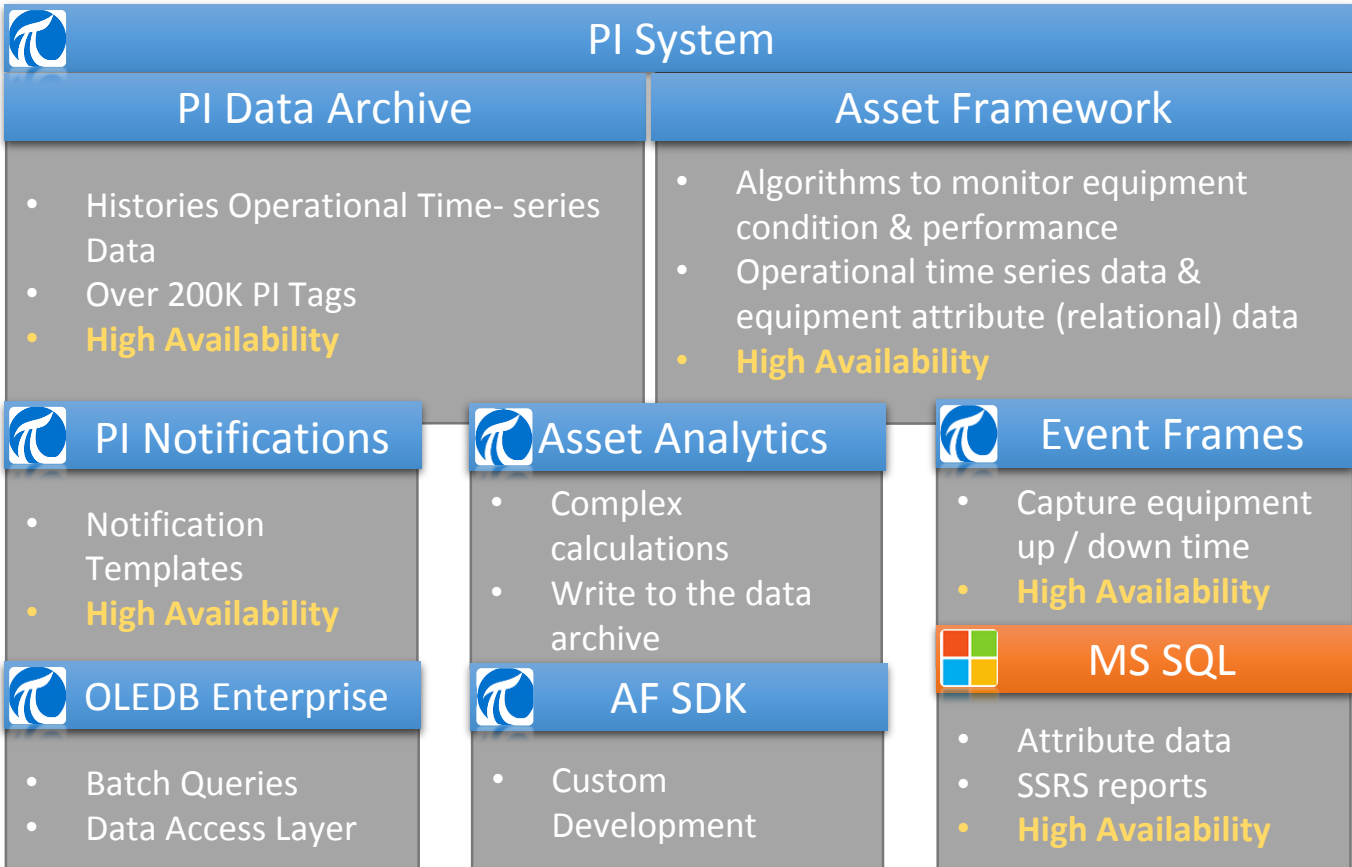
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User Experience (UX) Design

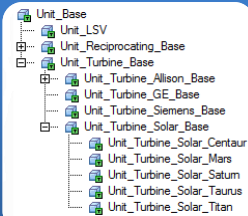
Enterprise Analytics 3.0 Process



Suite of Tools

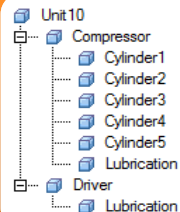


Asset Framework Implementation



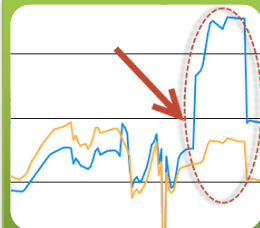
Scalability

- Highly Scalable Solution
- Take advantage of Element Templates
- Inheritance



Logical Asset Structure

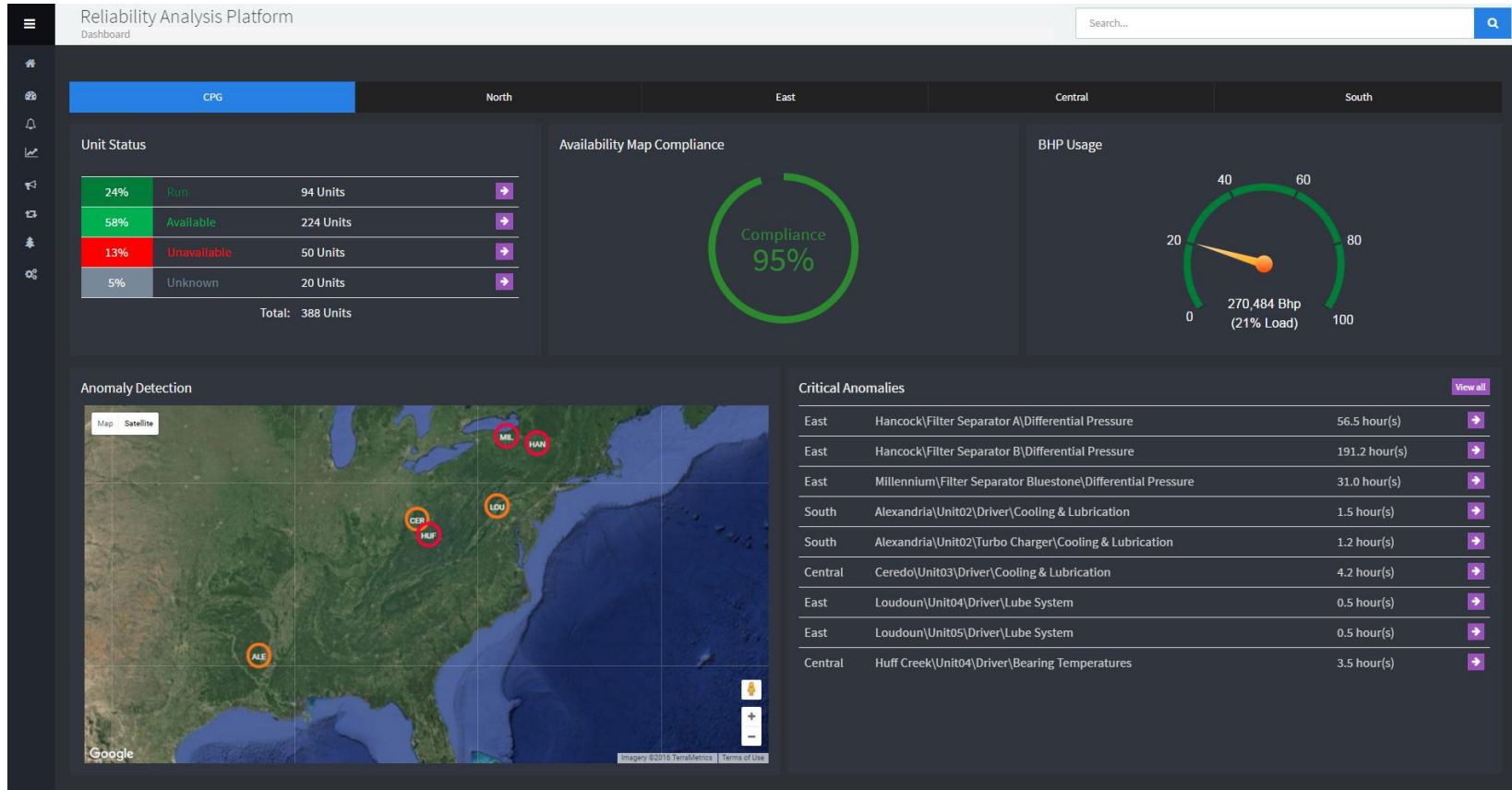
- Model our equipment fleet using a logical structure that is familiar to our engineers and analysts
- Bring operational time-series data and relational asset data together to implement complex calculations



Test and Validate

- Run the calculations back in time to test and validate our algorithms

Enterprise Analytics 3.0 – Executive Dashboard



Enterprise Analytics 3.0 – Anomaly Detection

Reliability Analysis Platform

Dashboard / Anomalies

Search...

CPG

North

East

Central

South

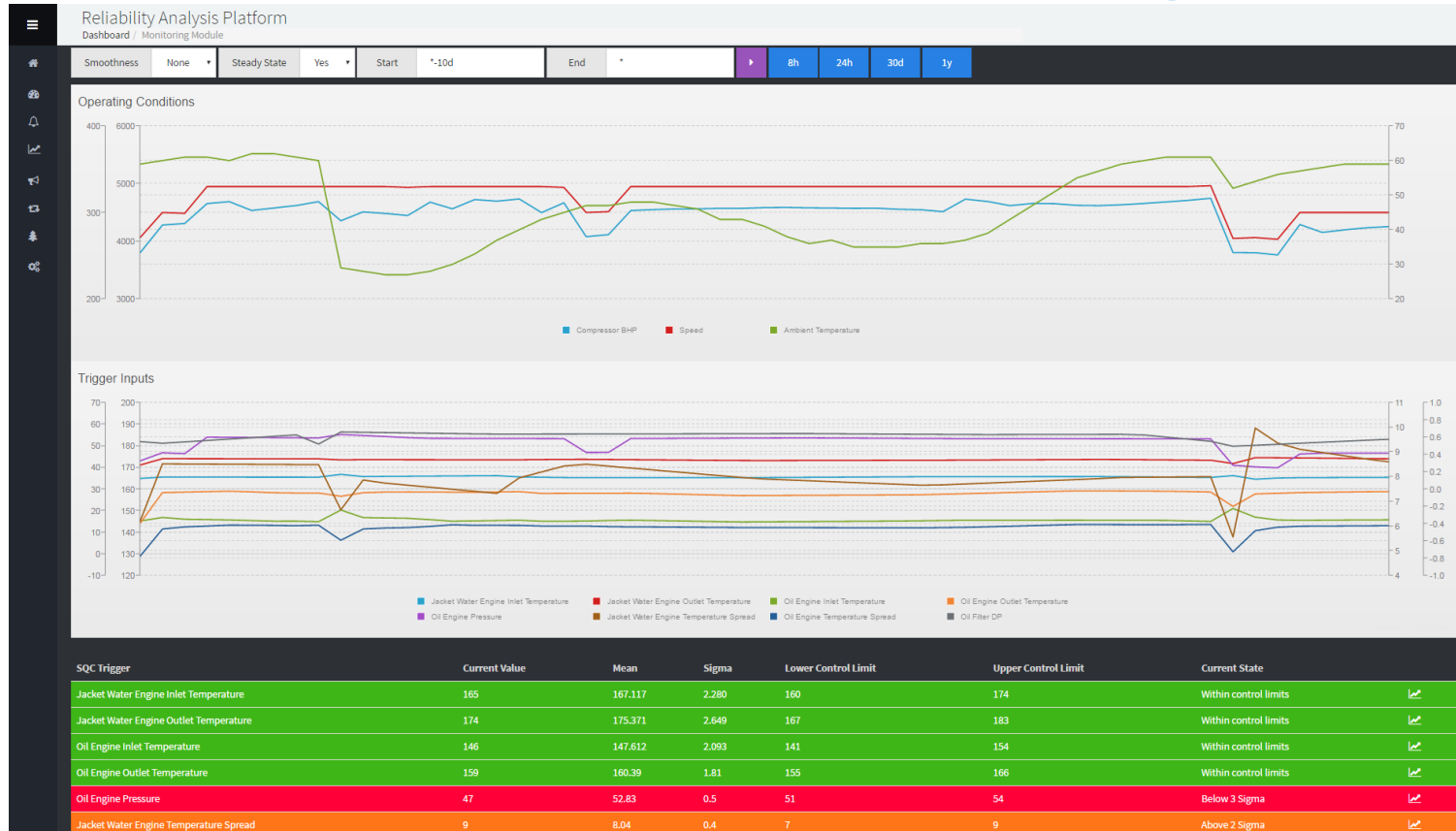
Active Anomalies

Past 24h

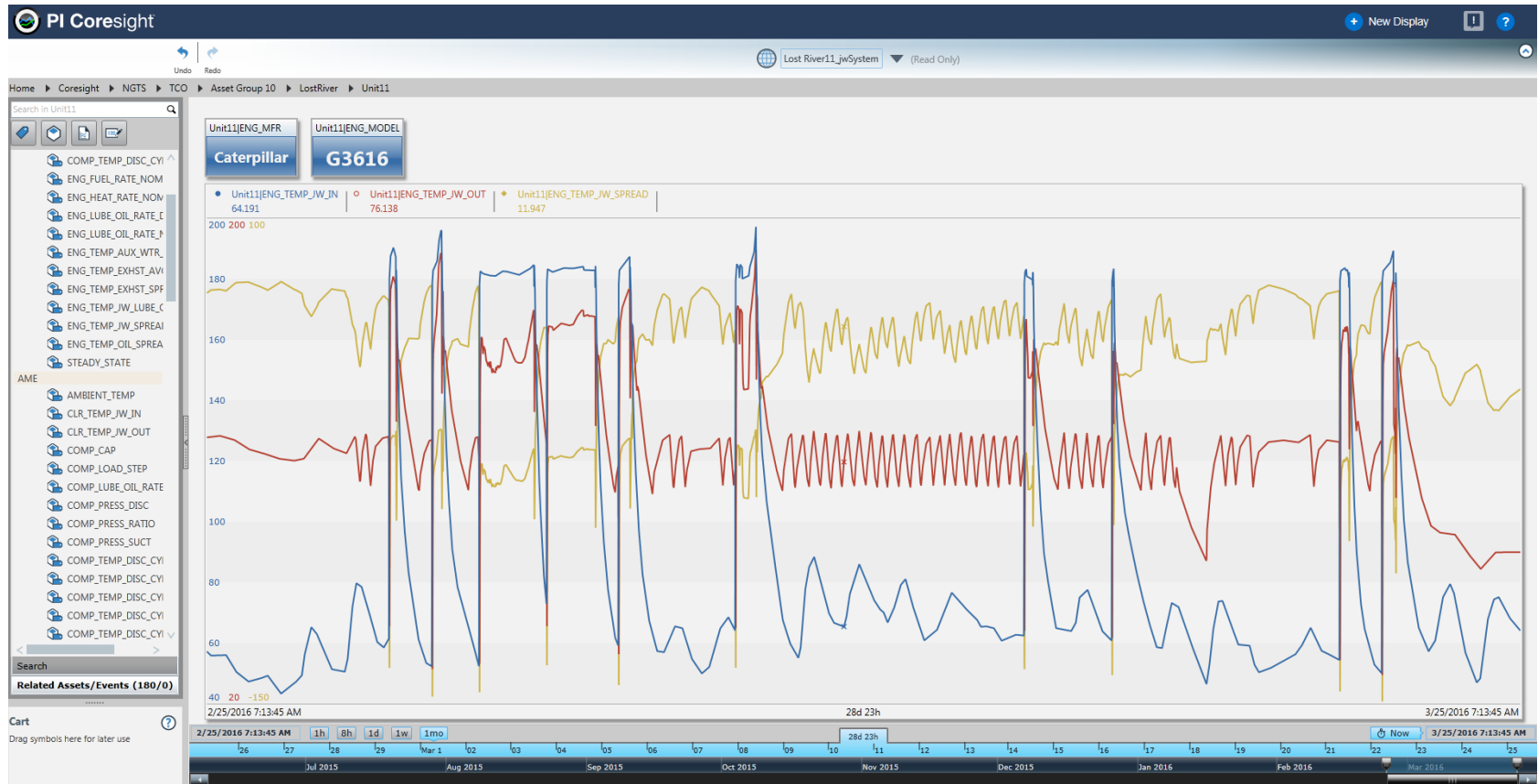
Found 8 active anomalies

Region	Tier	Monitoring Module	Duration	Status
East	1	Millennium\Filter Separator Bluestone\Differential Pressure	21.4 hour(s)	Acknowledged (Minor Issue)
East	1	Hancock\Filter Separator B\Differential Pressure	181.7 hour(s)	Pending
East	1	Hancock\Filter Separator A\Differential Pressure	46.9 hour(s)	Pending
East	1	Downingtown\Unit02\Gas Compressor Service 02\Discharge Temperature	20.2 hour(s)	Pending
East	1	Downingtown\Unit02\Gas Compressor Service 01\Discharge Temperature	19.4 hour(s)	Pending
East	3	Flat Top\Unit03\Gas Compressor\Seal System	7.7 hour(s)	Pending
North	2	Crawford\Unit14\Driver\Cooling & Lubrication	5.4 hour(s)	Pending
Central	4	Huff Creek\Unit04\Driver\Cooling & Lubrication	8.7 hour(s)	Pending

Enterprise Analytics 3.0 – Module Monitoring Analysis

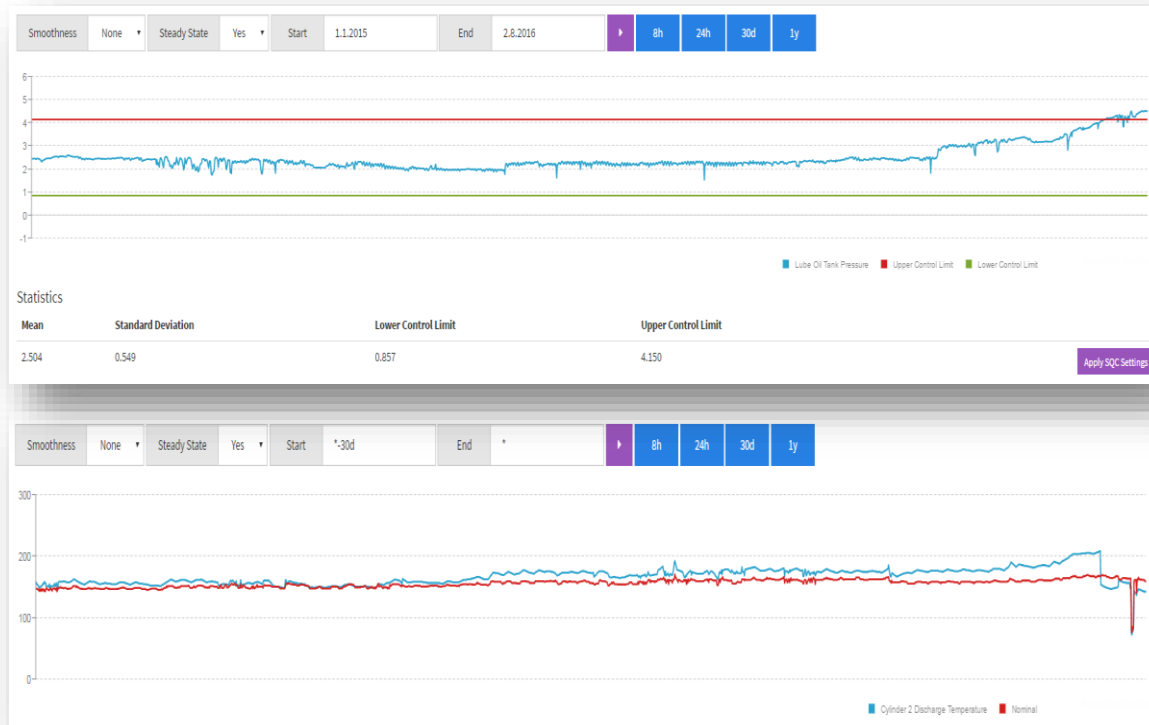


Enterprise Analytics 3.0 – Module Monitoring Analysis

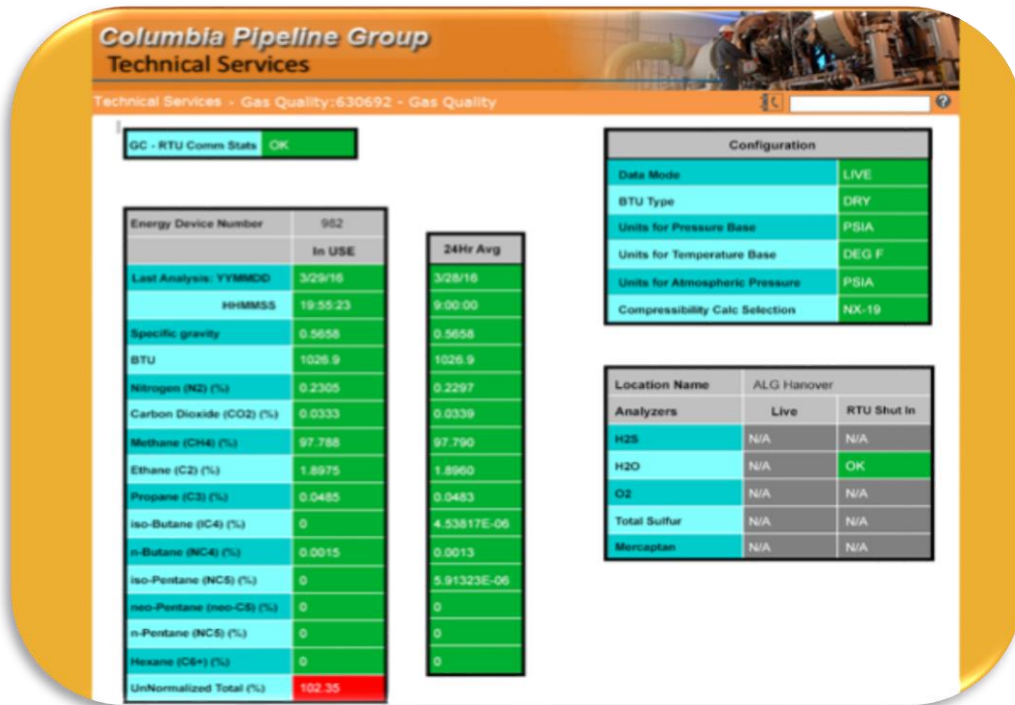


Monitoring Approach

- **Anomaly Detection**
- SQC
- Multivariate Analysis to account for correlation
- **Key Performance Indicators**
- Real-time measurement vs. nominal (expected)
- Nominal calculated for current operating conditions



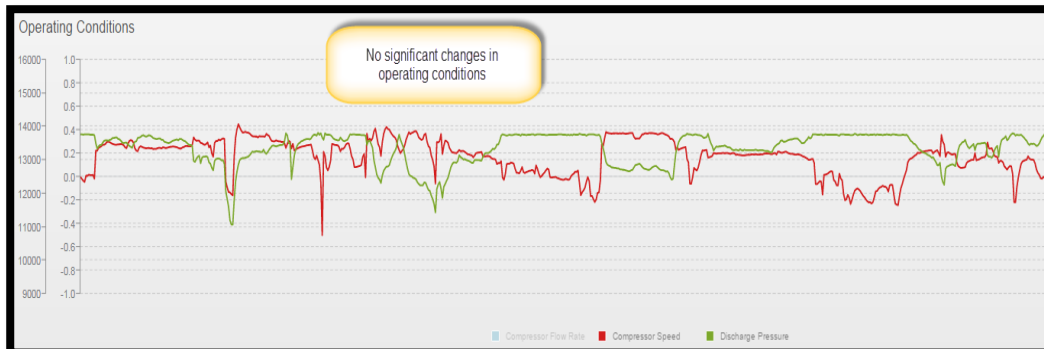
Gas Quality



Gas Chromatograph

- Tariff Compliance KPIs
- Communication Status
- Equipment Health

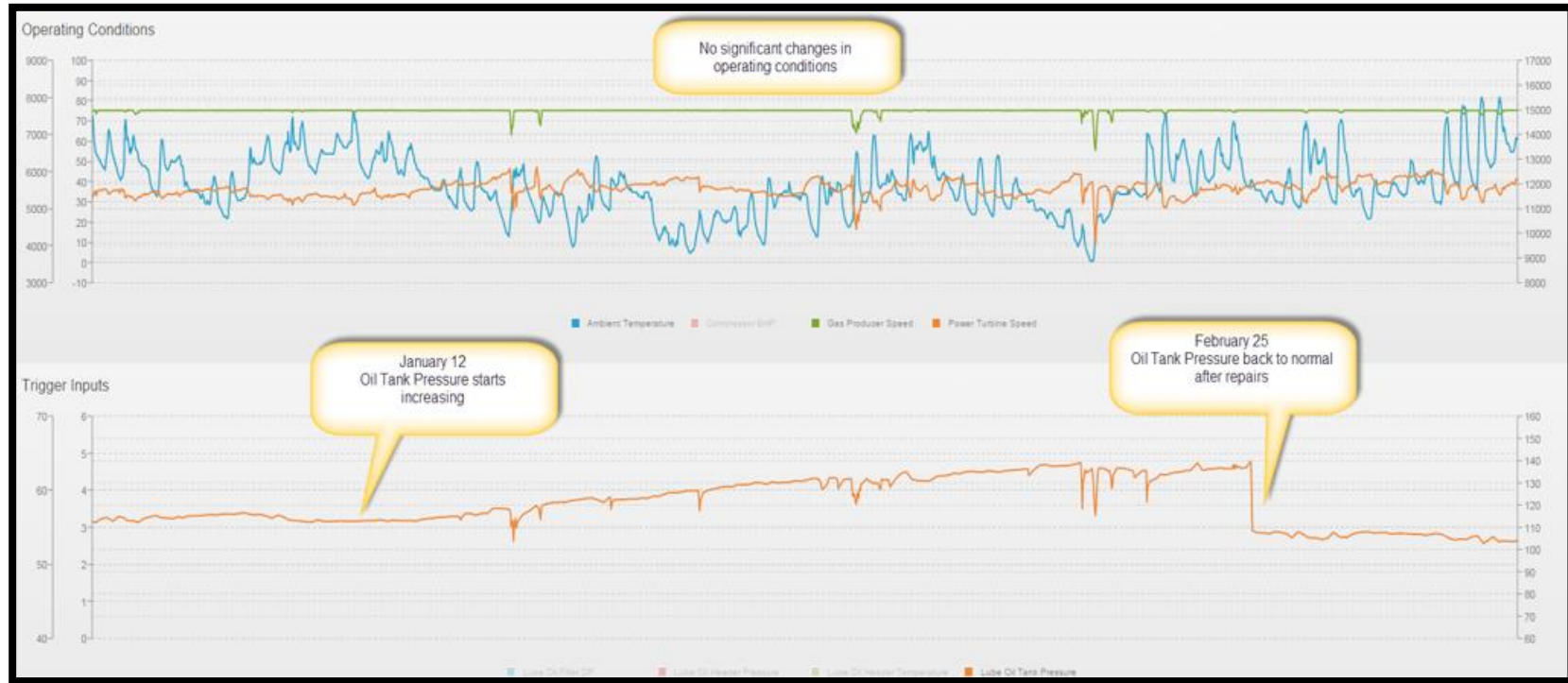
EA 3.0 Findings



Seal Gas Filters



EA 3.0 Findings

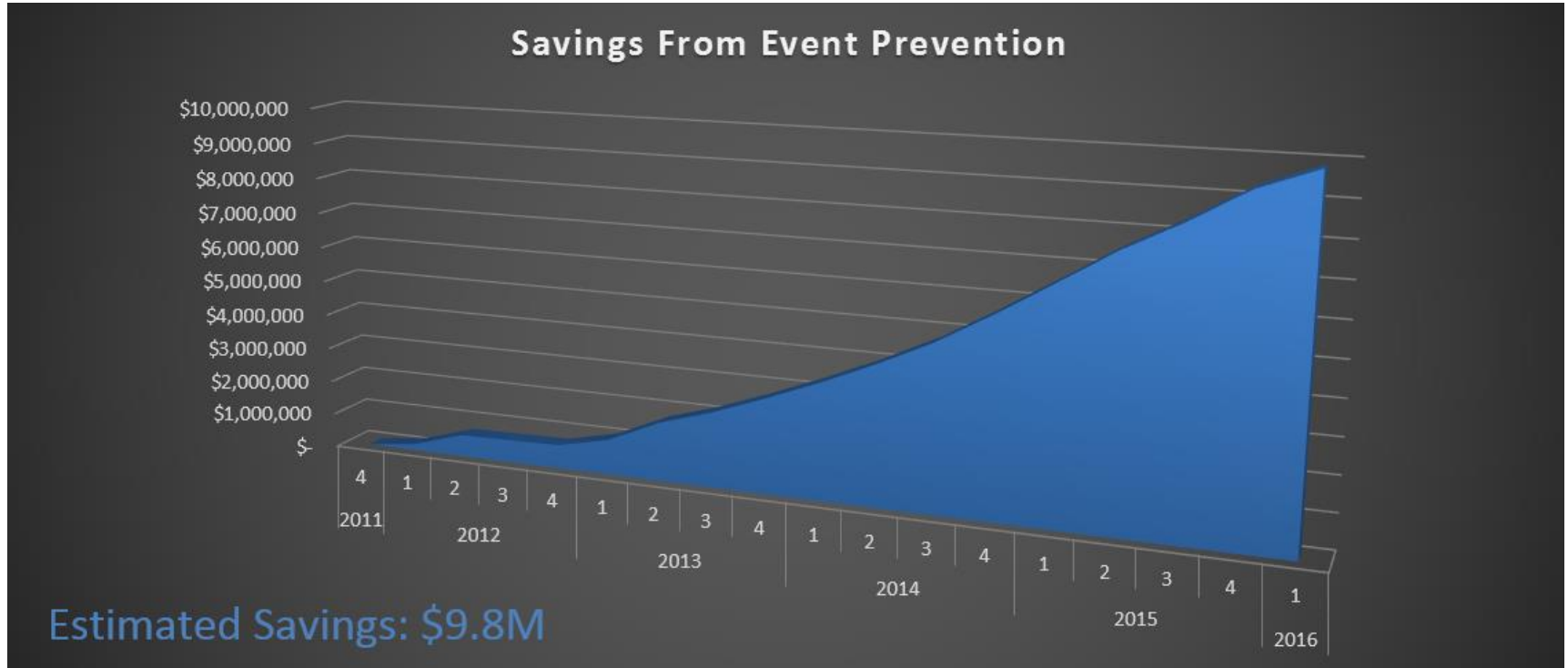


Gas Quality Findings

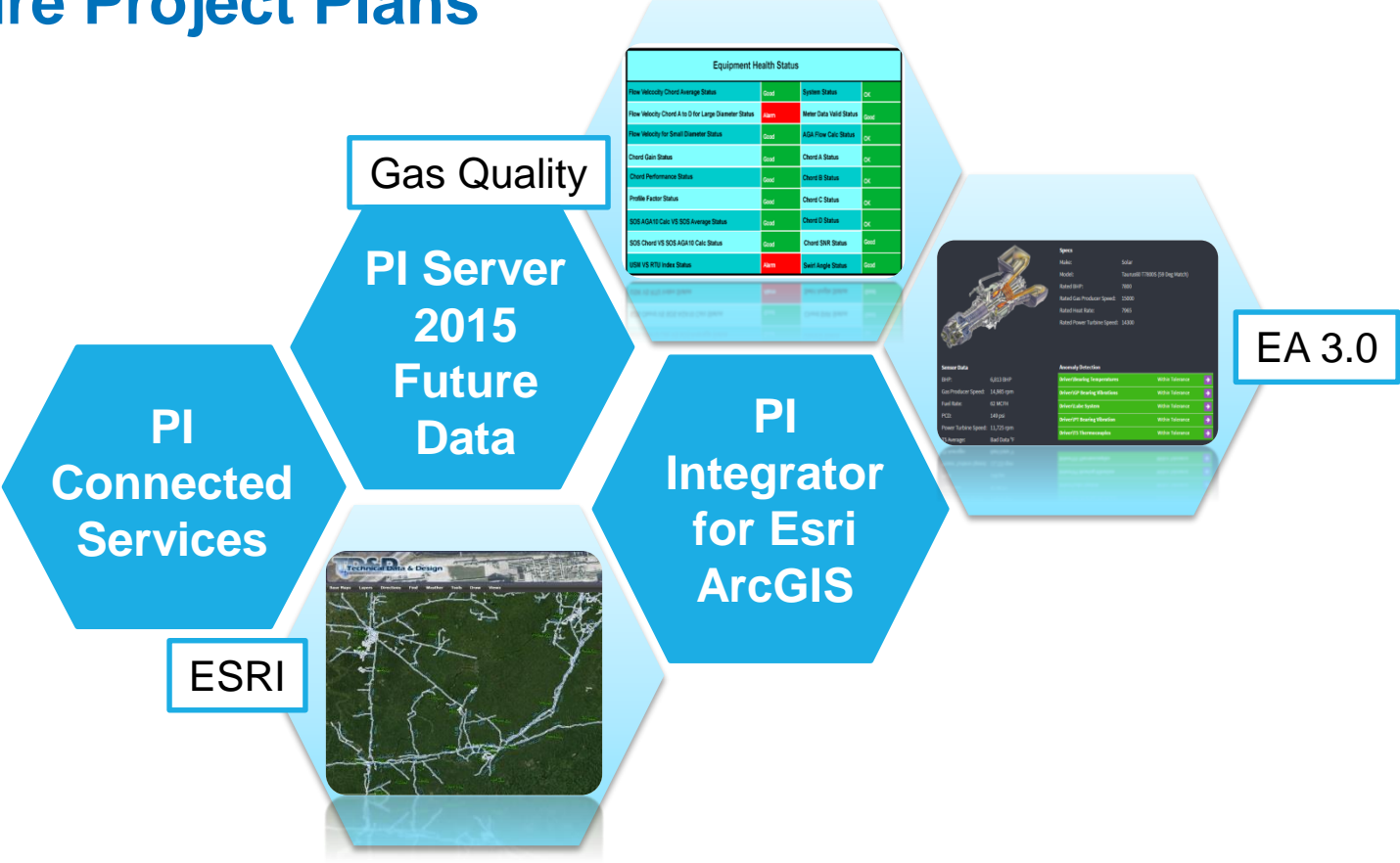
- Notification of Tariff Violations
 - producers monitored & regulated
 - non-compliance, no flow order
 - producer equipment failures



Tangible Savings From Event Prevention

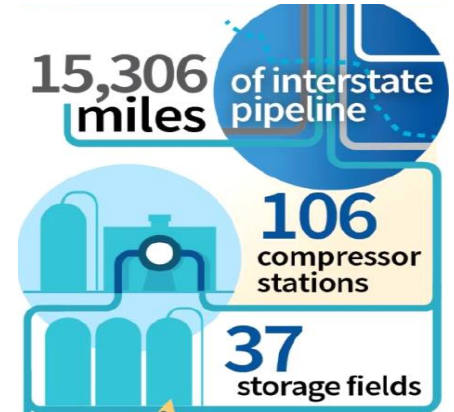


Future Project Plans



Summary

“The term Enterprise Analytics refers to a program aimed at leveraging leading technology tools to analyze data to enable the execution of proactive actions intended to avoid a negative event entirely or minimize the impact of such an event.”



BUSINESS CHALLENGES

- Rapid Expansion of our Compression Fleet
- Increased Number and Variety of Gas Streams
- AF Model Flexibility for Upcoming Expansion
- User Experience (UX) Design

SOLUTION

- Standardize & Modularize AF Model
- Enhance anomaly detection algorithms
- HTML5 / JavaScript User Interface
- PI Coresight

RESULTS AND BENEFITS

- Earlier and more accurate detection of possible equipment failures
- Ability to easily expand monitoring areas
- Simplified deployment process
- Enhanced User Experience

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Questions

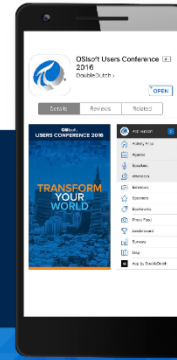
Please wait for the **microphone** before asking your questions



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감사합니다

谢谢

Danke

Merci

Gracias

Thank You

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Спасибо

Obrigado

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