

Leveraging Digitization to Achieve Operational Certainty*

Pattabhiraman Ganesh¹

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¹Emerson Automation Solutions, United Arab Emirates (Pattabhiraman.Ganesh@emerson.com)

Abstract

This presentation covers:

- The typical challenges faced by the Industry in adopting Digitization Technologies
- Identifying biggest opportunities for leveraging Digitization to achieve Operational Excellence with focus on ROI
- Examples of Applications and Successes achieved by End Users Industries
- Focus will be on Asset Integrity, Equipment Performance, Process Measurements and Safety Content: Industry benchmarks reveal that there is a significant opportunity for Process Industries to improve their earnings by moving to Top Quartile Operational performance. Today, end users want to leverage Digitization Technologies to improve their operational performance: Reduce Operating Costs, Enhance Plant Availability, Maximize Production, Improve Safety and Comply with Environmental Regulations. Most importantly, they want to be able to make important decisions in a timely manner. When it comes to investment on any new technology, key questions that need to be answered are – Is there a Business Case, is it Proven and what is the ROI? Can the existing infrastructure be leveraged? This presentation provides an approach to establish a prioritized business case for deployment of digitization technologies. The process involves working collaboratively with key stakeholders at the end user site or enterprise. The approach leverages on Industry experience and guidance from Industry Benchmarks, to address highest impact opportunities on a plant's operational performance. Expectations from Digitization: Digitization must provide a platform that leverages Industrial IoT to enable Operational Excellence. It should be a scalable architecture that ensures return on investment at every stage. This enables the users to start small, get early success and expand it plant wide, or even across an enterprise, connecting multiple locations. Layers of Digital Ecosystem
- Sensing or the data layer, consisting of innovative sensors that are cost effective, easy to install and maintain, to provide reliable real-time data. Non-intrusive and cost-effective sensors are preferred, where possible so that they can be at locations that are hard to access using conventional methods. These sensors will primarily be used to fill the gap of missing measurements that are essential to complement the already available data for meaningful Analytics.

- Secure Gateways / Data interfaces which allow secure export of data from new and existing systems to the Analytics Applications located anywhere in the Enterprise or in some cases, even outside the Enterprise in a Private or third party platform / Cloud based environment.
- Suite of Analytics applications that provide actionable information to take timely decisions. These applications must leverage existing infrastructure and data already available to the extent possible to reduce cost.
- Platform must be capable of providing this actionable information to the various plant personnel in templates specific to their function at the relevant time.
- Connectivity to Subject Matter Experts within or outside the enterprise to securely access site data, perform expert analysis and provide timely and actionable reports back to the site. The Digital Ecosystem must be scalable – one can start small with monitoring of a few critical points, realize ROI, get confidence and expand plant wide. Applications can be hosted in a traditional on-premise environment OR a centralized integrated operations center within the end user enterprise for access by end user experts OR hosted in the cloud with access to third party Subject Matter Experts. The presentation will cover Typical Applications used by Oil & Gas Production, Midstream, Refining and Petrochemical Industries and the results achieved will be shared.

Digital Subsurface Transformation

7-8 May, 2018. Dubai, UAE

Leveraging Digitization to Achieve Operational Certainty

Pattabhiraman Ganesh
Director, Plantweb Solutions, Middle East & Africa
Emerson Automation Solutions

Promise of Digital Transformation

Eliminate efficiency barriers and enable expertise

Real-time visibility into operational performance

Embedded expertise in applications and work processes

Sustained performance improvement through autonomous machine learning

Actionable information delivered to anyone, anywhere

How will it improve my operational performance?

Where do I begin to implement the technology and at what scale?

Can I cost effectively leverage existing investments?

Where are proven examples that give certainty in my ROI?

How quickly will I realize payback?

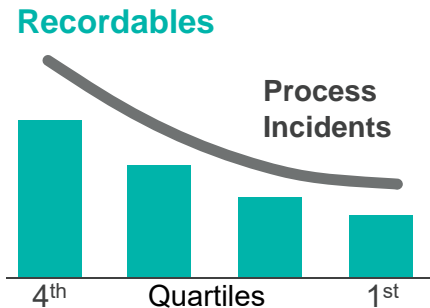
How do I make a Business Case

Industry Benchmarks Reveal Significant Business Improvement Opportunities from Average to Top Quartile Performers

Safety

3X fewer recordables

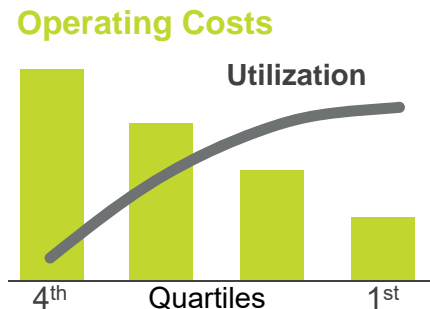
and process incidents



Production

20% lower operating costs

10% higher Utilization Rate

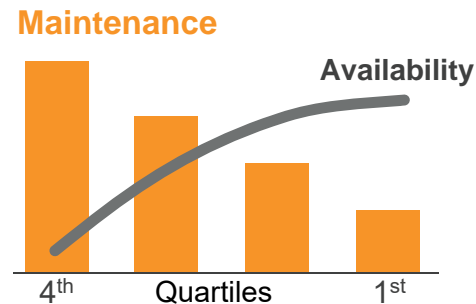


Approximately **ONE TRILLION DOLLARS** in company value is lost every year to suboptimal operating performance

Reliability

4% higher availability

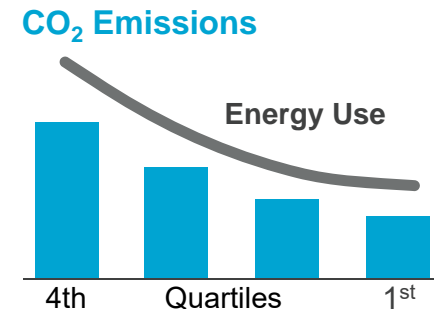
Half the maintenance costs



Emissions

30% lower emissions

30% less energy use



Operational Certainty Approach for Top Quartile Performance



Cross-functional consulting expertise

Consistent methodologies

Defined performance benchmarking

Digital ecosystem

Leverage Existing Investments

Make The Business Case

R
IOT
I

INDUSTRIAL
IOT





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Digital Ecosystem

Automation is a Unique Lever for Connecting Operations to Business Performance



Data

New sensors provide new, real-time visibility across entire operation – cost-effectively



Connectivity

Secure flow of operating and asset information across the enterprise



Analytics

Modeling and domain expertise embedded in applications improve decision support



Expertise

Flexibility to focus on core competencies; leverage internal and external expertise across the enterprise



Mobility

User specific visualizations and tools to improve workforce proficiency anywhere

This Isn't a Revolution, It's an Evolution

Industrial INTERnet of Things

Advanced technologies have altered the cost-benefit equation for access to expertise and efficiency

Production Operations Management

Production Management, Reliability, Safety, Energy, Digital Infrastructure, Information Distribution

Supervisory Control

Control and Safety Systems, Field Asset Management

Field Devices

Equipment, Field Devices and Control

Digitization Involves Domain Experts' Partnerships & Integrated Approach to Deliver Working Solutions



Microsoft Azure Cloud
Services



Historian Infrastructure



Connectivity



Connectivity

Evolving Deployment Methods for Operational Improvement

Local Experts

Automation Network



Centralized Expertise

On Premise or Cloud Hosted

Customer Center
Integrated Operations Center
Monitoring and Diagnostics Center



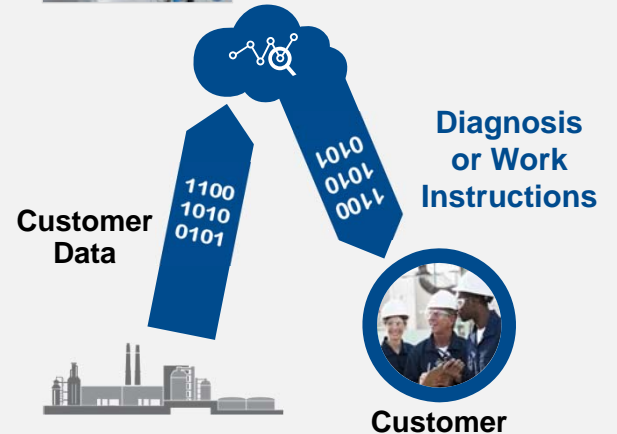
Customer Data

3rd Party Expert Services

Cloud Hosted



3rd Party Monitoring
and Analysis Platform



Connecting the Data to Expertise Unlocks the Value of Digitization

Digital Ecosystem – Asset Specific Analytics

FOUNDATIONAL SOLUTIONS

IIoT SOLUTIONS

Services

Project, Lifecycle, and Educational Services

Consulting



Always Aware

Mobility



Plantweb Optics

Analytics

Production Optimization

Operator Performance

Asset Management

Control & Safety Systems

SCADA

Plantweb Insight



Steam Traps



Pumps



Corrosion



Heat Exchangers

Plantweb Advisor



Performance



Health



Energy



Application-Specific

Connectivity

Secure First Mile



Secure Data Pathways



Data

Intelligent Field Devices



Pervasive Sensing

Flow



Valve Position



Pressure Gauge



Radar Level



Non-Intrusive Temperature



Toxic Gas



Electrical



Acoustic



Vibration



Non-Intrusive Corrosion



Software as a Service

Connected Services



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SaaS
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Innovative Sensors Provide Quality Field information



Position Monitors



Vibration



Pressure



Temperature



High Density



X Well



DP Flow



Totalizer



Level-GWR



Level Switch



Tank Gauging



Hydrocarbon Leak Detection



Gas Detector



Corrosion & Sand Monitors



Steam Trap & PRD Monitoring



Power Meter



Temperature & Humidity



Medium Voltage



Discrete



Wireless Adapter



HART Gateway



SCADA

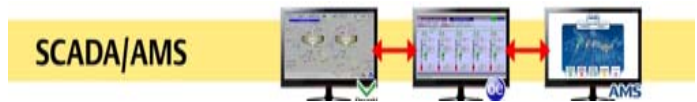
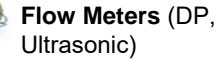
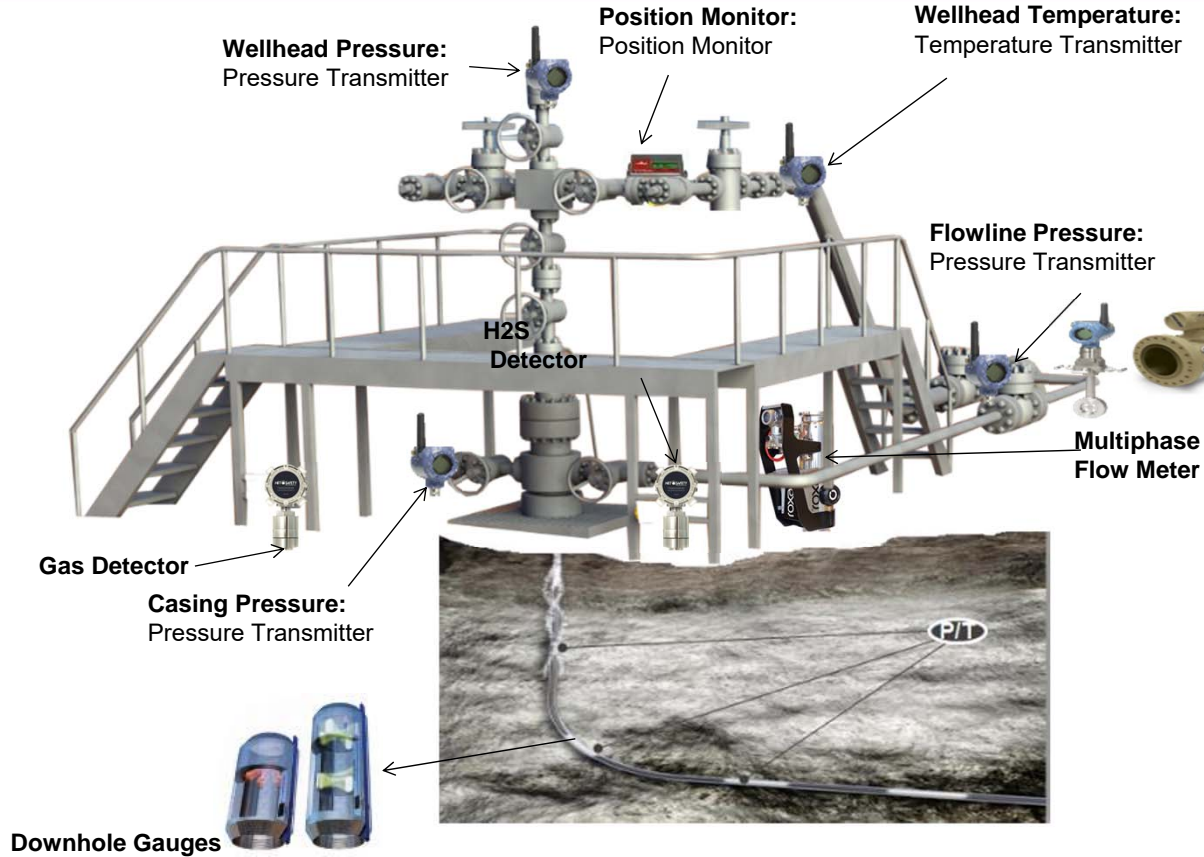


RTU



DCS Interface

Wellhead Monitoring – Easier / Faster / More Reliable For Better Production Decisions



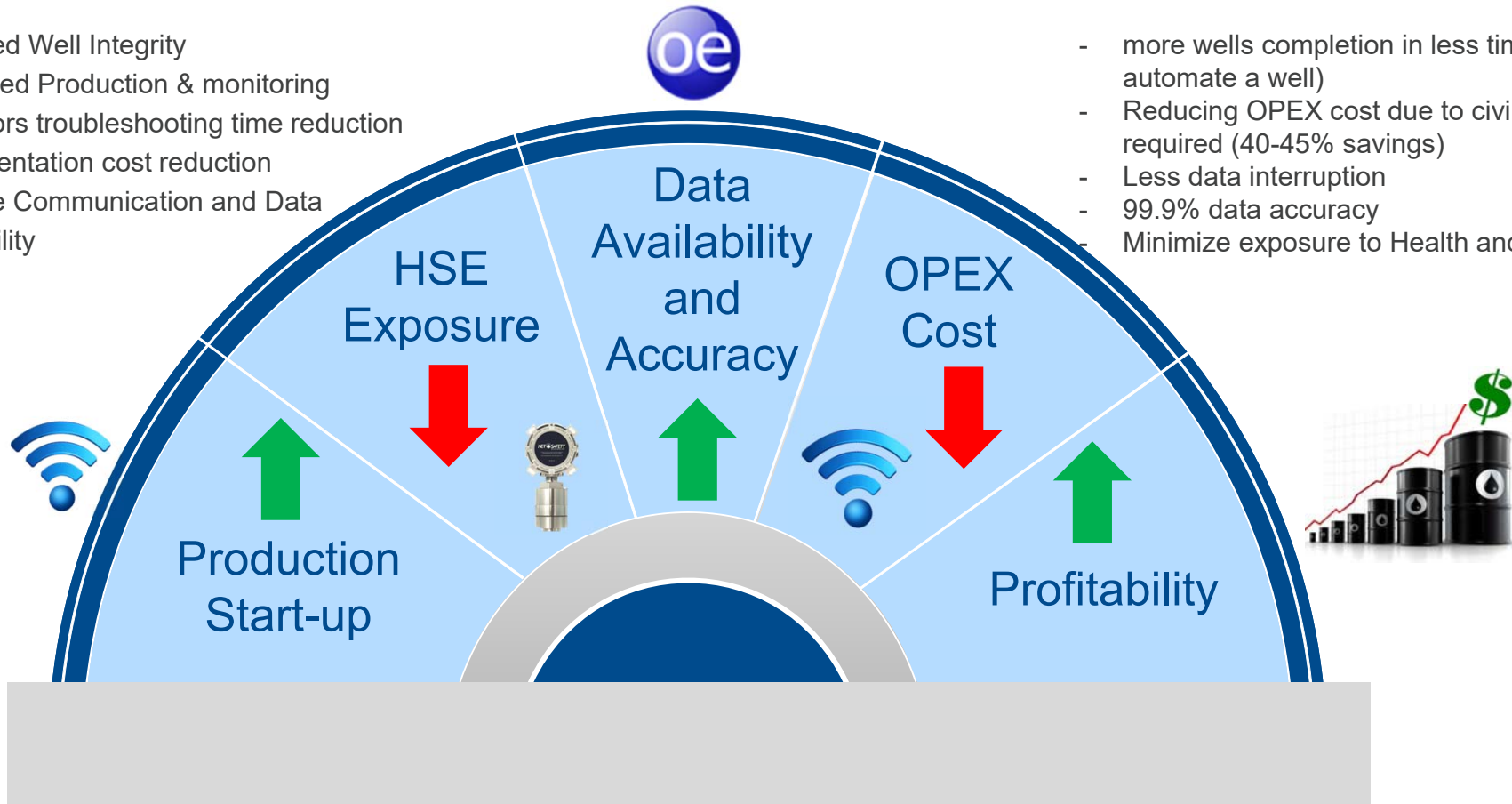
Case Study – Business Results Achieved

❖ Value of Automation/Real-Time Surveillance

- Improved Well Integrity
- Optimized Production & monitoring
- Operators troubleshooting time reduction
- Implementation cost reduction
- Reliable Communication and Data Availability

❖ Adapting Emerson wireless technology

- more wells completion in less time (1-3 days to automate a well)
- Reducing OPEX cost due to civil work and cables required (40-45% savings)
- Less data interruption
- 99.9% data accuracy
- Minimize exposure to Health and Safety risks





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Asset Specific Analytics

Digital Ecosystem – Asset Specific Analytics

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Pervasive Sensing



Software as a Service

Connected Services



SaaS
Digital Twin: Assets & Plant
Digitized Projects
Operator Training



Asset Specific Analytics Deliver Actionable Information

Provides Ability To

- Monitor key assets in real-time
- Quickly identify abnormal situations
- Prioritize maintenance



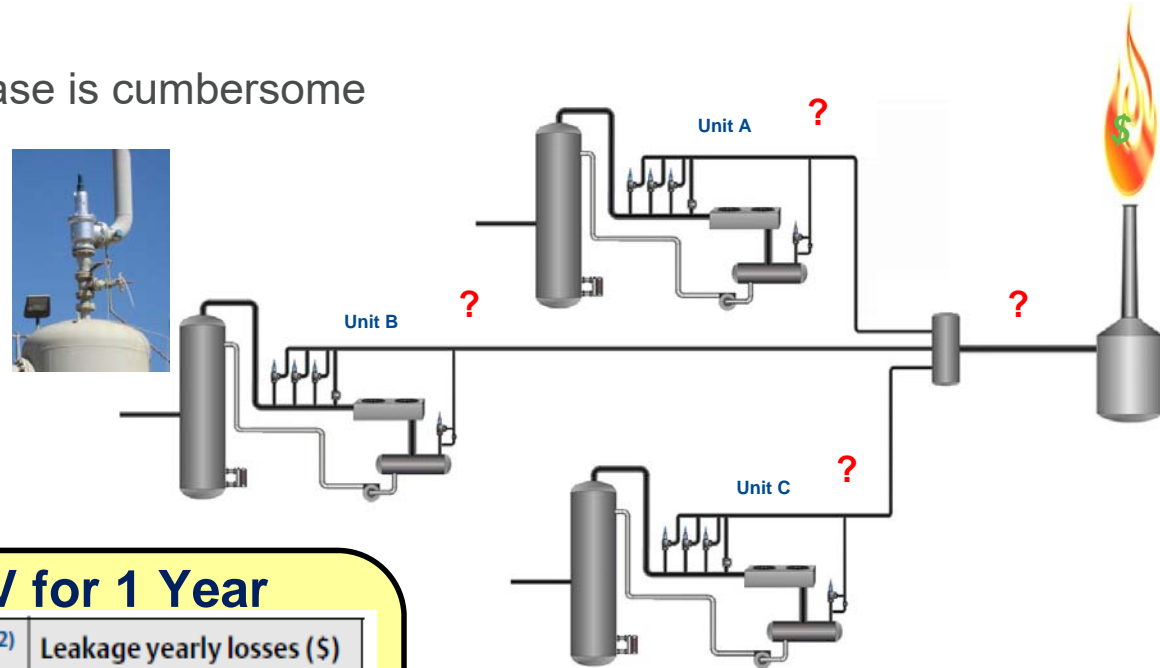
Benefits Realized

- Optimize Operations
- Improve Reliability

“Insight in the Blink of an Eye”

Pressure Relieving Devices - Challenges

- Hard to detect the source of Leak
- Using process information to identify release is cumbersome
- Meeting Regulatory requirements
- Losses due to flaring



Losses due 0.1% leak of a PRV for 1 Year

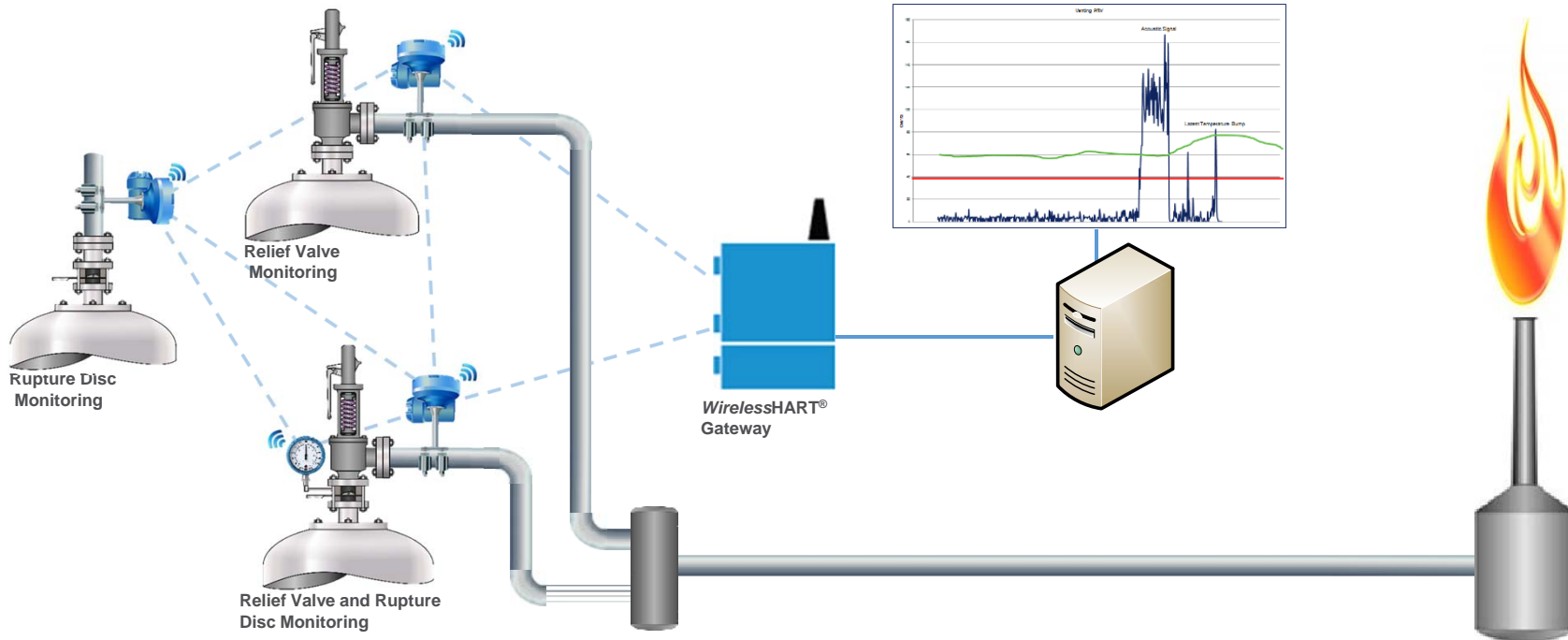
Gas type	Gas per metric ton (\$) ⁽¹⁾	Process pressure (psig) ⁽²⁾	Leakage yearly losses (\$)
Ethylene	1,044	250 @ 212 °F	740,000
Ammonia	500	250 @ -28 °F	335,000
Steam	22	250 @ 400 °F	7,800

1. July, 2015 Platts Global Petrochemical Prices.

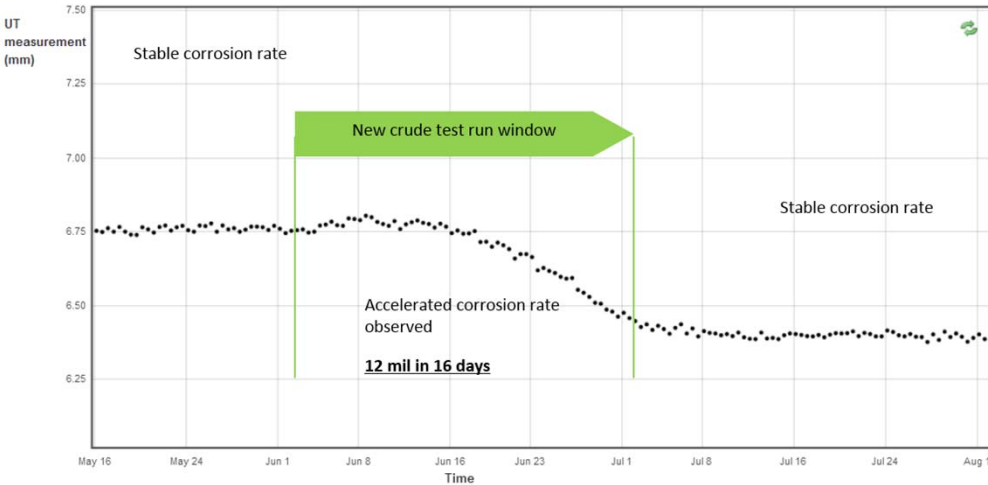
2. Relief valve set pressure – 300 psig and ASME orifice type “G”.

Real-Time PRD Monitoring Solution

1. Non-intrusive solution enables **lowest cost implementation**
2. **Quickly and easily identify the source of release** in your flare system
3. Delivers **the information you need for compliance** - through your existing host system or historian



Real time Corrosion Monitoring



Typically 90% of corrosion happens in 10% of time



ER Probe

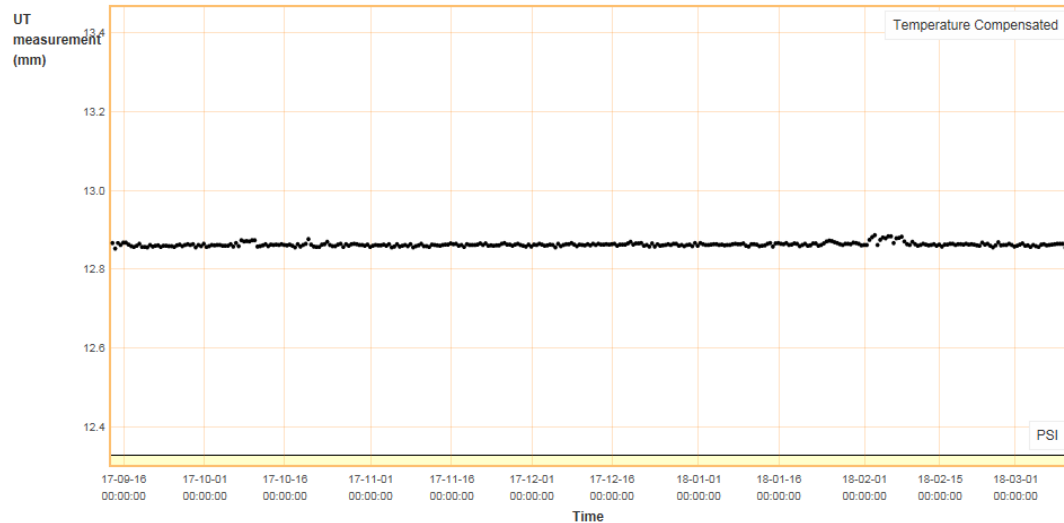


Acoustic Non-Intrusive Sensor



- Mitigate Risk – take Timely Action
- Optimize Inhibitor Dosing, Reduce Cost
- Take Informed Production Increase decisions
- Increase time between Turnarounds
- Extend Life of Aging Equipment

Onshore Production Study: OPEX reduced by 4% by Optimizing Chemical Inhibitor Dosage





- \$35M / Year Spent on Corrosion Inhibitor Chemicals
- Quality & Frequency of Monthly Inspection Data insufficient to make conclusions on metal loss
- Sensors installed across 3 gathering lines from well pads to processing facilities – 10 to 15 KM long Pipelines
- After weeks of on-line data, was able to establish systems that were experiencing ongoing damage and which ones were not
- Data established, which areas were corroding within Weeks
- Chemical Inhibitor usage optimized




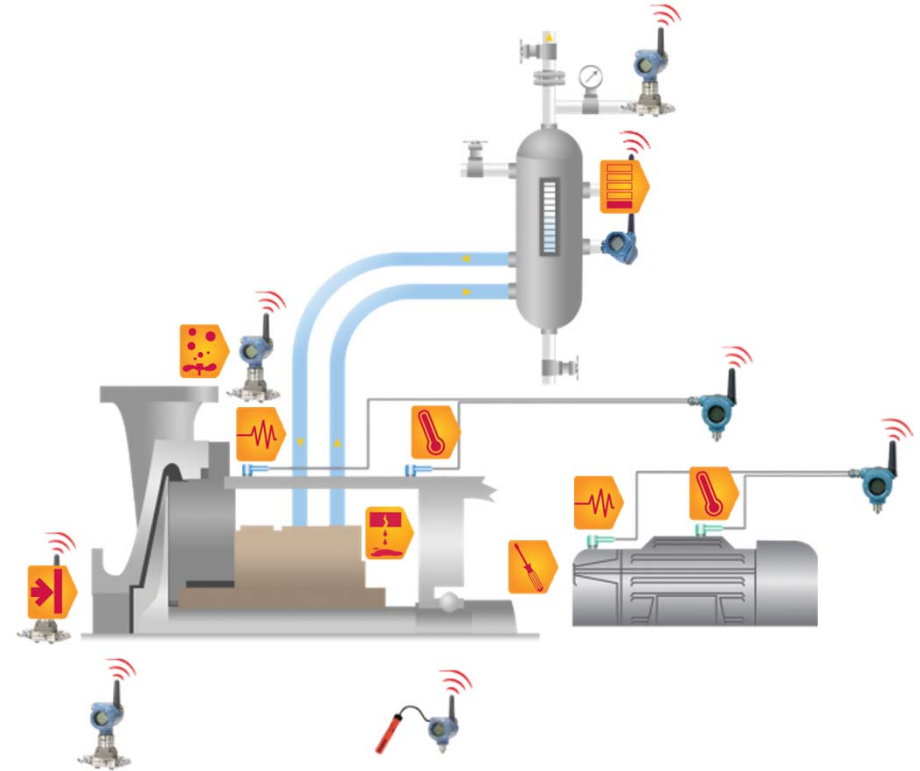
Pump Monitoring – Numerous Abnormal Situations And Conditions Can Be Recognized

 **Vibration Monitoring** – early indication of vibration faults instead of manual rounds

 **Seal Monitoring** – conform to API Standard 682 with seal monitoring pressure and level solutions

 **Cavitation Monitoring** – statistical analysis of process and vibration data to detect pre-cavitation

 **Strainer Monitoring** – differential pressure across the strainer can identify plugging



Equipment and Process Data Create a Holistic View of Pump Health While Analytics Play an Important Role in Identification and Indication

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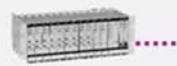
Energy



Application-Specific

Connectivity

Secure First Mile



Secure Data Pathways



Data

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Pervasive Sensing



Software as a Service

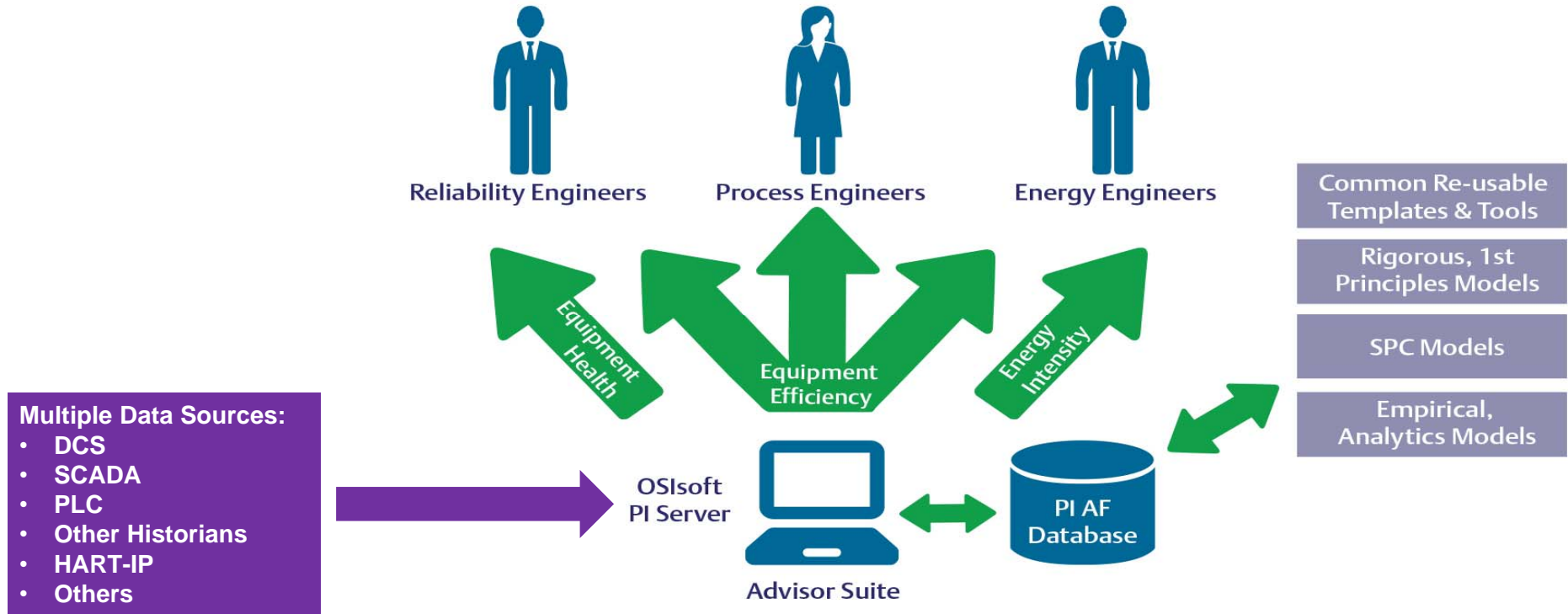
Connected Services



SaaS
Digital Twin: Assets & Plant
Digitized Projects
Operator Training




Leverage Existing Data and Use Common Data Architecture to Provide Relevant Information and Insights to Key Stakeholders




Provides a Single Source of Truth, Minimizes Islands of Information and Leverages Existing Investments in Sensors, Networking and Software

Enterprise Solutions for Equipment Analytics


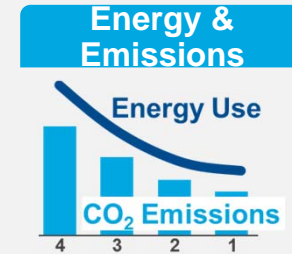
1 Equipment Health (Actual vs. Baseline)




2 Equipment Efficiency (Actual vs. Design)



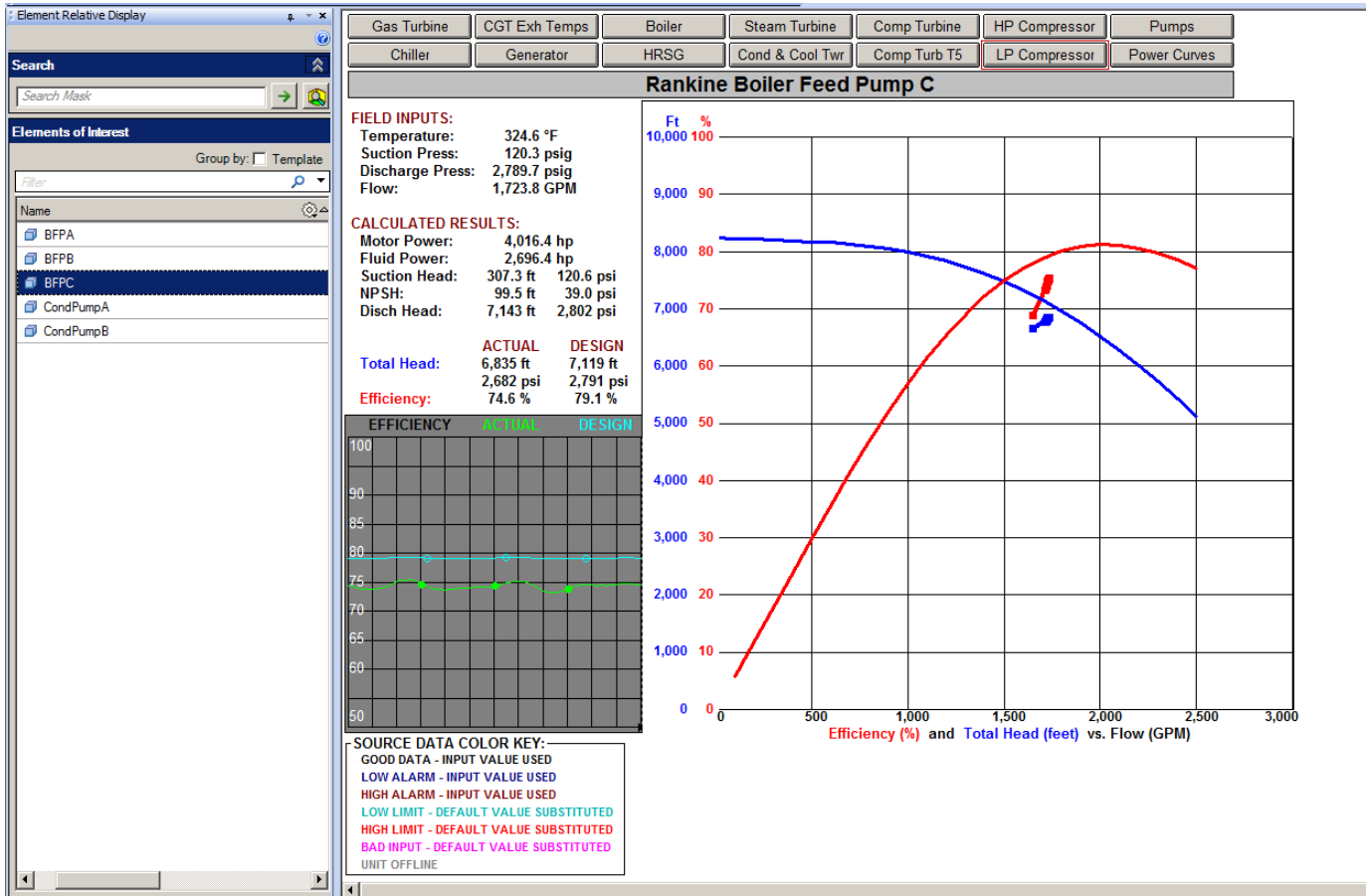

3 Energy Intensity (Actual vs. Target)

Rigorous Analysis Around Equipment Efficiency

Understand Financial Impact of How Equipment is Operating

- Intuitive graphical displays show actual performance against design
- Uses industry standard ASME-PTC thermodynamic 1st principle models
- Models and Calculations are pre-engineered
- Uses equipment curves and asset specific design data



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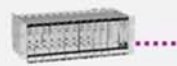
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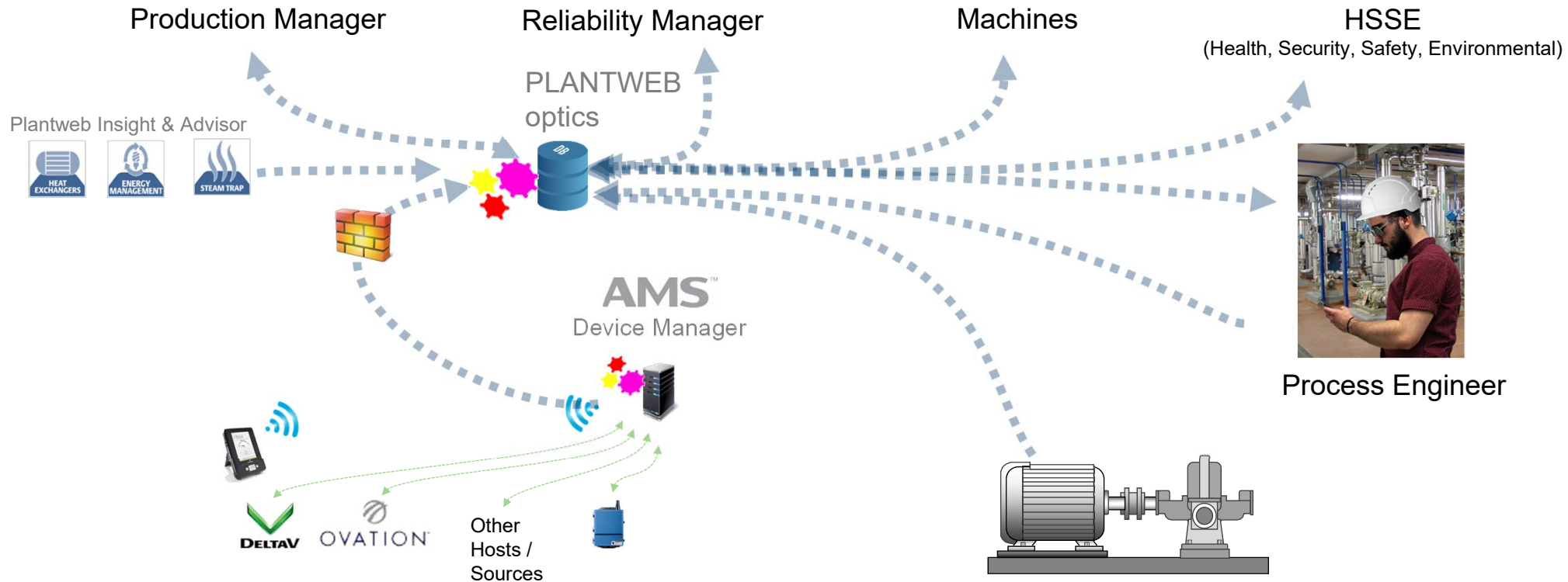
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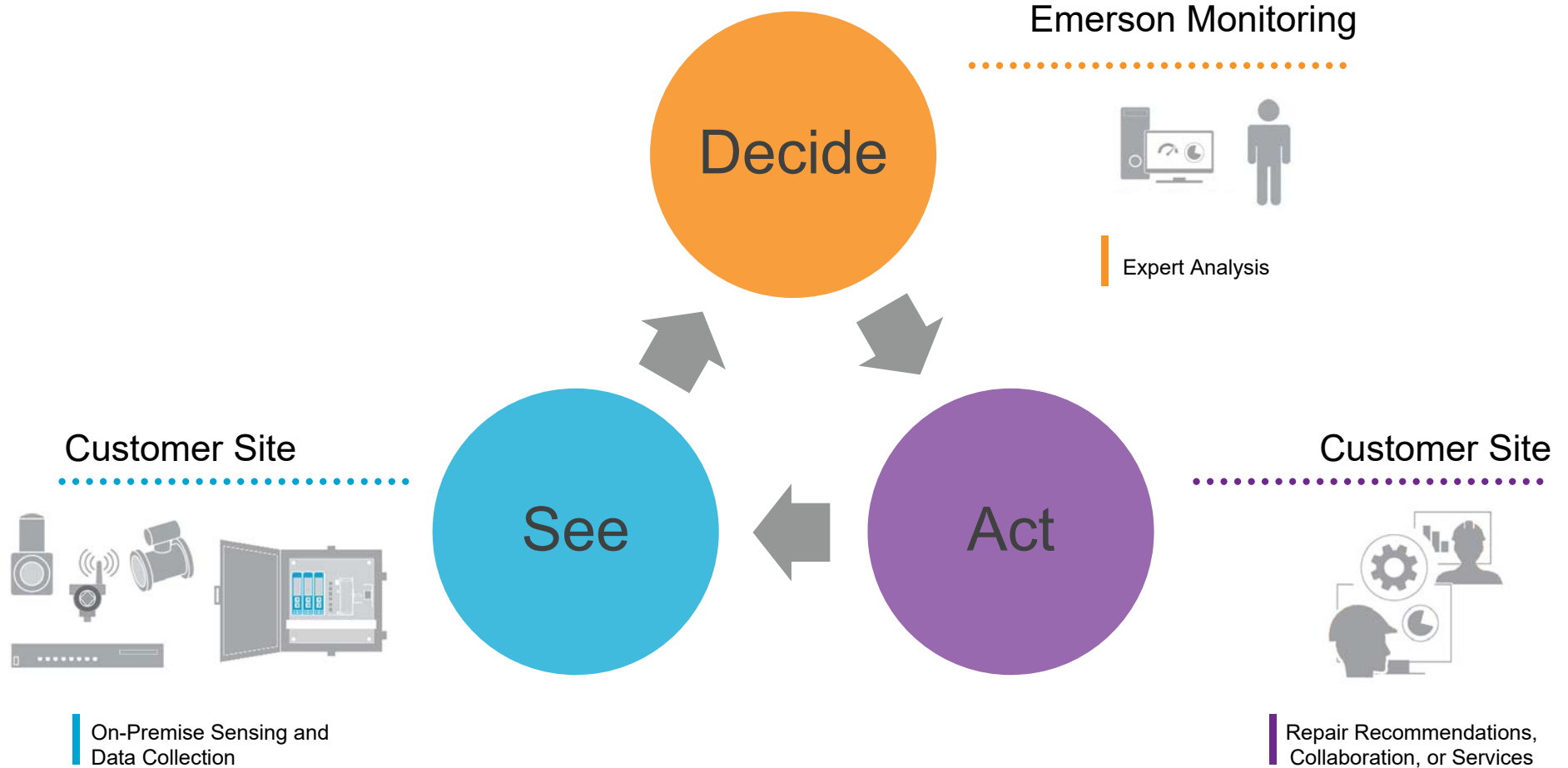
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Connected Services are based on See, Decide, Act



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