



knowledge
2017 Honeywell
Users Group



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Power of Connected Partners
27 September 2017

EXPLORE HOW AN IIOT ECOSYSTEM DRIVES POWERFUL PROCESS INDUSTRY IMPROVEMENTS

Honeywell
THE POWER OF **CONNECTED**

Addressing Core Industry Problems

Enterprise Intelligence Management



Production Efficiency



Process Reliability



Supply Chain Optimization

Gains not possible with conventional methods used today



Operator Effectiveness



Asset Surveillance



Planning & Scheduling



Reduce Off - Spec



Predictive Maintenance



Inventory and WIP Reduction



Optimize Process



Expert Guidance



Enterprise-Wide Real Time Supply Chain Execution

Benefits from fully-deployed IIoT solution for typical 150k barrel / day refinery on the West Coast:



Proven impact **\$14-\$18M** per site per year

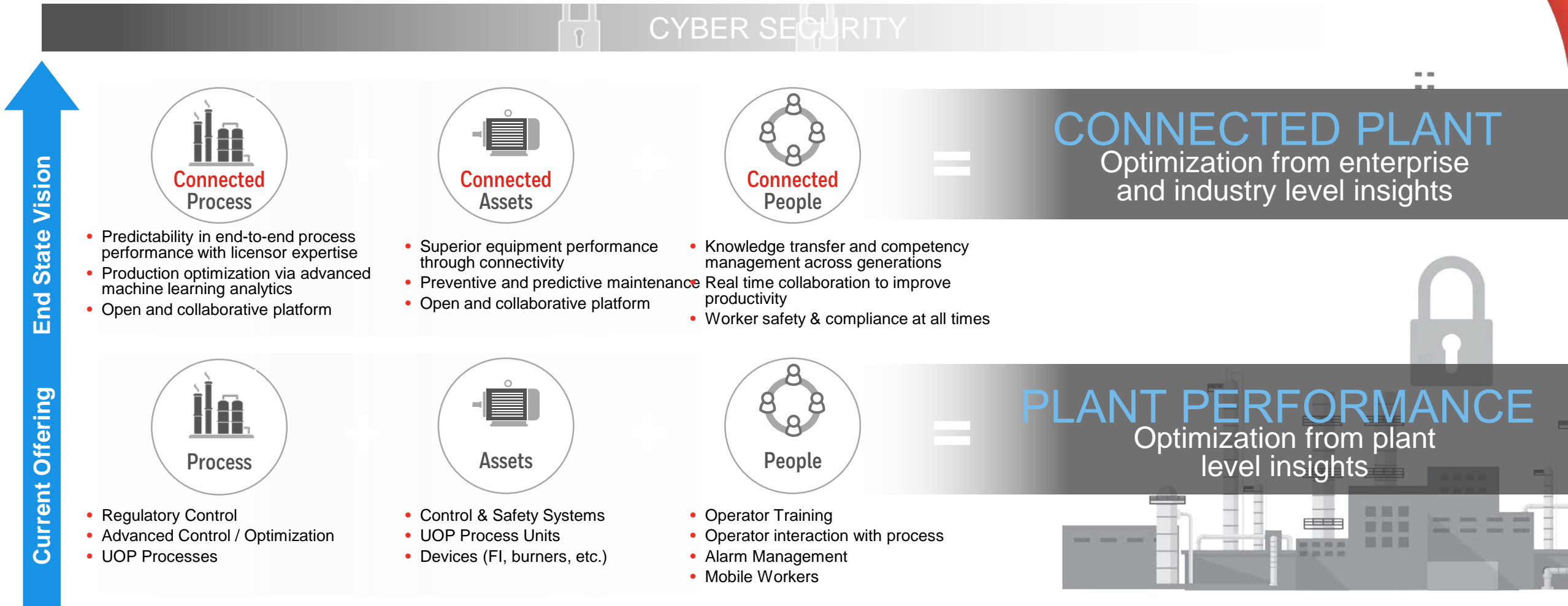


Typical savings of **\$25-\$26M** per year



Cost savings **\$26-\$28M** per site per year

Connectivity Is Transforming Our Offering



Build on Our Installed Base Heritage and Create New Offerings



Honeywell Connected Plant: Delivering What No One Else Can

Delivering ROI Focused Solutions

For a medium sized refinery in the US...



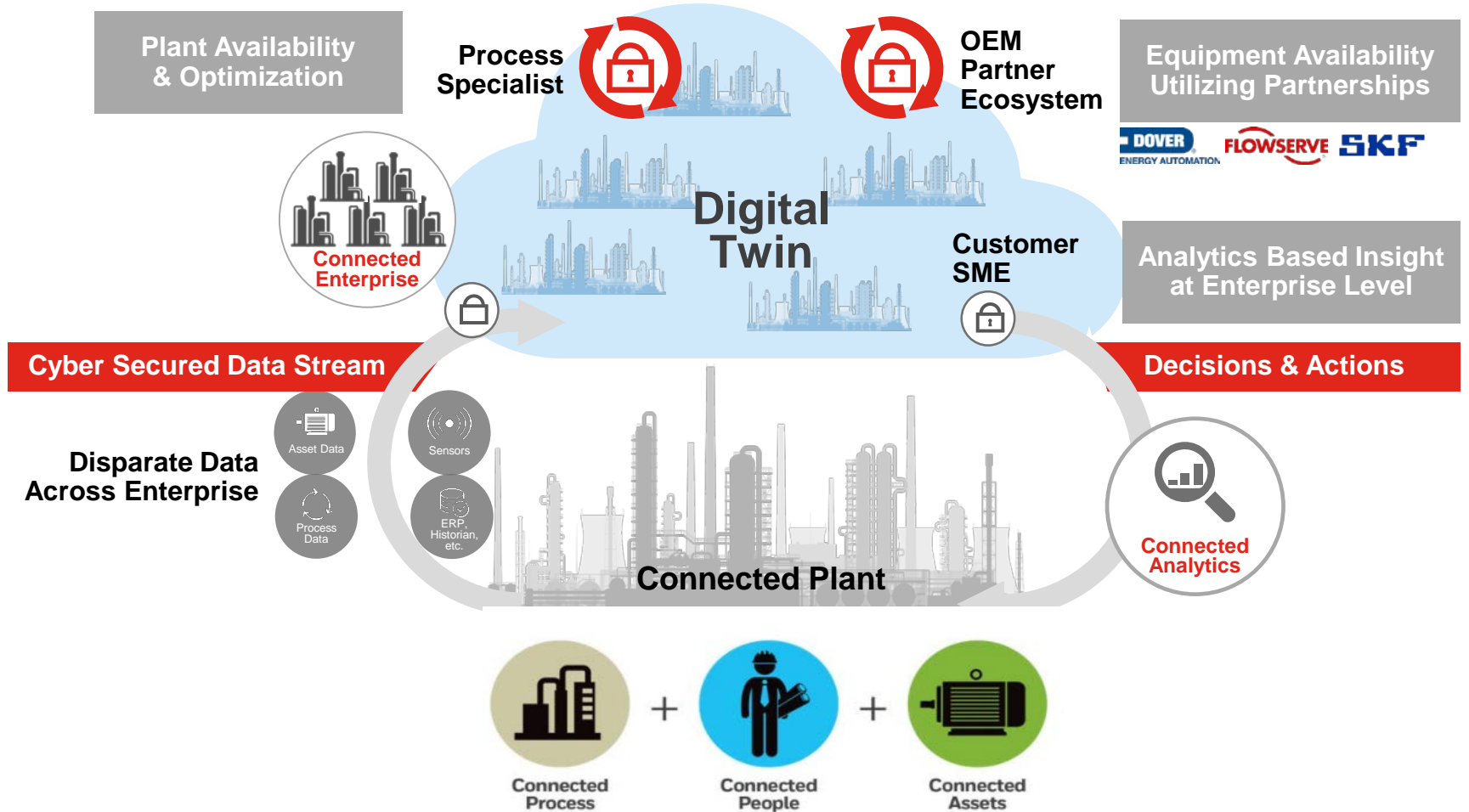
~5% of production lost to unplanned shutdowns/yr...



1% improvement in plant availability & quality...



+\$26M increase in profit/yr



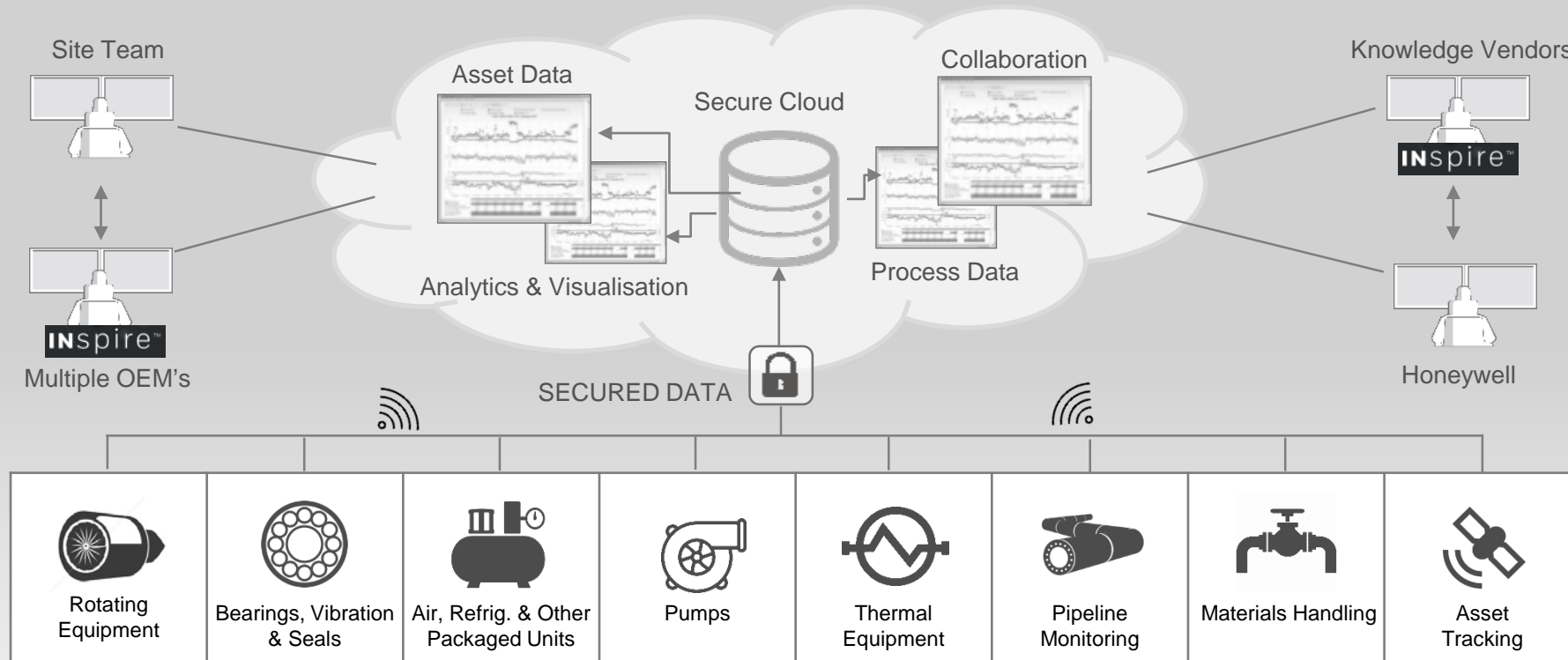
Connected Platform and “Offerings” for Operational Excellence

Connected Assets: Leveraging the Power of IIoT



- Asset Surveillance
- Predictive Maintenance
- Analytics
- Energy & Compliance Monitoring

We combine **asset** and **process** data, use **analytics** and **expert guidance** to provide actionable insight to avoid critical asset failure and unplanned shutdowns.



Industry leading software, secure IIoT platform and collaboration through an ecosystem of partnerships with industry leading OEMs & Knowledge Vendors

Connected Assets: Leveraging Domain Expertise

Bringing together collaborators to jointly develop IIoT solutions to solve operational challenges



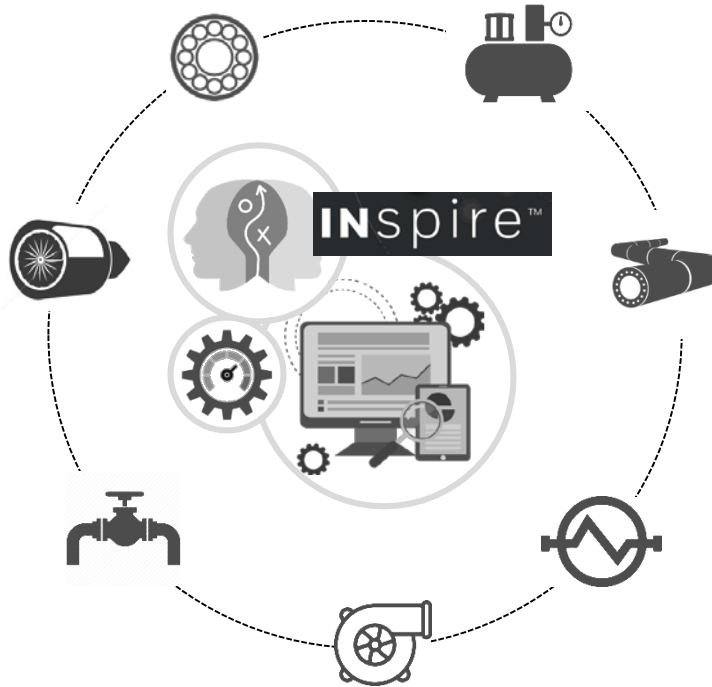
Connected Assets

- INspire™ Partner Program
- Connectivity enablement
- Open, Collaborative Ecosystem

Honeywell
UOP



Honeywell
Process Solutions



DOVER
ENERGY AUTOMATION



FLowsERVE

SKF

GEA

HOERBIGER

L.A. Turbine
The Turbinequander Company

AEREON

SPARKS
DYNAMICS

INspire™

*Process, Software & Cyber
Domain Expertise*

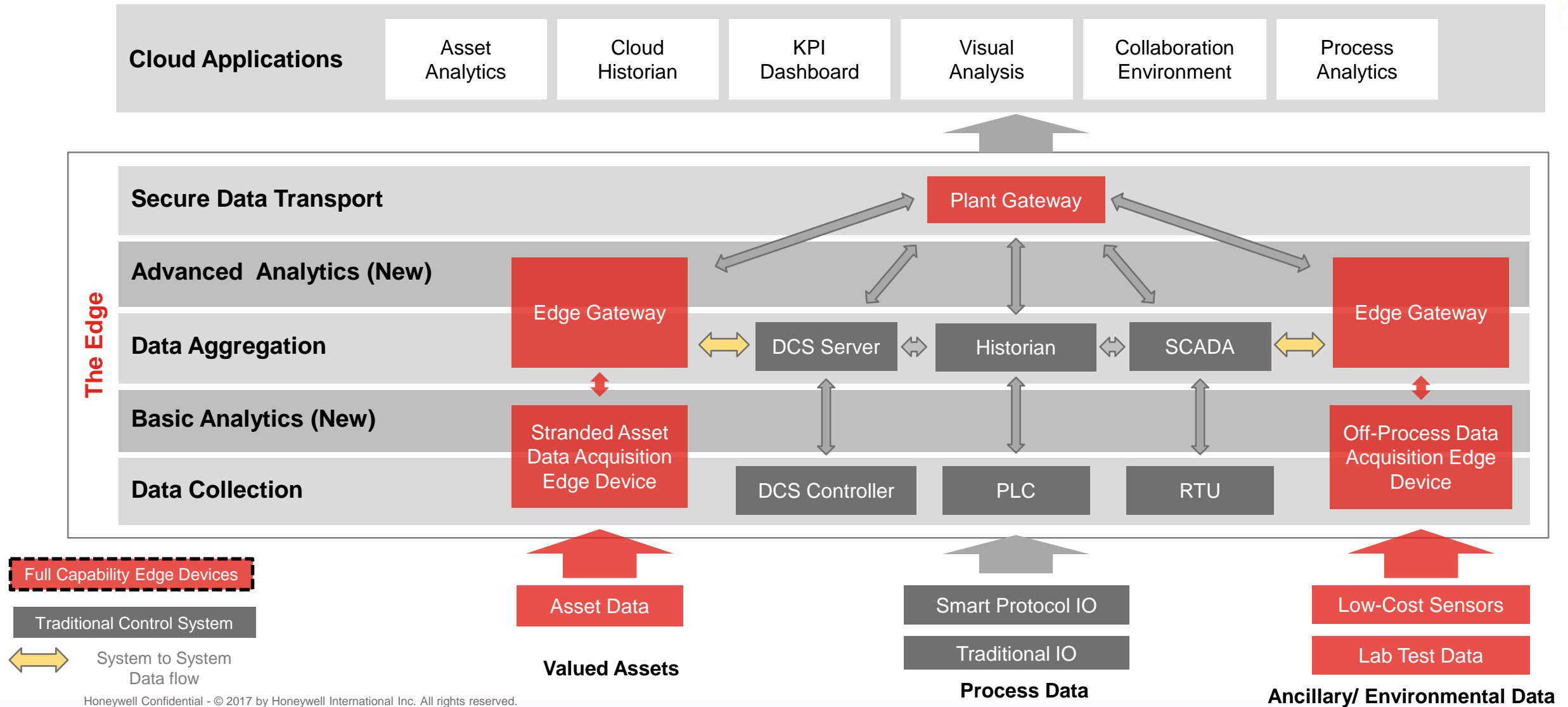
Customer Expertise

Asset & Equipment Expertise

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Edge Devices – Consolidate Asset + Process IIoT Data



New EDGE devices developed to meet data collection, transport and analytics needs.

HCP | Continuous Compressor Analytics

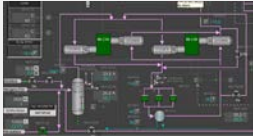
Data, Analytics, and Expertise

Asset data



- Vibration measurements
- Dynamic cylinder pressures
- Temperatures
- Windrock Expertise

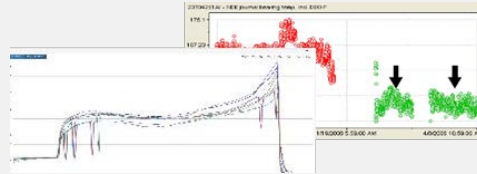
Process Data



- Product molecular weight
- Process unit design
- Flows and velocity
- Pressure & valve settings
- Honeywell Expertise

Analytic Elements

- Rod loads
- Rod reversal
- Flow balance
- Power loads
- Feed systems
- Process KPIs
- Fault Models
- Notifications
- Production schedules



Economic Benefit through OEE

Availability & Efficiency

- Reduce Downtime
 - (1% improvement = 8hrs/month @5K hour)
- Energy and operational efficiency
 - (2% improvement process reliability & efficiency)

Annual Estimates

\$ 4,320,000

\$ 838,000

Maintenance Costs

- Reduce maintenance costs (valves, rings, rider bands)
- Major cylinder rebuild (extend from 1 time per year)
- Other labor and maintenance cost reductions

\$ 225,000

\$ 270,000

\$ 90,000

- Totals
- Payback less than 3 months with ROI near 300%

\$ ~5,600,000

* Benefit Examples based on 9 compressors in operation at PMT's Orange Texas plant

Customers experience operational efficiency problems, adjust process and equipment settings to compensate, and degrade the reliability of the compressor. OEMs and Honeywell need to understand how the process and equipment are monitored & diagnosed to proactively optimize performance and availability.

HCP| Connected Assets – Continuous Compressor Analytics

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Honeywell and Windrock



Use Case: Poor compressor reliability & process efficiency

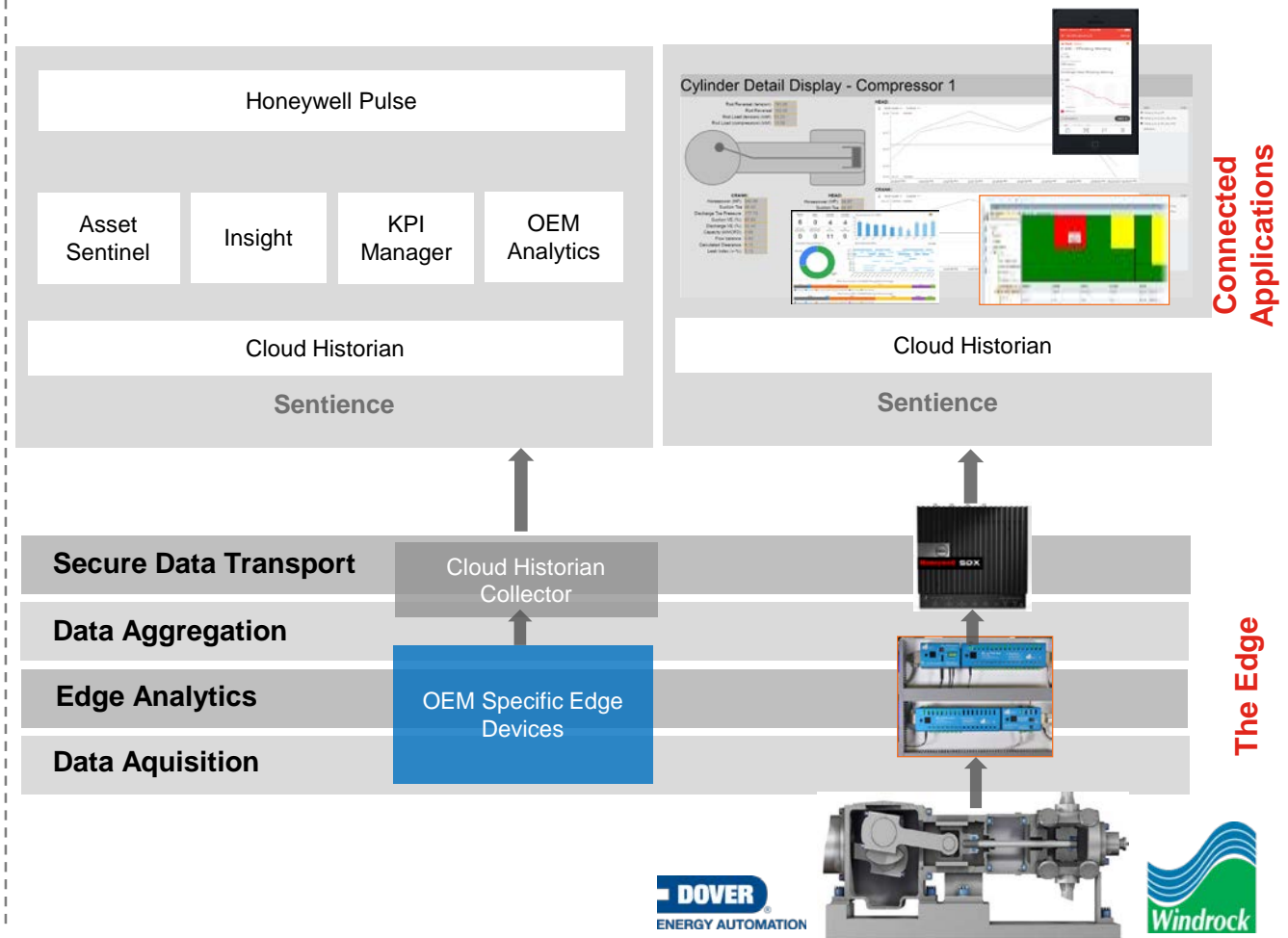
Symptoms

- Degraded compressor performance reducing throughput
- Operationally compensating for equipment issues
- Compressor wear is sacrificing the efficiency of the process
- Over maintaining compressors is decreasing uptime & reliability

Honeywell/Windrock Connected Service

- Continuously monitor asset condition and tune the process
- Analytics optimize performance & minimize invasive maintenance
- Avoid maintenance induced failures with the **Right** maintenance

Connected Compressor Monitoring



Customer

- Increase OEE uptime and throughput
- Lower Maintenance Costs
- Safe and CyberSecure
- Benchmark equipment performance
- Enterprise wide visibility

Honeywell

- Connected ecosystem
- Cyber Secure Visual Analytics

Windrock

- Strong customer service
 - Constant monitoring with notifications
- More effective customer engagement
 - Proactive versus reactive

Continuous Rotating Machinery Health

Expertise, Data and Analytics Required

Asset data

- Bearing Temperatures
- Bearing Vibration
- Motor Speed
- Motor Vibration
- Shaft Vibration
- SKF Expertise

Process Data

- Process Unit Design
- Motor Power
- Flows
- Pressure and valve settings
- Control system alarms
- Honeywell Expertise

Plant Data

- Maintenance schedule data
- Associated area maintenance planning cycles
- Production Schedules / Delivery commitments
- Asset location data

Analytic Elements

- Vibration
- Electric Motor Related Failures
- Vulnerability index analytics
- Process KPIs

Economic Benefit and OEE

Availability & Efficiency

- Reduce Downtime
 - (40% improvement = 12hrs/month @2K hour)
- Energy and operational efficiency
 - (2% throughput improvements)

Annual Estimates

\$ 298,000

\$ 456,000

Maintenance Costs

- Reduce maintenance costs 89%
- Totals
- Payback less than 6 months with ROI near 200%

\$ 200,000

\$ 954,000

* SKF and Honeywell need to understand how the process and equipment are monitored & diagnosed to proactively optimize performance and availability.

HCP| Connected Assets – Rotating Machinery Health

Honeywell and SKF

Use Case: Electrostatic Precipitator blower motor vibration

Symptoms

- Frequent vibration alarms forcing shutdowns and inspections
- Trip costs approach \$1M in machine damage & production losses
- Random alarms and shutdowns every 5 to 7 days
- Reduced yield

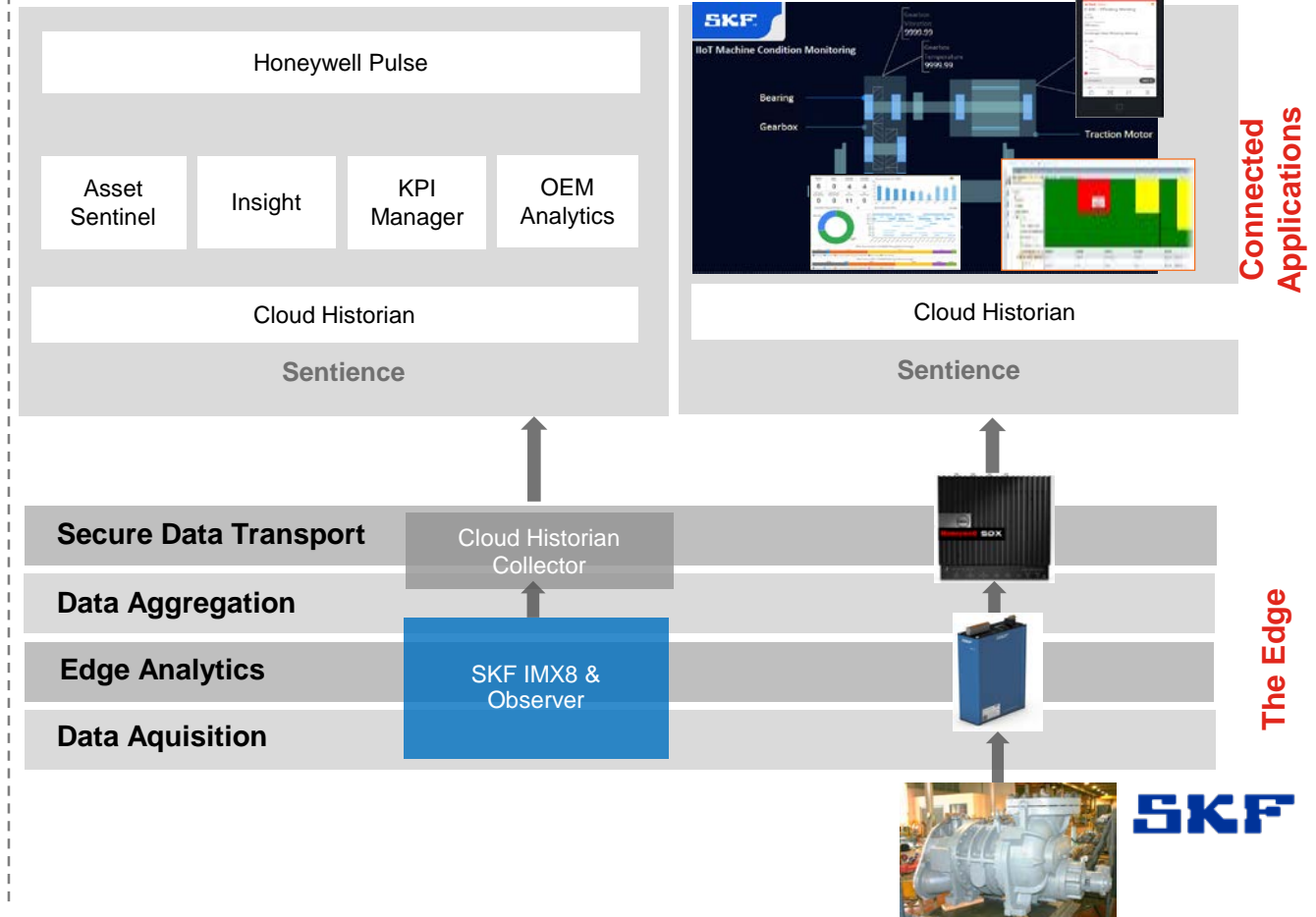
Honeywell/SKF Connected Service

- Continuous blower condition analytics identify vibration root cause
- Vibration caused by build up from firing malfunction in precipitator
- Action is to reduce vibration by slightly lowering blower speed
- Created analytics driven vulnerability index and maintenance plan

Results

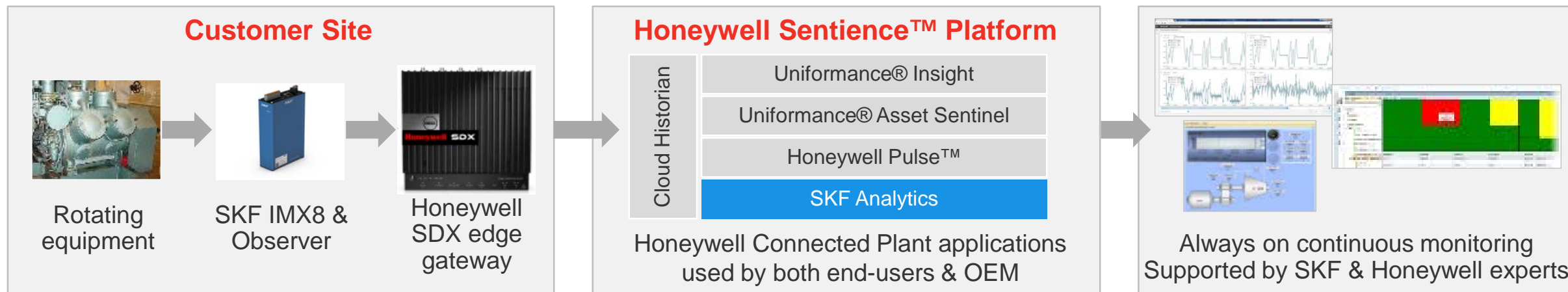
- Shutdowns reduced by 40%, 75% reduction in stop duration
- Quarterly yield improvement 2%, and OEE improved by 5%

Connected Rotating Equipment Health



Use Case: Honeywell/SKF Rotating Machinery Health

Service: Analytics enabled continuous predictive reliability, maintenance and performance monitoring service



Ecosystem Benefits / Approach

Customer

- Increase OEE uptime and reliability
- Lower Maintenance Costs
- Safe and CyberSecure
- Benchmark equipment performance
- Benefits with Zero additional production system load or complexity
- Enterprise wide visibility

Honeywell

- Builds ecosystem
- Subscription revenue for HCP software
- Industry credibility from SKF expertise

SKF

- Better customer service with less cost
 - Constant monitoring with notifications
- More customer engagement
 - Proactive versus reactive

Rotating Machinery Health



Comprehensive & scalable solution for real time performance management



Built on Honeywell HCP and Sentence software

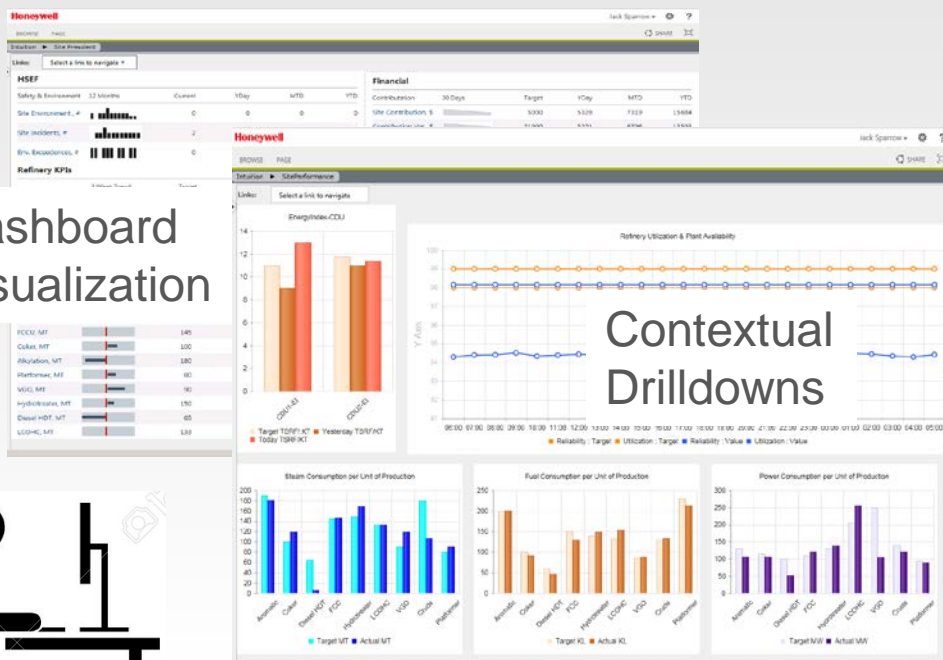


Domain knowledge from Honeywell embedded into solution (e.g. standard KPI repository)



Strong consulting, engineering and support organization that will ensure our clients get maximum, and quick value realization

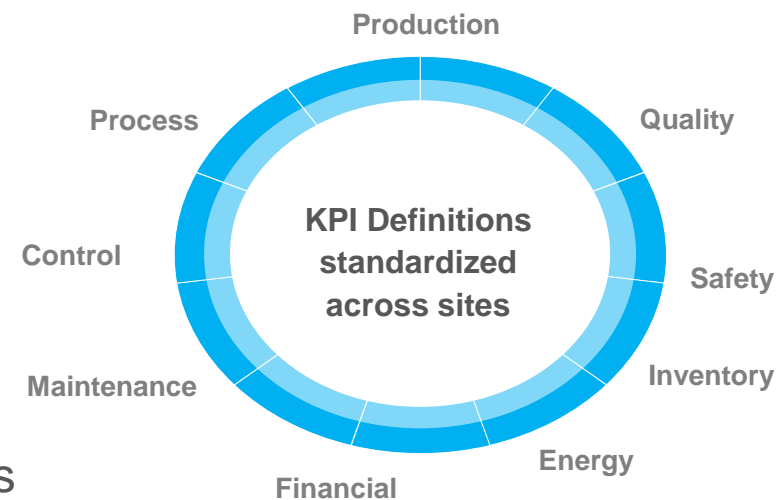
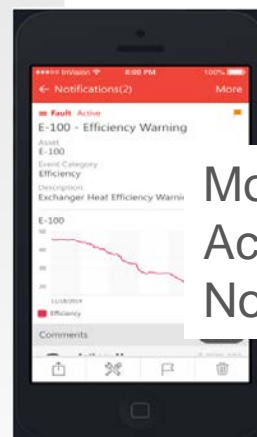
Secure Enterprise Portal



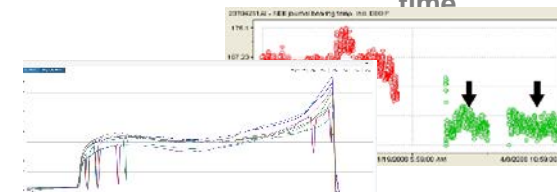
Dashboard Visualization

Contextual Drilldowns

Mobile Access & Notifications



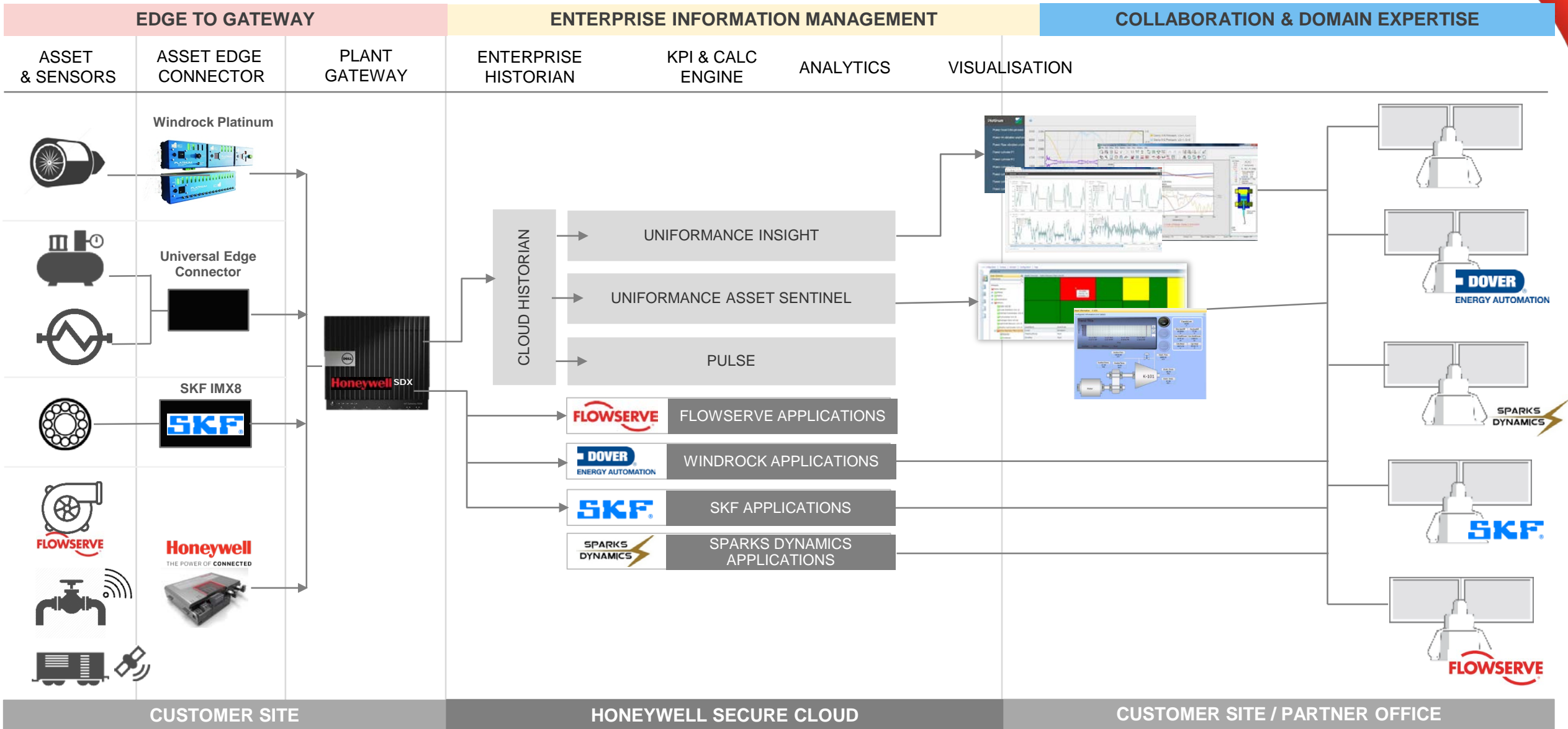
Cycle time



Performance Analysis

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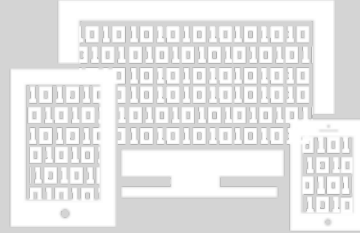
Multiple INSpire Partners – One Secure Platform



To get there we will all have to **Think Differently**



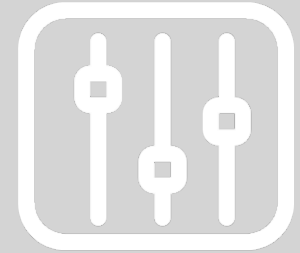
Cyber Security
is the key
enabler for IIoT
buildout



**Step change in
digitization:**
how we procure,
how we provide
support



**Shift in
employee skill
sets** requires
different support
and approach



**Change
management**
will be key to
adoption

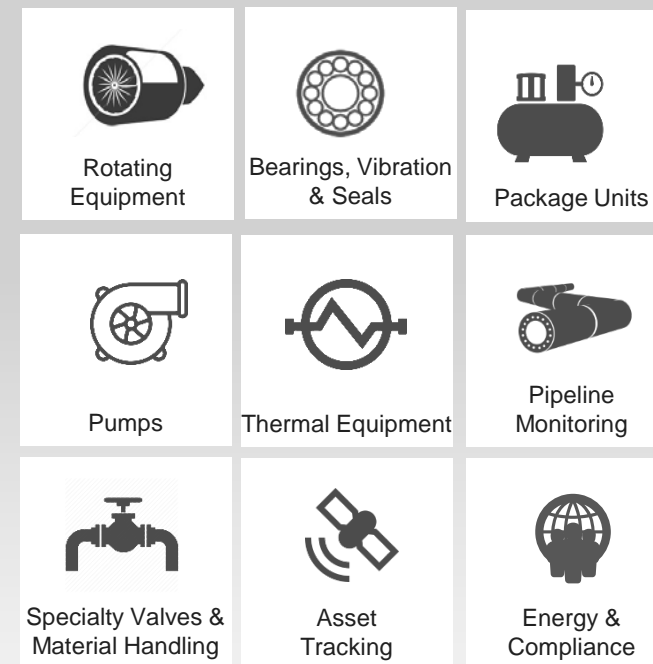
Connected Assets: Leveraging Expertise

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- INspire™ Partner Program
- Connectivity enablement
- Open, Collaborative Ecosystem

Bringing together collaborators to jointly develop IIoT solutions for a myriad of operational challenges



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