

AVEVA PI WORLD

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# Extend the power of your PI System with AVEVA Artificial Intelligence

Presented By: Jim Chappell

**AVEVA**



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# Jim Chappell

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# PI + AI to drive Performance Intelligence



## Challenge

How do you transform the massive amount of data you've been collecting in PI into Performance Intelligence?

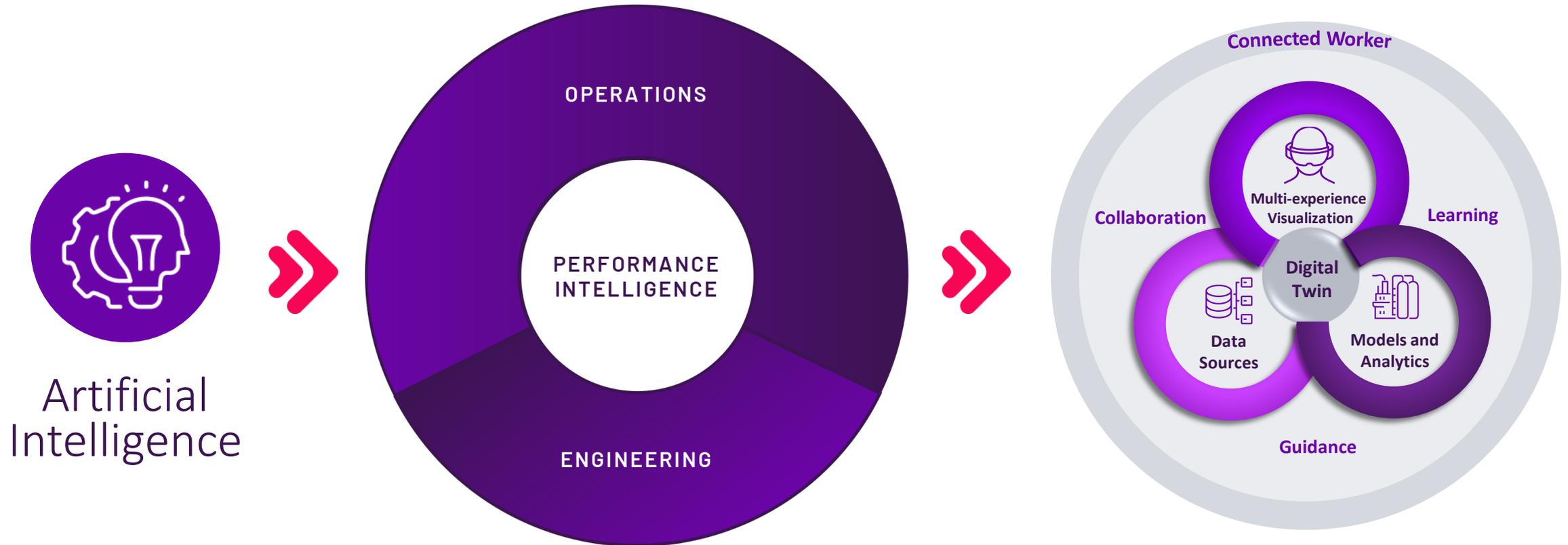
## Solution

Natively infuse PI with AI through Predictive & Prescriptive Analytics

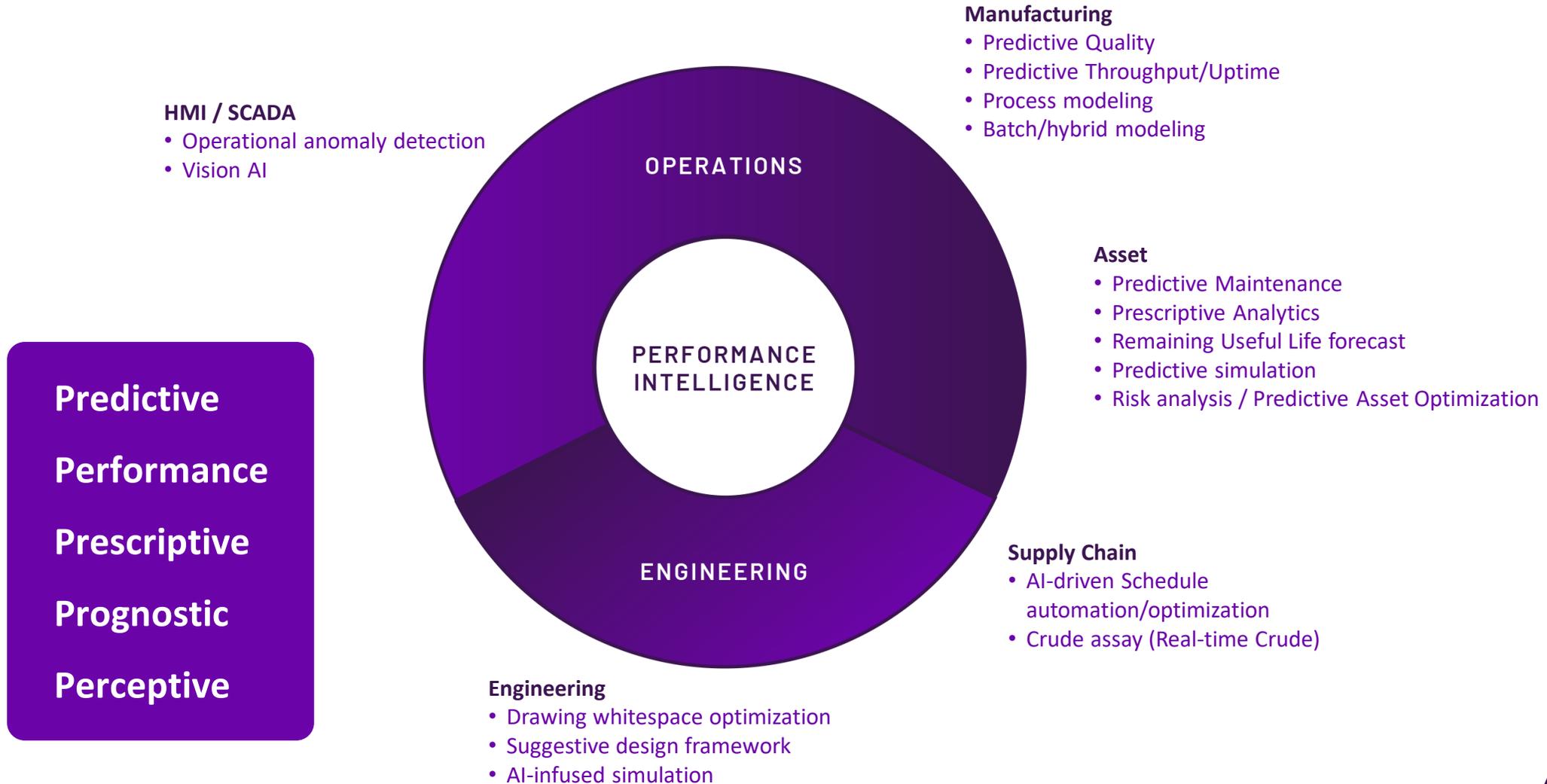
## Benefits

- Early detection of asset issues
- Deeper insight into operations
- Root cause and prescriptive actions

# Artificial Intelligence Infused Digital Thread



# Artificial Intelligence Infused



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So... how does this benefit PI?

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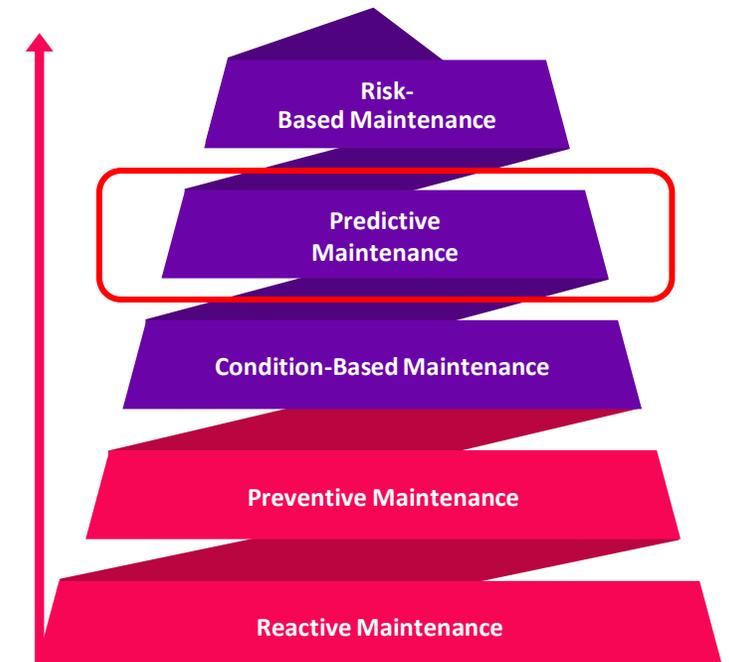
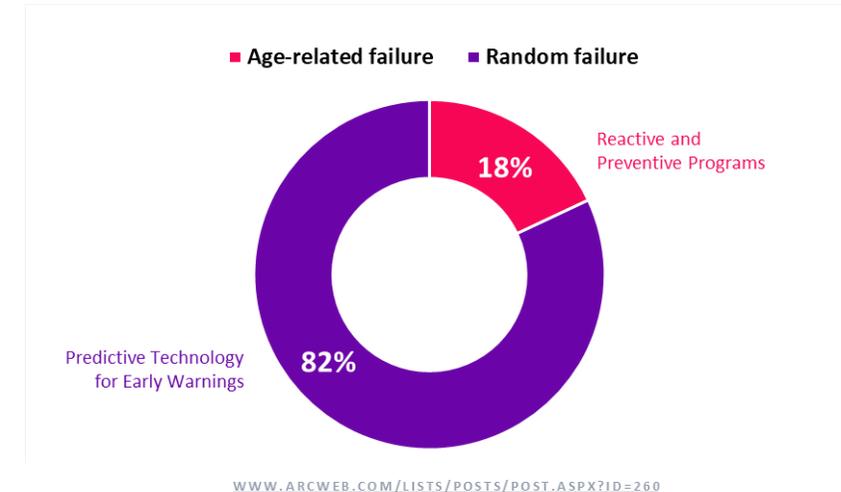
# Integrated Predictive/Prescriptive Analytics

## Prevent Equipment Failures

- Predictive monitoring of industrial equipment assets  
{Compressors, Pumps, Gearbox's, Motors, Turbines, Generators, etc.}
- Early warning detection and diagnosis of equipment problems

## Benefits

- Improve asset reliability and performance
- Reduce energy consumption and lost power
- Reduce maintenance costs
- Optimize maintenance planning
- Achieve fast time to value through out-of-the-box predictive monitoring of industrial assets



# Predictive/Prescriptive Analytics & the PI System

## Today

### ➤ Customer value

- Comprehensive monitoring & analysis through integrated IIoT data, performance calculations, and predictive & prescriptive analytics
- Very early detection of asset and process issues, long before any control system or SCADA alert
- Ability to manage risk and reduce/eliminate unplanned outages, saving millions of GBP annually in avoided costs

### ➤ Approach towards delivering customer value

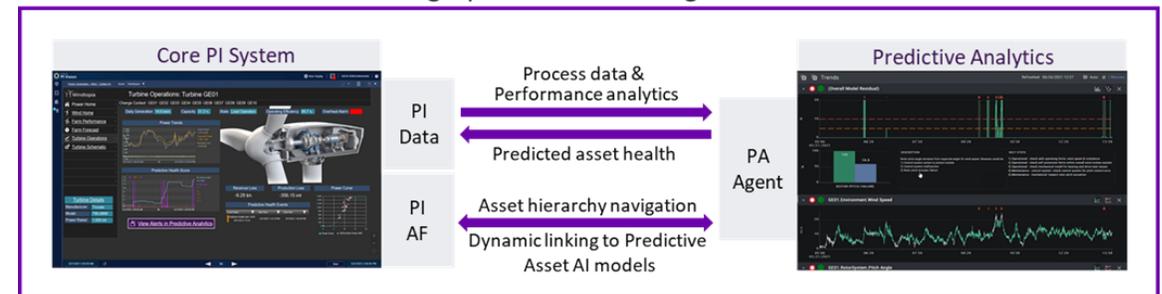
- High-performance integration of the PI System & Predictive Analytics
- Bi-directional data exchange in context
- Drill-down into predicted asset health from PI to Predictive in-context

### ➤ Heavy industry, including Renewables

### Deployed Integration



### High-performance Integration



# Predictive/Prescriptive Analytics & the PI System

## Developing unified PI + AI integration

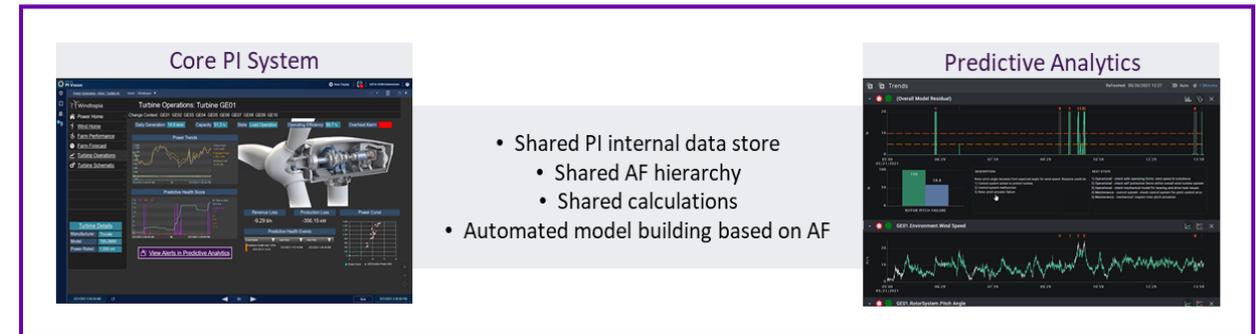
### ➤ Customer value

- Single solution
- Seamless Performance & AI monitoring/analysis
- Simple model building & maintenance
- Easy overall solution administration

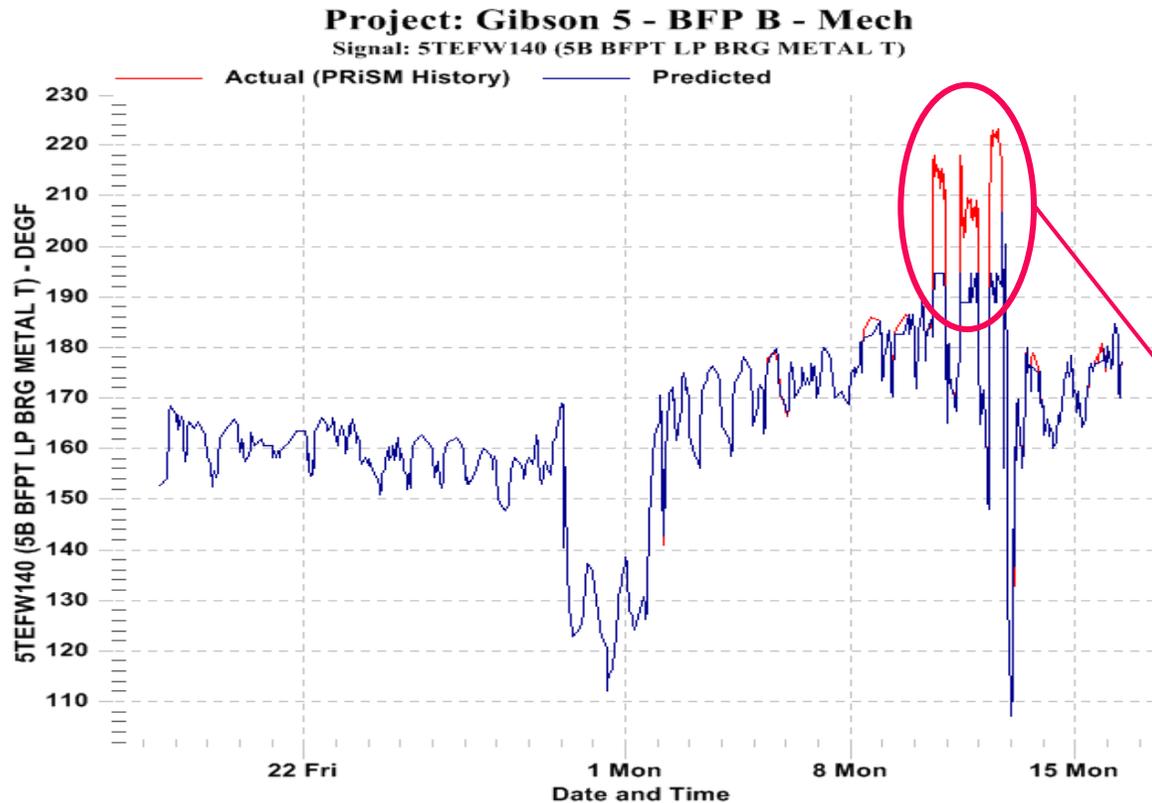
### ➤ Approach towards delivering customer value

- Integrated PI archive as the Predictive Analytics internal time-series archive
- Automated model building
  - Tag browsing using AF
  - Leverage AF tag properties and calculations to create models more easily
- Improved Digital Twin Maintenance
  - Native PI AF integration using PI AF Templates and Extensions
  - Single Administration for combined solution

### Native Integration



# Case Study: Pumps & Valving



## Predictive “catch”

### Observation

Bearing metal temperature spikes were observed.

### Results

Site investigation found oil reservoir filled with half water and half oil. It was determined that the intricate valving was supplying too much pressure to the seals resulting in water flowing to the bearings.



# Case Study: Environmental

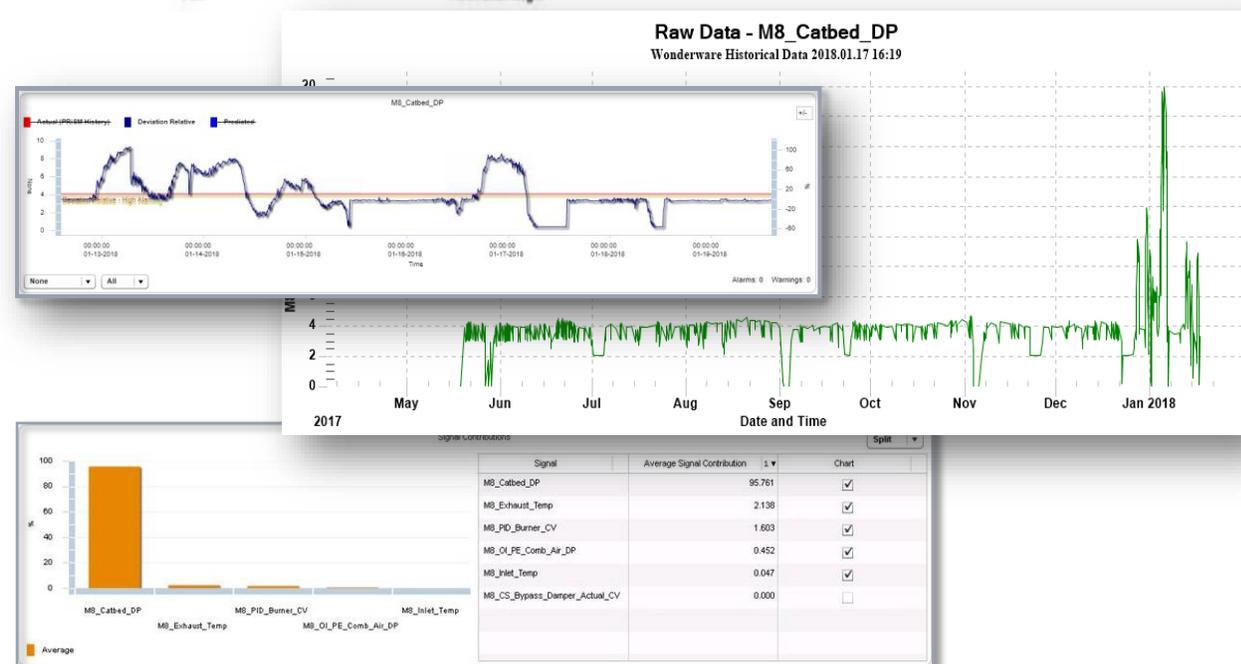
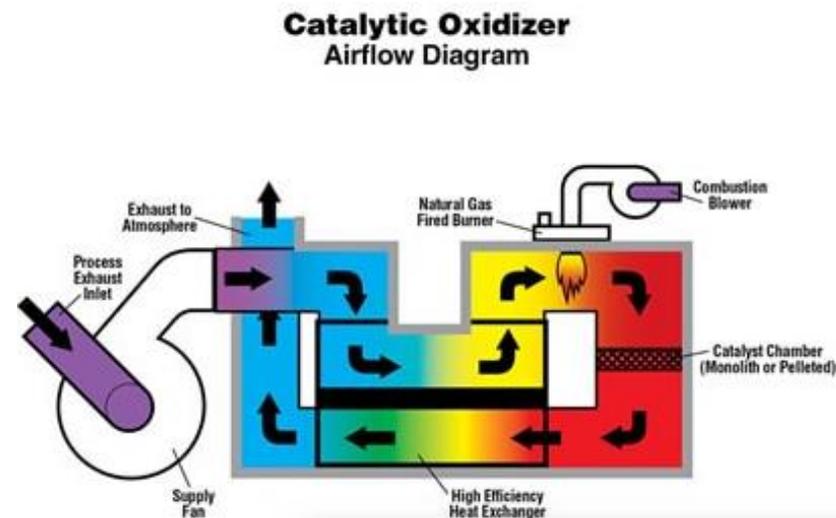
## Summary

The oxidizer is responsible for reducing environmentally harmful emissions. This is done by burning the exhaust gases at a high temperature (oxidizing) and then running the hot exhaust over a catalyst to help induce a chemical reaction.

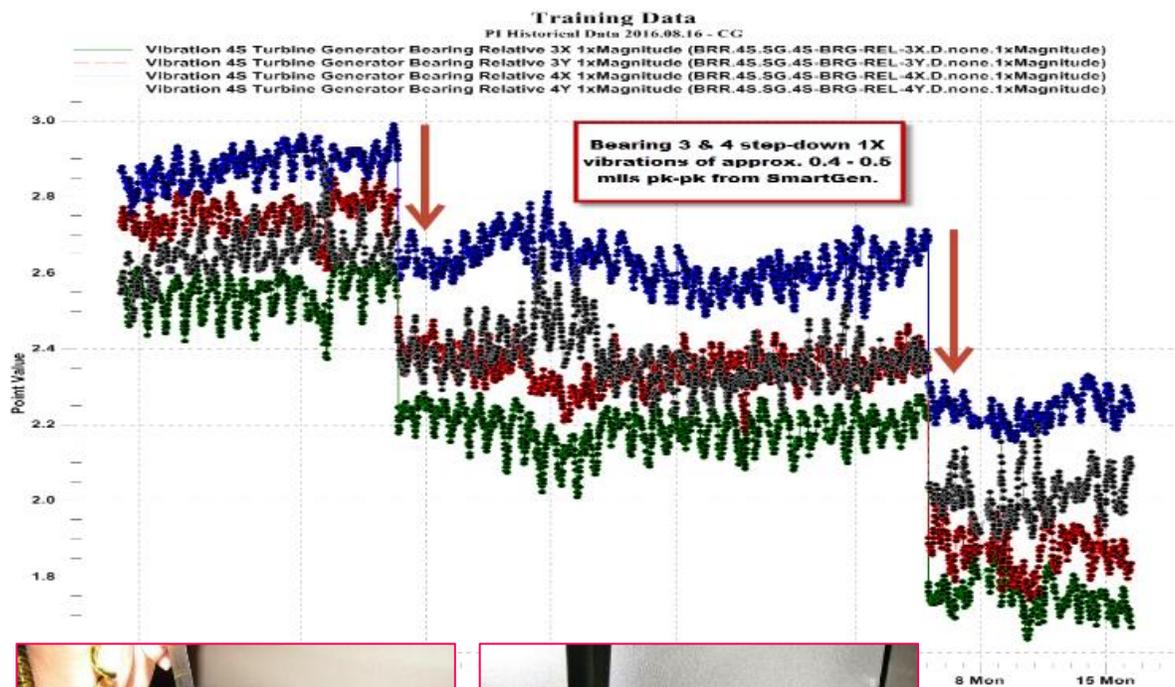
## Predictive “catch”

The system identified a higher than expected differential pressure across the catalyst bed, indicating a clog which can disrupt the oxidation process. However, this issue only occurred once in awhile.

The site determined that this predictive notification only occurred when the weather was extremely cold, causing the lines that bleed moisture to the outside to freeze. Maintenance personnel thawed the lines, allowing the moisture to dissipate which, in turn, reduced the pressure and eliminated the predictive analytics alarm.



# Case Study: Steam Turbine



## Summary

Due to AVEVA's AI-driven Predictive Analytics and proactive notification system, catastrophic damage to the steam turbine and potential significant personnel injury were averted.

## Predictive "catch"

After reviewing the events and actions taken to remedy the situation, the customer calculated that the avoided cost for this predictive "catch" was over **\$34.5M USD**.

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# Renewables - Wind

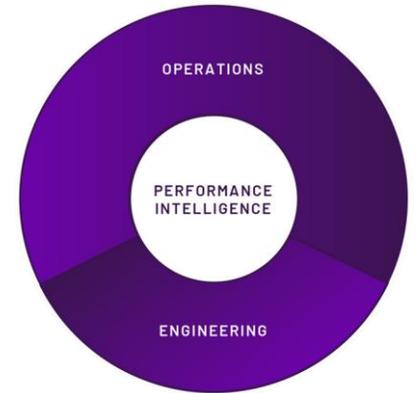
# Predictive/Prescriptive Analytics & the PI System

## Wind Farm Performance Monitoring + AI

Real-time monitoring  
Artificial Intelligence  
Predictive maintenance  
Root cause analysis  
Prescriptive actions  
Offshore farms  
Onshore farms



Turbine performance  
Rotor pitch  
Yaw drive mech  
Gearbox reliability  
Lube oil system  
Generator: elec & mech  
etc...



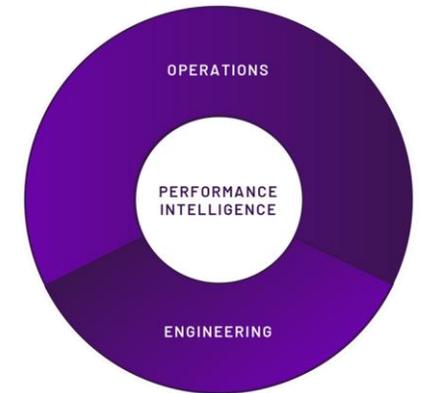
# Predictive/Prescriptive Analytics & the PI System

## Wind Farm Performance Monitoring + AI

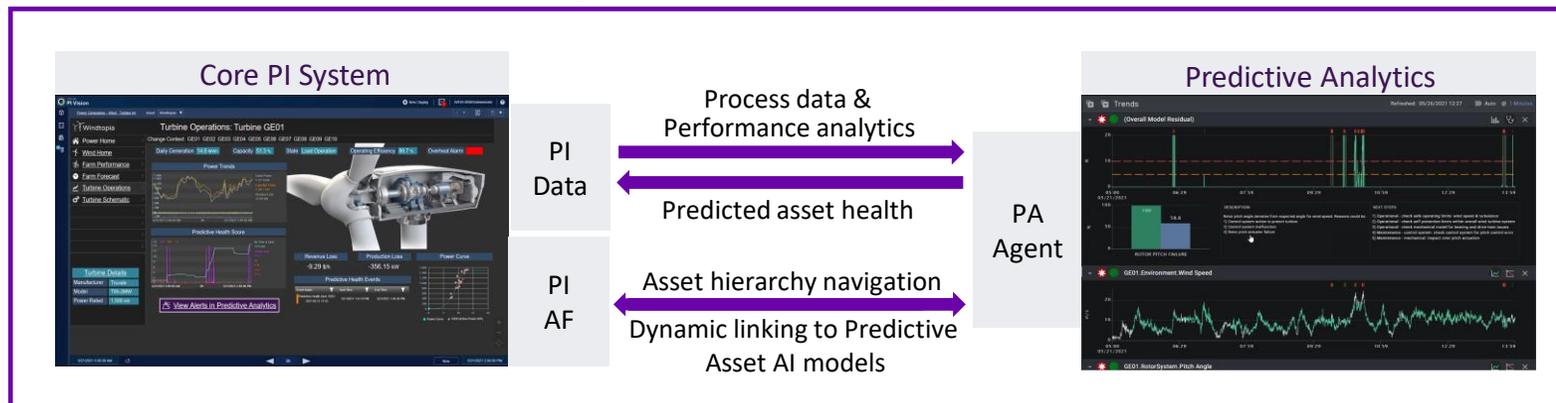
- Real-time monitoring
- Artificial Intelligence
- Predictive maintenance
- Root cause analysis
- Prescriptive actions
- Offshore farms
- Onshore farms



- Turbine performance
- Rotor pitch
- Yaw drive mech
- Gearbox reliability
- Lube oil system
- Generator: elec & mech
- etc...



## High-performance Integration



(High-availability through AF SDK)



Offshore



Onshore

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# Demo: PI + Predictive for Wind



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