Barrick Gold Cortez Process Turns to Industrial IoT to Maximize Uptime of Its Critical Assets

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Agenda

1. Introduction to Barrick Gold
1. Push for Industrial IoT Technologies
1. Petasense Asset Reliability & Optimization
1. Pilot at Cortez Process
1. Pi Integration

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Barrick Gold

One of the world's largest gold producers

- HQ in Toronto, Canada
- 75%+ of our gold production from the Americas
  - including Argentina, Canada, Dominican Republic, Peru and the United States
- At the start of 2018, Barrick had proven and probable gold reserves of **64.4 million ounces**

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Barrick Nevada

Cortez Process

- Located 100 km southwest of Elko, Nevada, in Lander and Eureka counties
- Cortez Mining District mining since 1862
- Proven and probable gold reserves at Cortez at start of 2018 were **10 million ounces**

Source: http://www.mining.com/worlds-top-10-largest-gold-mining-companies-2017/

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Industrial IoT journey

Barrick has a strategic intent to harness

the potential of **IIoT technologies** across sites

“Internet of Things is transforming the everyday, physical objects that surround us into an ecosystem of information that will enrich our lives.”

PricewaterhouseCoopers report

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Barrick is a long-term user of OSIsoft PI

- Using PI for the past 10 years
  - EA customer since 2015
- **Over 250K tags** being tracked
- Primary use cases:
  - **Analytics & visualization**
  - **Process modeling**
  - **Planning**
  - **Process monitoring**

BARRICK

+

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... but limited use for predictive maintenance

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Predictive Maintenance until now

Limitation	Consequence
Infrequent data collection (every 4-5 weeks)	Increased failure risk (asset condition may change between data collection)
Vibration on horizontal axis only	Misses important signals in vertical and axial directions
Time-consuming data collection (350 points = 2-3 hours each day)	Increased failure risk (asset condition may change between data collection)
Tedious analysis process (3-4 hours per hour of sampling)	Infrequent and rushed analysis

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All resulting in BIG risks

Unplanned downtime, Costly repairs and Unnecessary PM

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4 disruptive technologies have paved the way for IIoT

Pervasive Wireless Technologies

Inexpensive Sensors

High-performance Cloud Computing

Advanced Data Science & Artificial Intelligence

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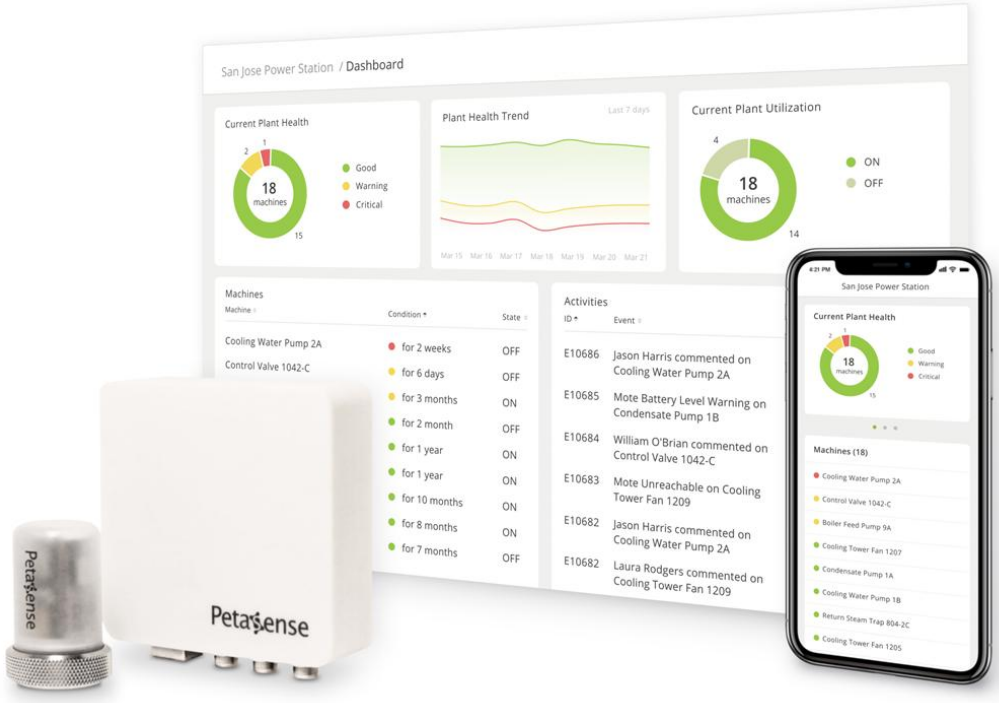
Petasense Asset Reliability & Optimization System



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Petasense Asset Reliability & Optimization System

1 IoT Sensors

2 ARO Cloud

3 Web & Mobile Apps

Vibration Mote
Vibration + Temp Sensor
for Rotating Machines

Transmitter
Multi-sensor Input Module
for Any Industrial Asset

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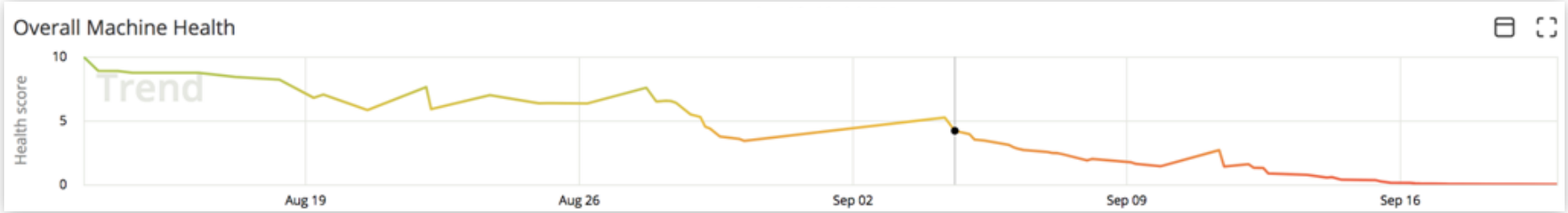
AI-based Asset Health Score



Benefit

Reliability Engineers and Analysts become much more efficient

- **Analyst need only review fraction of assets,** while rest are known to be healthy
- **AI provides diagnostic insights,** troubleshoot assets with potential issues

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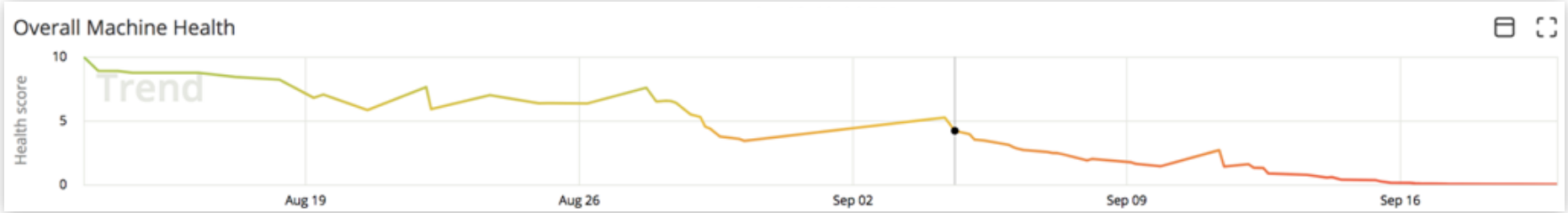
AI-based Asset Health Score



Step 1) **Input machine specs** to configure the digital asset model

Step 2) **Establish a baseline** of typical operations in the first 2-4 weeks of monitoring

Step 3) **Algorithm compares new data to baseline** adjusting the health score based on anomalies and deviations detected

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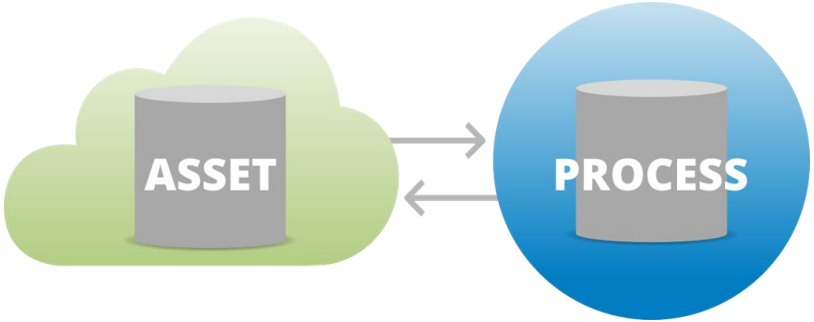
Integration with OSIsoft PI



Benefit

Bridges the gap between asset reliability & operational efficiency

- **Correlation of asset and process data,** a holistic picture of operational health

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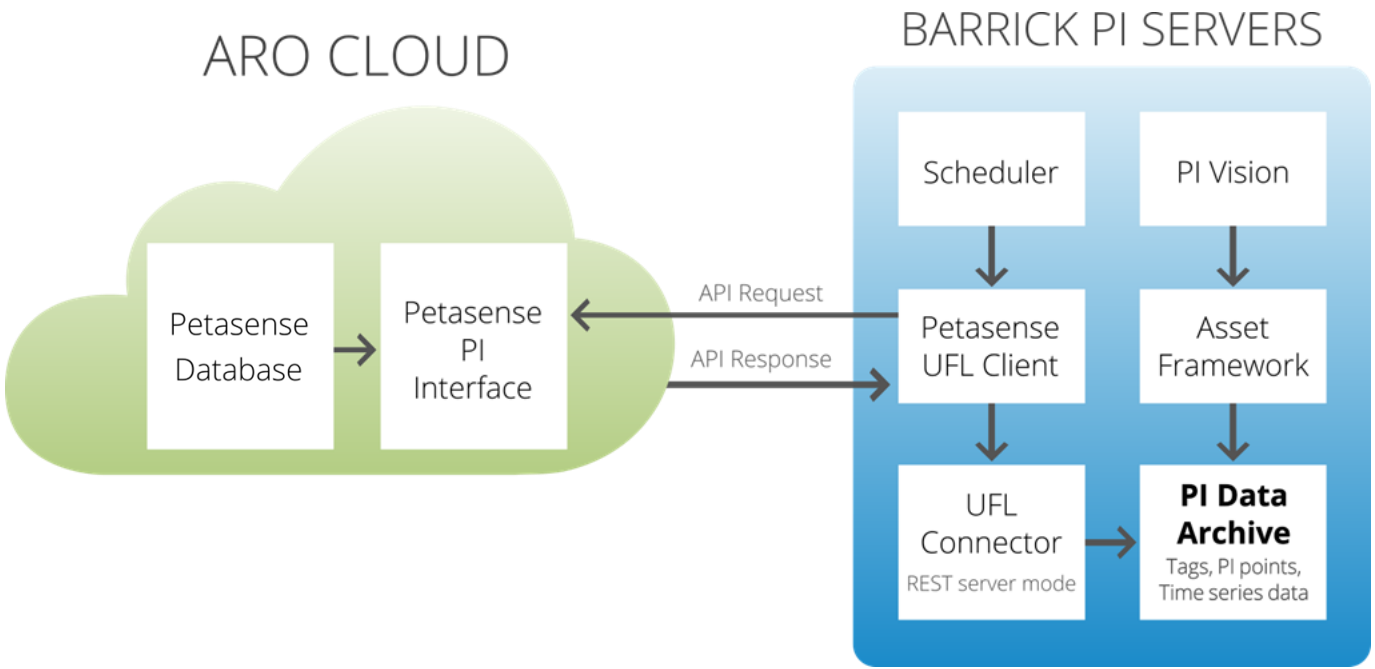
Integration with OSIsoft PI



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Petasense Pilot at Barrick Cortez

Elko, Nevada

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Pilot Scope

Monitor 10 Machines

- Tails Pumps, Barren Pumps, Mercury Scrubber Fan, Cyclone Feed Pump, Electrowinning Fan, Agitator, Ball & Sag Mill
- Wireless data collection every 3 hours (instead of every month)

Integration with OSIsoft PI

- Asset condition data alongside process data

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Industrial IoT sensors in action

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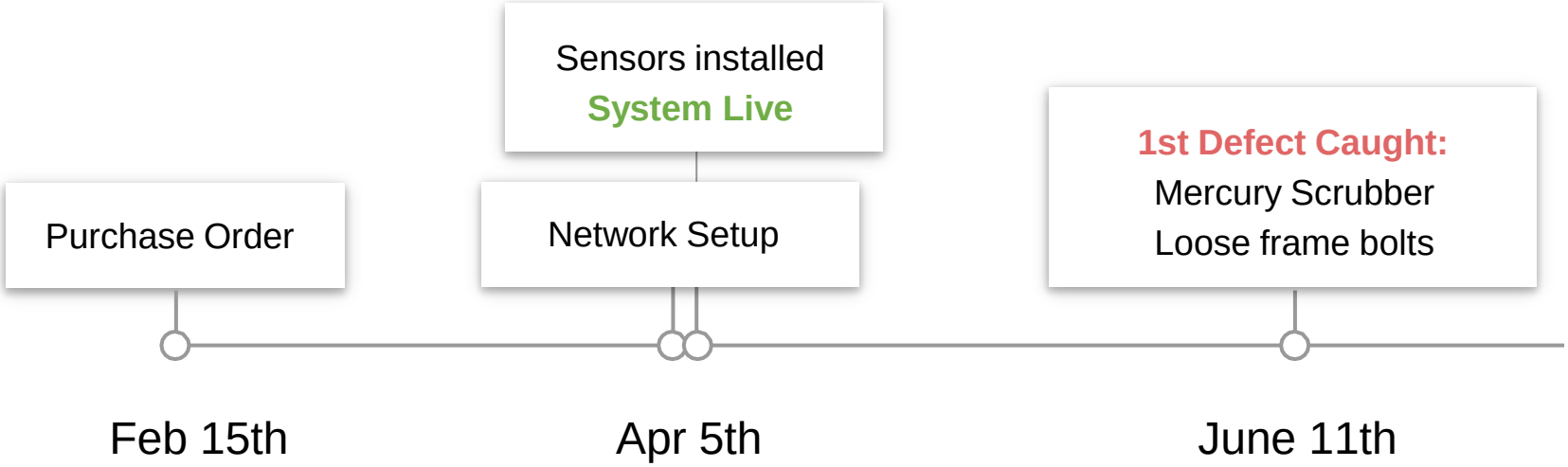
Seeing ROI after 36 days of deployment



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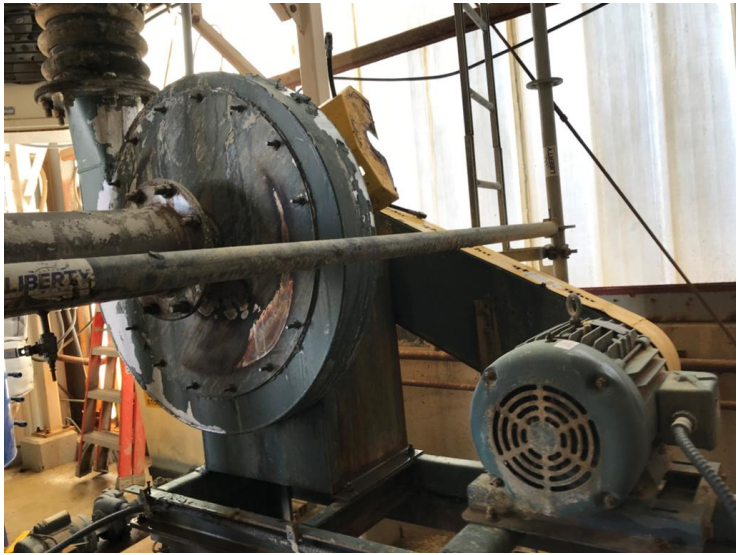
First Defect Caught

Mercury Scrubber Fan - Loose Frame Bolts

Avg Vib Trend - June 8 to 14, 2018



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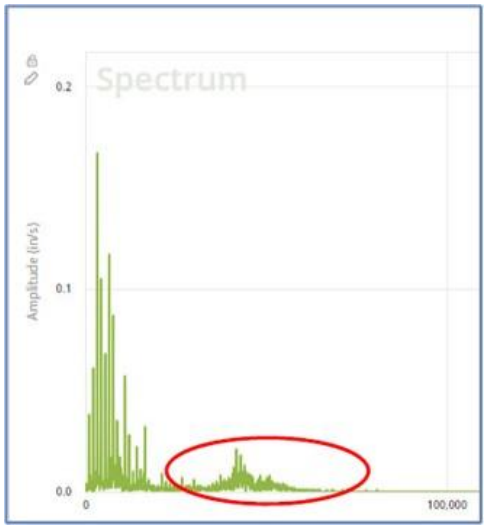
Recent Defect Caught

Barren Booster Pump - Elevated Noise Floor (Cavitation)

Vib Spectrum - Feb 22, 2019



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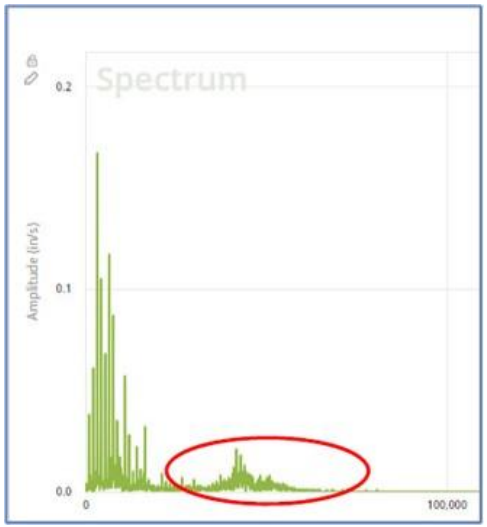

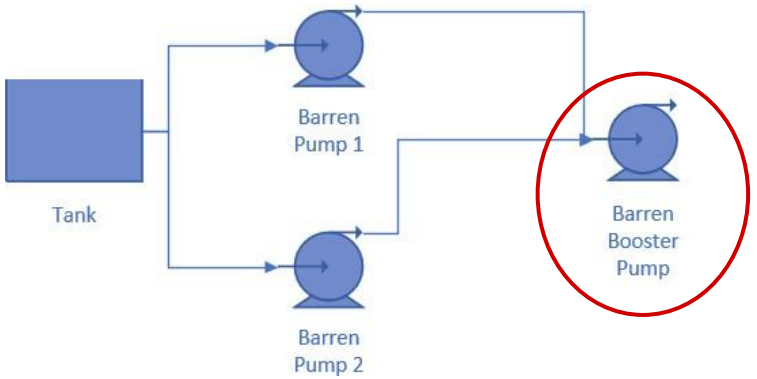

Prompted inspection of the two pumps that feed into the Barren Booster Pump

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Recent Defect Caught

Barren Booster Pump - Elevated Noise Floor

Root Cause Identified

IMPELLER WEAR

on Barren Pumps 1 and 2

Resulting in

CAVITATION

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Two ways to integrate asset and process data

1

From Petasense to PI

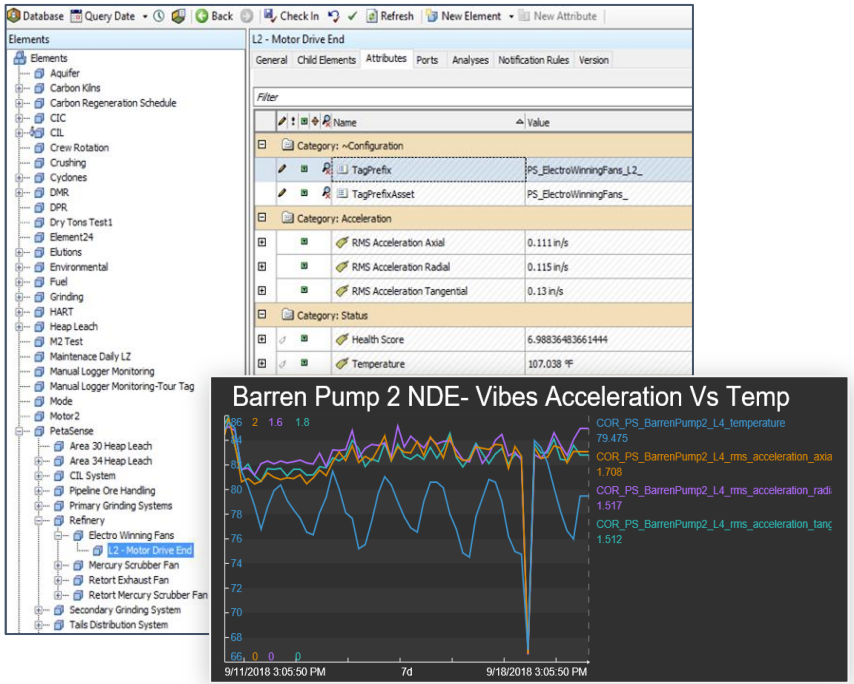
Use case

Process optimization,

Single-parameter alarms

User

Process Engineer, Site Engineer



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Two ways to integrate asset and process data

2

From PI to Petasense

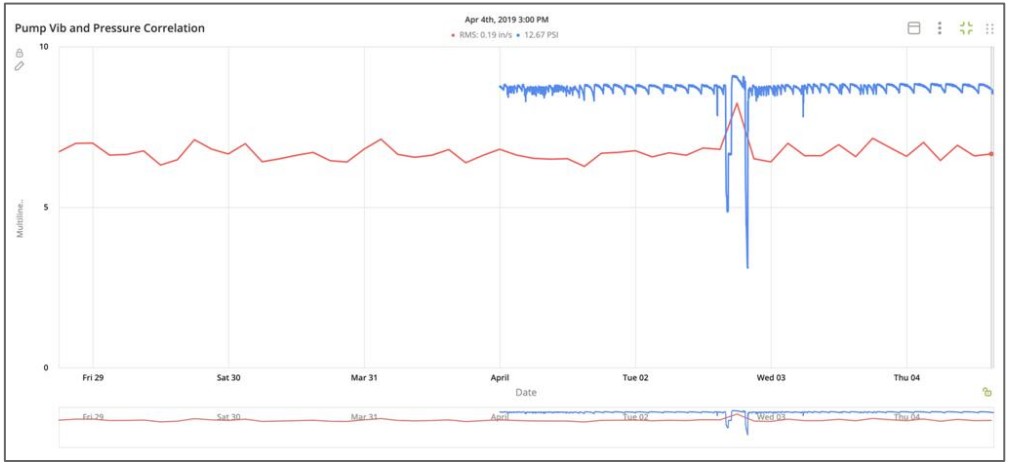
Use case

Diagnostics, Asset optimization,

Multiparametric AI-based analytics

User

Reliability Engineer, Analyst



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Where we are today

70+ Machines Monitored

Mills, Agitators, Conveyors, Cyclone Feed Pumps, Tails Pumps, Gland Water Pumps, etc.

1,200+ tags sent from Petasense to PI

Vibration, Temperature and Utilization data

Currently deploying at Goldstrike (sister site)

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Benefits of implementing the IIoT System

Tangible

- Saved $600K of potential downtime in just one instance
- Reduced Unplanned Downtime
- Reduced Repair Costs
- Extended Preventive Maintenance
- Improved Operational Efficiency

Intangible

- Peace-of-mind, No emergency failures
- No more walk-around data collection, only on an as needs basis
- Leverages existing data to get improved analytics about assets and processes
- Standardized approach to asset reliability across multiple sites

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What's next in Barrick's IIoT journey?

1. Deeper integration of PI data into Petasense to leverage AI-based analytics

2. Continue deployment of Transmitters, collecting additional sensor parameters

3. Current pilot at Goldstrike Process, expand to production

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BARRICK GOLD

Cortez Process Turns to Industrial IoT to Maximize Uptime of Its Critical Assets

CHALLENGE

PI lacked asset condition data to optimize Predictive Maintenance

- Increased Risk of Unplanned Downtime
- Increased Cost of Repairs
- Unnecessary Preventive Maintenance

SOLUTION

Implement an IIoT-based Predictive Maintenance system

- Petasense Asset Reliability and Optimization (ARO) System
- Industrial IoT Sensors and Machine Learning Software
- Ability to Integrate with PI

RESULTS

Saved $600K of potential downtime in just one instance

- Quick deployment and ROI
- Easy integration with OSIsoft PI, enabling advanced diagnostics and AI-based analytics

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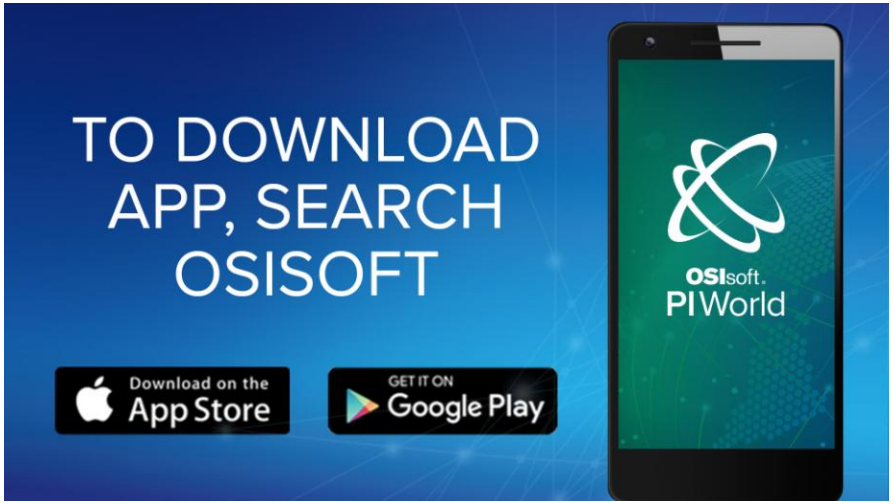
Questions?

Please wait for the **microphone**

State your **name & company**

Please remember



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