IBM Maximo Asset Performance Management

APM Launch Announcement and Update

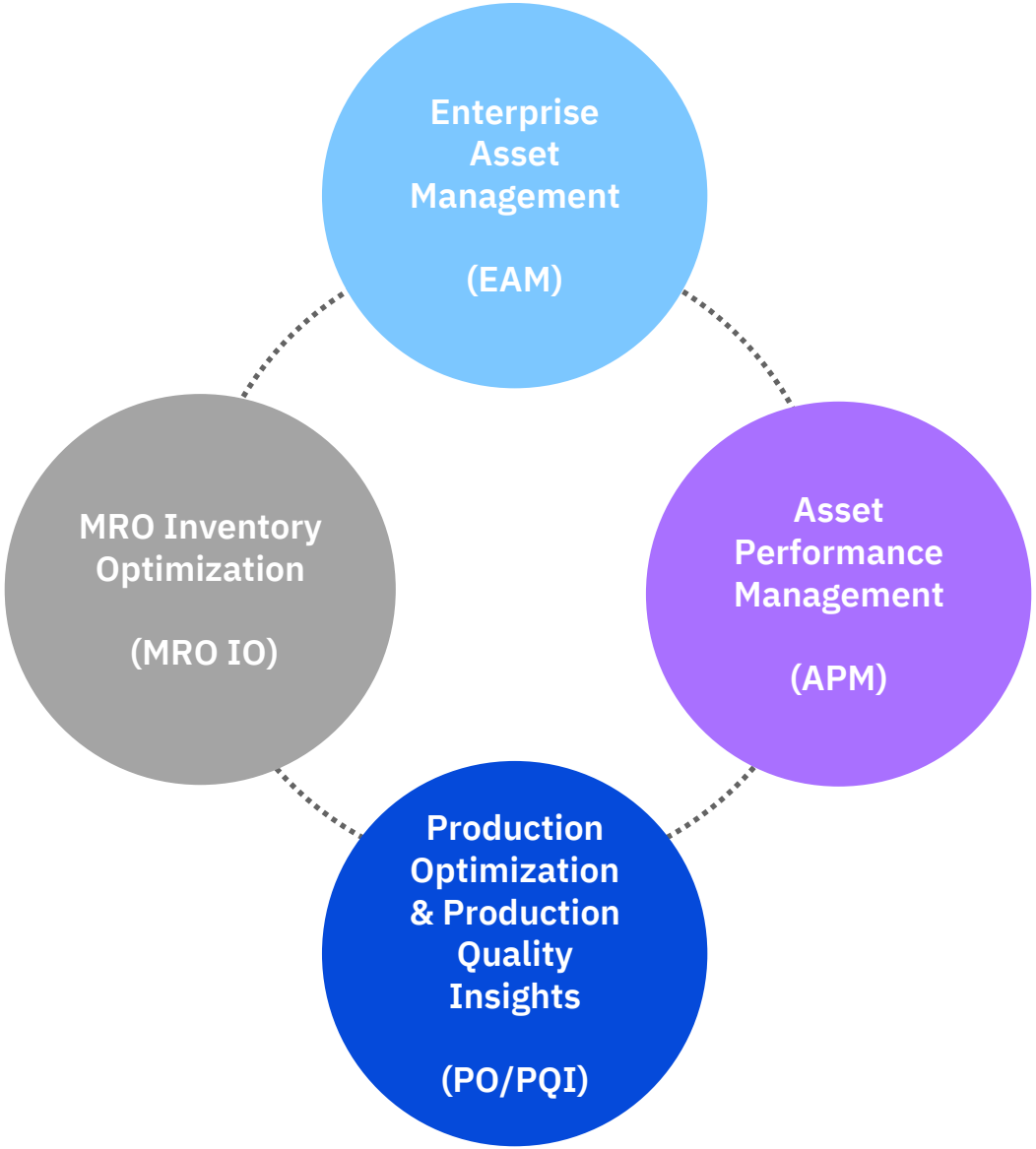
IBM Watson IoT / © 2019 IBM Corporation

Watson IoT

Driving client value through increased operational effectiveness and efficiency

IBM has identified four major disciplines that help industrial companies respond to the global productivity crisis with improved efficiency, reduced risks, and lower costs:

- **EAM** to capture asset data and manage execution of work
- **APM** to optimize performance through prediction and prescriptive actions
- **MRO IO** to improve uptime and cost with better inventory control
- **PO/PQI** to unlock equipment data and identify quality issues sooner to maximize operations



Expanded portfolio of industry-leading Maximo solutions

IBM Maximo Solutions	Enterprise Asset Management	Asset Performance Management	Production Optimization	Production Quality Insights	Worker Insights	MRO Inventory Optimization
	Keep critical assets operating at maximum efficiency.	Improve equipment performance with analytics and AI.	Unlock factory equipment data to maximize operations.	Identify quality defects sooner, and respond in real time.	Avoid devastating workplace accidents with IoT and analytics.	Reduce costs and minimize asset downtime.
Core Components	– Core Enterprise Asset Management (EAM) – EAM Industry Solutions – EAM Scheduler – EAM Anywhere – EAM Health, Safety, Environment (HSE) – EAM Spatial – EAM Blockchain – EAM Calibration – EAM ERP Adapters	– Asset Health Insights – Predictive Maintenance Insights – Equipment Maintenance Assistant – APM for Energy and Utilities	– Production Optimization – Process Optimization	– Visual Insights – Acoustic Insights – Prescriptive Quality	– IoT Worker Insights	– Spare Parts Inventory Optimization

Foundations			
Watson IoT Platform	Connect, Collect, Analyze, Optimize, Govern and Deliver	Tailored insights from AI and analytics models and algorithms	Trust and tracking within a shared Blockchain ledger
IBM Services	Industry, domain and IoT expertise	Industry solutions with pre-integrated AI / Machine Learning capabilities	

Asset Performance Management enhances clients' EAM foundation with analytics and AI



Planning & Scheduling

Execution

Health Monitoring

Predictive Maintenance

Prescriptive Repair

Asset Criticality & Strategy

Asset Performance Management (APM) enables **decision support**

Apply advanced analytics and artificial intelligence to shift asset maintenance strategies from preventive to predictive and prescriptive to deliver differentiated service levels

Enterprise Asset Management (EAM) enables **maintenance execution**

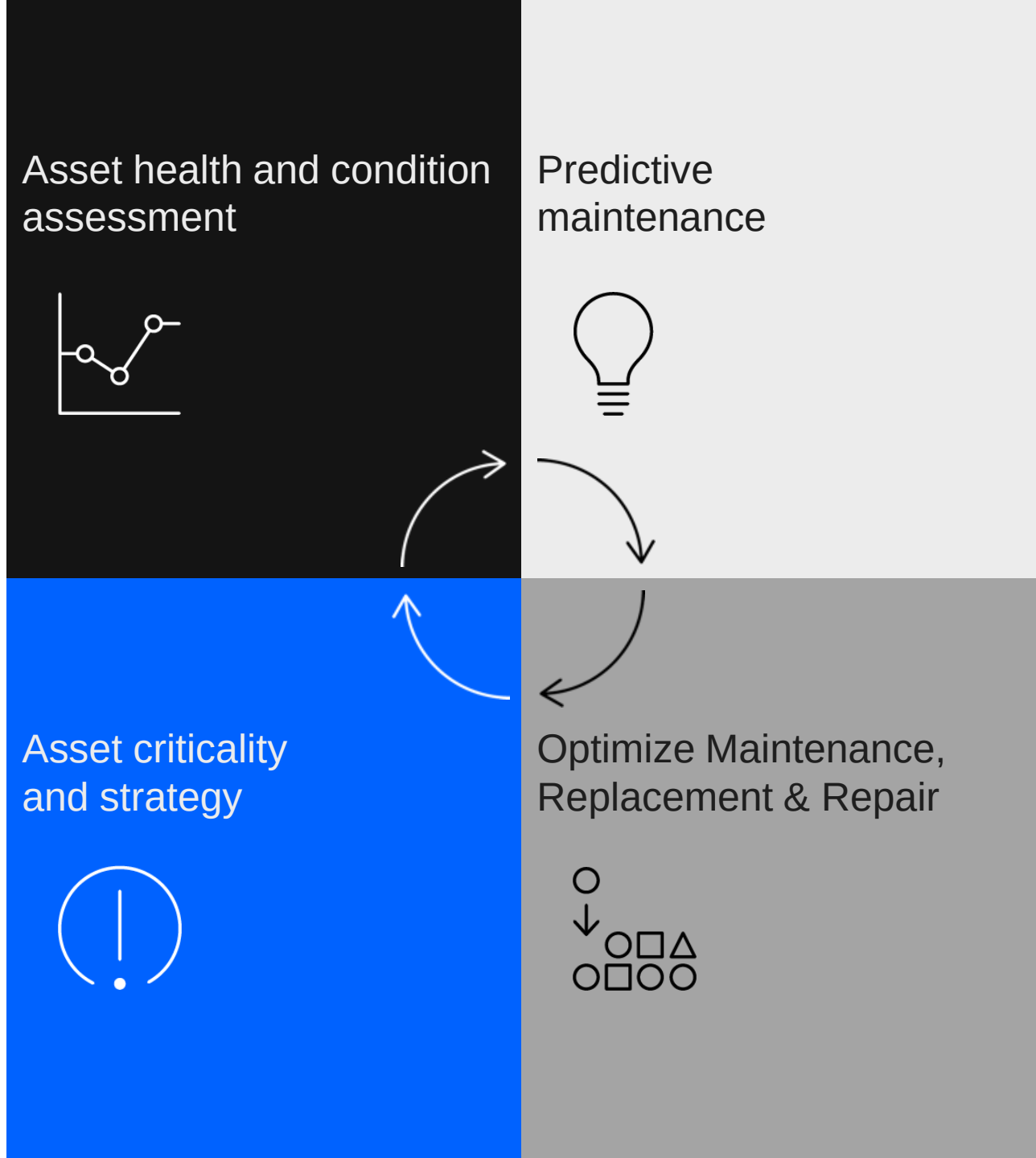
Plan and execute the day to day asset maintenance and planning activities and supply the asset master data and maintenance history which is critical for analytics

APM identifies assets in need of attention and recommends actions

Integrates disparate data sources to deliver actionable insights across the business for financially optimized asset decisions

40%

average reduction in operational maintenance costs through prediction



Asset Health Insights (AHI)

Case: Reduce planned maintenance & optimize repair vs replace decision making

Costs: MAHI license and Implementation

Savings:

- 25% reduction in planned maintenance
- 50% reduction in time taken to execute repair vs replace decision

Equipment Maintenance Insights (EMA)

Case: Poor “right first time” fixes and lack of maintenance history knowledge and expertise

Costs: EMA monthly queries and Implementation

Savings:

- 30% improvement in “right first time” fixes
- 40% reduction in time taken to find information

Predictive Maintenance Insights (PMI)

Case: Need to optimize maintenance

Costs: Predictive Maintenance Insights licensing and Implementation

Savings:

- 60% reduction in customer calls
- 50% reduction in effort taken to conduct predictive maintenance analysis

APM for Energy & Utilities (E&U)

Case: Reduce Capex and Opex; Optimize asset replacement planning

Costs: APM for E&U License and Implementation

Savings:

- 25% reduction in maintenance costs
- 90% reduction in time needed to generate prioritized asset work lists (days vs months)

IBM Maximo APM

Reduce downtime and maintenance costs with asset health metrics, predictive insights, and prescriptive repair guidance

- ***Asset Health Insights*** – Respond to changing conditions and prioritize maintenance and replacement decisions with asset health metrics
- ***Predictive Maintenance Insights*** – Avoid unplanned down time using anomaly detection and predictive analytics to forecast failures
- ***Equipment Maintenance Assistant*** – Fix equipment right the first time with AI-based guidance delivered to maintenance technicians at the point of repair
- ***Asset Strategy*** – Optimizes asset maintenance and replacement strategies based on asset risk and criticality

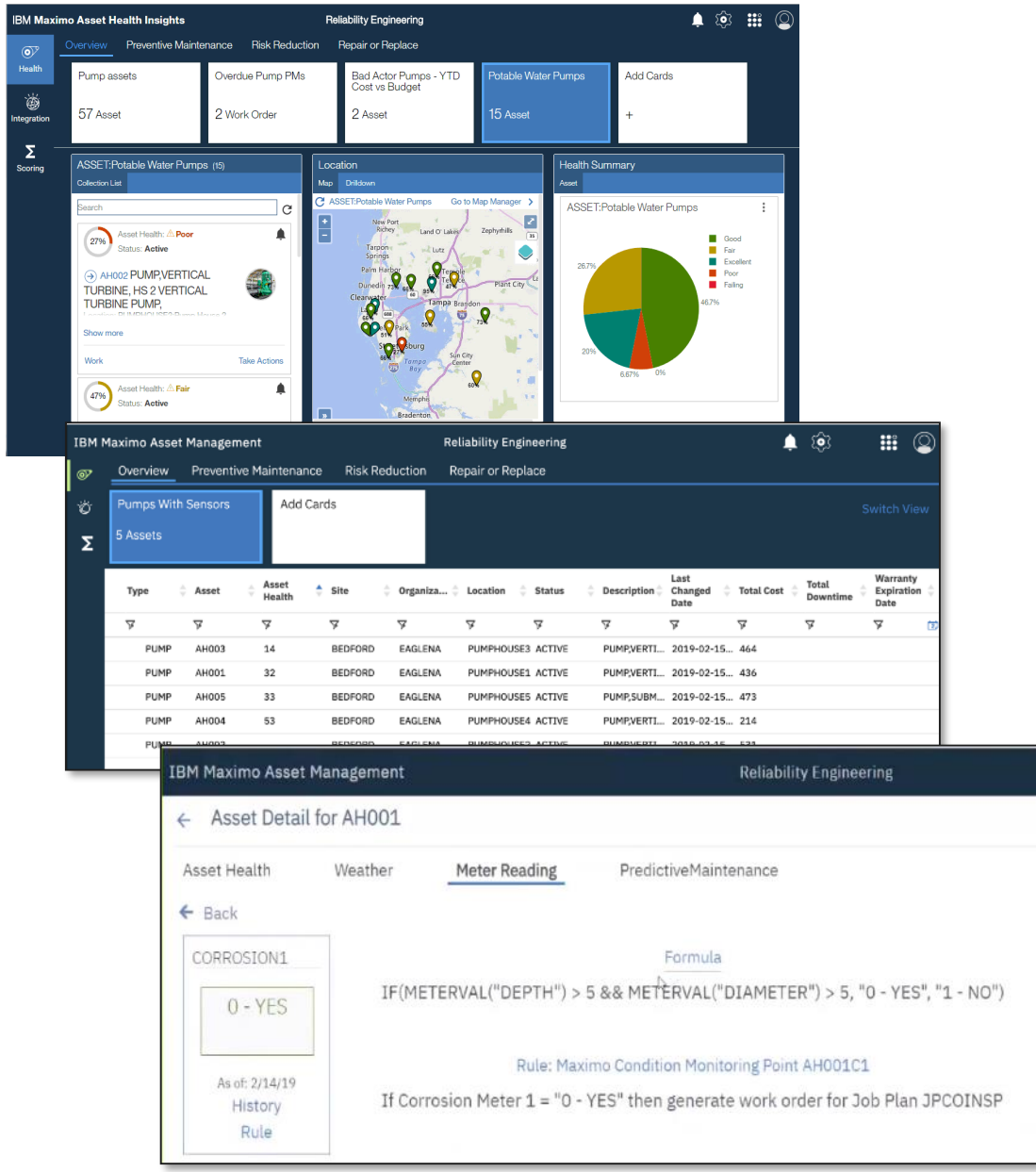


IBM Maximo APM Asset Health Insights

Enables reliability engineers and maintenance supervisors to gain a deeper understanding of the health of their assets. Provides capabilities to model, map, monitor, and optimize the health of assets.

New Capabilities

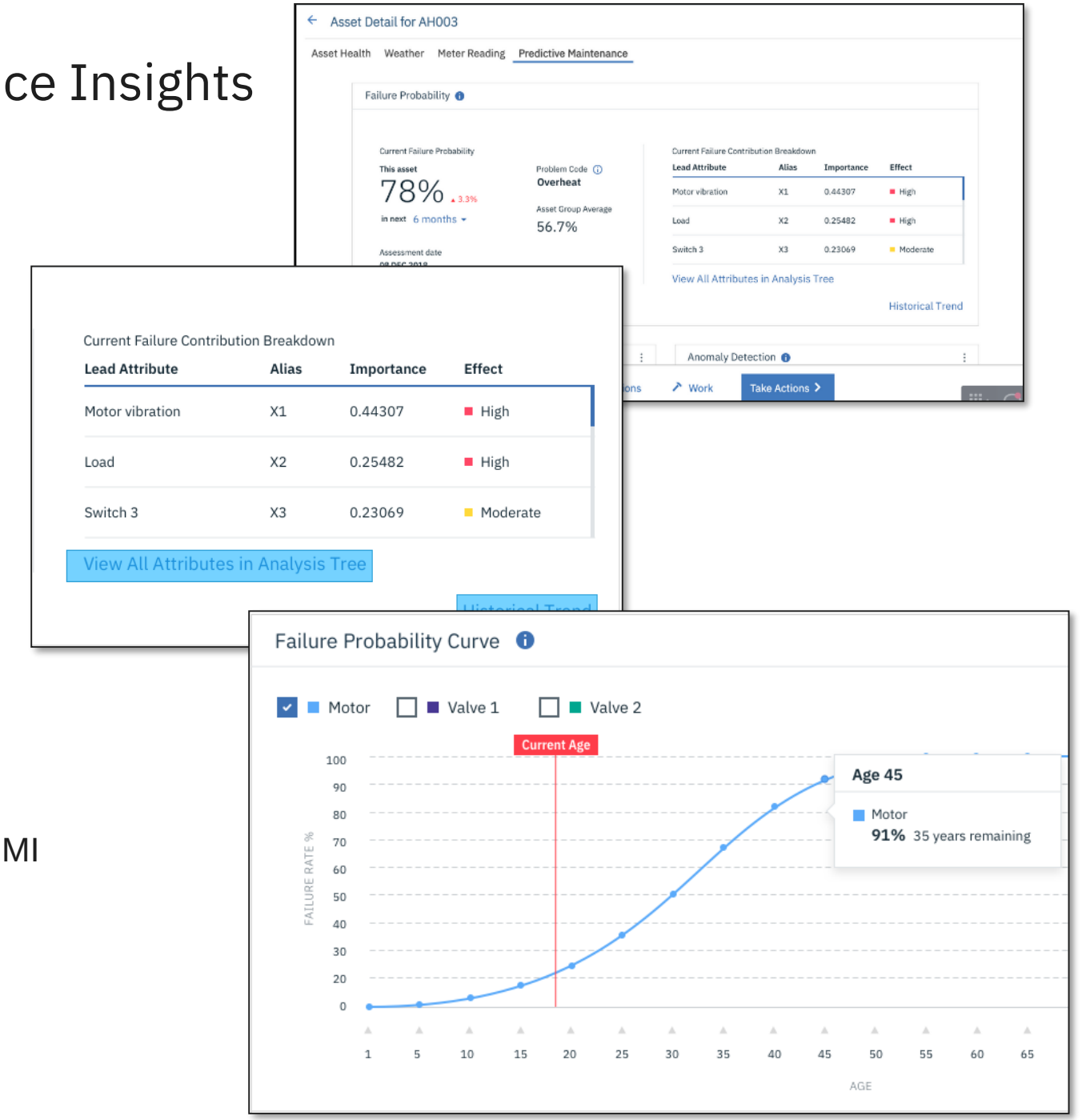
- Full user experience integration with Predictive Maintenance Insights
- Ability to leverage predictive results in health scores
- Condition-based-maintenance capability to create, view, and edit rules
- New table view to enable sorting & filtering
- Enable automated actions based on IoT data
- Maintenance Supervisor in Maximo can view and use asset health score to help prioritize work
- Enhanced visibility of asset criticality
- Sample scoring method and visualizations that are ready for immediate use
- Comparison of an asset score with it’s group average



IBM Maximo APM Predictive Maintenance Insights

New Capabilities

- Converged UX between AHI and PMI SaaS
- Prebuilt predictive maintenance models and visualizations
  - Days to next failure prediction
  - Failure probability prediction
  - Anomaly detection
  - Failure contribution breakdown
  - Failure probability curve
  - Ability to score custom models in PMI SaaS developed with IBM Watson Studio
- Development and training of all predictive models optimized with Watson Studio (not included)
- Common role based authentication for entire solution (PMI and AHI)
- Common UI look and feel, and seamless navigation (PMI and AHI)



Start Center | IBM Maximo Asset Management

Not secure | mymax.dnsalias.com:9443/maximo-x/#/relengineer/health/overview/1

IBM Maximo Asset Management — Reliability Engineering

Asset Detail for AH003

Asset Health | Weather | Meter Reading | **Predictive Maintenance**

Maintenance Timeline

SEP 2019

WO Work Order | PM Planned Maintenance | PF Past Failure | NF Predicted Next Failure Date



Failure Probability

Current Failure Probability

This Asset

42% 0

In the next 30 days

Asset Group Average

42%

Assessment Date

2019-07-11

Current Failure Contribution Breakdown

Lead Attribute	Importance	Effect
Temperature__min__30d	1	High

View all attributes in analysis tree | Historical Trend

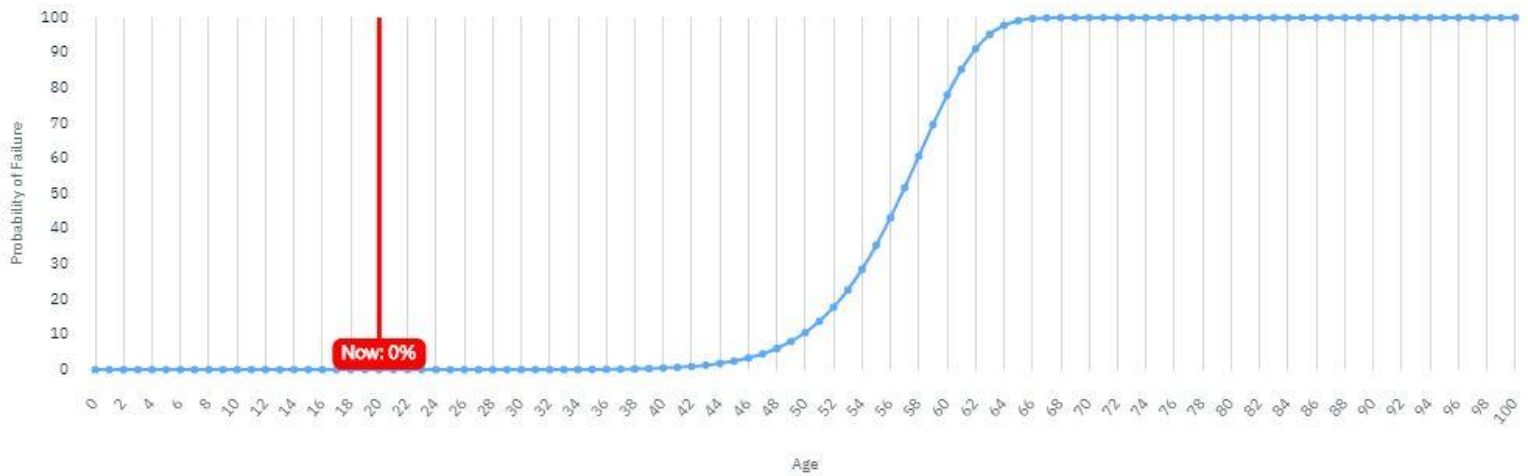
Back | Notifications | Work | Take Actions

Asset Detail for AH003

Asset Health | Weather | Meter Reading | **Predictive Maintenance**

Maintenance logs | Anomaly Score History

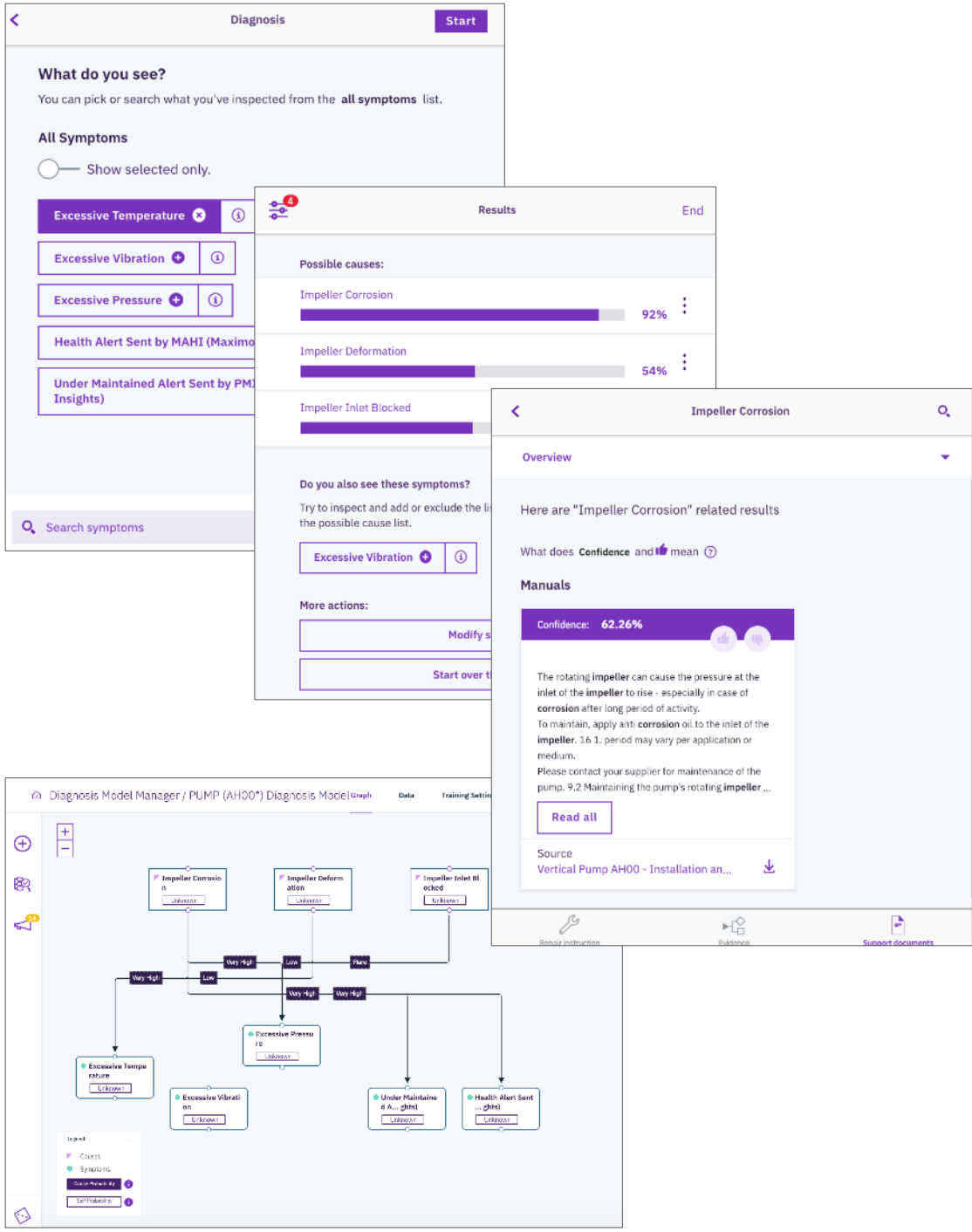
Failure Probability Curve



Maximo APM Equipment Maintenance Assistant

New Capabilities

- Find causes of an issue based on observed symptoms and get repair Instructions
- Translate your client's diagnostic trees and procedures, Root cause failure analyses (RCFA) and Failure mode and effects analyses (FMEA) techniques into EMA
- Diagnosis models are based on Bayesian networks and Machine Learning for more efficient probabilities that continually improve over time
- Creation of diagnosis model is via an easy flowchart UI
- Enhanced mobile interface
- EMA Demos available on DemoCore



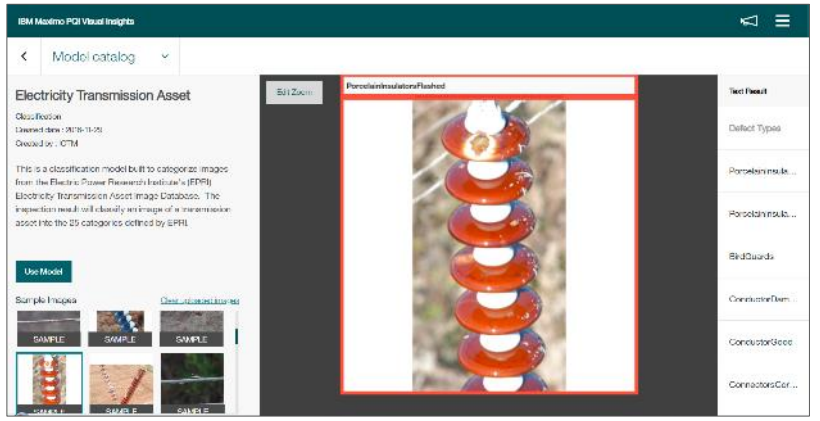
IBM Maximo APM for Energy & Utilities

Tailored for Energy & Utilities with pre-built models, dashboards, and use cases

- Risk & criticality scoring, health scoring and degradation models
- Pre-built advanced analytic models based on industry standards
- Extensible by customers and business partners

New Capabilities

- Total of 25 Pre-built AI models
- Maximo Integration
- New Industry Asset Models
- Enhanced User Experience
  - Google Street View
  - Updated Reports
  - Refreshed Look and Feel
- Visual Insights and Equipment Maintenance Assistant for E&U











Case Study
Regional Water Utility in NA

Business problem

A water utility client in NA needed a way to streamline the physical inspection of assets. Previously they used a very manual process with a form based custom application. With assets spread over 4 counties in difficult to reach locations, they were only able to inspect assets every 3-5 years, and therefore were not able to have an effective and efficient capital assessment and planning process.

Solution

By using Maximo APM, the client is able to drive current condition assessments in real-time using sensor data from equipment augmented by Maximo inspections as needed.

Business Value

- Enables more accurate assessments and improved replacement and refurbishment planning decisions.
- Tight integration with core Maximo EAM eliminates the need for the custom form-based application which was costly to maintain.



Case Study
GM

Business problem

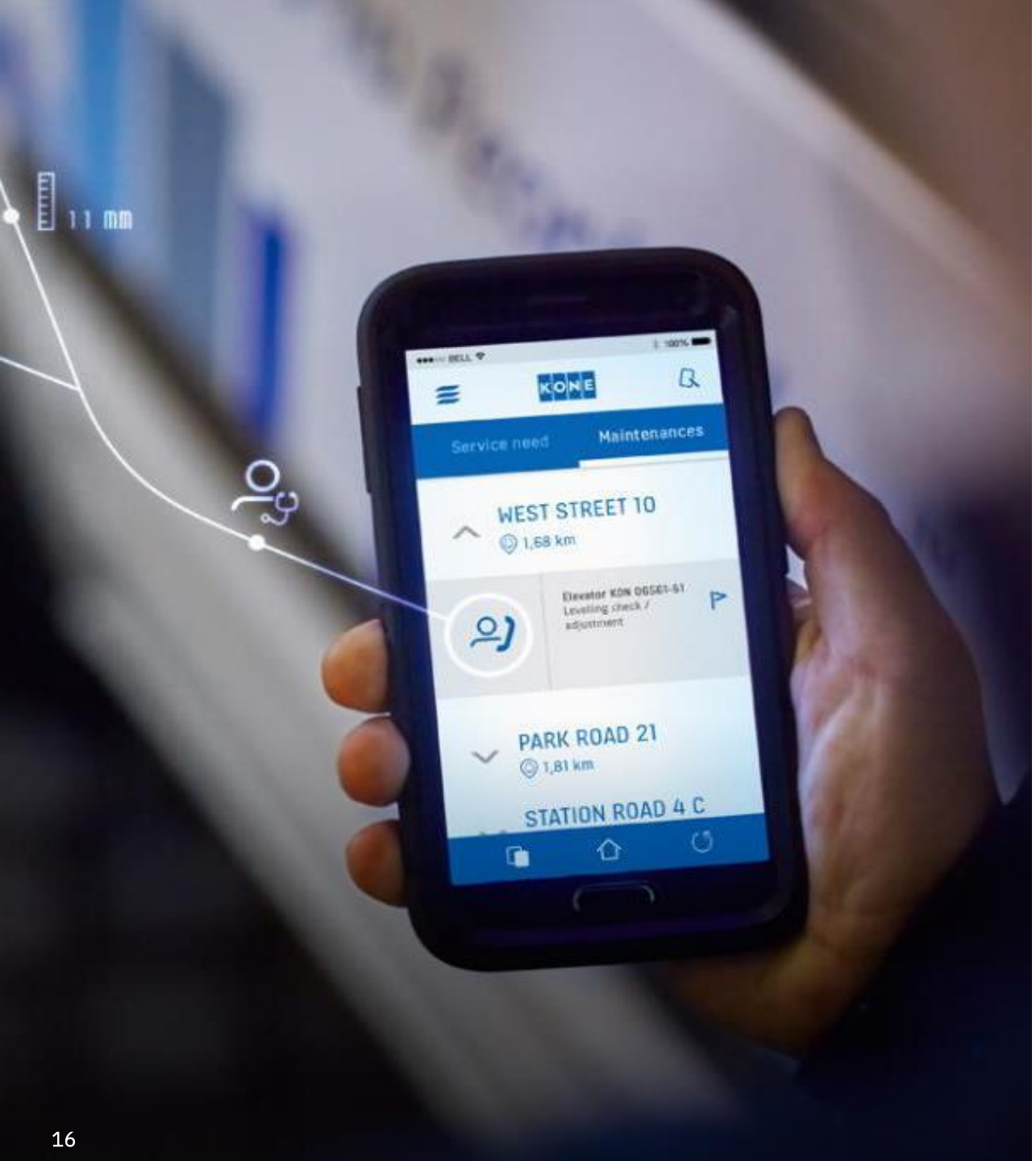
GM is focused on reducing maintenance costs that total over $1BN annually at 140 production sites globally. They also have the need for consistency across all of their sites in understanding the health of their critical assets, so that they can effectively plan for capital improvements.

Solution

GM is adding Maximo APM technologies to their newly converged global instance of Maximo. This includes health monitoring with a score based on meter data, age, etc., lifecycle costs. It also includes planning tools for condition assessment. This will allow them to have a data driven approach to prioritizing their asset replacement planning, and at the same time, help them optimize their preventive maintenance costs and improve mean time between failures (MTBF).

Business Value

- Provided a data driven approach to prioritizing their asset replacement planning
- Optimized preventive maintenance costs and improved mean time between failures (MTBF).



Case Study
KONE

Business problem

Engineering firm KONE needed a way to streamline the process of servicing its 1M+ elevators and escalators around the world. Using IBM Watson IoT, KONE connected all of its equipment worldwide—enabling far greater efficiency and performance than ever before.

Solution

The project started with using IBM Predictive Maintenance Insights, and IoT Platform to connect up to 100,000 devices during the first 24 months, increasing thereafter. KONE now collects real-time product performance data from its operations and analyzes it to provide real-time insights needed to anticipate issues and plan maintenance schedules.

In addition, we are using AI-powered offering IBM Equipment Maintenance Assistant to empower field service teams with prescriptive actions on how to fix or maintain their elevators. This diagnostic and repair guidance capability is in production at KONE and helps improve key maintenance metrics (FTF, MTTR).

Business Value

- Reduce unplanned downtime and improve service quality
- Reduce mean time to repair and improves first time fix rate.



Case Study
EU Transmission Operator

Business problem

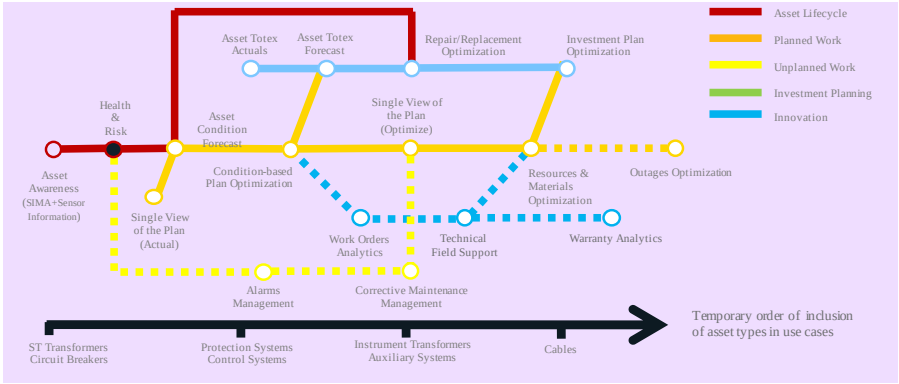
The utility created a 3 year program for Intelligent maintenance for substations, to optimize substations asset maintenance, while maintaining the same level of service, security and availability of the transportation grid.

Solution

IBM Maximo APM for E&U for transformers (400) and Circuit breakers (5700)

Initial use cases: Situational Awareness, Asset health and Network Risk, Maintenance Planning optimization

This roadmap reflects the high level priorities identified through the work sessions. It also shows how capabilities grow incrementally through the 5 work streams.



APM Resources

Launch Resources

- Press Release: (live at 11AM on the 28th) https://newsroom.ibm.com/2019-02-28-IBM-Brings-AI-and-Advanced-Analytics-to-the-Industrial-World
- External Blog: (live at 11AM on the 28th) https://www.ibm.com/blogs/think/2019/02/watson-iot-apm/

APM Overview Assets

- Background Video: (new) https://youtu.be/NubzVa0x6B4
- APM Assessment: (new) https://ibm.co/apmassessment
- Predictive Maintenance Infographic: https://www.ibm.com/downloads/cas/JPVYXV94

Short Demo Videos

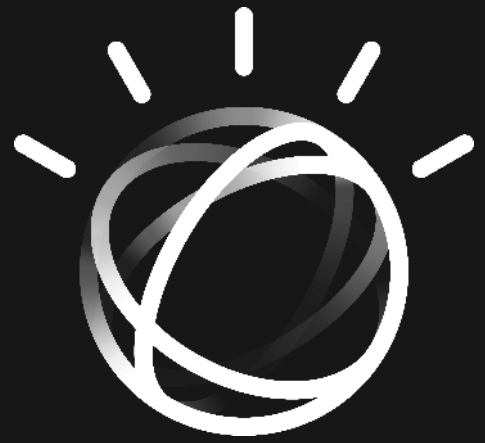
- Asset Health Insights: (new) https://www.youtube.com/watch?v=W-25pOYbqwg&feature=youtu.be
- Equipment Maintenance Assistant: https://ibm.co/2XrqOMB
- APM for E&U: https://ibm.co/2EjfRUm
- Predictive Maintenance Insights: https://www.youtube.com/watch?v=C0CxEj_8yFY

Solution Briefs

- Asset Health Insights: https://www.ibm.com/downloads/cas/7QKBRK65
- Equipment Maintenance Assistant: https://www.ibm.com/downloads/cas/ZQJYLXR1
- APM for E&U: https://www.ibm.com/common/ssi/cgi-bin/ssialias?htmlfid=19012619USEN&dd=yes&

Case Study Videos

- Sandvik: https://www.youtube.com/watch?v=mW0mL0QaMBQ
- Oncor: https://www.youtube.com/watch?v=9BBamHW1gcs
- US Army: https://www.youtube.com/watch?v=1hr-Uwzx9lo
- KONE: https://www.youtube.com/watch?time_continue=38&v=EVbd3ejEXus



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