

INGENUITY AT WORK

Asset Health Center helps AEP

American Electric Power (AEP) faced challenges presented by its aging transmission infrastructure. AEP decided to work with ABB to integrate existing infrastructure and system data, which – together with algorithms – would transform operational data into actionable decision-support information.



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AEP is an integrated utility that has the largest electricity transmission system in the United States. AEP operates in 11 states and serves approximately 5.4 million customers throughout the country with more than 64,000 km of transmission and 360,000 km of distribution lines. AEP was in a situation where equipment was reaching a certain vintage – for example, one-third of its transmission transformers were older than 50 years and another 18 percent older than 60 years. The need to prioritize and streamline asset renewal and maintenance while upholding excellent service had become of paramount importance.

AEP realized that a detailed overview of asset condition would allow decisions to be made regarding which assets need urgent maintenance, which can wait and which have to be replaced, and by when.

AEP decided to approach the matter by forming the AEP-ABB Transmission Technology Alliance. By establishing this alliance, AEP firmly committed to ensuring the reliability of their transmission infrastructure, properly prioritizing maintenance and addressing the replacement of their aging assets. To achieve these goals, AEP set out to create a robust asset health center.

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Questions that AEP asked itself revolved around topics such as failure prevention and the optimization of maintenance effort. These are issues that concern all electric utilities →1.

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01 Tracking asset age, condition and maintenance needs is an issue faced by all electrical utilities.



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With an asset health center, it is possible to organize and prioritize asset data so that maintenance personnel in the field and operators in control rooms receive targeted support in decision making and are not inundated by a large influx of unnecessary or irrelevant data.

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With experience in designing and implementing systems that balance operational technologies and information technologies, ABB was brought on board to develop this highly strategic and forward-thinking asset health center platform. One important aspect to be considered in this project, and indeed in similar projects throughout much of industry, is the unprecedented surge of data now being collected by smart sensors in the field →2.

ABB is uniquely qualified to merge these practical, useful and actionable flows of data to create a system that integrates all the technologies concerned.

The asset health center solution delivered by ABB to AEP provides not only a framework for gathering data but also expert-system models that recommend both short- and long-term tasks, prioritized by urgency →3. These capabilities are essential to effective decision making at the asset level.

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AEP's expectations were to realize valuable operating and maintenance benefits from automating situational awareness of asset conditions in order to help identify assets requiring maintenance or replacement →4. AEP has already reported benefits in operations and maintenance and can point to multiple transformer failures that have been prevented.

AEP was an early adopter and realized that an asset health center is an example of technical innovation in which real-time and historical data is gathered from across the network and turned into meaningful and timely insights. AEP began this journey with transformers and as they gained insight from the optimized maintenance and reduced failures of those assets, they expanded the exercise to include additional asset types – for example, breakers. AEP's long-term vision is to proceed through their entire asset portfolio to include all their major asset types in the asset health center system.

ABB continues to improve its asset health center technology and has recently released a next-generation solution.

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02 ABB's CoreSense™ is an example of how data is collected and used for asset health care. With CoreSense, the continuous online monitoring of the transformer provides an early warning of most incipient faults.

03 ABB's asset health center recommends asset actions, prioritized by urgency.

Next-generation asset management solution to improve efficiency and optimize costs

In July 2017, ABB launched its next-generation asset performance management (APM) solution: ABB Ability™ Asset Health Center. This latest software-based solution enables asset-intensive industries to improve efficiencies and optimize costs by combining ABB's APM offering with the Microsoft Azure cloud platform.

ABB's industry-leading Asset Health Center provides predictive and prescriptive analytics, as well as customized models incorporating decades of industry expertise, to identify and prioritize emerging maintenance needs based on the probability of failure and asset criticality. These models not only consistently identify degrading conditions, and risks and their relative importance, but also provide expert recommendations and priorities for resolution, analysis and mitigation actions.

Asset Health Center is a key component of ABB's Connected Asset Lifecycle Management solution, which is aimed at delivering a holistic solution for complete asset life cycle management →5. It is now available in the form of a Software as

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a Service (SaaS) solution and implementation in the Azure cloud platform enables a simpler and faster execution. Additionally, visualization and analytics have been improved, and there is now an easier integration of predictive models using, for example, Cortana Intelligence.

By combining the domain expertise embedded in ABB's software-based technologies with the global scale of Microsoft's Azure cloud platform, it is possible to deliver a powerful solution to help utilities gain new insights and drive faster decision making, so they can seize new growth opportunities. Asset Health Center on Microsoft Azure enables customers to leverage the power of the Azure IoT Suite and the Cortana Intelligence Suite to enhance business applications with

Asset Health Center's issue tracking ensures that identified risks are reliably resolved or mitigated.

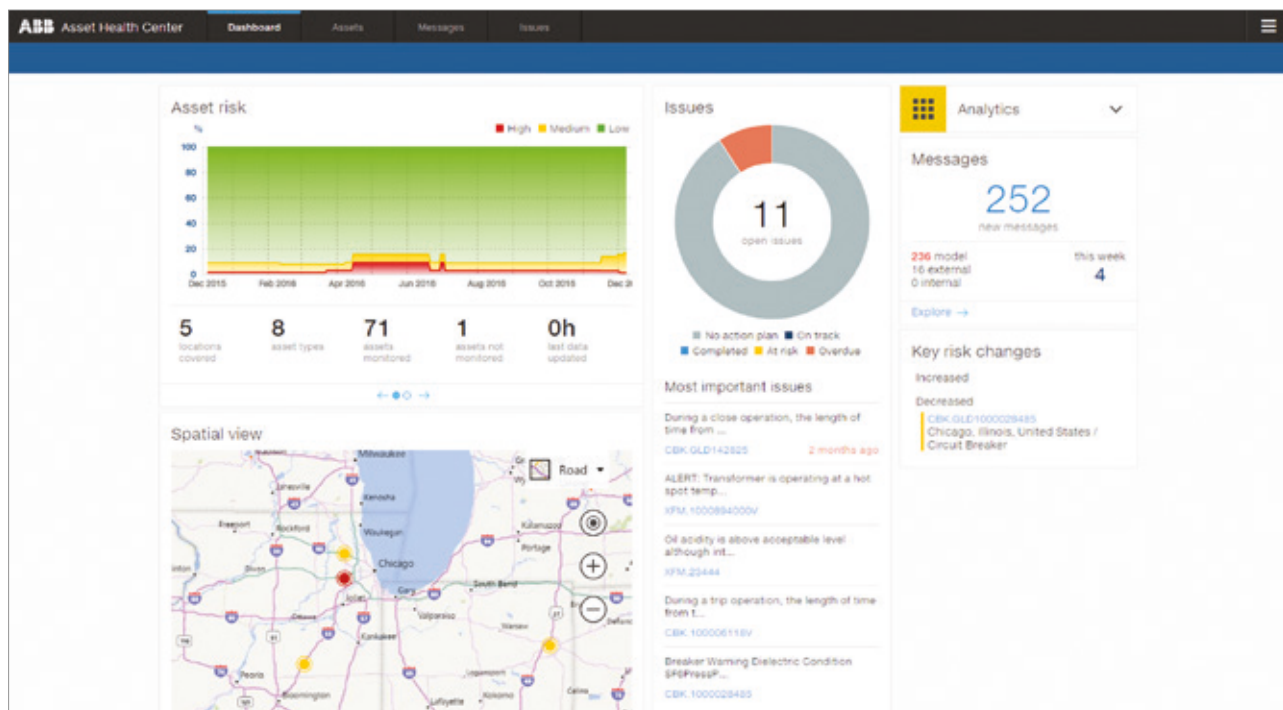
machine intelligence. In this way, the user can evolve from simple descriptive analytics to prescriptive analytical recommendations, facilitating the processes for risk-based investment optimization in alignment with ISO 55000 and PAS55 standards.

Asset Health Center's issue tracking ensures that identified risks are reliably resolved or mitigated. Alerts and monitoring can be enabled in order to stay actively informed of the status of these risks and ensure that they are appropriately addressed. Asset Health Center highlights key assets that are at risk, provides notifications of completion of important actions in the enterprise asset management (EAM) system and provides other tools to ensure risks that were identified early are resolved in time to prevent them from materializing.

Besides identifying and fixing issues through predictive asset analytics, utilities also need to fit in a lot of routine work – such as regulatory inspections and minor maintenance – into their daily schedules. Most utilities have a work backlog larger than resources can handle in short order. Asset Health Center will collect all open work and, using another algorithm, provide a suggested order that enables a risk-optimized maintenance schedule.

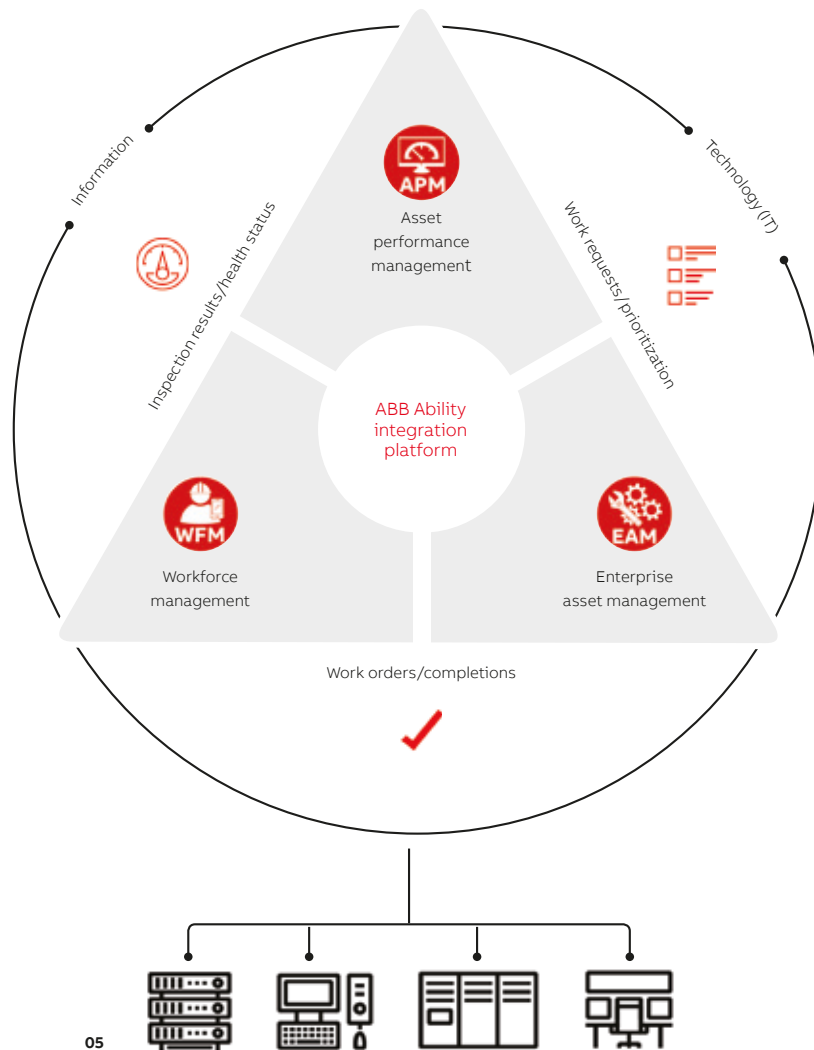
Asset Health Center is also a key component of ABB's digital substation concept where it collects condition data to optimize performance and improve the substation's efficiency and cost effectiveness – reducing transformer and breaker downtime by up to 50 percent.

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04 The Asset Health Center's information pages provide operators with a clear overview of asset condition so that risk can be minimized.

05 The Asset Health Center is an integral part of ABB's holistic, connected asset life cycle management approach.



Asset Health Center is an example of how the ABB Ability range of digital solutions connects customers to the power of the Industrial Internet of Things, turning data insights into direct action that generate customer value in the physical world.

Asset Health Center uses predictive and prescriptive analytics, as well as customized models incorporating decades of industry expertise.

ABB Ability Asset Health Center via the Microsoft Azure cloud or on-premise

Asset Health Center can be delivered as a service via the Azure cloud or installed on-premise. Its scalable architecture allows customers to be up and running within hours to allow for quick returns on effort and low-risk pilots.

Asset Health Center can be scaled up to an enterprise-level application, meeting core IT requirements such as cyber security, single sign-on and standardized integration with common third-party systems. The application is extendible so that the analytics can evolve with the maturity of the user's asset management program. Because Asset Health Center is built on Azure and Cortana Intelligence Suite, the extensions can be added by the user and maintained with commonly available skill sets, avoiding the need for specialized platform training. ●