

WHITEPAPER

How ISO 55000 can help transform utility operations through better asset management

Executive summary:

Your organization generates an enormous amount of data that could help you improve your utility's performance, but if it resides in separate organizational silos with different naming and governance standards, it will be difficult to use data in a way that enables meaningful, timely action.



ISO 55000 defines common language standards for implementing digital asset management strategies that integrate data and give a holistic snapshot of a utility's performance.

Integrating this data can enable:

- Asset health/condition-based maintenance
- Risk management and decision-making
- Compliance with regulatory mandates
- Real-time situational awareness

There are many enterprise asset management (EAM) systems on the market, e.g., SAP® Plant Maintenance, IBM® Maximo®, Cascade®, but these systems are only as effective as the data that they have available. Thus, it is crucial for organizations to invest in data infrastructure tools that can provide a “digital twin” of operations and teams, such as a Center of Excellence, to ensure that ISO 55000 standards can be implemented and maintained.

Organizations that successfully grasp the full impact of ISO 55000 certification will:

- Increase visibility into the enterprise assets
- Extract actionable insights from valuable data
- Reduce unexpected outages, compliance challenges and safety risks

ISO 55000 certification benefits your utility

- Positions AM as a professional discipline
- Provides sustainability through formalized processes
- Brings AM awareness to top management
- Serves as an insurance processes
- Establishes a process of internal review and improvement



Empowering electric utilities to act wisely – and fast

Electric utility assets have grown more complex with each passing year. In addition, smart grid technologies have increased the number of data streams critical to understanding the health and operational performance of these assets, especially considering that today's transformers could have up to 200 sensor points. Data from these assets have the capacity to support faster, smarter and more efficient decision-making – but only if it is managed and integrated in meaningful ways that enable data-driven decisions and actions.

In other words, the value of the data is lost if it cannot accurately identify critical priorities, pinpoint pre-emptive decisions that will keep assets in top form and spot imminent abnormalities, outages or other risks in a timely way.

In addition to their overwhelming volume of data, electric utilities are facing many other daunting obstacles, such as:

- Need for flexible solutions
- Aging infrastructure and workforce
- Outdated processes in need of automation and standardization
- Compliance with regulatory requirements
- Issues associated with integrating distributed energy resources and other smart grid technologies
- Challenges associated with safety, risk mitigation and security
- Mergers and acquisitions creating disparate systems with data

The ISO 55000 standard is comprised of three parts:

1. ISO 55000 AM overview, principles, and terminology

Introduces the critical concepts and terminology needed to develop a long-term plan that incorporates an organization's mission, values, objectives, business policies and stakeholder requirements.

2. ISO 55001 AM requirements

Specifies the requirements for the establishment, implementation, maintenance and improvement of an AM system.

3. ISO 55002 AM guidelines for the application of ISO 55001

Provides guidance for the application of an AM system, in accordance with the requirements of ISO 55001.

The Role of ISO 55000/55001/55002 in APM

ISO 55000 defines standards for implementing digital asset management strategies. This can maximize the effectiveness of an Asset Performance Management (APM) practice by integrating enterprise-wide SCADA and non-operational data that can come through sensors in real time to get critical information into the right hands at the best time to identify defective or low-performing assets.

Once a utility can identify which of its critical assets need attention, it can shift its maintenance approach from Reactive or Interval Maintenance to Condition-based and Proactive maintenance programs that optimize asset performance and extend asset lifecycles. Meeting ISO 55001 requirements helps achieve organizational objectives through the effective, efficient management of physical assets.

AM encompasses the complete, cradle-to-grave lifecycle of physical and infrastructure assets, such as power plants; water and waste treatment facilities; transmission and distribution substations and networks; transport systems; buildings; equipment; and more.

An AM system:

- Consists of policies, processes, roles, and responsibilities that standardize and coordinate activities to help organizations achieve their goals.
- Ensures that everyone knows who does what, and how things should be done, so that tasks are performed the same way across the organization.
- Provides the consistent, planned practices that are required to effectively and efficiently manage physical assets.
- Is a documented "management system" that directs, coordinates and controls AM activities and functions.

ISO 55000 certification helps utilities derive the most benefit from an APM practice by enabling disparate organizational functions to understand assets and connect real-time, sensor-based data to key people and systems to improve timely decision-making. It also helps utilities adopt a more measured approach to aligning organizational objectives and taking "the long view" of resource planning and risk management.



A “digital twin” is the cornerstone of APM

Integrating sophisticated data capture and analytics across an enterprise equips workers with crucial, reliable, timely information that makes it possible to monitor equipment condition 24/7, make accurate predictions about maintenance and repairs, and take appropriate action before failures or outages strike.

In other words, the value of the data is lost if it cannot accurately identify critical priorities, pinpoint pre-emptive decisions that will keep assets in top form and spot imminent abnormalities, outages or other risks in a timely way.

SCADA and sensor-based data from real-time systems, e.g., load, voltage, current, temperature, power factor, switch position or efficiency, can also be crucial in answering questions, such as “When is the best time to perform maintenance?” The problem is that this type of critical data originates in disparate systems that are not directly compatible with AM systems.

The key to APM is establishing a “digital twin” of systems, processes and assets, along with their detailed history, to create a clear snapshot of each asset over the course of its lifecycle.

The PI System™ manages operational data and sensor-based data that enables end users to monitor asset performance in real time. The PI System also transforms sensor measurements and makes them available to AM systems in a meaningful way, providing periodic aggregations like runtimes, breaker counts, fault current and high temperatures, as well as transformer overloading, to facilitate timely interventions. Thus, the AM system’s capabilities are significantly enhanced, in that they enable smart, seamless predictive and condition-based maintenance strategies.

Digital twin technology aligns data governance with ISO 55000

The PI System can store, analyze, calculate and report on asset and non-asset data, such as financial data. ISO 55000 requires that data be defined with a structured framework. An example of this would be an output of a Reliability Centered Maintenance (RCM) asset analysis. Data collection is only one aspect of meeting the standard but it is a key aspect; data requirements and intended use of the data – such as maintenance, budgeting, planning, cost tracking or lifecycle tracking – must also be identified.

Demonstrating that the ISO 55001 requirements will be met provides tangible evidence of a systematic, cross-functional, optimized approach to AM. Alignment provides assurance to customers, owners, employees, regulators and other stakeholders that the organization's assets are in good hands.

The end results include:

- Enhanced customer satisfaction from improved performance and control of service delivery
- Optimized return on investment and/or growth
- Improved risk management and corporate governance with a clear audit trail
- Improved health, safety and environmental performance
- Success in demonstrating the best value for money spent
- Confidence from long-term planning, better sustainability and improved performance
- The appropriate resources with the correct competencies

The PI System can fuel a digital twin approach to create a digital replica, i.e., a clone or virtual representation, of physical assets that can drive complex analytics and simulations without the need for expensive custom integration. This makes it possible to contextualize the data and personalize the system, while enabling collaboration and integrating seamlessly with deep learning and artificial intelligence. Sensors collect the data and return it to the digital twin to help optimize performance with the creation and management of a predictive maintenance regime. The subsequent analysis of the data makes it possible to keep close tabs on functioning, so a targeted solution can be quickly developed when problems arise.

A framework allows enterprises to establish structures and context using features such as the PI System's asset framework. Managing operational and non-operational data collected in the PI System from equipment and sensor-based data, enabling effective data management that offers the power to predict and the time to respond.



Case study

Powerstream – Alectra Utilities

Powerstream Holdings, a progressive distribution utility company that recently became Alectra Utilities, serves nearly 1 million customers north of Toronto and in central Ontario. The company wanted to improve the availability of its operations data so all business units could access the information they needed. Powerstream knew that its data was not easily accessible, nor was it archived in a way that made it easy to search.

The PI System enabled Powerstream’s team to easily access its operations data across locations. The organization built reports and dashboards tailored to specific audiences and integrated to its computerized maintenance management system (CMMS) to enable true condition-based maintenance.

As a result, system and equipment condition awareness significantly increased across the entire organization. The company identified several major maintenance issues early and took the necessary steps to address them, saving nearly \$3 million in replacement costs and countless hours of downtime for customers.

Additional benefits included:

- Improved system reliability
 - Improved response time to equipment abnormalities
 - Increased equipment availability
 - Savings in OPEX costs
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“The PI System resulted in \$2 million dollars of savings for us by preventing critical transformer breakdowns. It also detected two major increased gassing events.”

- Vince Polsoni,

Manager, Station Sustainment Department Powerstream, Inc.
(now Alectra Utilities)



Why the PI System?

Implementing ISO 55000 maximizes the performance of your AM System. Standardizing your power/ transmission & distribution/smart grid data infrastructure on the PI System provides your utility with significant value in the following areas:

- Provides greater situational awareness
- Extends asset life
- Improves operational performance
- Reduces CapEx and operation and management spend
- Improves decision-making capabilities of staff
- Provides end-to-end visibility to drive innovation

Users across your enterprise – from operations, engineering and energy trading to customer service, maintenance and executive management – can utilize the PI System to get a handle on the deluge of data, extract meaningful insights and respond appropriately.

Case study

New York Power Authority

New York Power Authority (NYPA) owns and operate 16 hydro and natural gas generation plants (~6GW) and covers about 1,400 miles of transmission lines and assets, culminating in about 1/3 of New York's backbone grid.

The PI System enables the iSOC (Integrated Smart Operations Center) to support:

- Outage avoidance
- Improved reliability and efficiency
- Long-term planning and modernization

Solution

Implement a digital strategy with the Digital Worker Program to combine:

- Sensor deployment (data collected by the PI System)
- Communications backbone (fiber and microwave links)
- iSOC (that leverages the PI System to make collaborative decisions)
- Asset management (ISO 55001) to perform APM leveraging PI System asset framework, event frames and analytics capabilities.

Results

By using the PI System, NYPA turned data into actionable information by sharing data to the right departments for data driven, holistic decisions and enabled those at the plant via PI Vision to mobile devices. NYPA as a result of the Digital Worker Program has:

- Increased safety
- Increased worker satisfaction
- Reduced re-work
- Reduced time to decisions
- Enhanced training

“Deploying breakthrough technologies and using advanced data analysis allows us to make optimal, cost-efficient asset management decisions we can continue to provide low-cost reliable power while making smart and efficient operating decisions.”

-
Gil C. Quiniones,
Present and CEO, NYPA, 2019



Conclusion

The PI System generates powerful results

Increasingly, asset managers are turning to performance-based standards like ISO 55000/55001/55002 to reduce costs, increase asset availability and mitigate risk. However, fractionated data management systems can prevent effective implementation of these standards. When data is collected via multiple, domain-specific point solutions, data archives are almost always incomplete, fragmented or unavailable to all stakeholders. Users can become frustrated when trying to solve problems, conduct analyses or integrate cross-modal information. The PI System's infrastructure approach shapes, integrates and protects critical real-time data, so it can be accessed by those who need it – across the utility's entire enterprise.

The PI System achieves a highly scalable, open data infrastructure that empowers utility enterprises to turn operational data from many sources into actionable knowledge that results in proactive, rather than reactive, decision-making. Electric utilities that undergo digital transformation can expect to:

- Reduce costs
- Open new revenue streams
- Extend equipment life
- Improve equipment reliability
- Make better decisions
- Plan capital expenditures wisely
- Become proactive with asset maintenance

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AVEVA

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