WHITEPAPER

Six key considerations for selecting a digital water management system and technology partner

A guide for water distribution utilities that need to leverage data and optimize operations across their entire water distribution network

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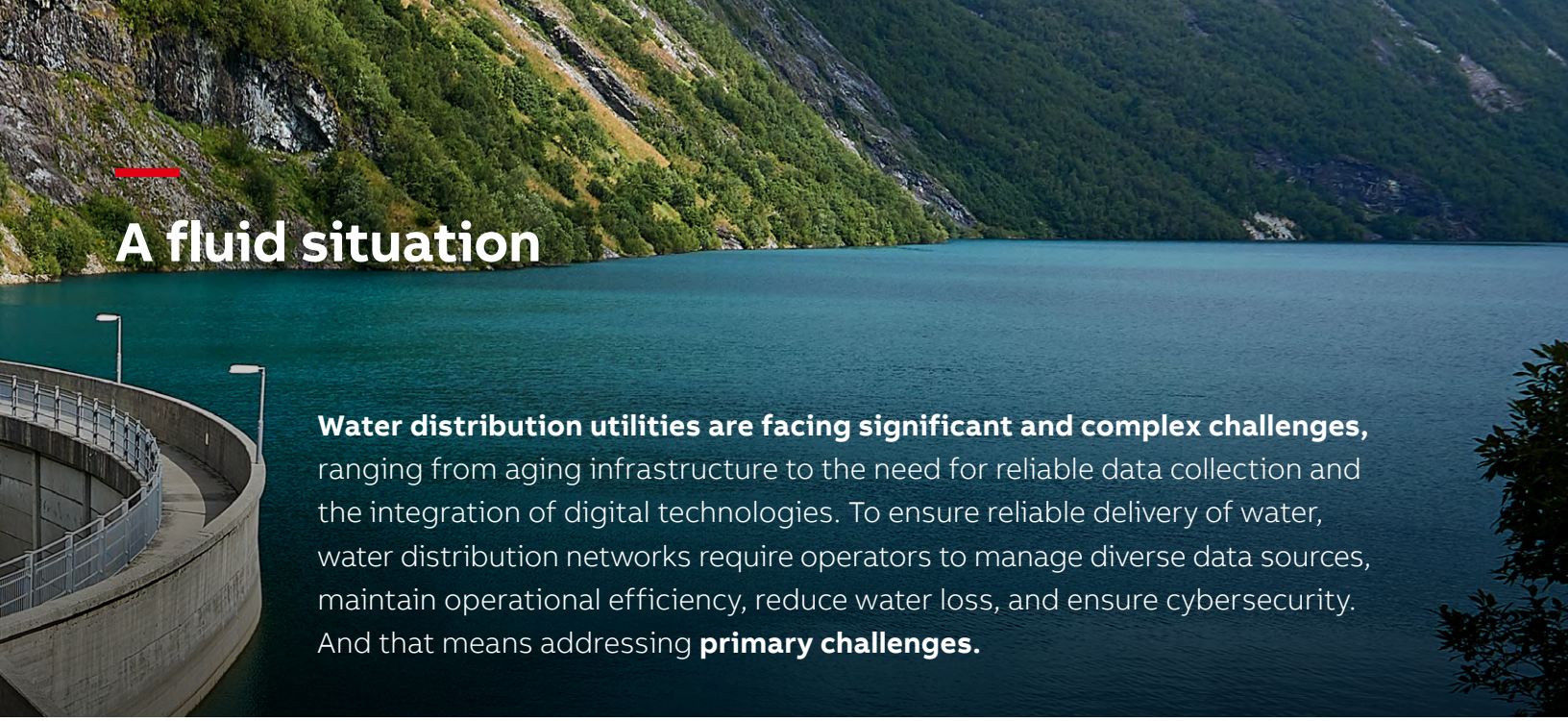


A fluid situation

Water distribution utilities are facing significant and complex challenges, ranging from aging infrastructure to the need for reliable data collection and the integration of digital technologies. To ensure reliable delivery of water, water distribution networks require operators to manage diverse data sources, maintain operational efficiency, reduce water loss, and ensure cybersecurity. And that means addressing **primary challenges.**

Aging infrastructure
Water distribution networks are struggling with deteriorating infrastructure. Much of the existing water infrastructure, from pipelines to pumping stations, was built decades ago and is now reaching the end of its useful life. This aging infrastructure leads to costly maintenance issues, inefficiencies, and increased water loss.

Disparate data sources and non-harmonized data
Many water distribution utilities collect data from a variety of sources, including SCADA systems, IoT devices, smart meters, legacy systems, and stand-alone applications. However, these data sources are often siloed, making it difficult for utilities to gain a comprehensive understanding of their network performance and operations. Without harmonizing these disparate data sources, utilities struggle to make data-informed decisions.

Monitoring and optimizing operations across an entire water distribution network
Water distribution utilities manage complex networks that span treatment plants, pumping stations, storage tanks, and distribution pipelines. Monitoring and optimizing such a large and diverse system in real-time requires digital tools that provide visibility into every aspect of the network. However, without integrated and accurate data, utilities face challenges in ensuring efficient and reliable operations.

Water loss and non-revenue water
One of the most pressing issues facing water distribution utilities is non-revenue water (NRW), which represents water that is produced but never reaches the customer due to leaks, theft, or meter inaccuracies. Reducing NRW is critical for improving the financial sustainability of utilities and ensuring the efficient use of water resources.

Increasing cybersecurity threats
As water distribution utilities become more connected and data-driven, they also become more vulnerable to cyberattacks. Protecting critical infrastructure from cyber threats is essential to maintaining the safety and security of water systems.

Water Management System (WMS) defined

A WMS is a digital platform that integrates data, sensors, software and other physical and digital assets to optimize operations at water distribution utilities. Water Management Systems leverage digital technology to improve the efficiency, effectiveness and sustainability of water distribution processes.

Consideration 1:
Your current level of digital maturity

1

The first step in selecting a WMS is to assess the utility's current level of digital maturity. This assessment is crucial as it establishes the starting point for any digital transformation, and influences the system's integration with existing infrastructure.

Assessing level of digital maturity allows utilities to identify where they are in their digital journey. Are they already using digital tools for monitoring, or are they relying on manual processes? This evaluation will help establish the foundation for future digital investments.

Taking this step also considers a utility's ability to optimize current infrastructure. The condition of hydraulic infrastructure and existing digital systems will determine how easily new digital layers can be added. A clear understanding of the existing systems allows for smoother integration and optimization of new digital solutions.

Finally, level of digital maturity affects a utility's ability to leverage data. Utilities that are already collecting data from various sources can better leverage that data to make informed decisions. By determining digital maturity, utilities identify gaps in data collection and management, allowing them to make necessary improvements.

Key factors in assessing digital maturity include:

Knowledge of infrastructure status: Is there a reliable and regularly maintained database of its network assets, including pipes, junctions, valves, and geographic locations?

Data handling: Are there existing systems like a Geographic Information System (GIS) to manage network data? How are day-to-day operations measured, and are sensors positioned correctly to provide reliable data on flow, pressure, tank levels and more?

Data reliability: Are the collected data streams consistent and accurate? Can these data sources be easily integrated into a single database, or do they exist in separate systems that require manual merging?

Data lake

Determining level of digital maturity also involves evaluating the utility's capacity to store and analyze data effectively. For example, advanced utilities may already be using an intelligent data lake to consolidate information. By understanding their current capabilities, utilities can set realistic goals for upgrading their digital systems.

Consideration 2:
Optimizing existing infrastructure

2

When introducing a digital WMS, one of the primary concerns is how it will affect existing infrastructure. The goal should be to optimize, rather than replace, current digital systems.

A digital WMS should be able to work with pre-existing systems like SCADA (Supervisory Control and Data Acquisition) without necessitating their replacement. The system should read and unify data from existing digital tools, creating a comprehensive dashboard without altering or disrupting the customer's current infrastructure. Whether the utility has smart meters or other forms of real-time data collection, the new WMS should integrate these without requiring significant reconfiguration.

Preserving existing infrastructure is a crucial concern for water distribution utilities that are hesitant to overhaul their digital systems.

Key factors in optimizing existing infrastructure:

Maximize previous digital investments: Ensure that the WMS leverages existing digital assets (such as SCADA, CRM, billing systems) to create a unified interface.

Optimize data value: Use collected data effectively to enhance operations and decision-making.

Leverage advanced features: Utilize advanced features like hydraulic modeling if already implemented.

Consideration 3:
Modular and progressive integration

3

A flexible, modular approach to digital transformation is essential. Due to scarce budgets and shortages of skilled labor, the WMS should allow for gradual implementation, starting with basic functionalities like data collection and moving toward more advanced features, such as simulation and digital twins.

If a utility's digital maturity is low, the focus should initially be on basic data harmonization. The utility can begin by resolving fundamental issues like ensuring data reliability and merging multiple sources of information. Advanced features, such as leakage monitoring and digital twin functionality, can be introduced progressively as the utility's infrastructure becomes more capable of supporting them.

Key considerations for modular and progressive integration:

- **Tailor investments:** Enable features progressively based on digital maturity to optimize investments.
- **Target immediate value:** Look for immediate, incremental benefits throughout implementation.
- **Enhance resilience:** Aim to strengthen infrastructure without disrupting existing setups.

Testing the waters
Modular and progressive integration minimizes risks, reduces the likelihood of costly errors, and ensures that utilities can scale their digital transformation efforts according to their needs and budget.

Consideration 4:
Cybersecurity

4

As water distribution utilities increasingly rely on digital systems to monitor and manage their operations, maintaining robust cybersecurity becomes a top priority. Utilities must ensure that the data collected through the WMS is secure and protected from cyber threats.

Utilities can opt for on-premises installations if they prefer greater control over their data. If a cloud-based system is selected, it is crucial that the WMS provider ensures data segregation and proper treatment of sensitive information.

Cybersecurity is a core consideration from the outset, and any WMS must adhere to industry best practices in securing both operational data and the broader network.

Key considerations for cybersecurity:

State-of-the-art practices: Ensure that the WMS complies with cybersecurity best practices.

Secure data handling: Ensure that data ingestion is done in read-only mode, maintaining the integrity of source systems.

Flexible deployment: Choose the most flexible deployment option (on-premises, cloud, hybrid) based on your needs while ensuring cybersecurity through a tailored architecture.

Consideration 5:
Interoperability with existing systems

5

A WMS must integrate seamlessly with existing digital systems and technologies. WMS, after all, is not a stand-alone technology that operates on its own. In most cases, utilities already have systems in place for automation and control, such as SCADA and other third-party systems. The selected WMS must integrate with these systems because it collects data using standardized protocols, such as OPC Unified Architecture (OPC UA) protocols.

In some instances, custom connectors may be required to ensure smooth integration, depending on the existing systems in use. The ability to interoperate with other digital solutions without requiring extensive customization is a critical factor in the WMS selection process.

Going with the flow

Resistance to change by utility employees as well as modifications to existing workflows and processes are common challenges when implementing a WMS. Overcoming these barriers is essential for ensuring the smooth adoption of the new technology and maximizing its benefits.

Training and education: Provide comprehensive training to ensure that employees understand how to use the new system and the benefits it offers. Addressing concerns and demonstrating the value of the system can help reduce resistance.

Involvement in decision-making: Involve key stakeholders, including engineers, operators, and IT staff, in the selection and implementation process. This inclusion fosters a sense of ownership and helps build support for the new system.

Key considerations for interoperability with existing systems:

Standard protocols: Ensure compatibility with standard protocols for seamless integration.

Legacy system integration: Make sure the WMS is flexible enough to work with proprietary APIs and legacy systems, as needed.

Future adaptability: Ensure the system can accommodate future changes in your setup.

Consideration 6:
Leveraging partnerships for hydraulic and digital expertise

6

While digital solutions are the focus of the WMS, hydraulic expertise remains crucial for effective water management. In cases where hydraulic assessments are needed, utilities can rely on partnerships, such as those offered by hydraulic engineering firms. Some WMS technology suppliers, such as ABB, offer hydraulic engineering and consulting through partnerships with expert companies, such as Denmark's DHI. A thorough understanding of the utility's hydraulic infrastructure, including asset locations, pressure points, and district divisions, is essential before implementing digital monitoring systems.

The WMS provider must collaborate with hydraulic experts to ensure that the digital system accurately reflects the physical realities of the water network. This partnership ensures that utilities monitor their networks effectively and make data-driven decisions to optimize performance.

Optimize limited resources in terms of budget and workers skill

Water distribution utilities often operate with limited budgets and a constrained workforce. A digital water management system can help optimize resources by automating processes, reducing manual labor, and improving decision-making efficiency.

Cost-effectiveness: Select a digital water management system that offers modular scalability, allowing utilities to implement only the features they need, when they need them. This approach helps utilities avoid large upfront costs and ensures they get the most value from their investment.

Workforce efficiency: By automating tasks such as data collection, leak detection, and reporting, a digital water management system can reduce the workload on operators, allowing them to focus on higher-value tasks.

Keys to leveraging partnerships for hydraulic and digital expertise:

Integrated expertise: Partner with a supplier (such as ABB) that has hydraulic engineering and digital system integration capabilities, supported by partnerships, such as DHI.

Hydraulic model utilization: Evaluate the reuse or calibration of existing hydraulic models.

Dynamic hydraulic modeling: Promote the creation of a live, dynamic model that evolves with real-time data for advanced simulation and analysis.

Conclusion

Selecting a digital Water Management System for a potable water distribution utility is a complex process that requires careful consideration of the utility's current infrastructure, digital maturity, and long-term goals. By optimizing existing systems, adopting a modular approach, ensuring cybersecurity, and leveraging partnerships with hydraulic experts, utilities can implement a WMS that meets their unique needs and sets them on a path toward greater operational efficiency and reliability.

Introducing ABB Ability™ Water Management System

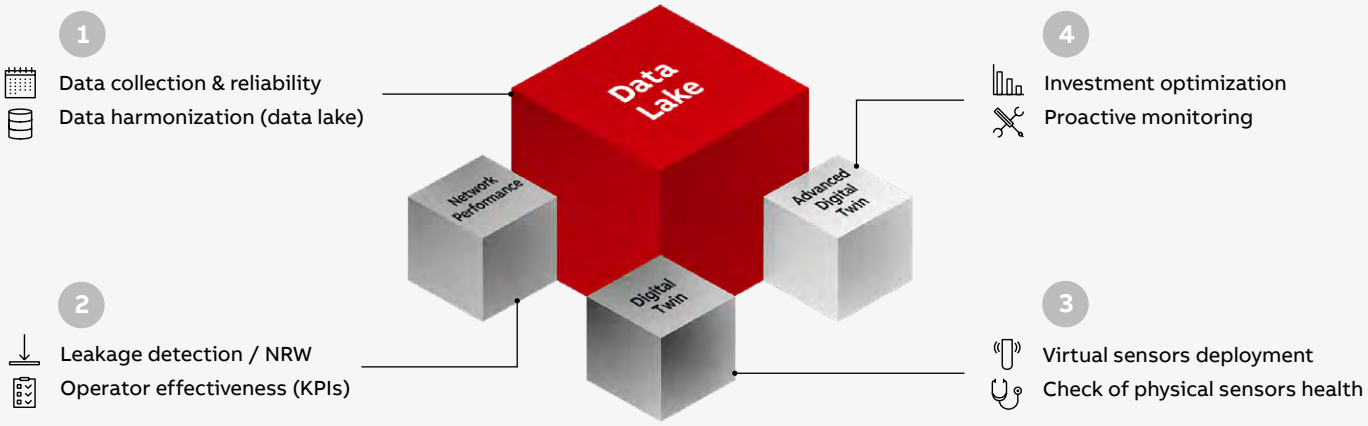
Leverage data for real-time response and improve operations.

ABB Ability™ Water Management System is a modular, vendor-agnostic platform that seamlessly integrates data from multiple sources of information, including existing SCADA systems, to manage operations across the entire water distribution network with an efficient and effective unified view.

You connect multiple types of information coming from systems and plants. You then harmonize and aggregate that data to feed specific cognitive modules. The result? You enhance situational awareness in a single interface, make smarter decisions, and improve operational efficiency.

Modules that meet your distinct challenges

A modular, vendor-agnostic platform seamlessly integrating diverse data for comprehensive management of your water operations.



LEARN MORE

ROI of implementing ABB Ability™ Water Management System

Increased worker productivity

Real-time data integration and the single-view cockpit:

- Reduces average employee time to detect leaks
- Increases average number of scanned kilometers per employee
- Increases annual number of leaks detected per employee

Reduced costs

Detecting leaks sooner reduces both costs incurred from water loss and repairs, since repairing a burst is always more costly than repairing a leak.

Improved decision making

Automating data collection, storage and use optimizes data accuracy and reliability, resulting in improved data analysis, reporting and decision-making.

Improved predictability

Virtual sensors and the digital-twin feature help water utilities optimize infrastructure maintenance and reduce service interruptions by running what-if simulations on any node of the water distribution network.

Optimized CAPEX

The digital-twin feature helps Water utilities better plan their investments into the current layout of the water distribution network (in terms of maintenance), and to import and simulate new network models to discover if the investment will produce the desired results.

Why ABB

People

- Over 50 years of experience in driving global innovation for firms in the petrochemicals, refining, and sustainable fuels Industries
- Clear understanding of the challenges facing the industry with consultative planning support

End-to-end solutions

- ABB offers end-to-end solutions through automation, electrical, digital, specialty offerings and services
- ABB brings the key elements of your plant together to drive holistic reliability and visibility

Support

- ABB has support systems in place for maximum protection of your operations and increased foresight to minimize downtime
- ABB Care offering and ABB's personnel are dedicated to enabling the most from your production

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Information to come