WHITEPAPER

Unifying your water and wastewater operations

Authored by:

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Executive summary

From everyday living to industrial operations and production, water is vital to life. With 71% of the earth's surface covered in water, its essential nature remains undisputed. Water and water assets are vital components of productivity in industries across different sectors. Water utilities and water network operators have a very simple mission: Deliver safe and reliable water service to their customers. However, like most industries, the water and wastewater sectors are facing diverse challenges such as an ageing workforce, ageing infrastructures, ever increasing government regulations and competition for diminishing investment capital.

Technology developments like the Industrial Internet of Things (IIoT) and big data analytics can provide the tools to tackle the issues faced by the water and wastewater sector. However, a well thought out implementation plan is needed to assure this digital transformation does not lead to siloed software systems that could worsen the problems it intends to solve. The lack or improper integration of several third-party and home-grown systems often lead to lack of enterprise visibility and inefficient decision making, particularly when abnormal situations occur. The situation worsens as infrastructure continue to age, experienced workers retire or change roles, and specialized applications to operate water and wastewater facilities become more complex. This increasing complexity and variety of software and hardware and a changing workforce makes it imperative to have a reliable single version of the truth.

Overview

The AVEVA™ Unified Operations Center (UOC) is the foundation for real-time operational performance management for water and wastewater organizations, providing closed-loop enterprise-wide visibility to optimize assets and operations. Based on a "System of Systems" approach, AVEVA'S UOC allows the integration of out-of-the box water industry solution templates, reports, dashboards and operational KPIs into a single platform. The addition of predictive analytics, big data and augmented reality tools enable

the transformation of traditional HMI and SCADA applications into the ideal convergence of Operational and Informational Technology.

In this whitepaper, we will establish our holistic and innovative solution, and we will detail the process and networks that enable us to provide you with the data you need and provide information to support your application of the provided data to achieve all-around efficiency for water operations.

Water and wastewater industry challenges

Water and wastewater organizations have diverse operational challenges, with the need to manage a wide range of systems – hardware and software of varying ages, from numerous vendors, and with widely divergent levels of cohesion and interoperability.

By leveraging AVEVA's industrial software portfolio water and wastewater utilities owners can focus on their biggest challenges – provide reliable and affordable services while complying with an increasing number of government regulations and ensuring the sustainability and safety of their operations.

- **Reliable Services:** Water and wastewater utility owners aim to prevent or reduce downtime, with optimized workflows to maintain safe and reliable water service to their customers. The lack of appropriate data analysis and visualization often lead to unexpected equipment or process failures that cause service interruptions. Improvement in service reliability could be achieved with appropriate data management and improved systems for water and wastewater facility operations.

- **Complexity:** Lack of integration from the multitude of third-party and home-grown systems in use today hampers operations and efficient decision making in water utilities organizations. Also, as applications are more specialized and plant-specific, siloes of information can continue to form, especially as facilities age and new designs are implemented over time.

- **Cost Mitigation:** Lack of clear insight into data for management and projections leads to ineffective planning and tracking of operational costs in real-time. This increases operational costs and the waste of consumables, creating a negative environmental impact. Labor costs are also a significant concern. Water organizations must deal with the difficulty of finding qualified candidates for open jobs, and they strive to upskill the workers and avoid the increasing training costs related to employee turnover due to an ageing workforce.

- **Sustainability:** A lapse in the reliability of services and efficiency of processes translates into a problem for sustainability. Consistency in the quality of services through advanced systems is ideal to develop and implement sustainable models. These advanced processes reduce energy and operational costs while optimizing the performance of employees, assets, and operations.

- **Cybersecurity:** Water and wastewater organizations are embracing the digital revolution at an increasing pace. Industrial software providers are developing new and/or optimizing their existing offerings to help their clients meet the challenges of the digital journey. Based on incidents during the last few years, governments worldwide have revamped guidelines and requirements to protect critical infrastructure and their citizens. Unfortunately, the same way innovative technology serves the common good, there are plenty of bad actors who use technology to try to inflict catastrophic damage to infrastructure, cyber systems, and ultimately the citizenry.
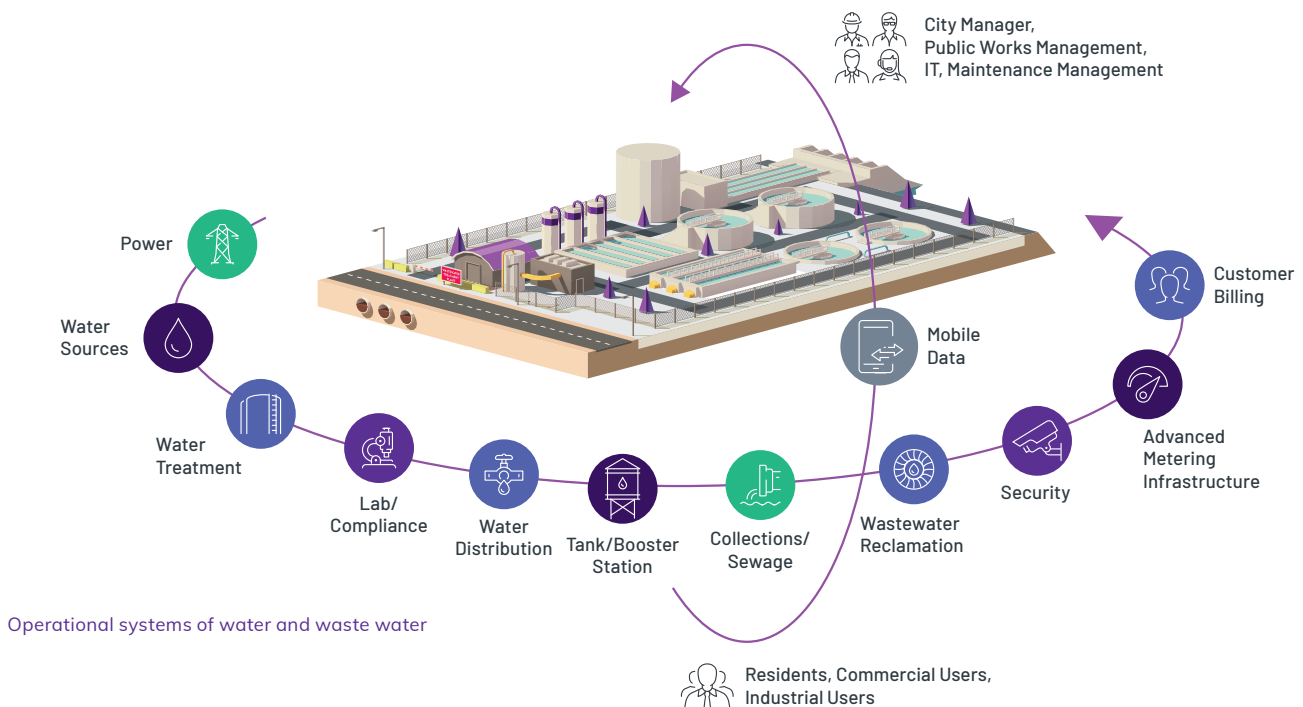
Water and wastewater stakeholders have different needs

Providing a comprehensive solution to the operational challenges of water and wastewater organizations requires an understanding of the responsibilities of management stakeholders.

- **Water and wastewater owners** are focused on achieving growth, mitigating risk, and reducing operational costs. They require access to correct data for making the best-informed business decisions, which have a direct impact on the operations of water and wastewater facilities.

- **Plant managers** are responsible for the overall operations within a water and wastewater treatment facility. Duties typically include worker supervision, enforcing plant procedures and policies, conducting performance reviews, and overseeing training programs. They must balance risk and opportunity as they attempt to break down departmental silos with an eye towards saving energy.

- **Operations departmental leaders** focus on operational efficiency through collaboration with other departments in the water and wastewater facility to expedite the decision-making and emergency response processes. Their main objective is to reduce shutdown time while optimizing results.

- **Information technology experts** drive system availability and resiliency by maintaining and upgrading systems, managing deployment speed within cost, and streamlining information flows.

- **Environmental managers** are responsible for making sure an organization is compliant with environmental regulations in areas such as air quality, waste, clean water, and pollution. Therefore, data accuracy is necessary for them to advise on carbon footprint impact and implement required adjustments for better efficiency in the water and wastewater organization's operations.

- **Operation maintenance technicians** keep the facility running at optimal conditions and require easy and secured access to all available plant information in real-time.

The collaboration of these stakeholders, through visibility and confidence, is essential to effectively ensure reliable and cost-effective operations in a water and wastewater facility.

City Manager, Public Works Management, IT, Maintenance Management

Power

Water Sources

Water Treatment

Lab/ Compliance

Water Distribution

Tank/Booster Station

Collections/ Sewage

Mobile Data

Wastewater Reclamation

Security

Advanced Metering Infrastructure

Customer Billing

Operational systems of water and waste water

Residents, Commercial Users, Industrial Users

AVEVA Unified Operations Center for water and wastewater: A comprehensive operations management solution

The AVEVA Unified Operations Center is an OT\IT\IoT convergence solution that provides a single-pane-of-glass view for water utilities to monitor key KPIs and take command and control of both industrial assets and business applications.

The main features of the AVEVA UOC for water and wastewater are depicted below

Contextualized monitoring

- Centralize & contextualize the visualization of all the facilities and systems in a single unique platform, as well as a unified alarm management

Control and scenarios

- Monitor all integrated sub-systems
- Ability to change the set points, parameters and operating modes

Flexible layouts

- Manage different visualization scenarios
- Flexibility depending on site, role, person, device, schedule or event

Asset management

- Increase life-cycle of assets
- Improve availability
- Reduce breakdowns
- Optimize inventory
- Apply maintenance strategy

Field operations

- Automate field operations
- Access workflow/SOP steps
- Provide feedback to operations team

Workflow/scenarios/SOPS

- Create complex workflows
- Connect people, process & IT/OT
- Send tasks on mobile
- Change process set points
- Digitalize knowledge
- Increase collaboration

Digital Twin

- From Design to Operations and Maintenance
- Full life cycle of assets
- BIM Integration

Advanced analytics

- Model optimal equipment performance and highlight critical data in real-time to identify anomalies and mitigate issues before they become critical

Communication

- Traditional Industrial OT / Telemetry/ IT Connector
- IOT Connectors
- Integration to AVEVA and third-party systems

Unified Operations Center is uniquely actionable, universal, agnostic, and configurable. These differentiators strengthen the AVEVA UOC's abilities to help water and wastewater owners ensure continuous and reliable operations while reducing costs and adhering to ever-changing sustainability requirements.

Hardware and software agnostic

The solution is hardware and software agnostic, with the ability to consume and share data from third-party vendors, and it can be applied to new build construction, or existing software and hardware infrastructure. With out-of-box configurable tools and connectors, water and wastewater organizations can reduce the complexity of developing and expanding such a unified solution, greatly reducing the need for customized programming.

Context-driven view

One of the primary uncertainties facing water utility organizations is how to respond effectively in real-time to information about problems, as well as identifying complex patterns from data and relating them to business goals to improve the efficiency and productivity of operations. Contextualization is the key to actionable information.

AVEVA Unified Operations Center integrates operations and business systems, from operational to financial systems, providing key metrics such as power efficiency, utility costs, and maintenance requests, allowing business leaders and decision makers to drive value and utilize resources efficiently.

The solution aggregates, analyzes and converges data from disparate systems into actionable dashboards based around effective KPIs, even triggering automated workflows according to crucial events.

The integration of sub-systems such as collection, treatment and distribution, electrical, mechanical, fire and security into a single unified platform enables operators to react quickly to performance opportunities with increased situational awareness.

Operators do not need to sort through disparate systems to find relational data – context is defined from the ground up to reveal insight not normally visible, ensuring optimal operation of your water and wastewater facility.

Roll up KPIs and performance metrics for easy at-a-glance assessment

Streamlining workflows and collaboration

Having everyone on the same page reduces the amount of time it takes to respond to an issue. AVEVA's approach with Unified Operations Center, integrates aspects of collaboration and knowledge management by enabling information to be routed to the correct stakeholder aligned with supporting guidance from subject matter experts.

This closed-loop approach is the true convergence of IT and OT, and it ensures that operations, information and people are always contextually connected.

Achieving this 'always-on' state leads to an organization that is reliably in peak health by continually analyzing operational and asset health, increasing asset utilization and equipment life, and facilitating rapid identification of underperforming assets.

AVEVA UOC also highlights operations and maintenance needs at every level of the business, enabling allocation of enough resources to solve the problem, helping to manage costs and maintain uptime.

This creates direct value for water utilities stakeholders, by allowing them to focus attention on the right decisions at the right time, increasing information flow and accountability at every level of the organization.

The AVEVA approach

AVEVA's approach begins with a comprehensive requirements assessment focused on meeting the overall objectives of your water and wastewater operations, while minimizing execution risk and includes our core expertise in delivering enterprise-level solutions:

- The tremendous depth and breadth that comes from decades of prior global experience on projects of similar size, scope and complexity

- A highly experienced and completely integrated execution team with strong leadership and proven standard practices

- A global team of experts and an extensive network of partners who are familiar with the tools, technology and implementation methodology

- An execution team who will provide design guidance to ensure compliance and consistency across all elements and phases of the project from pre-award to handover

- Knowledge transfer and local support

- AVEVA's software technology is focused on templated design techniques to improve the development experience. This reduces overall engineering effort and drives best-in-class total cost of ownership

- Jumpstart your UOC deployment with pre-built graphics, templates, and connectors specific to the water & wastewater industry. Content can be further customized for branding and unique system attributes to accommodate different operations environments

Cybersecurity compliance

Together with safety, the most critical area to address during digital transformation is industrial cybersecurity. The safety and security of your infrastructure and data are our top priority.

As an established leader with over 50 years of experience delivering an industrial software portfolio, we recognize that your data demands a stringent cybersecurity posture and the highest set of operating standards.

We continuously monitor the changing security landscape of cryptography and cybersecurity to ensure that we offer the best available protections to our customers and their sensitive data. We build security from the ground up – using components that meet recognized standards and include enforced encryption.

We incorporate security protection into our system design and development process, including rigorous testing and validation. Security is integral to design and is fundamentally built into the AVEVA software services that support the operation of your systems.

AVEVA's Cybersecurity Team manages a Secure Development Lifecycle process (SDL), governing the practices and procedures for all solution and service development efforts. This multi-phase process is based on IEC 62443 standards and includes requirements to continually monitor AVEVA's solutions for violations of cybersecurity best practices, execute penetration testing to eliminate any vulnerabilities, and comprehensively address the organization's compliance and cybersecurity challenges.
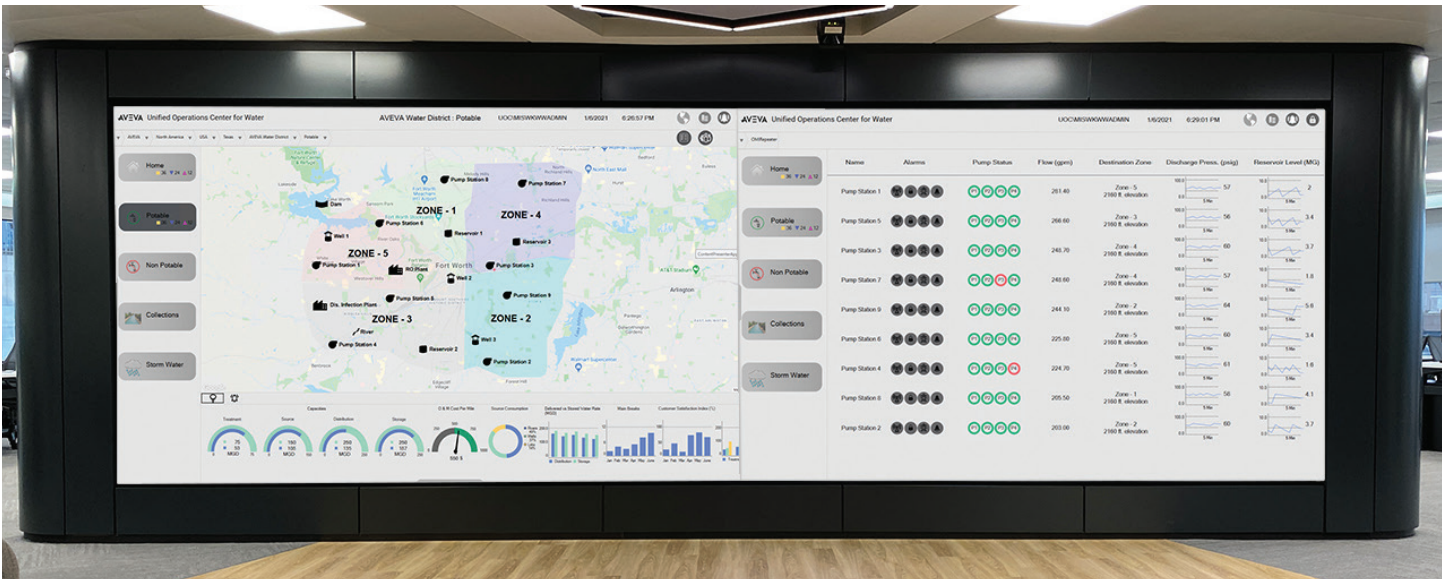
AVEVA

The value of AVEVA's Unified Operations Center for water and wastewater

With decades of experience managing complex deployments and delivering tremendous value for customers, AVEVA is the ideal partner for water and wastewater owners and operators seeking a technological edge that improves operational efficiency and clarity and provides an unprecedented level of consolidation and control.

AVEVA's Unified Operations Center adds value to organizations by delivering proven technology to accelerate scalability, facilitate operations efficiency, optimize energy consumption, converge disparate systems, manage workflows, and improve workforce training and operational knowledge management

Operational improvements:

- Real-time operation visibility and integration for water and wastewater operations
- Asset Management and staff improvement
- Maintenance workload assessment
- Up to $1 million annual savings

Predictive diagnostic for rotating equipment:

- Predictive failure warning and fault diagnostics from water and wastewater data
- Up to $100K savings per failure predicted post-implementation
- 10% annual savings

Asset utilization:

- Centralized water and wastewater asset performance monitoring
- Up to $150K reduction in water and wastewater operational costs

Customer satisfaction improvement:

- Enhanced reporting and feedback on the performance of utilities
- Improved response time to critical issues
- Faster service restoration after a failure

Operation training improvement:

- Enhanced operational efficiency of new workforce with up-skilling
- Average ROI on operation training within 12-18 months.

Carbon footprint reductions:

- Water process optimization for water and wastewater facilities
- Optimal operational performance means less waste and better use of resources
- Integration with real-time calendars for un-utilized areas and equipment
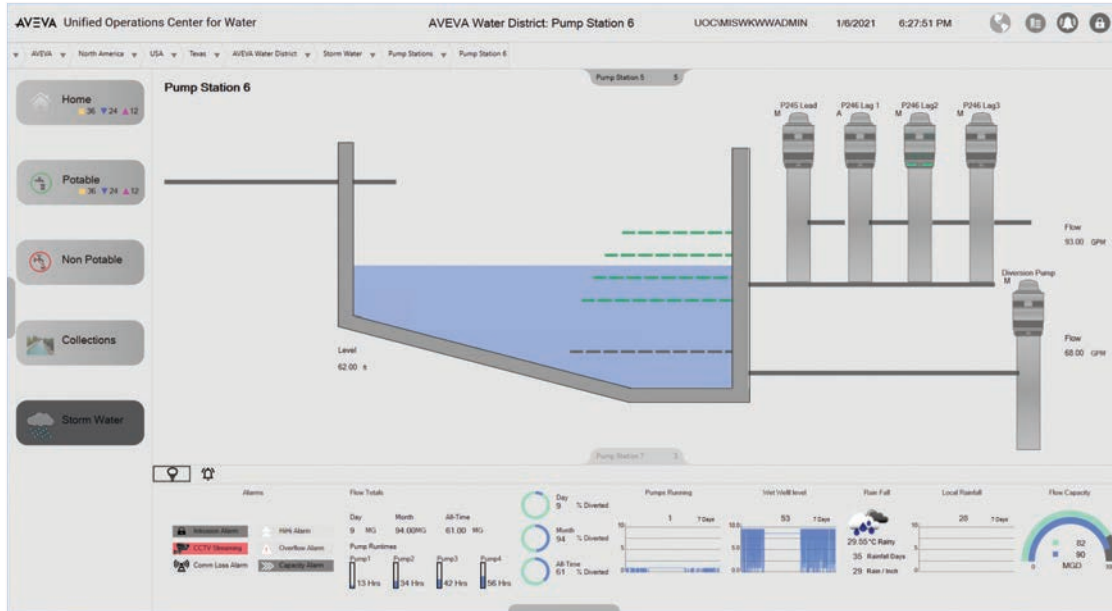
Drill down into water and wastewater functions to see real-time displays

About the author

Douglas Nunez is a Senior Infrastructure and Utilities Marketing Manager at AVEVA. With over 20 years in the Power and Utility area, Douglas has a deep understanding of power market dynamics, including key issues, policies and trends affecting renewable energy development.

He is an experienced performance consultant with a demonstrated history of working in the power generation industry. He is also skilled in process controls, process simulation and project management.

Contact AVEVA or one of our regional partners for more information about Unified Operations Center for water and wastewater operations

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