WHITE PAPER

Why next-generation reporting is critical in the water utilities industry

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Executive summary:

The internet of things (IoT) is transforming the water utilities industry. From sensors that collect flow and pressure information in remote locations to smart meters that upload data continuously into the cloud, more and more equipment is generating endless streams of data.

Yet although various water utilities systems are gathering more data than ever, many of them don't allow or enable decision-makers full use of that data to drive actionable insights, increase operational efficiencies, and automate the often-laborious process of generating reports.

To harness data to its full capacity, it is critical to upgrade the way the water utilities industry conducts reporting by focusing on improved dashboards that allow for all parts of water systems to be viewed in real time, illuminating data that was once hidden or inaccessible from managers.

AVEVA™ PI System™ is a centralized platform for recording operational data. It creates the real-time and historical visualizations necessary for supporting this big data architecture.

Next-generation reporting is critical

Water managers stand to reap tremendous benefits if they implement next-generation reporting. In fact, this higher level of reporting should be considered mission-critical, as it allows managers to view any part of a water utility system (and the life cycles within that system). It also saves many hours of manual labor, cuts costs for companies, and increases customer satisfaction. Water utilities that digitally transform regulatory reporting processes see improvements in daily operations by forecasting potential problems and increasing the efficiency and speed of their systems.

Save time by digitally transforming the regulatory reporting process

California Water Service (Cal Water) manages over 10 billion gallons of water a year and serves almost two million customers. Managing the source, cost, and location of each gallon as well as tracking flows and power for over 1,000 pumps was no easy task, and it was made more difficult because the company had a labor-intensive, multi-step regulatory reporting process.

First, workers were required to drive to stations to take handwritten readings on paper, which then were compiled in an Excel spreadsheet. This spreadsheet was migrated into a Microsoft Access form, which was then accessed, printed, and submitted to a district manager for approval. Once approved, the data was manually transcribed into a new Excel spreadsheet for use by the finance and corporate departments.

The reporting system involved hundreds of hours of travel time and manual record keeping, and it was also prone to transcription errors. In addition, the database wasn't capable of organizing data for easy access, and it also couldn't be used for making calculations, aggregations, or trending. In short, although Cal Water's system was computerized, it still required a lot of manual labor for it to function, and the data was captured in a convoluted process with multiple formats (Figure 1).

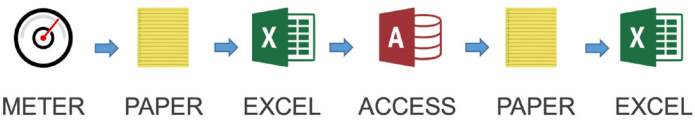

Figure 1: Former data flow

Different departments also encountered the problem of there being too much data to sort through. The accounting department, for example, only needed an average of 10 numbers a month, and it couldn't handle the individual metrics for water flow and power for each of the 2,000 operating end devices that made up the entire data system. In other words, the enormous amounts of data collected from tracking flows and power for 1,000 pumps had become stuck in data silos from which information couldn't easily be extracted.

Transitioning from a computer-assisted reporting process to a digitally transformed process was the answer to breaking Cal Water's bottleneck of data.

Today, Cal Water's updated, state-of-the-art system allows the company to aggregate data from thousands of the enterprise's end devices. Rather than try to find and extract information from a complex web of data systems, users from different departments can then ask a single platform for the data they need (Figure 2). This data is received instantaneously via customized departmental reports. These fully automated reports can be validated and digitally signed by district managers and engineering and then aggregated by accounting and compliance into a single water reduction report within minutes, saving them on manual labor and money.

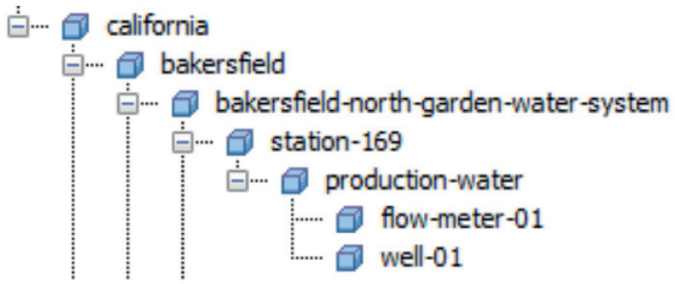

Figure 2: Rollup calculations consolidate data from all lower levels and give district-level production data from meter data. From this hierarchy, customized reports can be generated for several enterprise departments.

Forecast potential problems by increasing situational awareness

Great Lakes Water Authority (GLWA) serves four million people with fresh water services and three million people with sewer services. For GLWA, collecting data from over 55 major facilities and 500 remote monitoring locations, including rain gauges, sewer meters, and pressure sites, was overwhelming, and it left a large margin for error.

BRK Ambiental had a similar issue due to the enormous size of its enterprise. With 32 dams for raw water storage and 85 sewage treatment ponds spread out from northern to southern Brazil, the water utilities corporation faced expensive, and potentially dangerous, issues if even one of its sites wasn't secure. For example, when intense rains caused a sudden elevation in a company reservoir to overtop two of its structures, the stability of both structures was at risk (Figure 3).

Both GLWA and BRK Ambiental knew that increasing the situational awareness of their structures and sites was needed to secure and monitor their prospective enterprises. To do this, the operations and IT staff at GLWA developed real-time water and live GIS wastewater maps. The maps provided better spatial visualization and integrated massive amounts of data. Meanwhile, the same system allowed BRK Ambiental faster access to large volumes of information, such as the height and capacity of water, year of construction of its structures, and real-time rainfall data.

Figure 3: Overtopping occurred in February 2018

Figure 4: Sabesp sanitation cycle main display

In other words, AVEVA PI System allowed decision-makers at each company to add new local data via a computer, mobile device, or tablet. This development increased transparency into the operations of the entire enterprise for all levels of employees. It also improved communications and user engagement between departments. Most importantly, the real-time visualization of sites and structures not only translated to faster response in case of issues, such as outfalls or dam overtops, but it also forecasted potential problems and mitigated them.

Increased customer satisfaction by improving efficiency

Water utilities need to provide water to customers even when there are shortages. This is challenging for any company, and one might imagine that it would be particularly difficult for giant enterprises such as the Brazilian water and sanitation company **Sabesp**, which serves 27.7 million people in 368 municipalities in the state of São Paulo. Yet the company – the fourth-largest water utilities company in the world – is not only recognized for its robust management of 4.6 million water connections and 3.8 million sewage connections, but for its high rate of customer satisfaction.

In 2008, Sabesp implemented a new supervisory control and data acquisition (SCADA) system that helped the company monitor, gather, and process real-time data remotely. In 2017, the company updated its real-time data infrastructure, so it could provide more integrated analyses of the processes within the entire sanitation cycle (Figure 4). This update, which included health monitors of the system, created a more stable and reliable environment, providing faster access to data and real-time alerts in case of a water shortage event.

The visibility and transparency of Sabesp's sanitation cycle helped managers become more agile in their decision-making, and AVEVA PI System also led to better asset management and improved operational processes. Most importantly, the new system improved service and increased customer satisfaction. Although only 67% of customers reported feeling satisfied with service in 2015, this percentage skyrocketed to 84% in 2017, and in 2018, the company was recognized as the second-most reliable public company in São Paulo.

Summary

Enabled by the IoT, smart data can offer water utilities managers a more holistic view of their water systems. Yet to have a bird's eye view of their entire enterprise, managers must first implement a centralized system capable of handling diverse, high-volume data sources. The system also needs to be nimble, easily integrating with GIS, machine learning, and other solutions.

Finally, the system must offer next-generation reporting, complete with user-friendly dashboards and real-time visualizations that transform data science into actionable information.

The value of AVEVA PI System

AVEVA PI System supports big data architectures and complements enterprises' data lakes by efficiently streaming analytics-ready data. It reduces the time required to turn data science insights into actions while also accepting predictions back into the system to augment the decisions made by people in operations.

Worldwide, AVEVA PI System manages more than two billion data streams. More than 65% of Fortune 500 industrial companies have implemented AVEVA PI System. In fact, more than 1,000 leading utilities companies rely on AVEVA PI System to transform their operations through data.

About the author

Gary Wong is the Principal, Global Water Industry at AVEVA, a leader in real-time operational intelligence. He has over 20 years of extensive international experience providing sustainable, strategic and cost-effective business solutions in the water industry. Prior to joining AVEVA/OSIsoft, he has held positions with Metro Vancouver and as a consultant directing both public and private sectors on Operations, IT strategy, planning, sustainability, and engineering. Mr. Wong is also the Chairman for the Smart Water Networks Forum (SWAN) Americas Alliance and holds a Bachelor's Degree in Chemical Engineering, is registered as a Professional Engineer in Computer Engineering, holds an M.B.A. from the Queen's School of Business and is also a Chartered Professional Accountant.

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