

A Deluge of **BIG DATA**

The Connected Water Utility



OSIsoft®

CHALLENGES IN WATER

Water industry professionals are experiencing a data deluge. There's a lot of data out there, gathered from sensors monitoring everything from water quality to pipe bursts — but altogether, it's too much data divided among too many silos to make sense of what it all means.

At the same time, the water industry faces a wide range of challenges, including aging infrastructure, environmental regulations, meter data management and ensuring that water is available and free from contamination — all of which have serious public health and safety consequences if mishandled. Effective data management is a powerful strategy that addresses all of these concerns, but there's an urgent need for new, innovative ways to manage its vast scale and complexity.

The data deluge is also messy. The typical water management provider contends with data gaps between multiple information technology (IT) and operational technology (OT) vendors, each specializing in different functions that range from geospatial information systems (GIS) to computerized maintenance management software (CMMS); meters, data loggers to supervisory control and data acquisition (SCADA) systems and more. (Figure 1)

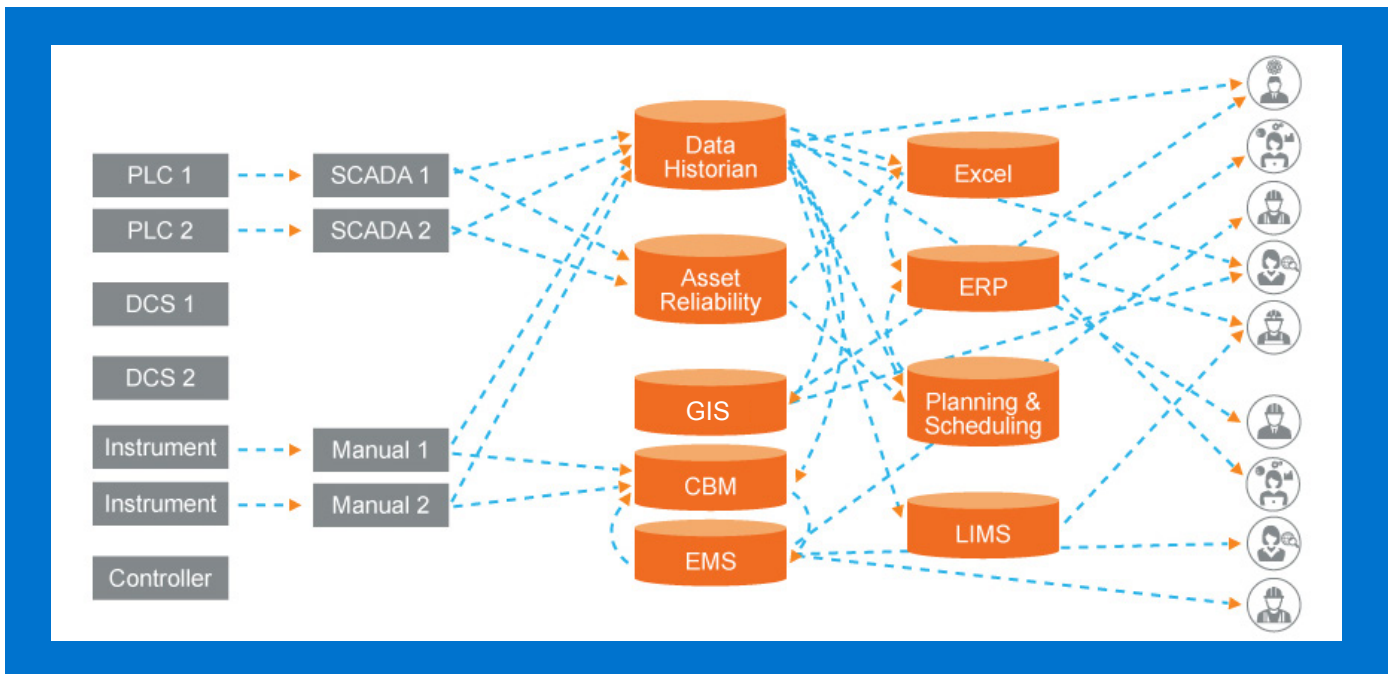


Figure 1: The deluge of OT data extends to OT systems. Connecting these systems can result in “spaghetti” architectures that make having a single clear picture of operations challenging.



Vendors' proprietary systems and the growing number of available sensors produce and use data in different formats, creating more silos than ever at the Edge where sensors reside, On Premise such as SCADA and in the Cloud. Water utilities must often gather and analyze different data sets from different vendors when producing their reports, dashboards, and analytics, but the proliferation and fragmentation of sensor-generated data makes it increasingly difficult to use the data in a meaningful way, especially without context.

Meanwhile, the number of new sensors on the market continues to grow. These sensors gather even more data (from flows, pressures, levels, leaks and vibrations),

typically funneling it into vast databases in the cloud. Water utilities have the opportunity to access an enormous amount of information that wasn't available in the past — if they can manage the data effectively enough to extract useful insights from it.

Unfortunately, Big Data is usually “locked” inside different IT and OT transactional systems such as operations, maintenance, billing, control systems, metering, or GIS. These systems store only “raw” data, which isn't kept in a format that is meaningful to management. If water utilities can properly access and manage their data, however, most of these problems go away.

TREATING DATA AS YOUR MOST IMPORTANT RESOURCE

Clearly, water utilities need new ways to manage and make sense of Big Data. Over 90 percent of utility respondents believe that innovation is critical to the future of their organizations.

One proven solution is OSIsoft's signature process information system (the "PI System"), which collects and stores real-time operational data and provides context so data can be easily accessed, analyzed, and visualized. Instead of attempting to interpret data siloed between multiple vendors, water utilities can streamline their data management by relying on software that gathers all data into one source of the truth to make smarter decisions. (Figure 2)

Since 1980, OSIsoft created the PI System to help organizations unlock the hidden potential within their

data: Clients in more than 140 countries have gained access to 2 billion data streams across 21,000 sites. OSIsoft is a leader across industries: 80 percent of the world's top oil and gas companies rely on the PI System, as well as more than 1,000 utilities; eight of the global Fortune top ten metals and mining companies; 24 of the top 25 pharmaceutical companies; and nine of the top ten chemical companies. The pulp and paper industry also relies on the PI System to monitor 138.5 million meters of production annually. With greater access to data, organizations save money and time by identifying risks — and preventing disasters before they ever occur.

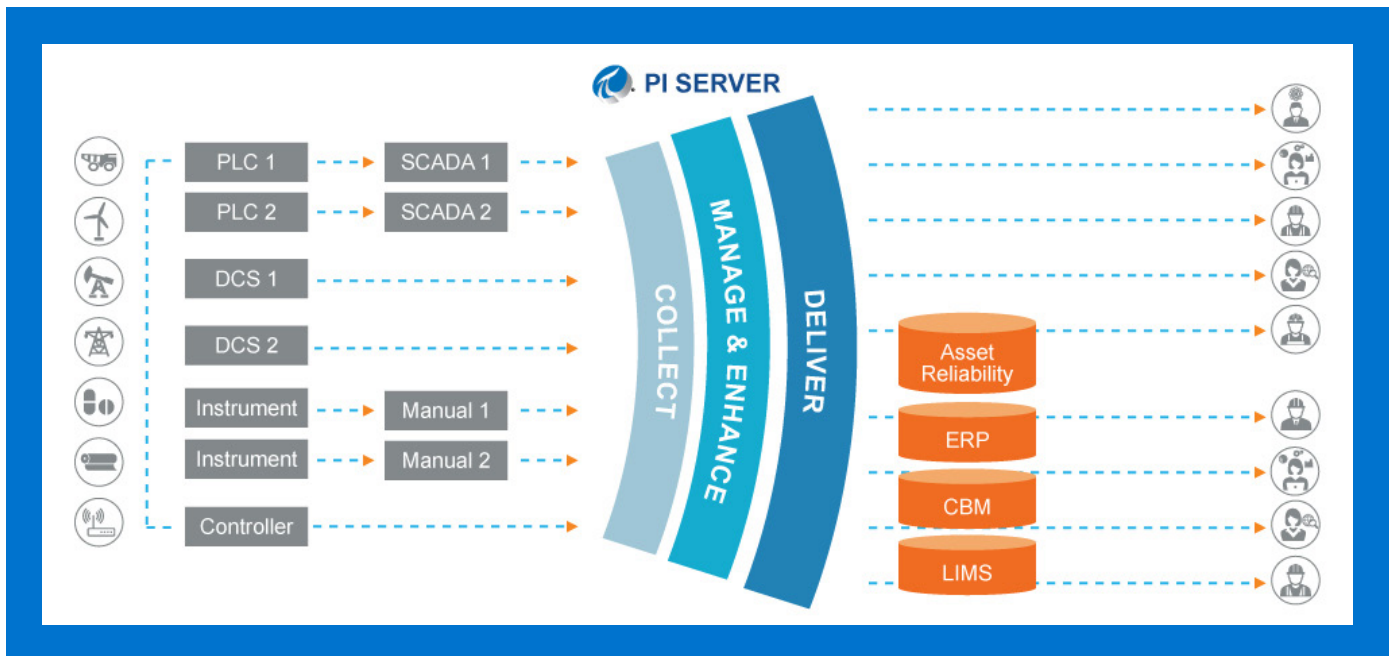


Figure 2: A real-time data infrastructure strategy.



BREAKING DOWN DATA SILOS

When Maynilad Water Services reviewed its data management prior to implementing the PI System, the results inspired dismay. Data was locked in a maze of siloed departments, and what could be extracted was in a raw format that didn't immediately reveal its meaning.

Further complicating the situation, every meter provider had different data management repositories, resulting in an array of formats and products that were difficult to navigate, let alone learn from. Designed to solve this inefficiency by “talking” to different brands of meters, the PI System streamlined data from over 450 interfaces into a centralized, vendor-agnostic platform. This ease-of-use also makes it easy for other companies to integrate the PI System, regardless of what vendors a water utilities provider uses or whether those vendors change over time.

By bridging the gap between operational technology (OT) and information technology (IT), the PI System allows users to access relevant data instantly. For many clients, it's as easy as securely logging onto the system through a web browser, which serves as a centralized repository. Dashboards are accessible to the water regulator online, translating the repository of raw data into actionable insights.

Francisco Castillo, Ph.D., PMP, Sr. Vice President and CIO of Maynilad Water Services noted in a [presentation about breaking down data silos](#) that his company didn't “want to be beholden to a meter provider.” The PI System managed this by providing his data management team a much higher level of autonomy.

USING DATA TO PRODUCE REPORTS THAT MATTER

Any water utility provider can amass and store data, but providing context around that raw data and visualizing it is what matters most. Data must be readily accessible and easy to use in real time, automating reports that were once done by hand or seeing trends from multiple sources and systems.

When it's time to produce a report, relevant data is often split between departments. For example, a report about non-revenue water might need to contain data from the water supply and telemetry departments. For data to be effective, data sharing must be as frictionless as possible. The PI System allows different departments to easily access the total repository of data, which is typically fed by a variety of sources such as telemetry, metering, water supply, sewerage and automation.

The PI System is perfect for managing large volumes of raw technical data — in fact, that's the sole purpose it was designed. Dr. Castillo noted in his presentation that “it's robust, fast... and easy to use,” adding, “we don't need different departments coming to IT to ask for [cross-departmental reports] to be produced.”

The PI system also provides a new level of transparency that wasn't possible before by managing time series data, which is time-stamped to ensure it's always traceable. This is especially important when using the system's automatic alarm systems, allowing users to trace any issues to a precise moment in time. The system provides production alarms, reliability centered maintenance and critical operational conditions to ensure staff are swiftly alerted to problems so they can be resolved with minimal downtime.





NEXT STEPS: USING DATA TO DRIVE SMARTER DECISIONS

The more efficiently data is managed, the better companies are able to use it. Used by 65 percent of Industrial 500 companies in more than 140 countries, the PI System supports users through five critical steps of data management, allowing them to:

1. **Capture** high quality data from a diverse range of sources
2. **Search and analyze** historic and real-time information for easy comparison
3. **Visualize** high-priority information alongside relevant context
4. **Share** data within and across operations boundaries
5. **Gain operational intelligence** to unlock a competitive edge

In the following three case studies, take a closer look at how the PI System is used in Europe, North America and Australia.



1. THAMES WATER INTEGRATES OT AND IT DATA

Thames Water serves more than 15 million customers daily, making it the largest private water and sewage utility provider in the United Kingdom. Before adopting the PI System, Thames Water only had access to 25,000 streams of data that was difficult to work with across its departments. The lack of complete, reliable data made it difficult to identify the cause of polluting surges, reduce energy consumption and provide customers with transparent insight into their own water usage.

Under the PI System, Thames Water can now converge IT and OT data. In addition to the SCADA system, Thames Water also uses Asset and Operations Real Time Analytics (AORTA) to further clean and organize its data. Five years into using the system, Thames Water has saved millions of dollars by identifying redundancies in its operations, reduced production energy by 10 percent and proactively avoided events that can lead to surges. Thames Water can now track as many as 5 million distinct signals.

2. THE CITY OF RIVERSIDE PUBLIC UTILITY STREAMLINES OPERATIONS

With 120,000 residents to serve, the **City of Riverside Public Utility (RPU)** needed a solution to modernize its aging infrastructure. Prior to investing in the PI System, RPU relied on outdated, inefficient methods, such as dispatching technicians to investigate when customers reported outages. Reports on water operations were produced manually from Excel spreadsheets, a task that took up to eight hours.

Using the system, RPU now automates many of the manual reports. Data is easily and instantly accessible in dashboards that are updated in real time, allowing managers to access detailed information about the system's performance and receive automatic notifications when abnormalities occur. (Figure 3) Technicians no longer waste time searching for outages, instead using notifications from grid sensors to travel directly to the source of any issue. Overall, the implementation of the system is projected to save over \$3 million in the next five years and connects 80 percent of RPU's disparate utility systems.



Figure 3: Riverside Public Utility provides a single web interface that any user can drill down into to see what is happening in real time.

3. TASWATER USES THE PI SYSTEM TO PREVENT ECOLOGICAL DISASTERS

In 2017, a **TasWater** customer reported a sewage leak — but by the time the leak was stopped, the damage to the nearby Pitt Water Nature Reserve was already irreversible. 6,000 liters of contaminated water spoiled the reserve's oyster beds, with disastrous effects on Tasmania's \$24 million oyster industry. The spill was just one of the estimated 2,000 annual spills that occurred across TasWater's 5,000 kilometers of sewer mains.

The incident prompted TasWater to look for proactive solutions that could stop leaks and spills before they cause serious consequences for customers and the natural environment. Approximately 70 percent of breaks are caused by tree roots, which can be prevented through targeted root cutting. Once TasWater had access to data through the PI Server's Asset Framework, it established automatic notifications when pumps took an abnormal amount of time to fill (which signals a blockage). Additionally, the new streams of data revealed leakages tied to stormwater, allowing TasWater to resolve a previously unrecognized problem. Overall, the system increased TasWater's ability to provide proactive service while reducing response time to problems by up to 13 hours. (Figure 4)

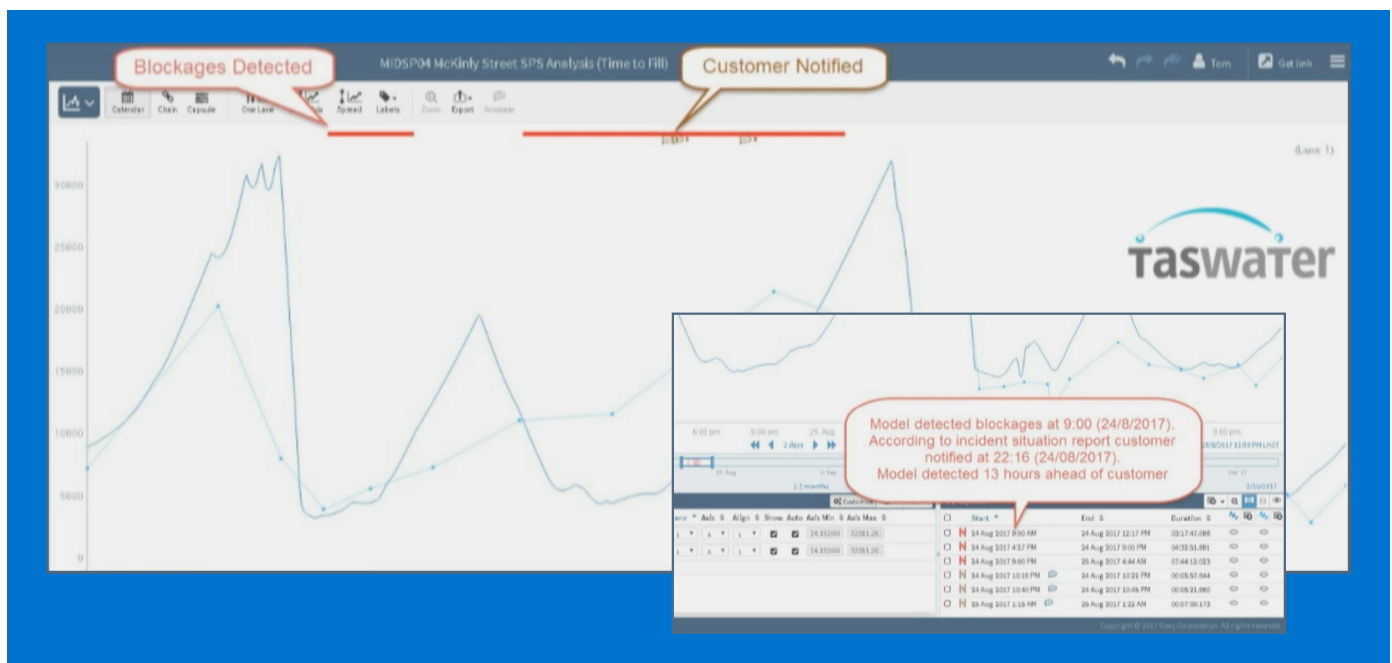


Figure 4: Modeling reveals ability to detect potential blockage 13 hours ahead of when customer would report a spill.



WITH THE PI SYSTEM, DATA FLOWS EASILY

Data management is a top concern for today's water utilities. Without adequate technology, water utilities risk wasting time and money struggling with disparate raw data from a wide range of sources.

Under the PI System, water utilities can gain access to new insights and automatic alerts when problems arise. In addition to increasing operational efficiency, water utilities can use data to proactively address problems before service is interrupted. Overall, the key to reducing costs and optimizing operations lies in data.

ABOUT OSIsoft

OSIsoft is dedicated to helping people transform their world through data. The OSIsoft PI System captures data from sensors, manufacturing equipment, and other devices and turns it into rich, real-time insight for improving productivity, making critical decisions, and developing new products. More than 1,000 leading utilities, 90% of the largest oil and gas companies, and more than 65% of the Fortune 500 industrial companies rely on the PI System to get the most out of their business. Worldwide, the PI System manages more than two billion data streams.

Visit our [Connected Water Utility](#) page to learn what the PI System is doing to improve water and wastewater management or you can [learn more](#) about OSIsoft and the PI System.

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