CUSTOMER PRESENTATION BRIEF

As presented at the 2016 EMEA Users Conference

OSIsoft.

SUMMARY

Thames Water

Industry

Water, Wastewater

Business Value

- Data Quality
- Energy Efficiency
- Quality Control
- Operational Visibility
- Pollution Reduction
- IIoT

PI System™ Components

- PI Server™
  - Data Archive
  - Asset Framework
  - High Availability (HA)
- PI Integrator for Business Analytics
- PI Coresight™

Smart Water: Saving Millions and Cutting Energy By Combining IT and OT with the PI System

The OSIsoft PI System is at the center of Thames Water's "intelligence Hub" (iHub), which merges disparate data sources to drive operational performance. Thames Water can now garner critical insights from its network of water delivery and sewage waste removal systems that span the greater London area. During the 2016 OSIsoft EMEA Users Conference in Berlin, Simon Coombs, a consultant with over 30 years of experience in IT/OT convergence for utilities companies, and Nick Burkinshaw, a 20 year IT veteran at Thames Water, detailed how Thames Water successfully converged IT and OT systems with the OSIsoft PI System.

The Waters of London

Founded in 1989, Thames Water is the United Kingdom's largest private water and sewage utility provider. Every day, over 15 million customers rely on Thames for clean water and sewer services. With 31,100 kilometers of water mains, including the Thames Water Ring Main around London, Thames manages a network of 88 water treatment works, 109,400 kilometers of sewer lines, 350 sewage treatment works, and 7,500 sewage pumping stations to deliver water, handle sewage waste, and manage storm runoff. In total Thames handles six times the volume of water in Sydney Harbor[1] each year – delivering 1 trillion liters of water to customers and processing 2 trillion liters of storm and wastewater. "It's a massive amount," said Combs.

In order to extract water from any local source, treat it, and deliver it to customers, Thames constantly needs to balance where to extract and treat water in a way that meets demand, reduces leakage, and delivers high-quality water. One of Thames' primary concerns is pollution avoidance, which can be highly unpredictable. Some surges – such as during rainfall or periods of high demand – can be predicted, but others, such as breakages and pump performance changes, are unexpected. Identifying the source of the surge can also be difficult. It is also an energy-intensive enterprise: the total amount of energy used by Thames is equivalent to 1 percent of the production energy within the entire United Kingdom. While water quality and demand are Thames' primary goals, regulators are also encouraging the company to reduce costs, energy consumption, and chemicals.

As a result, Thames needed to rework its entire big data and IT systems as well as its internal processes to create better visibility between its operations and its business decisions. That meant using operational data in a new, expanded, way. "What we are focused on is a new way of working enabled by Big Data and of course the PI System," said Coombs.

The IT/OT Convergence

When IT and OT converge the same data needs to be used in different ways across corporate firewalls. "It really is a difficult job to get it from one side to the other," adds Burkinshaw. "We had this lovely view that we would have this wonderfully clean data coming off sites, it would all feed up through various tears of the SCADA system, and pile into PI beautifully then up into iHub platform where it would be combined with the SAP data. In reality our data comes

[1] Sydney Harbor (or Sydharb) is an official Australian unit of measurement and a common unit of measure in the water industry. 1 Sydney Harbor (1 Sydharb) is approximately 500 gigaliters, 500 billion liters, 500 million cubic metres, or just over 132 billion gallons of water.

from all over the place it doesn't all come thru SCADA. Some comes from dial modem, some times things just blip in when they've got a problem. It comes from all over the shop in different times and different places," said Burkinshaw. Because of the volume and velocity of information being collected operational data is often incomplete. In fact, Thames discovered that 80% of the data be delivered to the PI System was out of order. "This was a serious constraint on what we were attempting to achieve," said Burkinshaw.

For Thames, the first steps toward IT/OT convergence was organizing their data better. To address these issues, Thames launched the AORTA (Asset and Operations Real Time Analytics) project to create a trusted data architecture. That project also meant changing the way Thames viewed it's data and it's systems. "We had to realize that we were never going to live in a perfect world. We almost never build a new SCADA system from scratch," said Burkinshaw. "We just put a bit more on something that was already there and as a result you're never going to have wonderfully clean layer at the operational data level – it's always going to be lumpy and full of gristle – so now we're looking at as system where we collect directly from source feed that into PI, almost circumnavigating the SCADA system. We'll still take data from SCADA obviously because a lot of the site SCADA data is very very valuable to us."

Now, under AORTA, data from SCADA systems and other devices are delivered into a PI Server. Asset Framework is then employed to organize the data by assets so operators and others can better understand performance. This cleaned, trusted, operational data is then channeled through the PI Integrator for Business Analytics to iHub, a system designed by Thames for combining operational data with enterprise applications like SAP to deliver customer services. PI System data now helps support 19 critical applications including My Meter Online, a customer-facing application that lets consumers check their water consumption.

Thames has also steadily expanded the scope of AORTA. At first, AORTA involved only data from potable water systems and tracked only 25,000 data streams. The data from wastewater operations was added. Thames now collects information from 600,000 tags and can potentially track over 5 million signals. "OSIsoft," he added, "has been a valued partner".

Benefits

With greater visibility into its operations, Thames has been able to reduce energy consumption while maintaining water quality and service. By studying and modulating day-to-day variations, that can't be explained by physics or equipment anomalies, Thames has reduced production energy by nearly 10%, noted Coombs. Thames, for instance, found that operators in one location were using two pumps, rather than one, for a particular task. By flagging and fixing the issue, Thames has saved £10,000 a year. "The good news is that because it is behavioral…you can actually change those behaviors," he said, adding that Thames has reaped "multimillions" in benefits over five years.

In addition, Thames can also now determine the cause behind pollution surges (sewer overflows), i.e. is it a normal increase in demand, a pump on the brink of failure, or a blockage? By intercepting these events in time and making the appropriate fixes, Thames can prevent pollution events, helping the company avoid complaints and save hundreds of thousands, if not millions, of dollars in fines.

"It [the PI System] is the one application that spans the IT and OT domains."

– Nick Burkinshaw
Operations Manager

Coombs, Simon and Nick Burkinshaw. *Navigating the IT/OT Transformation Journey at Thames Water.* OSIsoft.com. 28 September 2016. Web. 01 January 2017. <http://www.osisoft.com/Presentations/Thames-Water--IT/OT-Convergence---Navigating-the-Transformation-Journey>.