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AEGEA Implements a Digital Twin at Manaus' São Jorge District to Improve Water Quality and Asset Management Decisions

OpenFlows WaterSight Helps the Brazilian Utility Improve Leak Detection and Optimize Operational Workflows

IMPROVING WATER SERVICE QUALITY

AEGEA, one of Brazil's largest private water and sanitation companies, serves more than 21 million people in 153 cities across the country. Founded in 2010, the utility manages water infrastructure assets through full or partial common concessions, sub-concessions, and public-private partnerships (PPPs). The utility manages public concessions in the entire water cycle, including supply, collection, and sewage treatment, according to the profile and needs of each town.

"We play a fundamental role in supplying vital resources for the quality of life of millions of Brazilians," said Lais Regis Salvino, digital infrastructure engineer at AEGEA. "Our operations are guided by respect for society, the environment, and ethical principles. We are a transforming agent in the lives of people and the cities where we operate."

In 2021, AEGEA turned its attention to improving the quality of water services and asset management decisions in Manaus, the capital and largest city in the state of Amazonas. The utility initiated a pilot project in the district metered area of São Jorge, which serves 10,000 customers, to optimize operational activities and prevent pipe bursts. The pilot project included a 61.4-kilometer network with the goal of monitoring operations of the Manaus water supply system.

SEARCHING FOR A SOLUTION TO MEET THEIR NEEDS

Situated in the Amazon rainforest and isolated from other main cities, Manaus' position and geography created a unique challenge for water providers. As a result, AEGEA needed to find a solution capable of remotely monitoring and analyzing Manaus' water systems. Such a system would also prevent them from having to conduct multiple site visits that lead

to increased fuel and labor costs. Moreover, it would enable them to focus on predictive maintenance, which extends the operating life of the infrastructure and, in turn, reduces the resources required to keep it running safely and reliably.

INNOVATIVE TECHNOLOGY ESTABLISHES A CONNECTED DATA ENVIRONMENT

Using OpenFlows WaterSight, they created and curated a digital twin that brought SCADA, GIS, hydraulic modeling, and customer information into a connected data environment. With a digital twin, they could deliver cost-effective operations and maintenance strategies in real time. Because digital twins can be used at different scales, OpenFlows WaterSight utilizes real-time data to create a model that continuously monitors all infrastructure assets, including pipes, pumps, valves, and tanks. The scalable environment provides utilities access to critical system and individual asset performance information to enhance operations, maintenance, and decision-making.

"Powered by a single water infrastructure digital twin, the application provides visibility of nonperforming assets or anomalous network conditions, as well as efficient analysis of present, historic, and forecasted performance for all assets," said Regis Salvino. "OpenFlows WaterSight also helps us uncover areas of improvement."

LEVERAGE HYDRAULIC MODELS TO SIMULATE NETWORK EVENTS

During system deployment, the Bentley support team assisted AEGEA during the first eight weeks after gaining access to the system's sensors, billing, and hydraulic modeling information. Two separate sensor databases were connected—one in Oracle and the other in SQL Server—pushing historical and live data with 15 minutes registration frequency, as well as enabling the pattern curve calculation

for each. Some of the sensors provided important data that was used as boundary conditions for the hydraulic model, including the valve operational status, tank level, and input flow for each district metered area.

Hydraulic models were mainly used by the engineering department; however, AEGEA learned that by using OpenFlows WaterSight, they could easily and successfully leverage the engineering hydraulic models for daily operations and maintenance. The advantage here is that AEGEA can leverage the usage of an existing hydraulic model in WaterGEMS®, import it to WaterSight's cloud, and use the data to run real-time simulation of network events such as pipe breaks, pump shutdowns, valves operations, and fires to better understand and anticipate the impacts on service levels. With these capabilities, operators can have a real-time hydraulic analysis of the entire network, covering the gaps between sensor data.

ANALYZING BEHAVIOR FOR THE BEST RESULTS

Using OpenFlows WaterSight enabled AEGEA to improve the system's efficiency by analyzing the system's behavior to determine the best way to operate it. Additionally, AEGEA set up alarms based on pattern curves to detect anomalies in the system to track active leakage events.

Furthermore, the deployment of the water infrastructure digital twin at Manaus' São Jorge district effectively integrated all data stored in the different systems into one single platform, providing the utility with additional insights, including water balances, tank performance, forecasts, among others. As a result, AEGEA could see the behavior of their systems with real data, as well as improve operational workflows to determine how to best manage their operations. In addition, AEGEA reduced awareness and response times to network events with the support of real-time simulation and automatic events generation capabilities.
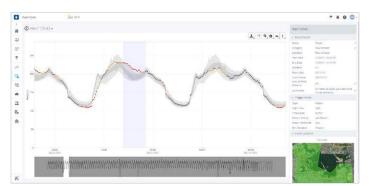
"Bentley OpenFlows digital twin solutions allow us to improve our system. With digital twins, we can analyze the behavior of our systems with real data and determine the best way to operate them. We can check the level of the tanks, and determine if we have any leaks in our network before they become a problem," Regis Salvino said. "Bentley's support was critical to the success of this project and to AEGEA's commitment to transform the lives of people and the cities where we operate."

AEGEA used OpenFlows WaterSight to analyze the water system and improve its efficiency.

OpenFlows WaterSight helped AEGEA improve operational workflows to determine how to best manage their operations.

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