SOLVING UTILITIES' DATA CHALLENGES WITH DIGITAL TWINS

VONNIE SMITH AND JIM TAYLOR

To understand the value of digital twins for the utility sector, we hear from two industry leaders whose companies' partnership has helped shape grid modernization strategies for the utilities of the future.

Q: What value is digital twins providing to utilities?

Vonnie Smith: Utilities have a ton of data, and they are facing tremendous challenges dealing with decentralization, electric vehicles, and changing customer demands and expectations. These challenges are putting pressure on utilities to access the right data at the right time. Historically, the data has been siloed in many locations, and it is through digital twins that utilities can consolidate the data, federate it, and validate that it is aligned and is of the appropriate accuracy and fidelity. What digital twins give to utility owner-operators is the ability to easily access multiple sources of data across various formats, and quickly gain insights to make more informed decisions.

Jim Taylor: Digital twins were originally developed out of industrial process or manufacturing environments, where it made sense to digitally model exactly how your process or your production facilities were going to operate. Using a digital twin, you can make changes in a virtual world and see how those changes will affect the process and its outcomes. Now, digital twins are being adopted by the utility industry. There can be multiple digital twins in a utility environment depending on the function or operation you're trying to emulate. You might have a planning digital twin, an operational digital twin, an asset digital twin, or a geographical digital twin. Some of them can cross each other and support each other. Others may be stand-alone digital twins. But the concept is the same. A digital twin helps us mirror what would happen in real-time in the field and reality, versus what we can do to model and emulate it in a digital environment. →

Q: What is the value of partnering with other industry leaders?

Taylor: When industry leaders work together, they can leverage each company's expertise.

For example, an industry leader with expertise in graphics and mapping capabilities as well as other related functions, teams up with a company that focuses more on the analytics engineering side of things, from a planning operational perspective. By joining these two fields, the companies can deliver better solutions to utilities for what's driving their future needs will combine multiple information modeling services to improve the lifecycle management and operational performance, safety, compliance, and governance of infrastructure assets while increasing the return on investment for owner-operators.

Q: What is an example of how Digital Twin Services help to advance utilities?

Smith: Utilities have to deal with hundreds, even thousands of requests to connect distributed energy into their electricity grids. To do that, they need to have access to information in multiple connected systems. They need to have access to information from the GIS system, and they need to have all of that balanced against the design information. For example, one Digital Twin service brings all that information together — through cloud services, providing digital workflows that are so visual they allow the user to become immersed in the visual environment. They provide a solution for decision-support. With built-in analytics and insights, tasks previously performed by engineers can now be done by customer service personnel. With engineering analysis at their fingertips, they only need to call upon the engineer in challenging situations. This means the utility is able to solve DER problems with a digital twin solution that is much more deployable and less expensive for the utility.

Q: What does going digital mean to you?

Smith: Going digital means utility organizations gain visibility into the data they need to solve the problems they have been dealing with for many years. For example, for substations, being able to produce greenfield and brownfield designs up to 40 percent faster. Or speeding project collaboration and coordination by bringing together electrical and physical design in the digital twin. Digitalization helps to avoid rework, reduce errors, and enhance collaboration. In operations, going digital means optimizing processes with day-to-day visibility of asset health to keep the lights on and minimize operational costs.

It means being able to provide whole lifecycle solutions to utility organizations. No longer do they have to guess, infer, or approximate information about assets or network configurations. By providing an "evergreen" digital twin, the world can change within the utility organization. Digital twins are important because they are a step forward for technology, for usability, and for providing organizations and their customers with the solutions they need to manage projects and assets in a digital world.

Taylor: Going digital is how we turn traditional devices and capabilities into effective data collection and processing at an enterprise level. It's about adding sensors and devices in the field or from a geospatial information system perspective, where we have the capability to digitize it and use new visual capabilities to see the data and reflect on what the data might mean.

Q: How has digital advancement evolved in utilities?

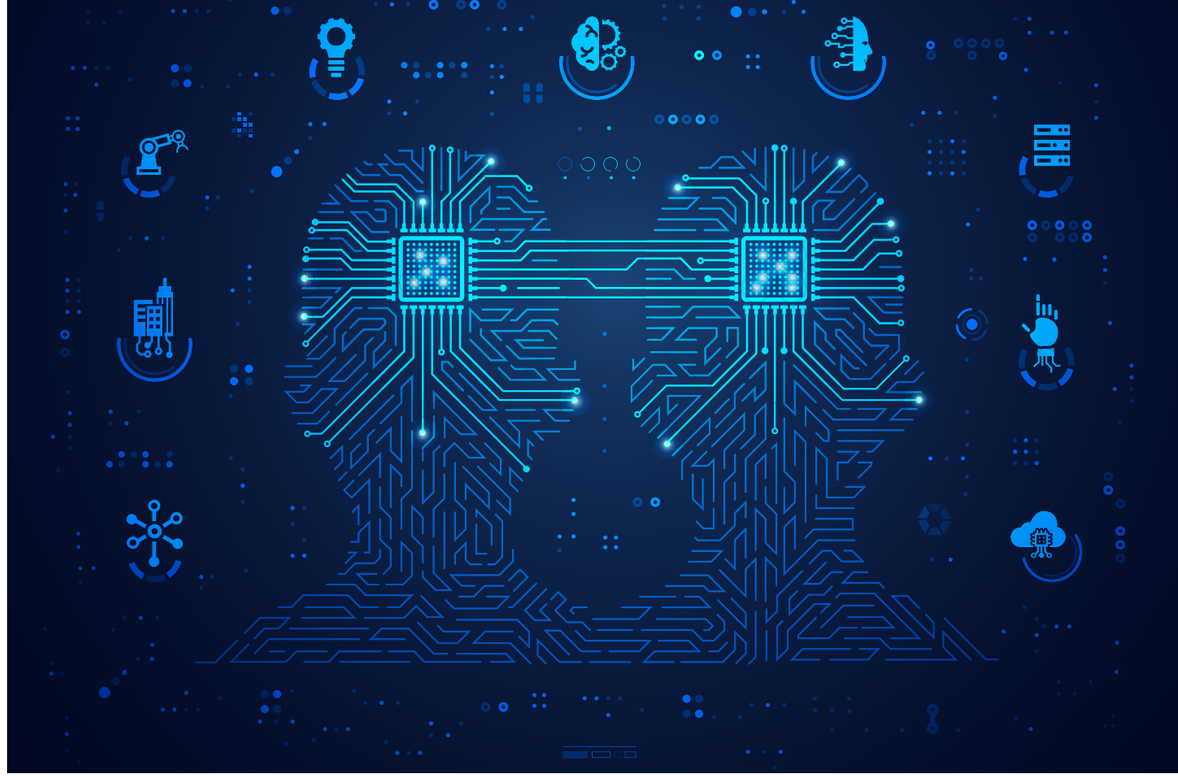
Taylor: Digital advancement is a new term, but it has been in development for a long time — years, in fact. When IT organizations became involved in operational technologies, they helped implement different software applications to store and analyze data from devices installed within the utilities. Digitalization continues to evolve, and it isn't possible to pinpoint a time where it started. However, we can say that it has been evolving faster over the past 10 or 15 years for most utilities. Digitalization is becoming more prominent because we have enough equipment, systems, and other components in the field to make business-level decisions from the information. We have enough data-gathering devices, and that data has really become an important asset to utilities. The companies that can take advantage of their data are those that are going to succeed.

Q: What is influencing utilities today in their ability to change and advance digitally?

Taylor: It's all about the utility's ability to gain insights into their data in a timely manner to make the best decisions. Having all these new digital capabilities to generate data and sensing devices in the field provides the utility with the opportunity to produce a lot of data. We will continue to advance digitally if that data can be fully leveraged and measured to add value to the utility.

Q: What excites you about how things are getting done now versus what was traditionally done previously?

Taylor: Now is a really exciting time in the industry. There are so many electronic devices that we can use to collect meaningful data. Digitalization is really about collecting and processing data to solve a lot of problems that we couldn't in the past. Now, we're able to simulate and see what's happening to the systems in real-time. In the past, we were using what I would call a "gut feeling" to do what we thought was right. Now, we actually can simulate very complex systems or problems and have an engineering view of what really is happening and why.



Q: Where does someone begin using digital twins?

Smith: Whether they started using CAD software many years ago and are designing and delivering projects, or they are working in utility operations using asset information management software to improve the performance of their assets, ultimately, we want to move our utility customers from where they are to where they would like to be — digitally advancing, using digital twins. We believe we can do that by working with our users to get them, incrementally, to the next step.

ABOUT THE AUTHORS:

Vonnie Smith is vice president of Energy and Communications Infrastructure at Bentley, where she responsible for products, solutions and consulting to the energy utilities and communications markets. Smith joined Bentley in 2005 and has worked in leadership capacities related to digital transformation, asset performance, infrastructure design and operations, project delivery and geographic information system (GIS). Smith has a Bachelor of Science in electrical engineering from the University of Texas at Austin, with a specialization in electric power systems.

Jim Taylor is currently the VP, business development and strategy for Siemens Smart Infrastructure, Digital Grid. His professional experience includes 10 years of power substation and distribution operations and maintenance with Barrick Goldstrike Mine in Elko Nevada and two years substation commissioning and electrical maintenance with Power Engineers. The experience has provided a unique understanding and need for management of reliability, environmental sustainability and fiscal responsibility within the utility environment. Taylor has a B.S. in electrical engineering from University of Wyoming. He also holds a Professional Engineer license and is a licensed journeyman electrician