Bentley Systems Announces New iTwin Cloud Services for Infrastructure Engineering Digital Twins

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Digital twins enter the mainstream – engineering firms and owner-operators put digital twin aspirations into action

SINGAPORE – **The *Year in Infrastructure 2019* Conference** – **24 October 2019** – Bentley Systems, Incorporated, the leading global provider of comprehensive software and digital twin cloud services for advancing the design, construction, and operations of infrastructure, today announced new cloud services for infrastructure engineering digital twins. *Digital twins* are digital representations of physical assets and their engineering information that allow users to understand and model their performance in the real world over their lifecycle. In effect, "evergreen" digital twins advance BIM and GIS through 4D.

Keith Bentley, founder and chief technology officer, said, "Today the 'digital twin era' is underway, and its pace accelerates every day. The early adopters we've worked with are already staking out leadership positions in the new digital twin economy, towards innovations in both their business processes and their business models. The advantages gained by replacing decades-old, disconnected paper-based workflows and work products with open, live, trusted, and evergreen digital twins are immense. Coupling that with an ecosystem of innovation through open-source platforms creates an unstoppable force for change in infrastructure. I can't remember a more exciting time for the infrastructure professions or for Bentley Systems."

New Digital Twin Cloud Services

iTwin Services enable engineering firms to create, visualize and analyze digital twins of infrastructure projects and assets. iTwin Services federate digital engineering content from BIM design tools and multiple data sources, enable "4D visualization" of digital twins, and log engineering changes along a project/asset timeline, to provide an accountable record of who-changed-what-and-when. Engineering teams are using iTwinServices to conduct design reviews, validate design data, and generate design insights. Users of Bentley's design applications can apply the *iTwin Design Review* service for ad hoc design reviews, and project teams using ProjectWise can add the iTwin Design Review service to their digital workflows to facilitate overall project digital twins.

PlantSight is an offering jointly developed by Bentley Systems and Siemens, which enables owner-operators and their engineers to create living and evergreen digital twins of operating process plants. PlantSight allows operations, maintenance, and engineering to access trusted, accurate digital twin data immersively, including P&IDs, 3D models, and IoT data. It provides a single view of truth in a validated information model that facilitates situational intelligence, line of sight, and contextual awareness. PlantSightwas jointly developed by Bentley and Siemens using iTwin Services and is commercially available from either company.

iTwin Immersive Asset Service enables owner-operators using AssetWise to align asset performance data and operational analytics in their digital twins' context, making engineering information accessible to a wider audience of users through immersive and intuitive user experiences. iTwin Immersive Asset Service shows "hotspots" of activity and change in asset status over time which leads to faster and better-informed decision-making that ultimately helps improve asset and network performance.

Digital Twins Enter the Mainstream

The ever-evolving physical reality of an as-operated asset has previously been difficult to capture digitally and keep current. In addition, the corresponding engineering information, in its assortment of incompatible file formats and constant change, has typically been "dark data," essentially unavailable or unusable. With digital twin cloud services, Bentley helps users to create and curate digital twins to improve the operation and maintenance of physical assets, systems, and construction processes, through immersive 4D visualization and analytics visibility.

At Bentley's *Year in Infrastructure 2019* Conference, digital twin advancements featured in 24 finalist projects in 15 categories in project locations across 14 countries ranging from transportation, water networks and treatment plants, to power stations, steel plants, and buildings. Overall, 139 nominations in 17 categories cited digital twin objectives for the innovations used on their projects – a significant increase from 29 such nominations in 2018.

Digital Twin Ideas in Action

In the technology keynote at the conference, Keith Bentley was joined on stage by representatives from Sweco and Hatch, showcasing infrastructure digital twin ideas in action.

Sweco digitally integrated a nine-kilometer light rail system project for the city of Bergen in Norway. The extension of the existing system was managed entirely through 3D BIM models, from alternative studies into a detailed engineering design. The use of iTwin Services allowed Sweco to keep track of changes automatically and minimize errors, enabling 4D visualization.

Hatch completed pre-feasibility, feasibility, and detailed engineering for a sulfuric acid facility in the Democratic Republic of the Congo. Bentley's plant design software enabled the project team to design a complete, intelligent digital twin to the most granular level of detail, moving the engineering quality processes upstream as part of the 3D modeling effort compared to traditional drawing-based quality processes. Hatch was able to reduce production ramp-up after hot commissioning, from six months to one week.

Microsoft is prototyping digital twins in its Asia headquarters in Singapore and its Redmond campus. Microsoft's Real Estate and Security group is implementing an approach for the Digital Building Lifecycle to optimize building performance, cost-effectiveness, employee satisfaction, productivity and security. Microsoft's efforts to create digital representations of physical assets like buildings are based on Microsoft Azure Digital Twins, an IoT service that helps organizations create comprehensive digital models of physical environments. Azure Digital Twins was released for public preview in 2018 and is now being adopted by Microsoft customers and partners globally, including Bentley for its iTwin Services. The companies are working together to create a digital twin of Microsoft's new facilities in Singapore.

Digital Twin Ecosystem
Both iTwin Services and PlantSight were developed with the iModel.js open-source platform for digital twins, which was first launched in October 2018 and reached its version 1.0 milestone in June 2019. A primary reason for open-sourcing the iModel.js library is to foster an ecosystem of innovation for owners' and engineers' digital twin software developers and for digital integrators.

One such ecosystem software developer is vGIS Inc. which used iModel.js to integrate a mixed reality (XR) solution within a transportation infrastructure digital twin. Their mobile mixed reality app visually merges project design models with reality, in the field, in real-time. Users in the field can view subsurface utilities, such as pipes and cables, merged within their real-world orientation. Users simply point at objects with their mobile devices to see project design elements in this context.

Alec Pestov, vGIS founder and CEO, said, "The iModel.js platform is a great resource for developing and integrating value-added tools and services, such as the advanced augmented reality and mixed reality solution offered by vGIS. We love the seamless interoperability with iTwin Services and the frictionless development path to get to that seamless integration, and we look forward to expanding our collaboration potential, through iTwin Services."

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Digital Twins Defined
Digital twins are digital representations of physical assets and systems in the context of their surrounding environment, converged with their engineering information, for understanding and modeling of their performance. Like the real-world assets they represent, digital twins are ever changing. They are continuously updated from multiple sources, including sensors and drones, to represent the right-time status or working condition of real-world, physical infrastructure assets. In effect, digital twins—by combining *digital context* and *digital components* with *digital chronology* —advance BIM and GIS through 4D.

Benefits of Digital Twins
Digital twins enable users to visualize the entire asset – in a web browser, on a tablet, or with a mixed reality headset – check status, perform analysis and generate insights in order to predict and optimize asset performance. Users can build digitally before they build physically and plan out and de-risk maintenance activities before they carry them out in the real-world. They now have software at their disposal to envisage hundreds of scenarios, leverage machine learning to compare design alternatives or maintenance strategies and optimize across multiple parameters. Visualization and contextualization of engineering data lead to better informed decision-making and stakeholder engagement throughout the asset lifecycle.

About Bentley's iTwin Services
iTwin Services enable project teams and owner-operators to create, 4D-visualize, and analyze digital twins of infrastructure assets. iTwin Services enable digital information managers to incorporate engineering data created by diverse design tools into a living digital twin and align it with reality modeling and other associated data, with no disruption to their current tools or processes. Users are able to visualize and track engineering change along the timeline of the project, providing an accountable record of who-changed-what-and-when. iTwin Services facilitate actionable insights for decision makers across the organization and asset lifecycle. Users make better informed decisions, anticipate and avoid issues before they arise, and react more quickly with confidence, resulting in cost savings, improved service availability, lower environmental impact, and improved safety.

About Bentley Systems
Bentley Systems is the leading global provider of software solutions to engineers, architects, geospatial professionals, constructors, and owner-operators for the design, construction, and operations of infrastructure, including public works, utilities, industrial plants, and digital cities. Bentley's *MicroStation*-based open modeling applications, and its open simulation applications, accelerate design integration; its *ProjectWise* and *SYNCHRO* offerings accelerate project delivery; and its *AssetWise* offerings accelerate asset and network performance. Spanning infrastructure engineering, Bentley's *iTwin Services* are fundamentally advancing BIM and GIS to 4D digital twins.

Bentley Systems employs more than 3,500 colleagues, generates annual revenues of $700 million in 170 countries, and has invested more than $1 billion in research, development, and acquisitions since 2014. From inception in 1984, the company has remained majority-owned by its five founding Bentley brothers. www.bentley.com

Sulfuric Acid Plant in Katanga, Democratic Republic of the Congo. Hatch leveraged the digital twin to provide alternative procurement strategies to lower the cost of material supply and cut several months off the schedule.

Image courtesy of Hatch.

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