Bentley Systems advances the future of global infrastructure through digital twins and the power of data, AI, and advanced analytics on Microsoft Azure

A desire to glean insights from disparate, siloed data

Many organizations have a wealth of data, but because it's disparate and siloed, it can be challenging to generate insights.

Using Microsoft Azure and digital twins to derive insights

By unifying data into a digital twin and applying AI, Bentley Systems helps decision-makers better understand their operations.

Reducing costs and increasing efficiency for customers

With Bentley Systems solutions in place, the Minnesota Department of Transportation expects to save USD 4 million per year.

Bentley Systems is an infrastructure engineering software company that provides innovative software to advance the world's infrastructure, sustaining both the global economy and the environment. The company's industry-leading software solutions, including best-in-class digital twins on Microsoft Azure, are used by professionals and organizations of every size, across industries, in more than 170 countries for the design, construction, and operations of roads and bridges, rail and transit, water and wastewater, public works and utilities, buildings and campuses, and industrial facilities.

A virtual representation of a physical object or system, a digital twin uses real-time data and other sources to enable learning, reasoning, and dynamic recalibration and control for improved decision making.

Bentley delivers solutions for the entire lifecycle of an infrastructure asset, tailored to the needs of various people who will work with the asset over its lifetime: the engineers, architects, geospatial professionals, planners, contractors, fabricators, IT managers, operators, and maintenance engineers responsible for creating and managing the world's infrastructure.

Comprising integrated applications and services built on Microsoft Azure, Bentley's solutions are designed to ensure that information flows between workflow processes and project team members to enable interoperability and collaboration. The company enables organizations to optimize use of their data for real-time information, analytics, and business intelligence.

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Bentley's commitment to its users combines the most complete and integrated software with exceptional service and support through all day, every day access to technical support teams, a global user success and professional services organization, and continuous learning opportunities. These include product training, online seminars, and academic programs for current and future generations of infrastructure professionals.

Helping its users achieve their digital transformation and business goals, the company collaborates closely with Microsoft to develop groundbreaking solutions to empower engineers, constructors, and owner-operators to design, build, and operate infrastructure assets that are more cost-effective, resilient, and sustainable.

Ushering in the golden age of AI

Though artificial intelligence (AI) research and development has been a promising part of the technology ecosystem since the 1950s, in just the past five years there has been a rapid evolution and the emergence of megatrends that signify a golden age of AI, machine learning, and advanced analytics. Sectors including infrastructure, finance, defense, and space are already making use of sophisticated applications of these technologies.

Bentley is now driving real value for its users with AI and machine learning. Advances in hardware and processing power have enabled neural network computing. Big data, whether in the public sector or commercial, has massive storage requirements that cloud is uniquely able to accommodate. Cloud infrastructure is democratizing this technology, making it available to a broad set of stakeholders.

Applying AI and advanced analytics to solve real-world infrastructure challenges, Bentley is helping its users answer urgent questions, such as: How do we continue to deliver the service levels expected from our infrastructure in an environment of reduced government budgets, aging assets, and a workforce cycling through

new generations without relevant experience and historical perspective?

By federating and aggregating data from multiple sources into a digital twin, applications can now begin to apply AI and machine learning to operate and reason across these datasets, many of which were previously locked away in silos or inscrutable formats. Addressing the challenges of infrastructure owners and the engineering ecosystem, Bentley is bringing AI to manage data in the digital twin, identifying patterns, doing predictive analytics, and isolating anomalies to solve complex problems crucial to sustaining the environment and growing economies.

Partnering with Microsoft to help customers achieve more

Bentley's lengthy, productive, and mutually beneficial collaboration with Microsoft has been recognized with several Partner of the Year awards. The company has been a Microsoft partner since 1984. The relationship with Microsoft provides Bentley access to the full modern Azure cloud technology stack so that its product teams can continuously incorporate new capabilities and deliver domain expertise across the industries it serves.

"We've had a long-standing partnership with Microsoft," says Jerry King, Vice President, Strategic Alliances at Bentley Systems. "We've always received great benefit from the partnership, both in terms of technical collaboration on how to best leverage the Microsoft platform and, in more recent years, in joint go-to-market and co-selling activities. We're extremely pleased to be a Microsoft partner."

Bentley believes that its relationship with Microsoft allows it to bring its solutions forward to achieve better outcomes for its users. Microsoft technology has helped Bentley grow from a leader in computer-aided design and drafting, to modeling and geographic information systems (GIS) and IoT, and now, going beyond, to 4D digital twins.

Bentley and Microsoft are founding members of the Digital Twin Consortium, helping to advance digital twin thought leadership and showcase best practices and benefits. The company finds that Azure is an optimal platform for AI and advanced analytics. Microsoft cloud technology is ideal for bringing a variety of information sources together in a system for the structured data required by an inference engine and Bentley's digital twin solutions. And the trust earned by Microsoft for the security and resiliency afforded by Azure is invaluable in the infrastructure environments where Bentley solutions are deployed.

Azure enables organizations of all sizes and across industry verticals to achieve their short- and long-term goals with a proven cloud infrastructure designed to help create and align business and technical strategies. With Azure AI services, organizations can build mission-critical solutions to analyze images, comprehend speech, uncover latent insights, and make predictions using data from across all their business.

Digital twins combine traditional business data insight with a comprehensive model of many different aspects of reality into a single view of information, as a transparent model of a business, driving operations, analytics, and simulation. This vision is behind Microsoft's investments in Azure digital twins to simplify the creation of next-generation IoT-connected solutions that model the real world. It's Bentley and Microsoft's mission to bring together the best of their combined technologies to support a resilient and sustainable future.

Digital twins at work globally

Bentley recently committed to funding a multimillion-dollar investment to accelerate infrastructure digital twin technology by helping grow an ecosystem of developers and partners to apply digital twins across multiples industries and domains. The company offers a comprehensive range of world-class integrated solutions tailored to meet the demands of multidiscipline project teams in a wide range of industries.

"We have some really compelling stories and uses of AI today within our offerings," says Bob Mankowski, Senior Vice President, Digital Cities at Bentley Systems. "But there's a lot more to do; we're very much at the beginning of this effort. Inside Bentley we're talking about infusing AI into all of our applications in our Azure cloud offerings. We're very much at the start of this journey."

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Doosan Heavy Industries and Construction provides power generation and engineering and construction services in South Korea. Doosan worked with Bentley Systems and Microsoft to develop a digital twin of its wind farms, allowing operators to remotely monitor equipment performance and predict energy generation based on weather conditions. The Azure-powered digital twin combines real-time and historical IoT, weather, and other operational data with physics-based and machine learning-based models to accurately predict production output for each turbine in the farm. Based on the simulated models, Doosan can adjust the performance of individual turbines, maximizing energy production and generating insights that will improve the design of its next-generation wind turbines.

The city of Dublin, Ireland, with a population of more than 1.2 million people, worked with Bentley and Microsoft to develop a large-scale digital twin as part of the city's planning efforts. The interactive virtual environment is helping city planners overcome the challenges of getting public review and comment for new development projects, ensuring that citizens can provide input in their local communities from the safety of their homes during the COVID-19 pandemic and keeping projects on track. The impact of the pandemic has forced many cities to accelerate their digital transformation journeys. An adaptable and scalable solution based on Bentley's OpenCities Planner and Microsoft Teams is setting the standard for the future of planning and public engagement in cities.

Bentley is using Azure Mixed Reality services and Microsoft HoloLens 2 to improve bridge inspection for innovative states and engineering firms, such as Minnesota Department of Transportation and Collins Engineers. In the United States alone, there are more the 600,000 bridges, a key part of the infrastructure that keeps the country running. Using drones to capture high-resolution images, users can create precise digital twins for a bridge. Azure Remote Rendering services produce real-time, high-fidelity renderings of the bridge so that multiple experts can view large sections of the structure at the same time. Leveraging the power of HoloLens 2 devices, inspectors can visualize sections of the bridge, adding spatial notes, dimensions, and other markings for detailed, contextual information on the structure. This combination of Bentley solutions and Microsoft technologies can save 40 percent in total costs for each bridge inspection. Using these powerful new tools on just 10 percent of their total inventory of bridges, the state of Minnesota Department of Transportation is projecting a savings of USD 4 million per year, which can be used to fix aging infrastructure.

"We are very excited about our stronger partnership with Bentley to co-innovate and build next-generation digital solutions powered by Microsoft's cloud, data, AI, and IoT platform," says Simran Sachar, Director of Analytics, AI and Industry, Global Partner Solutions. "We're accelerating the pace of innovation through the power of cloud, data, advanced analytics, and AI. Together, we're evolving digital twin technology to deliver incremental business value to customers and empower organizations with industry-specific solutions."

Collaboration to build for the future

There's tremendous potential for more exciting solutions development in the months and years ahead as Bentley Systems innovates integrated software applications on Azure to meet the needs of its customers.

At a recent brainstorming session, Bentley teams came up with over 100 use cases for AI and advanced analytics in the company's expanding solutions portfolio. Azure advanced analytics drive faster, more efficient decision making by drawing deeper insights from an organization's data and business processes.

The company is eager to increase activity and intensity of how they partner with Microsoft across all of its dimensions: co-developing, co-marketing, and co-selling. Important ongoing collaborations include:

• Accelerating the adoption of ProjectWise 365, Bentley's instant-on, Azure cloud-based solution for increasing the speed and quality of infrastructure design collaboration.

• The Smart Cities project, bringing together all of a city's data into a digital twin on Azure to address economic growth, safety, security needs, and overall resiliency for smart city innovation.

• Digital twin integration to close the global productivity gap with Azure digital twins and Azure IoT services to help companies move beyond engineering optimization or modeling assets to create rich models of entire business environments and, eventually, networks of businesses.

The infrastructure industry is especially sensitive to concerns around data security, workflows, and IP. Bentley sees no better and more trusted partner than Microsoft to bring value to its users with digital twins, improving predictive decision making, reducing risk in planning and operations, and making the world better, together.

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