# Bentley Inaugurates iTwin Services

At the Year in Infrastructure 2018 Conference, Bentley Systems has announced the forthcoming availability of its *iTwin Services:* digital twin cloud services for infrastructure projects (project digital twins) and assets (performance digital twins). *iTwin Services* can be transparently provisioned within Bentley's Connected Data Environment (CDE) for *ProjectWise* and *AssetWise* users.

Infrastructure asset owners and their teams have recognised the potential for leveraging digital twins in many ambitious use cases, including the application of analytics, artificial intelligence (AI) and machine learning (ML) in simulations and decision support throughout the lifecycle of design, construction and operations. To realise this potential, representations of assets not only need to be *digital, but also* – to be safely relied upon as a *twin* – there must be practical solutions for their synchronisation to changing actual conditions in the real world. Moreover, merely capturing and representing physical conditions, including IoT inputs, can never be sufficient to understand, analyse or model intended improvements, without also comprehending the 'digital DNA' captured in the project or asset's engineering specifications.

Therefore, would-be digital twins for existing infrastructure must reliably synchronise reflections of *both* an asset's physical reality and its 'virtuality' (engineering data). A digital twin can meet this requirement by geospatially converging the *digital context* (representing the physical) and *digital components* (representing the virtual), naturally resulting in an immersive environment for both visualisation and analytics visibility.

To date, however, the evolving 3D physical reality of an as-operated asset has been too formidably difficult to capture digitally, let alone to keep up to date. Meanwhile, corresponding, as-operated engineering information tends to be unavailable or dated, typically as an assortment of effectively inaccessible 'dark data' in either opaque engineering files or unintelligent document formats. Bentley has now surmounted *both* of these challenges, with the confluence of its reality modelling, iModelHub, CDE and web-visibility technologies.

### *Reality modelling*
A representation of any infrastructure asset's physical reality can now be reliably captured and maintained through increasingly continuous surveys and Bentley's reality modelling software, providing digital context in the form of reality meshes. Overlapping photographs and supplementary laser scans, largely from drones and ground-level imagery, are processed to generate spatially classified and engineering-ready reality meshes at any desired level of accuracy, within which each digital component can be automatically recognised and/or geospatially referenced. The reality mesh can provide an efficient and immersive visual 'twin' to intuitively navigate for finding, viewing and querying the associated information within, or related to, the asset's digital engineering models.

### Adding *iModelHub* within CDE
The challenge in comparably capturing and maintaining these engineering counterparts of the physical asset – its digital components – is the opacity of their existing representations, compounded by continuous changes. Bentley's iModelHub, introduced in 2017, overcomes these hurdles through automated digital alignment (to achieve semantic consistency from otherwise dark data in known formats), and synchronisation, based on change ledgers, corresponding to the CDE's project workflows (ProjectWise) or configuration management (AssetWise).

### *Web Visibility*
Once populated and synchronised by way of digital context and digital components, *iTwin Services* deliver their benefits through Bentley's new (separately announced) open-source *iModel.js* library. for web-based immersive visualisation. Infrastructure teams can easily develop custom applications that connect their digital twin for specific use cases by leveraging a vast open-source ecosystem. In addition, a geospatially immersive environment for city-scale digital twins is now available through Bentley's new *OpenCities Planner* services.

### Introducing Project Digital Twins
ProjectWiseCONNECT Edition users of Bentley's CDE can instantiate cloud-provisioned *iTwin Services* for any project without disruption to their existing ProjectWise workflows. iModelHub will then transparently create and maintain the project's comprehensive iModel: a distributed database, with its intrinsic change ledger updated at each deliverable-in-progress check-in state. For each such update to engineering information, application-specific 'information bridge' processing effectuates digital

alignment of the iModel's digital components.

To the extent of available reality modelling for the physical site, the CDE's corresponding ContextShare service maintains updated digital context. The iModel's digital components and ContextShare digital context are immersively merged through *Navigator Web* and iModel.js visualisation, as authorised and secured by iModelHub.

Accordingly, *iTwin Services* enable comprehensive project status reviews to be continuously available, synchronised to any requested project state on the iModel change ledger timeline, and/or for visualisation and analytics visibility into changes between any project timeline states. *iTwin Services* will also integrate Bentley's *SYNCHRO* 4D construction modelling.

*iTwin Services* for project digital twins will be available early in 2019, with quarterly base subscription charges for each *iTwin* based upon its scale, in terms of digital components and digital context, and inclusive of cloud provisioning and web accessibility.

**Adding Performance Digital Twins**
The iModel.js library supports functionality to create and curate iTwins fit for particular asset performance purposes, including 'agent' updating of data lakes for analytics visibility. This enables emerging AI and mixed-reality technologies to be advantageously applied throughout an asset's lifecycle, and across assets – relying, for assured fidelity spanning physical reality and engineering data – upon the necessary digital alignment, change synchronisation and immersive visualisation uniquely provided by *iTwin Services.*

Also at the conference, Siemens and Bentley unveiled *PlantSight*, a new range of cloud services to be jointly offered for as-operated digital twins of any process plants. PlantSight will provide increasingly comprehensive as-operated digital twin services, to incorporate Bentley's *AssetWise APM* with Siemens' operational technologies, MindSphere, and Teamcenter, for industrial plants' asset performance modelling. And to accelerate owners going digital, Atos and Bentley announced a new strategic partnership to create and curate performance digital twins.

Keith Bentley, Bentley Systems founder and CTO, said: "Our work with early adopters of iModelHub over the past year has confirmed to me that its unique strengths for alignment, accountability and accessibility find their highest and best use, in conjunction with our reality modelling technologies, for enabling project digital twins and performance digital twins. I look forward to actively working with users and external developers to create an open ecosystem of innovation for i*Twin Services*, leveraging the iModel.js library. I expect Bentley Systems to lead the infrastructure engineering community, as the 'infrastructure digital twin' company!"