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Networked digital twins are coming to industrial blockchains

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In the 21st century, industrial design often involves starting from a digital representation of some physical system to be built. Increasingly, this process creates a “digital twin,” which represents the connection between the representation and its physical realization in some deployed system or component.

Essentially, the digital twin is a data construct that mirrors the corresponding physical entity throughout its lifecycle. The twin is a complex data object that anchors tracking of the entity’s current configuration, state, condition, location, interfaces, sensor readings, operational characteristics, maintenance history and other attributes. In the process, the twin is the foundation for training, monitoring, maintenance, troubleshooting, optimization, simulation and other analytics-intensive processes that keep the physical entity in good working order.

Just as no digital twin stands alone from its physical counterpart, digital twins will increasingly interoperate within complex and distributed industrial systems. That’s where digital twins have come into the industrial “internet of things” in a big way. Case in point: SAP Monday announced its S/4HANA Cloud for Intelligent Product Design, a new solution that relies on the supplier’s digital twin technology to support data-driven collaboration among system engineering professionals within extended value chains. Embedded within SAP’s manufacturing industry solutions, the new offering provides manufacturers, suppliers, partners, service companies and other industrial stakeholders with a synchronized view of digital-twin information associated with physical assets in design, deployment and operation.

What’s most noteworthy about the announcement is how the company has built its architecture around the central notion that digital twins will be networked. The core capabilities of S4HANA Cloud for Intelligent Product Design are threefold:

- **Networked twin connections**: It supports twin-to-twin connections among physical assets or within specific assets.
- **Networked twin representations**: It synchronizes networked twins’ business data, product information, asset master data and IoT-connected data from both on-premises and cloud solutions.
- **Networked twin pipelines**: It provides an integrated twin data model that spans an asset’s lifecycle. It allows users to create, network, access and update twins to support complex business processes. It provides a shared global platform for collaboration in the design, deployment, management and governance of twinned physical assets. And it includes packaged integration to existing systems for computer-aided design, ERP and product lifecycle management.

Leveraging blockchains and other distributed data platforms, S/4HANA Cloud for Intelligent Product Design enables users to access real-time insights on distributed processes, as gained through machine learning and other embedded analytic tools. It lets process engineers monitor, optimize and troubleshoot distributed supply chains. And it provides a shared data store for engaging in collaborative R&D with internal and external participants.

It’s no surprise that SAP references blockchain as a key enabler — though not a prerequisite — for this networked digital-twin environment. As blockchains weave their way throughout the IIoT and other distributed supply chains, Wikibon expects that digital twins will take root within these distributed hyperledgers. Networked digital twins will become a foundation for IIoT blockchains everywhere, with the blockchains providing the immutable, trusted and distributed data-synchronization bus needed to tie it together from edge to edge. And as my Wikibon colleague Neil Raden recently noted, twins may even be extended in scope from physical assets to supporting networking among humans — patients, doctors and the like — in the increasingly industrialized healthcare industry.
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Here’s a good discussion of digital twin technology from a Wikibon research meeting late last year:
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