

7 WAYS TO IMPROVE DATA FOR SUPPLY CHAIN DIGITAL TWINS

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Enterprises are beginning to create digital twins of different aspects of their supply chains for simulation purposes. Various approaches to supply chain twins show tremendous value in sorting out supply chain bottlenecks, improving efficiency and meeting sustainability goals.

“Digital twins can be used to create digital copies of product lines, manufacturing systems, warehouse inventory and other processes that are then analyzed – allowing supply chain managers to extract data, predict supply and demand and streamline operations,” said Kevin Beasley, CIO at Vormittag Associates Inc., a company that offers integrated enterprise resource planning (ERP) solutions for databases.

Digital copies can mirror supply chain touchpoints, helping to streamline business operations by pinpointing the exact processes taking place. By implementing digital twin technology to align with

ongoing supply chain touchpoints and operations, companies can gain better insights into how to pivot and manage hiccups.

But enterprises face numerous challenges in transforming raw supply chain data into living, breathing digital twins.

“As supply chains continue to build up more data than ever before, the adoption of IoT technology and predictive analytics tools to capture and process this data and drive business insights has become increasingly important to the success of digital twins,” Beasley said.

Things are starting to improve. In the past, the use of digital twins was more challenging to implement as supply chain segments were more separated and data was siloed. Now, with the rise of cloud-based systems and automated supply chain management tools, digital twins are becoming increasingly

useful to predict trends, manage warehouse inventory, minimize quality faults and integrate one seamless flow of data.

Moving forward, Beasley expects to see the use of digital twins evolve alongside artificial intelligence (AI)-enabled modeling and IoT technology. For example, while IoT devices and sensors located throughout the supply chain have expedited the use of data to drive predictions on supply chain trends, the use of AI would make this system even more powerful.

As AI-enabled models advance, manufacturers will be able to utilize data insights and create digital twin technology that can transform their ability to streamline operations, predict inventory and cut down on waste.

Here are seven ways to transform raw data into actionable supply chain twins:

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Start with digital threads

Jason Kasper, director of product marketing at product development software provider, Aras Corporation, explains that it is essential to include the digital thread when planning out a digital twin. These must work in concert for practical analysis and decision-making within the supply chain.

In the context of a supply chain, he sees a digital twin as a representation of the configuration of all assets, including warehouses, manufacturing and supplier facilities, trucks, ships and planes. It also links to digital thread data such as inventory, location status and condition of assets.

By developing the backbone for a digital thread, organizations can weave together meaningful relationships, connections, decisions and who made them.

“Creating this complete view enables a full understanding of a specific supply chain’s status and the actions to keep it operationally efficient,” Kasper said.

Move from tables to graphs

Most enterprise applications capture data and put it into tables and the relationships or links between objects represented

by the data are only revealed when you execute a query and join the data — and joins are computationally expensive, according to Richard Henderson, director of presales EMEA at TigerGraph.

As a query grows in scope and complexity, this overhead makes queries across any reasonably sized digital twin too slow to be useful in the operational context, taking hours or even days. Businesses such as luxury vehicle manufacturer, Jaguar Land Rover, have found they can get around this problem by building their digital twin using a graph database.

When Jaguar Land Rover attempted to build a model of its manufacturing supply chain using SQL, testing revealed that it would take three weeks to run one query to view their supply chain for one model of a car over six months. When they built the model in TigerGraph, the same query took 45 minutes and with further refinements, this is being brought down to seconds.

A graph database approach allowed them to visualize relationships between business areas that previously existed in silos to identify critical paths, trace

components and processes in greater detail than ever before and explore business scenarios in a safe, sandbox environment.

Keep pace with data drift

Another big challenge for digital twins is data drift, said Greg Price, CEO and cofounder at Shipwell, a cloud based TMS solution provider. Teams need to ensure the data collected for the digital twin accurately and consistently represents the true conditions of the physical twin. Additionally, having the best quality data is key to deriving full value from a digital twin. This is slowly getting better as teams move towards streaming analytics, but the practice is not yet prevalent within the industry.

It is also not just the ability to have the data but the ability to understand it. Without good behavioral understanding, the interpretations run the risk of being off base, which can lead to poor decision-making. Companies need to build competency to understand how data drift can occur across the supply chain and then develop countermeasures to minimize its impact across each aspect of the supply chain, such as pricing and route management.

Bridge data silos

Because data is not standardized



and the digital systems used to manage the supply chain, such as ERP systems or warehouse management systems (WMS), were not created to be connected or share information.

Sam Lurye, CEO and founder of Kargo, a supply chain logistics and data solutions platform, explained that, “The biggest challenge in exchanging data is that it is extremely siloed across the supply chain.”

New companies are emerging to solve for this problem and they do so in one of two ways: aggregating existing data or generating a new data source.

Project44 is an example of a company that aggregates data from antiquated systems and makes it operational. Companies like Samsara and Kargo build their own unique data sources that create a source of truth with real-time, accurate data. The more real-time data you have, the better the digital twin.

Improving 3D capture

Even when supply chain twins are focused on modeling the relationships between suppliers and distributors, they can benefit from better 3D models representing products, processes

and facilities.

“When new items are introduced in a supply chain, as they often are in such a dynamic environment, there’s the challenge of ensuring that all components are continuously updated, as the representation must work hand-in-hand with the data to maintain the correctness of this solution,” said Ravi Kiran, CEO and founder of SmartCow, an AI engineering company.

Efforts in photogrammetry are attempting to tackle the issue through automation, but the technology has to evolve before it can be used in complex supply chain applications.

Include subject-matter experts

It takes a concerted effort to integrate with appropriate systems to ensure a robust digital twin is configured.

“The challenge to making this work well is having the required subject-matter experts step back from the daily management of the supply chain and its processes to support the configuration of the digital twin,” said Owen Keates, industry executive for Hitachi Vantara’s manufacturing practice.

These experts understand how

real-world processes integrate into the flow between ERP, supplier and third-party logistics systems, through to point-of-sale systems.

“Such investment in time from supply chain specialists will ensure that not only is the digital twin a true representation of the real world, but it also gets the team deeply invested in the digital twin and expedites the adoption of the digital twin process,” he added.

Leverage the cloud

Cloud providers are starting to provide a staging ground for consolidating supply chain data across business apps and even across partners. For example, Google Supply Chain Twin brings together data from disparate sources while requiring less partner integration time than traditional API-based integration.

“Since Google Cloud launched Supply Chain Twin, customers have seen a 95% reduction in analytics processing time, with some companies dropping from two and a half hours down to eight minutes,” said Hans Thalbauer, Google Cloud’s managing director of global supply chain, logistics and transportation.

Until recently, large companies only exchanged data based on



legacy technologies like EDI. A cloud-based approach can not only improve data sharing across partners, but it can also lower the bar for weaving in contextual data about weather, risk and customer sentiment to gain deeper insight into their operations.

“Our vision for the supply chain is to change the world by leveraging intelligence to create a transparent and sustainable supply chain for everyone. Building an ecosystem with partners on data, applications and implementation services is a top priority to enable this vision,” Thalbauer said.

Supply chain leaders are also starting to take advantage of

Microsoft’s digital twin integrations.

“Microsoft Azure could be a game-changer for many industries that rely on internal and extraneous data sources for their planning and scheduling,” said Yogesh Amraotkar, managing director of NTT Data’s supply chain transformation.

Azure also provides tools that make it easier to combine real-time sensory data using IoT Hub with the visualization of the supply chain elements with IoT Central.

Blue Yonder’s software-as-a-service solutions for the supply chain are built on the Microsoft Azure Cloud, which is growing

rapidly across the globe.

“Supply chain planning in the cloud, in the form of SaaS solutions, has already become the norm in the supply chain software industry,” said Puneet Saxena, corporate vice president of global manufacturing high-tech at Blue Yonder, a supply chain management provider.

Linking an ecosystem of data providers still requires time and implementation effort, but once established, these automated linkages can keep operating successfully without excessive human effort and trends in this vein of technology are likely to continue.

