
Can a supply chain digital twin make you twice as agile?
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# Contents



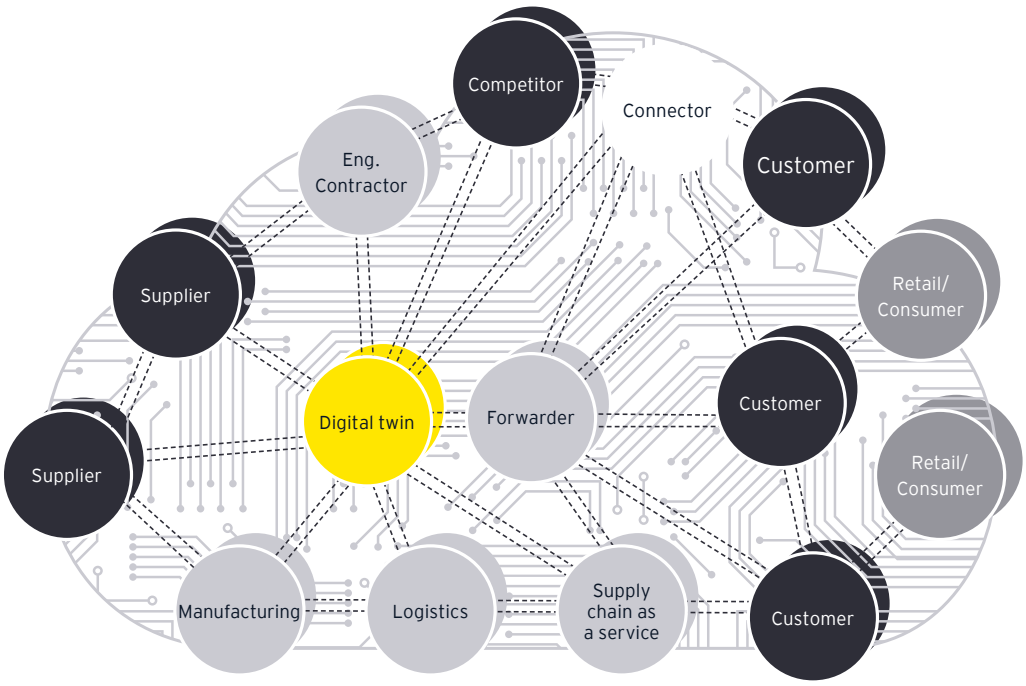
# End-to-end supply chain visibility and agility

Companies today find themselves with supply chains designed for a world that no longer exists, with the COVID-19 pandemic and geopolitical pressures globally being the latest disruptions in an ever-changing business landscape. Companies need greater visibility, agility and flexibility to address today's crises and prepare for tomorrow's — but traditional methods won't work in increasingly nontraditional times.

Thanks to emerging technologies and new platforms on the market, we now have a better answer to this conundrum: digital twins. A digital twin is a virtual model of the physical end-to-end supply chain. Digital twins can be a cornerstone of a company's digital strategy. Data from various sources and systems across a supply chain network — from Internet of Things (IoT) sensors and signals from GPS devices, for example — is connected to create a virtual replica, containing the same supply entities, parameters and financial targets (see Figure 1). Digital twins enable data-driven decisions using real-time data, and improve agility in both sensing and responding to disruptions like the COVID-19 crisis.

During an EY webcast in April 2020, participants cited end-to-end visibility as the number one factor for creating a successful supply chain — yet only 6% were very confident in their systems and capabilities to fulfill that need. And just 10% felt that they were equipped to address the fallout from COVID-19 in their supply chains. We have more and more clients thinking of digital twin strategy, organization and implementation. For example, one of our clients, a global chemical manufacturer, was facing major logistical challenges as soon as COVID-19 hit. In a short timeframe, we were able to help them develop a logistics network twin leveraging satellite analytics to monitor key ports (e.g., Norfolk, VA and Savannah, GA) and run lane analytics to provide decision-makers with deeper visibility into potential impacts around cost to serve and lead times. As a result, they were able to improve service levels above their pre-pandemic levels. Similarly, another client — a global consumer packaged goods (CPG) conglomerate was continuously able to get their products on the shelf, and in the hands of the consumer by driving capability, investment, capacity planning and demand signals

## Figure 1: **Creating a virtual replica of the physical supply chain**




Source: EY analysis.

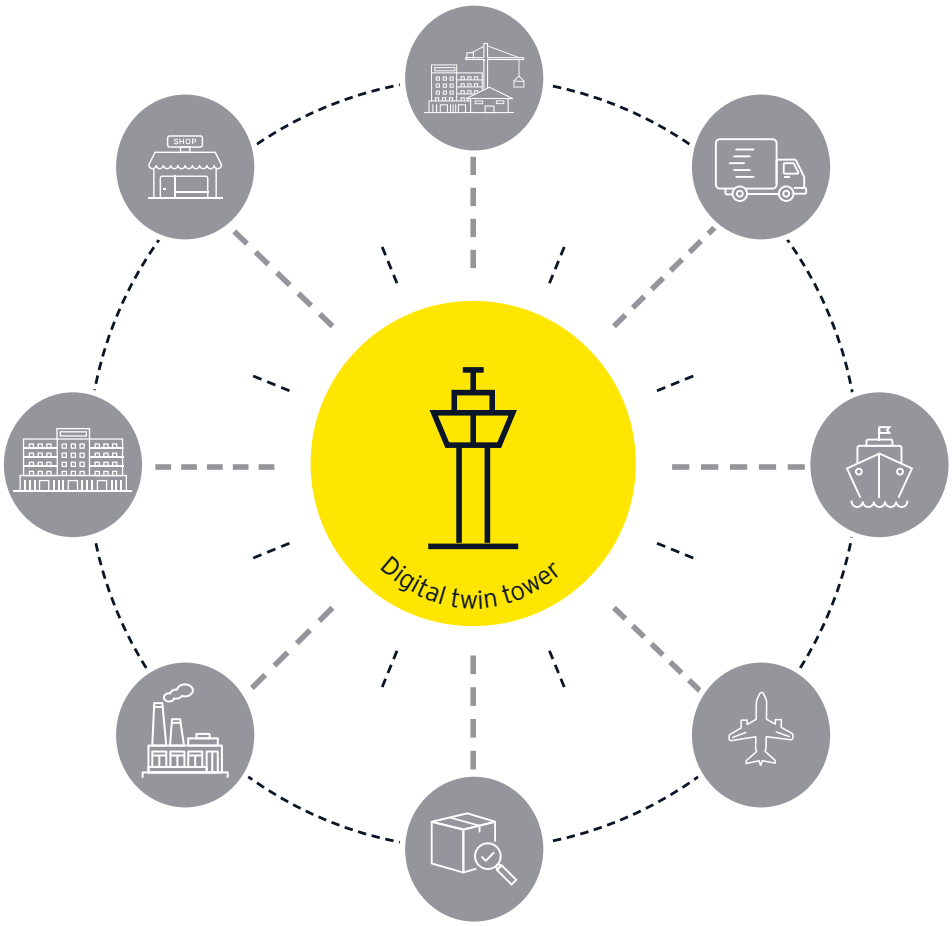
through simulating their supply chain in a virtual digital twin. With digital twin implementation, they are now geographically well positioned to serve customers in the most cost, cash efficient and sustainable way.

Covering the entire supply chain or just a part, digital twins have two varieties that are worth exploring, offering greater connectivity and visibility to support prescriptive decision-making:

## 1. Operational

As the name indicates, these digital twins – also called a "control tower" – connect to operational systems and bring in data to monitor the end-to-end supply chain in real time and predict areas where disruptions are potentially developing, helping leaders respond proactively in the moment. It is always on and connected (see Figure 2).

Figure 2: **Operational digital twin**




Source: EY analysis.

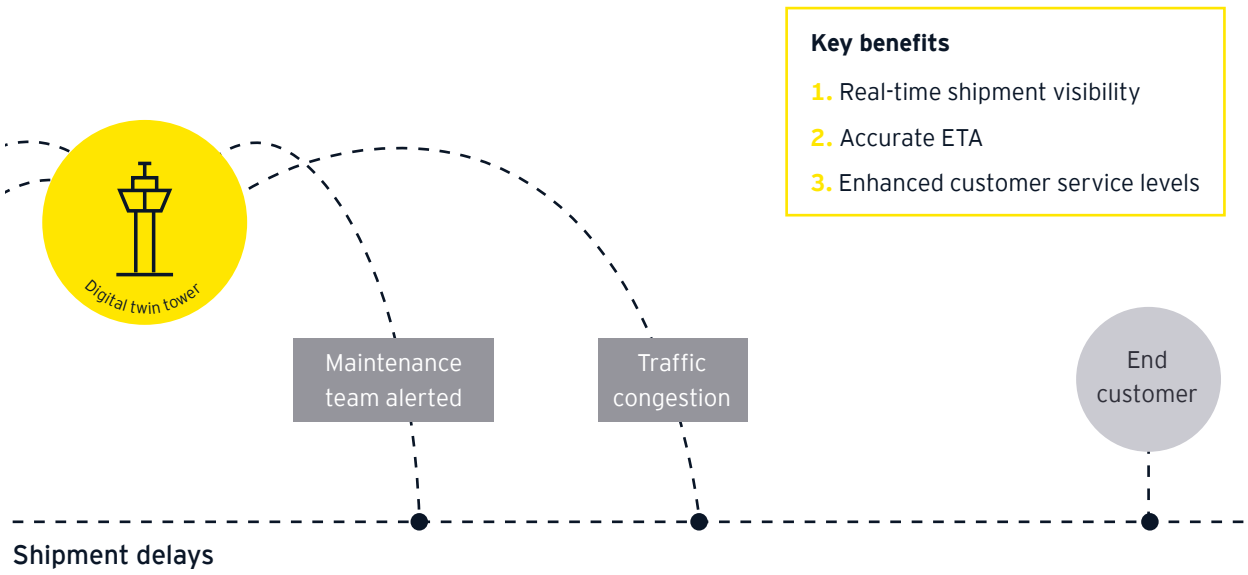
## 2. Strategic

These would serve as virtual laboratories where you can experiment with different scenario simulations on how to handle disruptions and devise new ways to optimize your network and inventory. These are more future-focused and may be connected to operational systems, and they are typically leveraged more on a monthly or quarterly basis (although, as capabilities evolve, more real-time uses are likely).

# Digital twins in action

In practice, a control tower can detect shipment delays by examining signals from GPS devices and comparing expected and scheduled times of arrival (see Figure 3). Root cause analyses can be performed to not only suggest solutions but alternatives for other customer orders, such as shipping from another warehouse. Similarly, in response to a crisis such as the pandemic, a control tower can use system thresholds on orders (like cancellations) to detect shifting demand patterns and even recommend changes to production levels of certain products as a result. During a natural disaster, IoT sensors on production equipment send a signal about unplanned shutdowns to control towers, which can then look for alternate product sources and then indicate when impacted customers should be informed.

## Figure 3: **How shipment delays can benefit from a digital twin**




Source: EY analysis.

A strategic twin can help inform long-term decisions by including simulation and optimization capabilities across the end-to-end supply chain. Imagine a situation where a future tariff change creates competitive pressures on your business model. How would you react? Traditional methods would necessitate significant manual effort, sacrificing time and often ceding the competitive advantage to competitors. A strategic digital twin can help identify and estimate the impact to your business in near real time.

In addition, it can help model alternatives and determine a network design that allows you to optimize across your chosen parameters. In the recent months since COVID-19, EY clients have also increasingly begun to explore long-term onshoring as a means of managing their operational resiliency. For those with physical supply chains, this increases the need to make decisions based on a multitude of factors — present and future demand patterns, operational and capital expenses, and service levels, among others.

A strategic digital twin allows companies to simulate these scenarios and enable more proactive and informed decision-making. In addition to these use cases, the applicability of strategic digital twins is vast. They can be used to solve for pressing needs, including modeling supply chain risk, and helping the business structurally minimize delivery times, among many others. In a time where agility is more important than ever, a strategic digital twin helps drive substantial value to the end-to-end supply chain.

Experience from EY teams indicate that digital twins add agility and drive better decision-making that can provide a significant impact to a manufacturer's bottom line.

## Digital twin technology provides tangible benefits to a company's P&L

Annual

**1% to 2%**

**Revenue growth**

- Increased fill rates (on-time and in-full)
- Increased speed-to-market
- Increased strategic sales

Annual

**10% to 30%**

**Planning efficiency (SG&A)**

- Decreased manual intervention, duplication of efforts

One time

**5% to 10%**

**Inventory reduction**

- Improved inventory visibility and reliability

Annual

**5% to 10%**

**Increased throughput**

- Revenue growth
- Improved on-time delivery
- Improved working capital

Annual

**10% to 30%**

**Reduced expenses**

- Reduced expedited logistics costs
- Reduced returns
- Reduced fines from shipment delays

Annual

**10% to 20%**

**Reduce inventory write-off**

- Reduce excess, obsolete, damaged inventory

Source: EY analysis.

# Digital twins: different considerations and road maps

A digital twin is a bolt-on solution in most cases: a vendor provides functionality that leverages data from existing sources. But the two types (operational vs. strategic) differ significantly in the level of detail that they analyze, the immediacy of the data needed, and the type of outcomes envisioned.

Control towers drive visibility into individual shipments and enable detailed operation-level alerts, requiring more thorough integration and a robust connectivity structure (involving technologies such as the cloud, 5G networking capabilities, IoT and GPS), and they impact more end users. Promising solutions exist on the market today for enabling controls towers, which would have been impossible just a decade ago.

By contrast, a strategic digital twin looks at the end-to-end supply chain through a more aggregated lens, involving data points concerning overall inventory, service levels, network optimization and others. These digital twins can be connected directly to an organization's ERP system, or information could be leveraged through more manual data downloads. Currently, the solutions on the market for these digital twins are less mature and not comprehensive.

As the two digital twins are distinct, they should each be approached differently, with distinct road maps, to be future-ready.

| Focus area | Control tower | Strategic digital twin |
|---|---|---|
| 1. Data | ▸ Cleansed master data<br>▸ Data rationalized across many sources<br>▸ Real-time data integration across multiple systems | ▸ Business growth plans<br>▸ Cleansed master data<br>▸ Historical transactional data |
| 2. Technology | ▸ Connected infrastructure (such as 5G, IoT and integrated cloud)<br>▸ Machine learning and analytics to provide predictive visibility, for example<br>▸ Control tower technology vendor | ▸ ERP system<br>▸ Digital twin technology vendor |
| 3. Processes | ▸ A structured operating model with corresponding processes that transcends functions, business units and regions<br>▸ Digital process mining<br>▸ Harmonization/simplification of data<br>▸ Tool customization<br>▸ Sustainability measurements | ▸ Revisit digital twin whenever there is a possibility of a disruption or at least every six months to refresh network analysis and make sure all optimization opportunities are being utilized to their fullest extent |

Source: EY analysis.

Like other types of technology, digital twins also trigger a need for organizations to rethink the roles and responsibilities of human talent. The adage of today is "Technology will make things possible; talent will make them happen" — the technology is an enabler, rather than a replacer, and a manufacturer's professionals will need to learn how to use different tools and draw on different skills.

Stakeholder analyses and engagement should be used to align on goals/KPIs for workgroups, and with those defined, an organization can better pinpoint the competencies needed to deliver. External (or in-house) tools can be used to identify gaps. Then focus resources on hiring the right talent and upskilling existing talent — for instance, through a qualifications program with rewards aligned to the business strategy. A culture of continuous learning is imperative, and external groups and alliances can be called upon for learning solutions or managed services.

These needs are similar for both control towers and strategic digital twins, although there are some differences to note. Control towers rely on a larger base of end users, at the planner/scheduler level, while strategic digital twins are more narrowly tailored to the manager level, including product, supply chain, finance and commercial directors. Control towers also require talent that is more focused on root cause analysis and remediation, while strategic digital twins enable executive decision-making.

# Conclusion

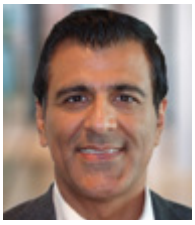
Companies face supply chain challenges today that are virtually unprecedented in modern times, and they should expect further disruption on the horizon. But while these challenges and the complexity of global operations are enormous, emerging technologies have also redefined what's possible: delivering visibility where it has never existed before, bringing order to data that spans the globe, and replacing gut instincts and guesswork with analytics-driven insights. Whether a manufacturer wants in-the-moment operational responses or long-term strategic simulations, digital twins bring together cutting-edge advances to enable flexibility and agility — competitive advantages that will grow more necessary in an ever-evolving world.

# How EY can help

Every transformation starts with an inspiration. At EY, we are creating an immersive experience where solutions like digital twins come to life, and the experience is personalized to your needs. The **EY-Nottingham Spirk Innovation Hub** in Cleveland, OH is where your transformation journey begins by co-creating your transformation roadmap and co-innovating with ecosystem partners.

*Contact us for more information.*

# Contacts

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Working across assurance, consulting, law, strategy, tax and transactions, EY teams ask better questions to find new answers for the complex issues facing our world today.



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