

16-page digital and printed guide Dexory

Landscape and portrait versions

DEXORY
Digital twins
How data-led intelligence and digital twins are driving innovation in warehouses

Introduction Evolution of digital twins

1 A digital twin is a real-time (or near real-time) virtual representation of a physical asset, system or process that exists in the real world.

2 Digital twin data-rich solutions enable accelerated access to value-additional strategic and operational data insights.

3 Digital twins help companies better use their processes, equipment and product data. They deliver a veritable step-change in operations and can boost profitability.

So how does a digital twin really differ from a 3D model?

One issue is the divide between the digital and the physical world. 3D models represent a moment in time. It is when changes are made physically or to the data used for the simulation. Therefore, the representation is soon out of date.

Developments in technologies such as IoT, Internet of Things, Artificial Intelligence (AI) and Machine Learning have advanced development and capabilities. So today digital twins don't just reflect how things were designed or implemented originally, but can provide a picture of how they are actually operating in real-time, or in the past at a specific moment - or even a predicted simulation of the future.

Digital twins can consist of many different concepts, from full 3D models that visually replicate the real world to dashboards that provide data and integration in a user-specific relevant way. Of course, for any of these concepts to maintain an up-to-date digital reflection of a complex process or product requires a continuous stream of rich data.

Digital twins and real-time data

Using a digital twin, companies turn a simulation into a business tool that will increase productivity, optimisation and profitability.

To be truly productive, a digital twin requires three elements:

- The original object
- The digital twin as a virtual object
- The real-time data information.

A digital twin is the virtual model of a real thing in real time.

- A digital twin simulates both the physical states and behaviour of the thing.
- A digital twin is unique, associated with a single, specific instance of the thing.

A digital twin future for warehouse operations

Dexory believes digital twins within warehousing and logistics will be vital in achieving greater operational efficiency, profitability and complete supply chain integration.

What is a warehouse digital twin?

To understand a digital twin, we need to look at its predecessor CAD (computer-aided design) twin, a static simulation of something or a full or part of an object. In the case of warehouses, this is sometimes created when an architect designs and builds the space allowing what the area will look like. Or it may be created after the warehouse is fully operational. But no matter when it was created, it is usually always static. As changes are made over time, it's rarely updated or altered, often becoming just another file on a server or a printout in a binder.

But this is now radically changing through digital twins, which don't just reflect how something was designed but how it's operating and what is happening today. The digital twin in this context can consist of several things: an advanced 2D CAD representation, a 2D drawing or a 3D advanced data dashboard enhanced by a data layer and

AI technology. It doesn't matter whether the depicted area exists or will only exist in the future. A digital twin only functions to the full potential if it is maintained with up-to-date digital data, reflecting what is happening in real-time and allowing retrospective analysis. The more real-time data available, the more accurate the twin can be, allowing operators to learn to detect issues ahead of time, reducing loss of goods and improving efficiencies and profits.

The benefits of digital twins

- VISIBILITY / CONTROL** Real-time insight into operations enabling the operator to make informed decisions.
- UNCOVER TRENDS** Monitor data to correct operational issues and identify better decision-making.
- FORECASTING** Use trends to improve future planning, resource allocation and capacity preparation to 90%.
- SIMULATION** Test scenarios in digital twin before physical implementation to avoid costly errors.

DIGITAL TWIN CONNECTS DATA POINTS

- SUPPLY NETWORK** Track and optimise supply chain data points.
- TRAINING** Access remote data training and learning opportunities.
- SUPPORT AUTOMATION** Enable the potential of other automation solutions and maximise the benefits of automation.

Intelligent decisions

Most businesses recognise the transformational power of data, but as big data has got more prominent, many of its opportunities have remained relatively untapped. There have been barriers due to the enormous number of time-consuming processes undertaken to provide the data. Within logistics, often it takes several days or even weeks to cover the whole warehouse, making the data irrelevant or out of date. This limited accuracy comes in the way of the data revealing its full potential.

Large supply chain companies today use some form of business intelligence, usually a static interpretation with limited insight capabilities. The next step is to move to a real-time data insight company. Real-time decision intelligence makes available data-driven decisions available to companies. Automation and AI are now enabling the evolution of using data with real-time decision-based intelligence.

IN A RECENT POLL, SUPPLY CHAIN OPERATORS WERE ASKED: 'if you had a digital twin of your warehouse, what would you use it for?'

- 6,000 hours** Yearly, over 6 million errors are lost due to mislabelled or damaged items, according to statistics, while 6,000 hours are wasted measuring and tracking goods manually.
- 23 minutes** Other measurements reveal that over 23 minutes per pallet are wasted retrieving lost inventory.
- 11%** Moreover, 11% of goods have some level of case damage on warehouse arrival.
- 40 hours** With advanced robot scanning, a company can save 40 hours per operator every week, which otherwise would be missed on manual processes.

Better stock control 11%

Capacity planning and forecasts 17%

Simulation to test scenarios 14%

All of the above 58%

In practice

An integrative, real-time, data-driven 360-degree inventory management system enables businesses to gain greater visibility, improve efficiency, decrease over and under-stocking and enhance planning and purchasing. The system can also provide automated daily stock checks, which companies find they cannot perform effectively or timely manually, reducing the time and cost of collecting reliable real-time inventory data. This data supports managers in driving better business decisions and ensuring financial compliance by identifying gaps and inconsistencies as they occur.

Real-time data and the data points in inventory management

Logistics and warehousing are on the brink of becoming even more technology-driven and real-time data will be at the core of commercial success.

As supply chains have faced unprecedented challenges over the past few years, especially in the e-commerce sector, where **online sales increased by 108 billion GBP in 2021 from 53.24 to 59.12**, the need for highly efficient warehousing and inventory management has grown exponentially. The difficulty in finding the right labour and sourcing overhead costs have only added to the need.

In the world of business today, company supply chains compete as much as the businesses themselves. An integrative, real-time, 360-degree inventory enables companies to gain greater visibility, improve efficiency, decrease over and under-stocking and enhance planning and purchasing. A technology-driven and real-time data process provides automated daily stock checks, which companies cannot perform effectively manually, reducing the time and cost of collecting reliable real-time inventory data.

This data supports managers in driving better business decisions and ensuring financial compliance by identifying gaps and inconsistencies as they occur.

Additionaly, the technology reduces revenue leakage associated with lost, misplaced or non-compliant assets. Plus, warehouses that set rack space can see what space is available at any given time, increasing revenues by better utilising their racks.

This is why integrating data-capturing robotic and data-driven AI software will be an essential factor for the future of warehousing, automating operations and highly labour-intensive processes, enabling staff to focus on critical operations, setting space wisely and attracting new retaining employees.

Why capture real-time data in inventory management?

- To close the physical to digital data loop
- To reduce the cost, time inaccuracy and safety risks
- Increase productivity, efficiency and revenues
- Forecast more accurately

Digital twins in logistics and warehousing for inventory management

A digital twin provides value and insights through visualisation, analysis and prediction. A real-time digital twin creates a bridge between data from existing warehouse management systems with live data from within the warehouse.

A digital twin empowered system can alert if the data doesn't match, allowing the problem to be fixed immediately.

As a result of using this system, warehouse inventory counts can be eliminated, space can be better utilised and can reduce goods misplacement.

Differentiation between real-time in a digital twin vs WMS

Today's Warehouse Management System (WMS) is a set of integrations, connecting warehouse inventory to all areas of the supply chain which is accessed online and now often from the cloud. Combining the WMS with a digital twin offers a way to have complete operational visibility and integration of everything inside the warehouse.

The WMS only has the data as inputted. If these inputs are incorrect, the WMS will be incorrect. Hence, why a digital twin, using real-time data, brings the physical and digital together continuously. A digital twin helps errors in the WMS as soon as they happen, provided from the real-time data of the physical world.

This type of predictive model could even be used for labor planning. Suppose there is a peak season about to occur. SRP, unusual demand trends have changed the amount of work coming in. How much labour should your warehouse inventory account for in the upcoming season? The AI platform would use the historical, accurate real-time data, current inventory demand and other real-time factors to know precisely how many workers will be needed to fulfil all orders over a specific period. This would save warehouse costs and alleviate third party logistics' (3PL) concerns about peak season labour costs and shortages.

Business impact:

- More efficient operations - greater clarity on inbound and outbound loads
- Lower volume time - less hours per week saved without having to re-evaluate individual perpetual checks
- Increased financial benefits resulting by reducing the number of mispicks and non-compliance events

It was important for us to use the technology to real-time value to the operation. Where a warehouse that is an early leader in an industry can't afford to wait for a technology to come to it, it really is a matter of the time or the technology to come to it, it really is a matter of the time or the technology to come to it, it really is a matter of the time or the technology to come to it.

Rory Miller, Vice President Cargo Technology

Unlocking the power of your data Data = digital fuel

INBOUND

- Receiving: Receive, unpack, inspect, sort, label, store, track, and manage inventory.
- Put away: Move goods to storage locations, ensuring accurate tracking and management.
- Storage: Store goods in a secure and organized manner, ensuring accurate tracking and management.

OUTBOUND

- Dispatch: Prepare goods for shipment, ensuring accurate tracking and management.
- Picking: Retrieve goods from storage locations, ensuring accurate tracking and management.
- Storage: Store goods in a secure and organized manner, ensuring accurate tracking and management.

Key takeaways:

- Analyze and learn
- Test different scenarios before implementing them
- Storage analysis
- Map peaks and scenario planning
- Maximize capacity utilization

An artificial intelligence platform using its own big data, outside industry trends and real-time inventory information to know how fast a product moves and when to reorder. Imagine never running out of stock because replenishment is always ordered beforehand. Never waste space in your warehouse by carrying more products than are needed. This is the core to maintaining profitability by selling the right inventory while reducing the storage space of stagnant products.

Real-time actionable insight. All the time.

Powered by autonomous robots, Dexory view is the only platform that delivers real-time data and insights for the receiving, storing and dispatch stages, giving companies unprecedented real-time access to their operations from anywhere and at any time.

Real-time, all the time

You need insights across your whole business operations, in real-time.

Dexory delivers by layering data and intelligence over physical environments, using the myriad of data points collected by our robots from your physical space.

You send a constant stream of insights back to the cloud, giving you seamless back-end integration.

Data delivered by robots

Our fully autonomous robots collect real-time data on pallets, parcels and products as it passes through the warehouse, allowing for much better inventory control and condition reporting. This reduces misplacement errors, whilst ensuring that the right stock is available.

The data updates the digital twin platform.

Optimise processes

The warehouse's advanced and predictive analysis from the digital twin platform improves forecasting and drives more intelligent decision-making. Businesses can accurately forecast demand, plan inventory locations, determine stock demand value, and reduce risks.

Conclusion

Supply chains can self-monitor and be self-maintained by constant data exchange between suppliers, devices and logistics providers will be transformed into an intelligent predictive system.

Embedding data sharing through the supply chain is an important first step. To move and data segmentation. Real-time data fed digital twins in the supply chain turn the supply chain into a truly connected supply network, offering the ultimate visibility and efficiency required for growth and an integrated logistics industry.

Our vision is to enable companies unprecedented immediate access to their operations. Dexory's innovative technology is revolutionising warehouse and large storage area management everywhere.

Join us in making that next step.

About Dexory

Dexory captures real-time insights of warehouse operations using fully autonomous robots and Artificial Intelligence.

We make the complex simple. Using autonomous technology to unlock data and drive insights through all levels of business operations, helping companies boost their performance and maximise their full potential.

Our fully autonomous mobile and modular robots measure, track, and find goods across warehouses without workflow disruption. The data is fed real time into digital twins, allowing logistics and warehouses to quickly respond to operational challenges they face on a daily basis.

Instant access to real-time data helps optimise the present, define the future and discover the intractable. Founded in 2015, Dexory aims to transform the data gathering operations of warehouse environments.

Terminology explained

WMS - A Warehouse Management System (WMS) is a software solution that offers visibility into a business' inventory and manages supply chain fulfilment operations from the warehouse/distribution centre to the end customer.

Internet of Things (IoT) refers to the collection of objects that are embedded with sensors, software and data exchange capabilities to enable them to communicate and interact with each other via the internet.

Cloud computing is a delivery model for IT services, including computing resources such as servers, storage, databases, networking, software, analytics, and intelligence over the internet (the cloud) to offer faster innovation, flexible resources and economies of scale.

API (Application Programming Interface) is a software interface that allows two applications to communicate with each other. Open source software is a type of software whose source code is made available to the public so that other developers can use it.

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