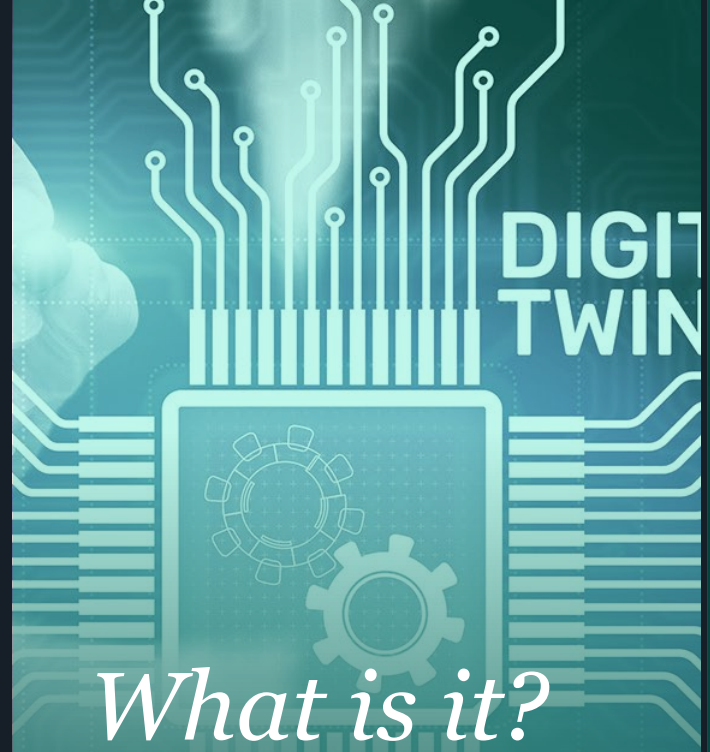
Unparalleled Warehouse Performance and Adaptability

DIGITAL TWIN TALK – LOGIMAT 24

Miebach

Let´s talk Digital Twin



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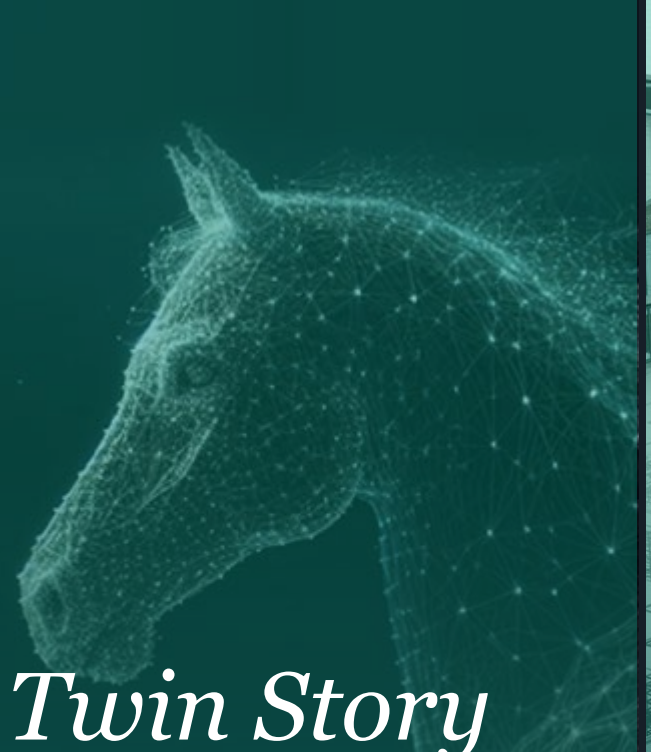

Twin Story

You want to see a Digital Twin in action?
We´ll share some insights…

Technology

What is the cutting-edge technology to materialize business value?

Success Factors / Enabler

A Digital Twin can be plug-and-play, if… you consider some important principles

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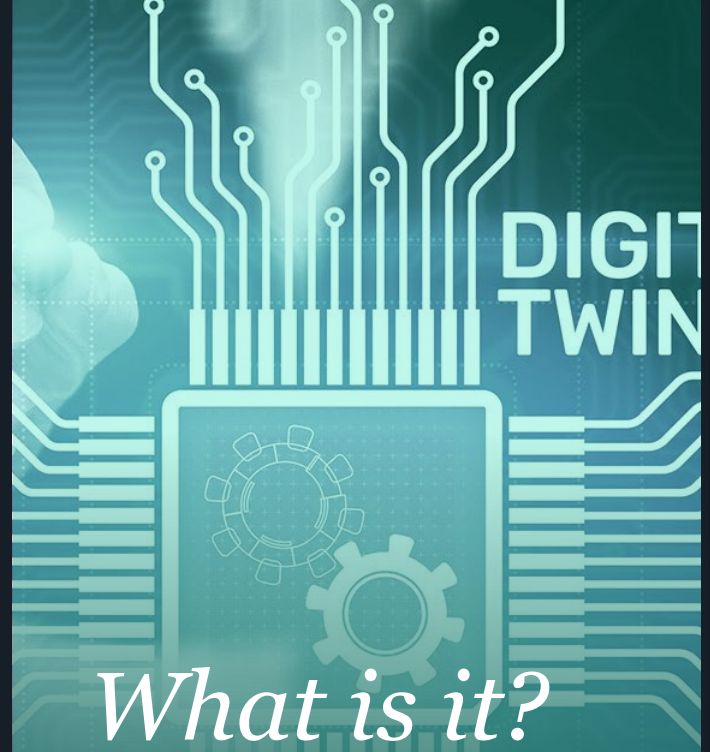

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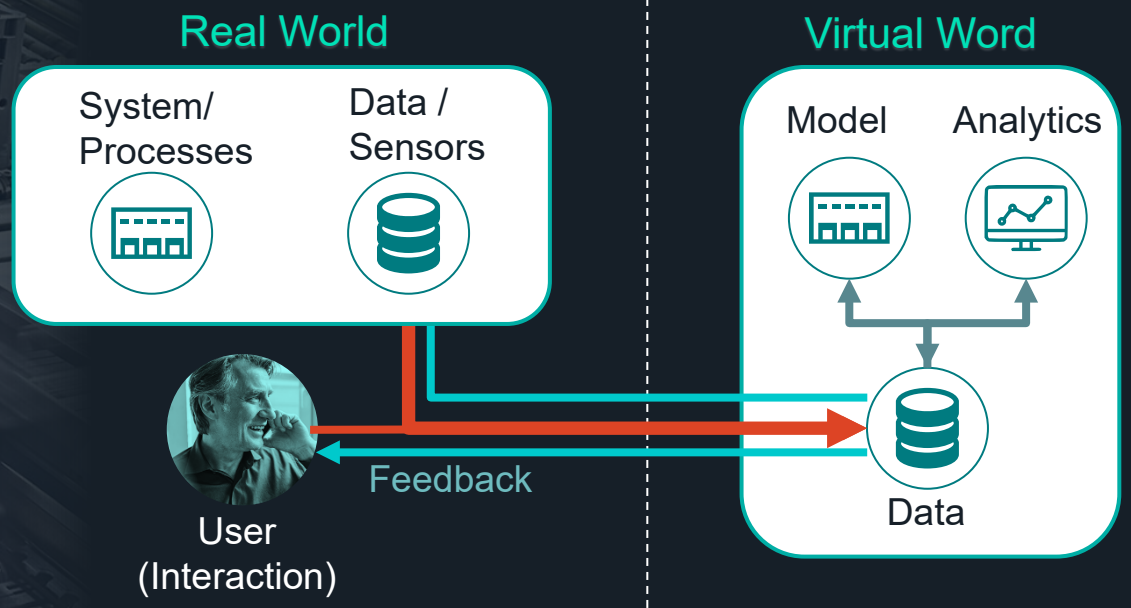
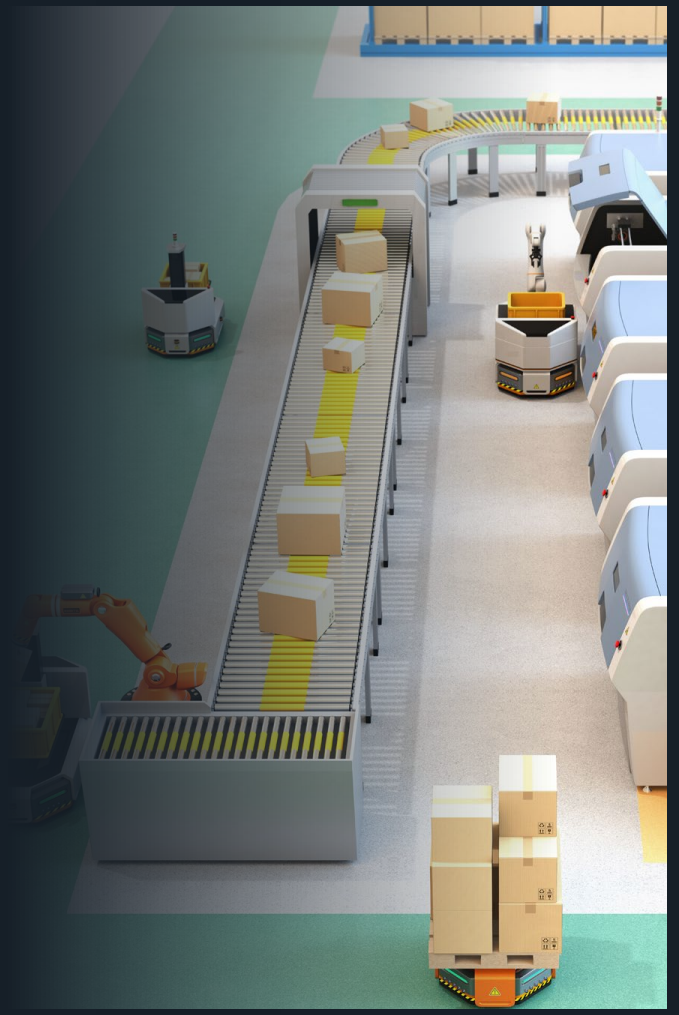
Digital Twins in Intralogistics
Decision-making through what-if-scenarios



What-if?



Our purpose: support customers in Intralogistics in capturing the full benefit of Siemens Digital Industry‘s automation & digitalization offering

To support OEMs in MHE making use of our technology in the entire value chain …

… to enable Operators of Automated Warehouses to capture the maximum benefits during the whole life cycle

As **technology partner**, we provide the most comprehensive portfolio to enable the **digital transformation in Intralogistics** – for OEMs in material handling equipment up to customers operating automated warehouses.

We enable our customers to **capture the benefits from Digitalization** along the **entire value chain** and the **whole life cycle** of the installation.

Through the seamless **integration of real and virtual world**, we support **increasing flexibility and productivity** of the assets and thereby **reducing cost and energy consumption**. We make real what matters in Intralogistics!

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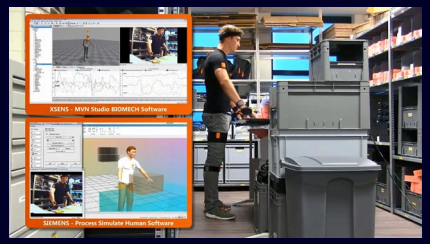
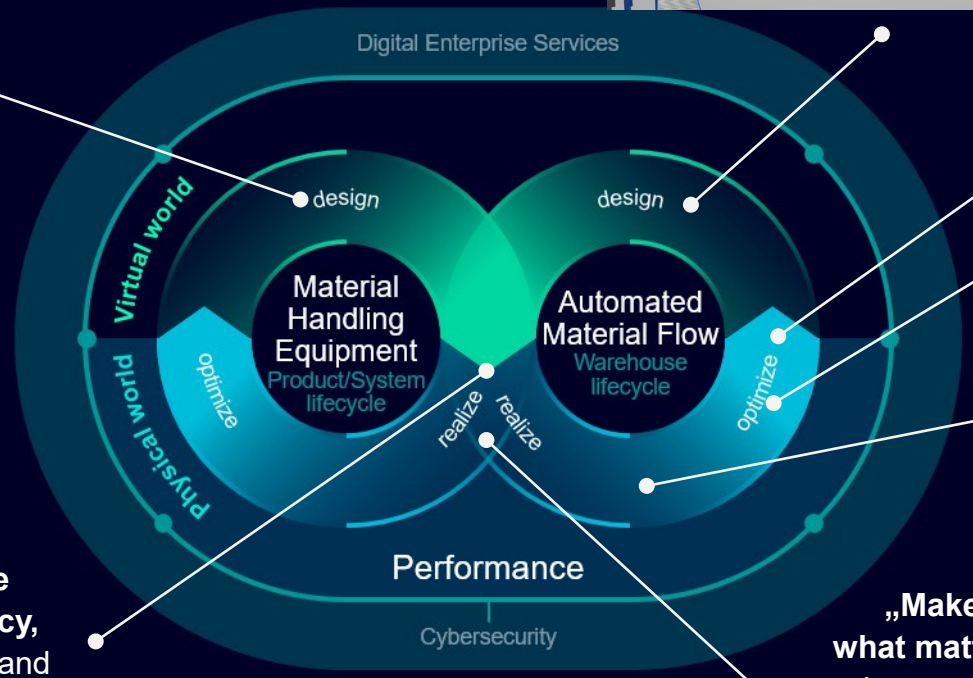
Digital Enterprise in Intralogistics

Connecting the virtual and real world today, for continuous optimization



Boost productivity in machine and workplace develoment by **collaborative multi-domain engineering processes**

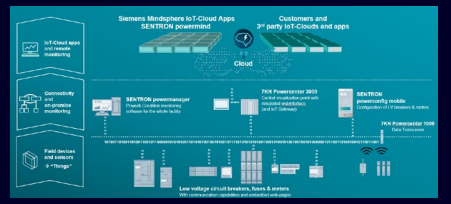
Shorten development time for **optimized material flow**

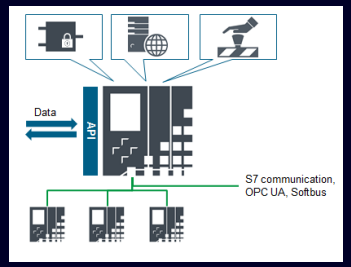


Maintain and optimize operations: Cloud / IoT based applications portfolio (Siemens or 3rd party built Apps)

Classical and digital **industrial services** incl. consulting offerings

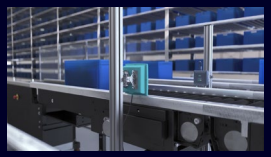
Provide efficient and reliable power management

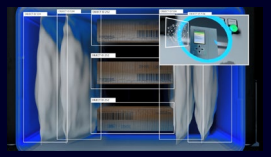




Improve efficiency, quality and enhance flexibility by **virtual commissioning**

„Make real what matters“ in operations execution for core applications by **DI‘s entire TIA Portfolio**





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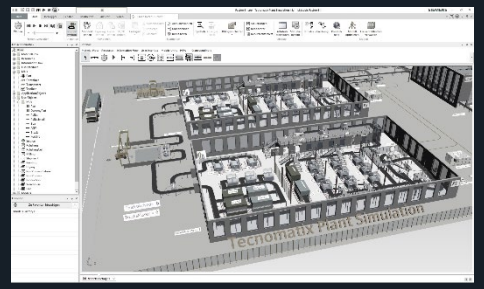
Miebach Digital
Simulation Models and Intralogistics Digital Twins

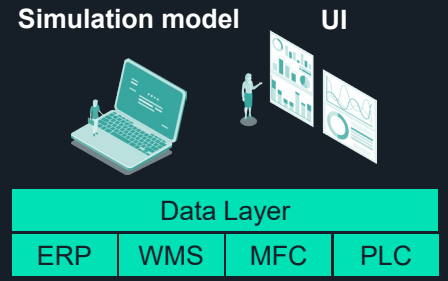
Simulation Models

- Virtual representations of physical objects
- Static data
- Expert use



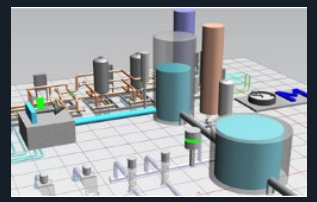
Digital Twins

- Same core models
- Near-real-time data
- User interface democratizing the model for non-expert use



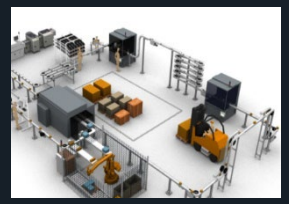
Conceptual Design → **Detailed Design** → **Implementation** → **On-going operation**

PoC Validation



Design quality assurance

Troubleshooting support



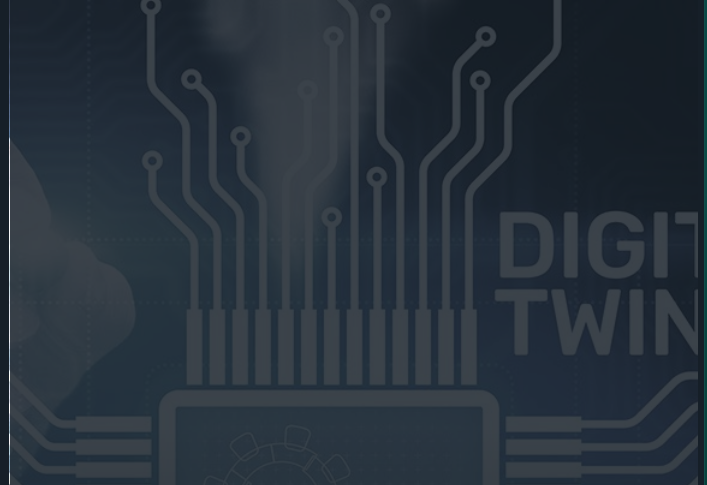
Assortment

Peaks

Prioritization & Balancing

Capacity

Let´s talk Digital Twin



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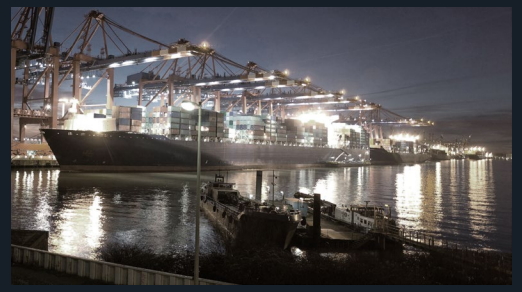
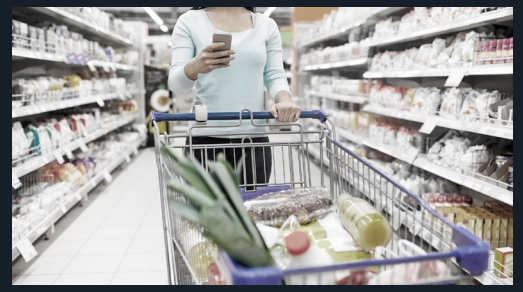
In our use case, growth and changing customer behavior drive the need to adapt existing intralogistics operations

Expansion



Assortment



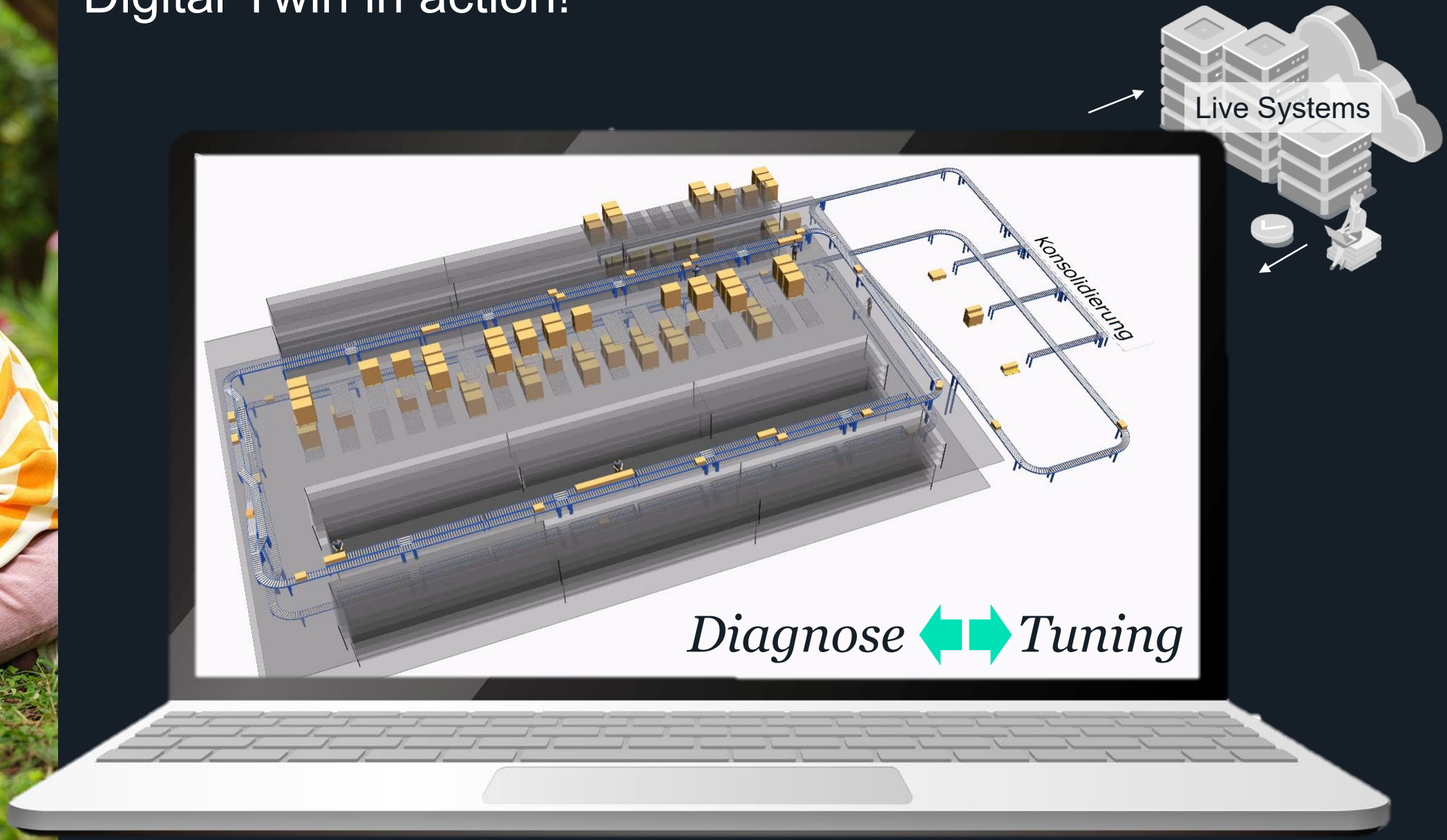
Brownfield

Challenges

- Equipment / Hardware not scalable
- Order-Mix
- Heterogenous Assortment
- Complexity
- Individual customer needs
- Service Level

ADAPTABILITY!

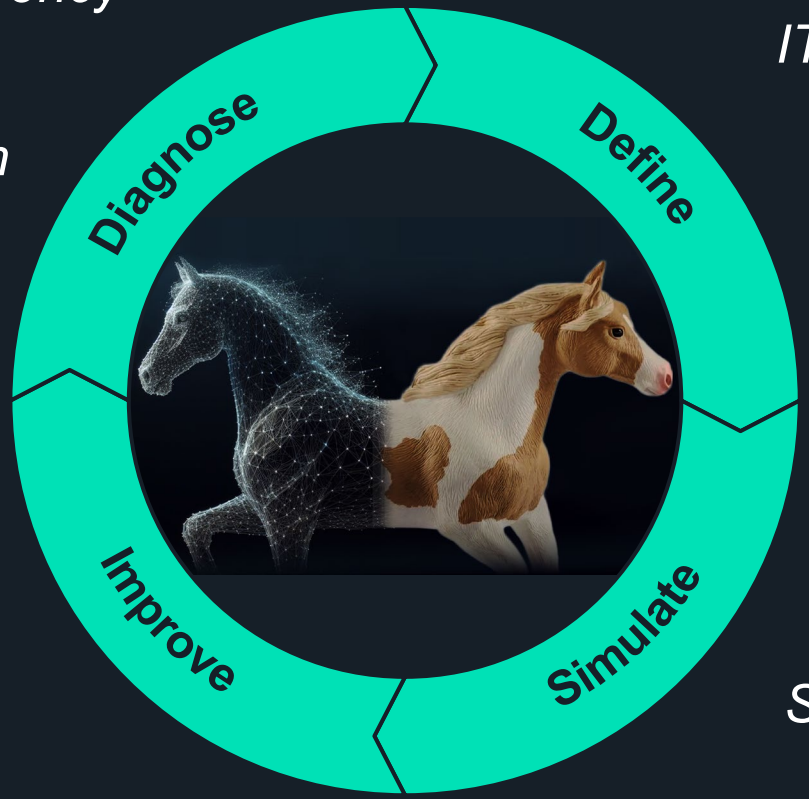
Digital Twin in action!



Smart Solution: Bottlenecks were detected, and effective counter-measures tested and implemented

Transparency

Bottleneck detection



IT-Strategies

Parameter tuning

Sensitivities

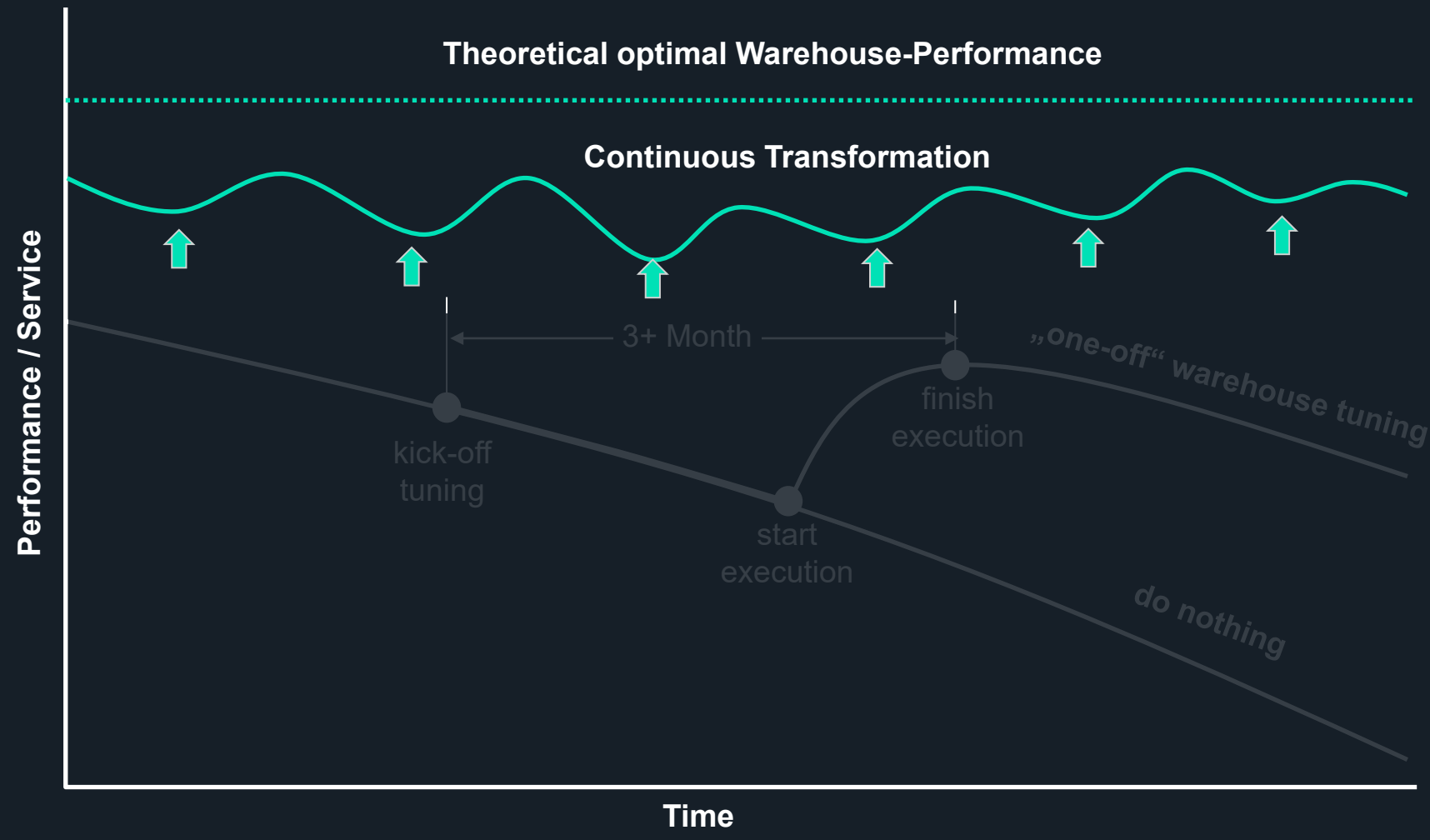
Stress-testing

9%
Reduction of replenishment efforts

33 %
Higher picking-performance

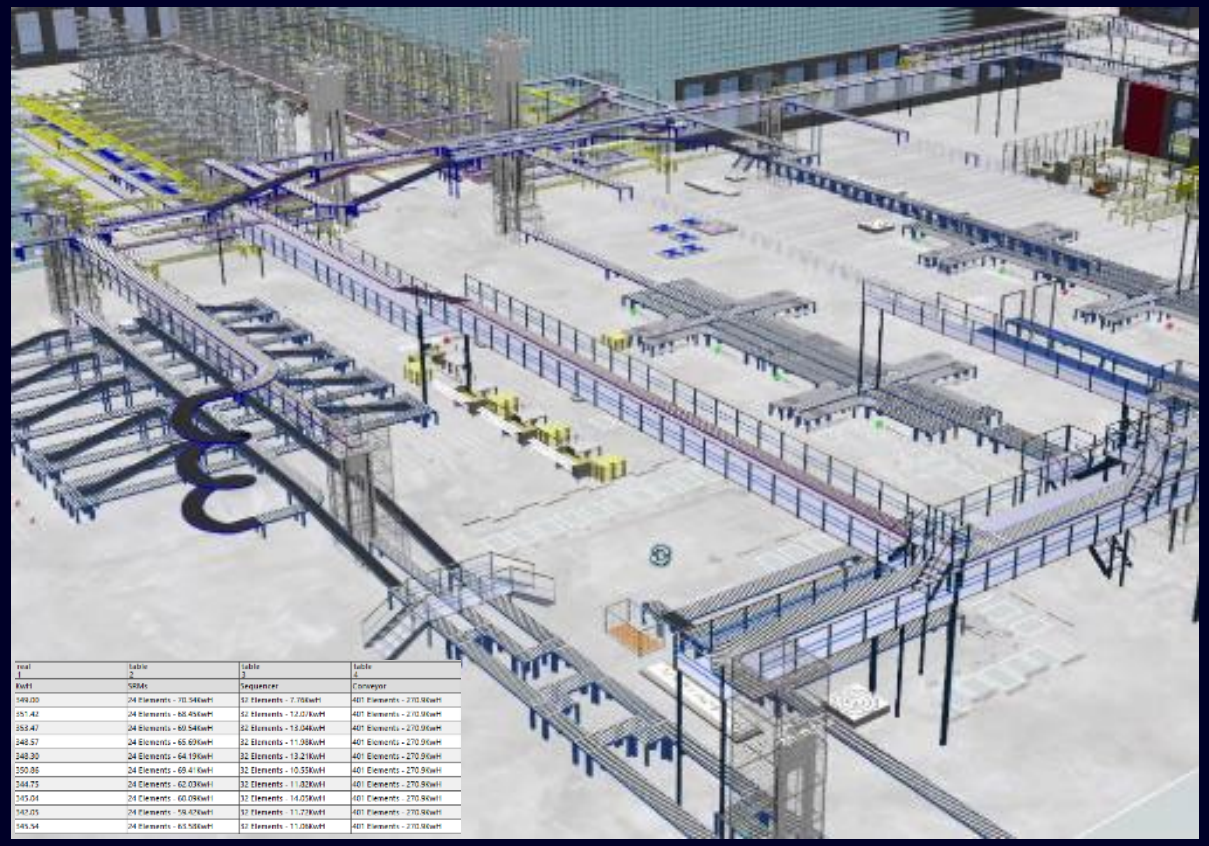
> 175T EUR
Savings p.a.

Digital Twin application has led to higher adaptability



Plan the right measures in Intralogistics: Identifying technology potentials by means of a Digital Twin

Digital Twin of the Material Flow



Use cases and benefits

- Feasibility of storage and material handling equipment concepts
- Optimization and verification of throughput scenarios
- Check against virtual PLCs or WMS software
- Verify and solve bottlenecks, optimize resource utilization (e.g. human workers and / or mobile robots)
- Robustness w.r.t to variable load scenarios and changed orders structures
- Feasibility of warehouse extension / partial technology upgrading
- Optimize energy consumption
- …
- Simulation model can be used beyond planning as core element of a “Closed Loop Digital Twin” during productive phase

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How to bring the Digital Twin alive:
Low-Code integration and calibration with Mendix

Material Flow Simulation

- Simulations of upcoming shifts, based on real list of orders, stock information and availability of workstations
- Run multiple Scenarios
- Prediction of energy consumption

SENTRON PAC Power Monitoring Device via SIMATIC Energy Suite

Mendix User Interface

- Low-Code application, easy to extend, also for non-programmers
- Easy access for shift-leads, IT, maintenance crew and management
- Can trigger multiple simulation runs and recommend the optimal worker configuration
- User can define the main optimization goal: performance, fulfillment rate or energy consumption

Real Warehouse Management System

- Shift planning information
- Order lists and stock information
- Order execution times

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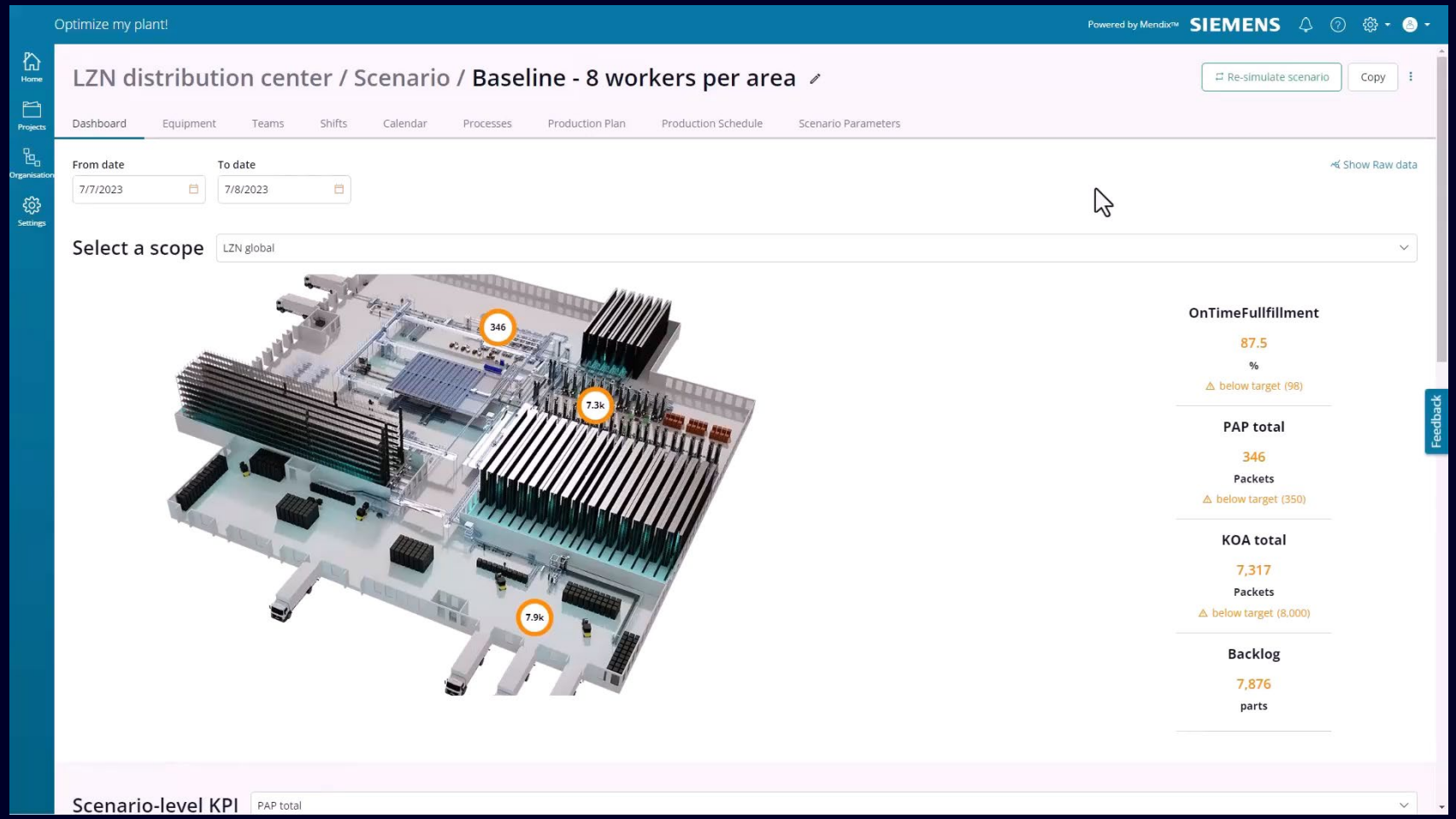
Close the loop with the Digital Twin to enable continuous integration

“Closed Loop” Digital Twin integration

- Automatically update the model with real information from the warehouse, needed for long-term use of the model
- Required every time a process changes or order structures are changing
- Keep accuracy of simulated outcome as high as possible
- Run multiple Scenarios
- Find optimal configuration of workers and workstations
- Compare user-defined worker configuration with simulated alternatives
- Identify operating mode with reduced energy consumption



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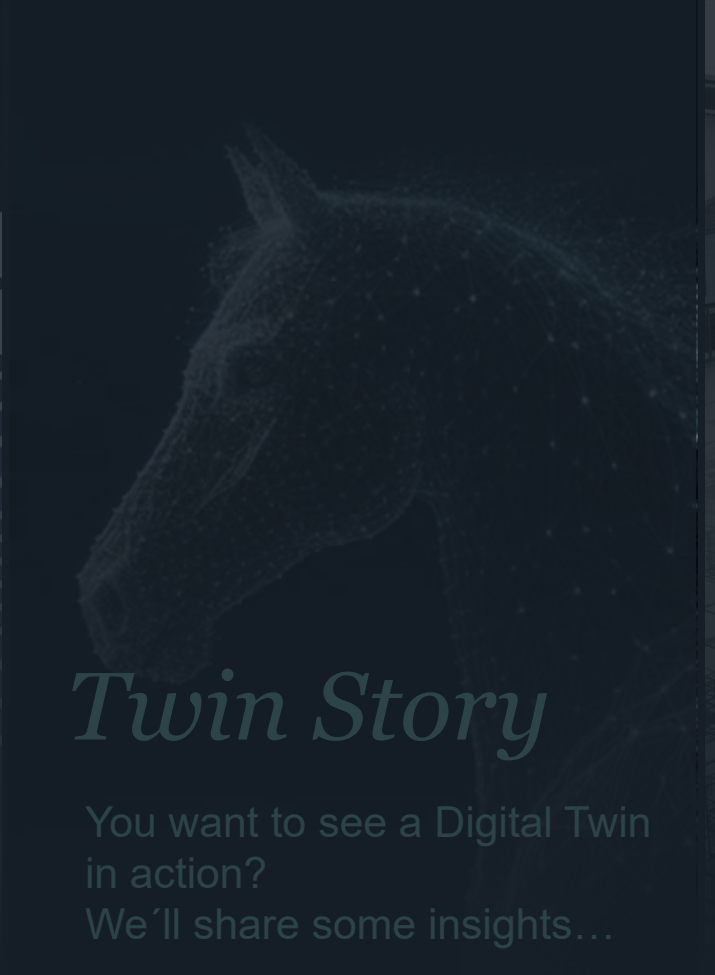

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A stable data-pipeline enables a high-frequent use of digital twin applications and hence a higher frequency in decision-making

System Landscape

ERP

WMS

WCS

PLC

Data Engineering

Digital Twin and Analytics

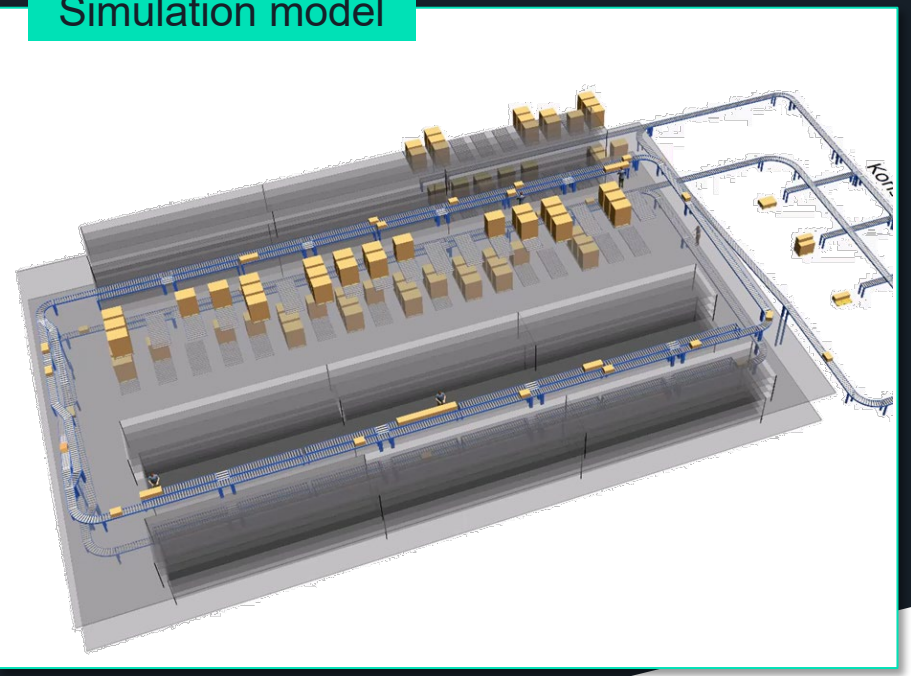
BI

Process Mining

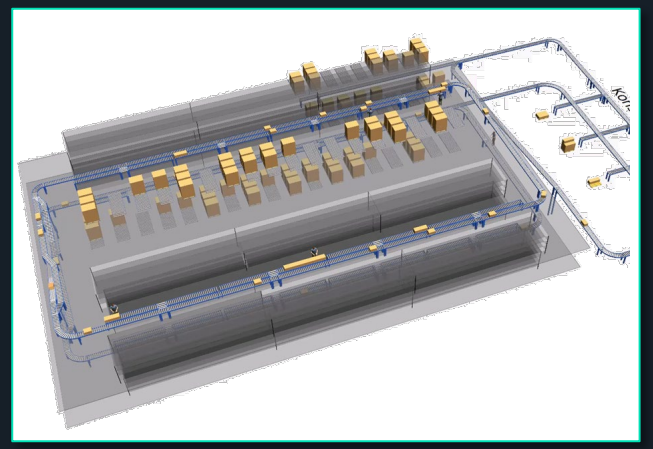
AI Engines

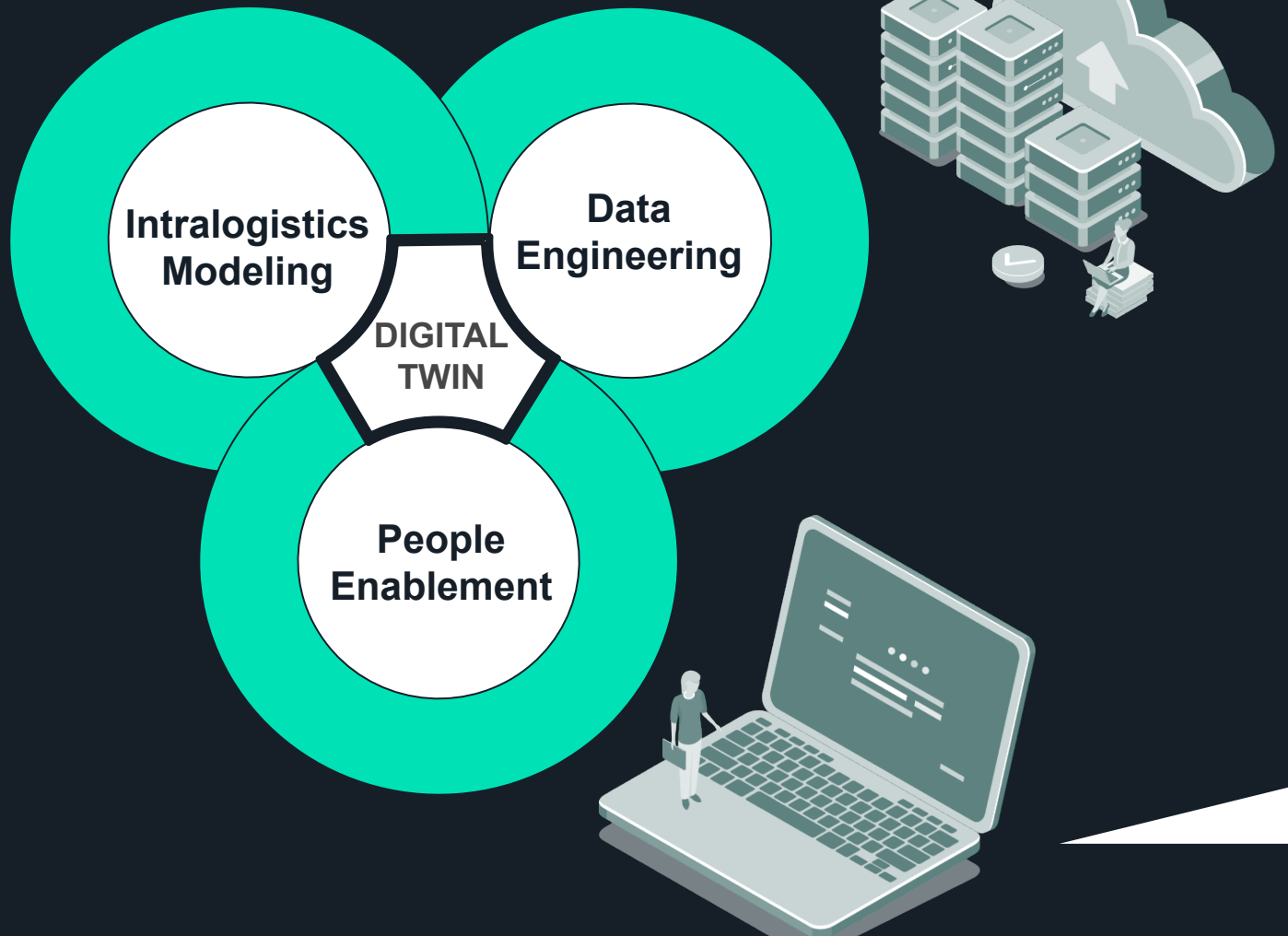
Simulation

Simulation model



Needed capabilities to run a Digital Twin application





Miebach Consulting – The Supply Chain Engineers

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