Johnson&Johnson x Capgemini

Factory Simulation

Digital manufacturing & continuity

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Factory Simulation enables faster, evidence-based decisions that improve performance with higher certainty

Why organizations need Factory Simulation

- Pressure to accelerate time-to-market while meeting regulatory requirements
- Increasing process complexity driven by new products and technologies
- Need to adapt rapidly in a volatile operational environment
- Operational decisions have long-lasting impact and must be validated before execution.

How Factory Simulation supports organizations

- Reduce lead times and production costs
- Increase throughput and OEE through identification of hidden constraints
- Accelerate ramp-up and technology transfer
- Avoid unnecessary CapEx and OpEx investments

Boost performance while reducing cost and investment risk without manipulating the real system

Examples: Internal Logistics

AGV Analysis

- A client from the aerospace sector needed to decrease the throughput rate of a wing component from 12 to 8 days.
- Key to this objective, the client wanted to commission AGVs facilitate the intralogistics movements. The client had conducted analysis and determined that they required 10 AGVs.
- Simulation provides detailed statistical insights as well as the ability to test what if scenarios and validate the correct number of AGV

Results

- ✓ Identification of the optimum number of AGVs, **moving from 10 to 7 AGVs, providing both CapEx and OpEx savings circa € 0,5M**
- ✓ Verification of achievable ramp up targets.
- ✓ Identification of the optimum battery management strategy, **reducing 15% further OpEx energy costs**

Internal Logistics Automation

- Need to define an efficient logistics system to support expected growth in production.
- Need to generate what if scenarios to evaluate alternatives to automation
- Need to define technical specifications of the new equipment and its system to ensure growth in production will be met

Results

- ✓ Identification of the **optimum intralogistics system**, substituting manual trolleys, **saving 10 FTEs**
- ✓ Verification of new system will meet required capacity to support production demand
- ✓ Facilitated specification of technical equipment to support business requirements

A clear vision, data and governance are the key ingredients for achieving the benefits provided by Factory Simulation

Main Challenges

- **Undefined Business Objectives**
  Without clear decision goals, simulation models become mere technical curiosities lacking strategic value.
- **Data Quality and Availability**
  Unstructured or incomplete operational data leads to inaccurate simulations and erodes stakeholder confidence.
- **Organizational Ownership Challenges**
  Lack of clear process ownership causes outdated models and unvalidated assumptions across departments.
- **Over-modeling and Talent Gap**
  Excessive model complexity and scarce simulation expertise hinder timely insights and model maintenance.

Main Pre-Requisites

- **Clear Business Objectives**
  Leadership must define specific vision and goals for this capability to ensure the right focus to deliver value
- **Data Readiness and Accuracy**
  Appropriated access to clean, relevant data from enterprise systems and knowledge to avoid incorrect analysis
- **Strong Governance Structure & Methodology**
  A systematic, well-defined approach towards simulation that is embedded within the business processes
- **Cross-Functional Collaboration**
  Ensure key stakeholders are involved and own both the digital asset created and analysis.
- **Appropriated tools and skillset**
  A simulation tool and skills align with the strategic vision to achieve

Fulfilling main pre-requisites must be main priority for organizations starting with factory simulation

Factory Simulation is evolving into a real-time, predictive decision engine for the entire manufacturing ecosystem

WHERE IS HEADING

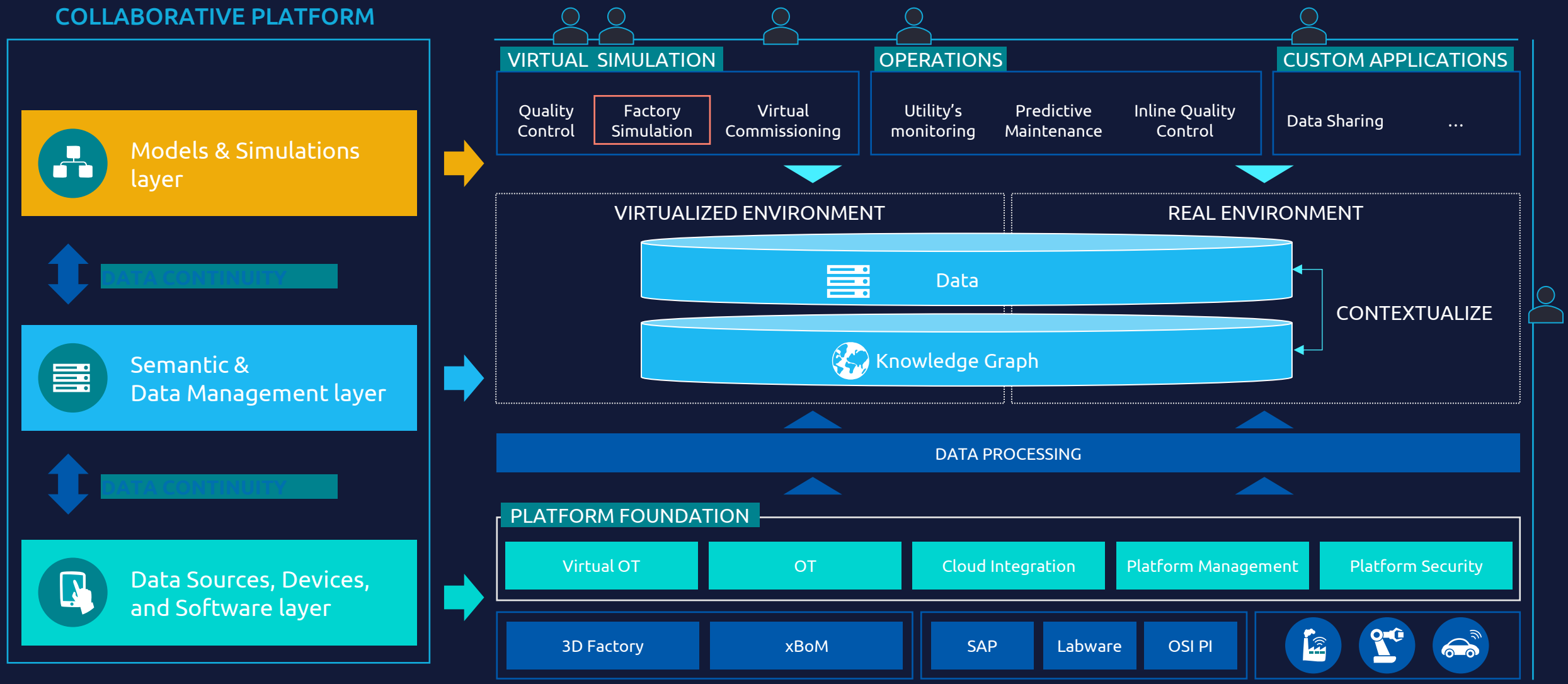
1. From offline models to living digital assets
2. From one-shot analysis to end-to-end virtual testing environments
3. From insight reporting to predictive decision making
4. From expert-only tools to business user automation

TECHNOLOGY ENABLERS

- **Real-time data connectivity (APS, MES, IoT, ERP)**
  Factory simulation becomes part of the production planning ecosystem, triggered by business events
- **Cloud scalability**
  Factories will run large-scale experimentations in minutes to identify best strategy under uncertainty
- **Integration with planning and financial decision**
  Organizations will embed simulation to complement CapEx planning, hiring forecasts and technology transfer decisions
- **Enablement of virtual sandboxes**
  Organizations will use virtual sandboxes to verify and validate changes before commissioning them
- **AI generated models & auto calibration**
  AI will accelerate the creation of models and make use of them to provide suggesting to factory or line managers

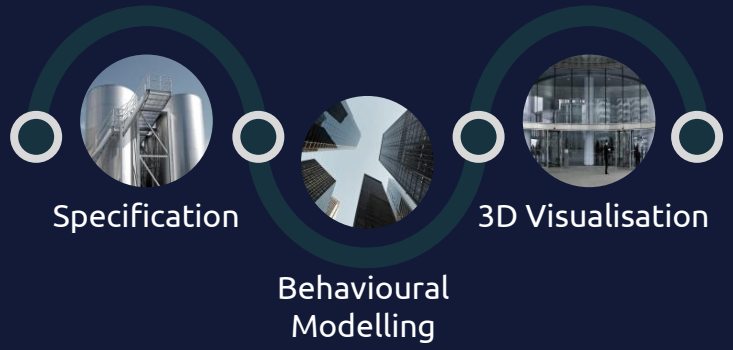
1 Digital twin architecture details

Digital twin is the combination of the virtual and real environments

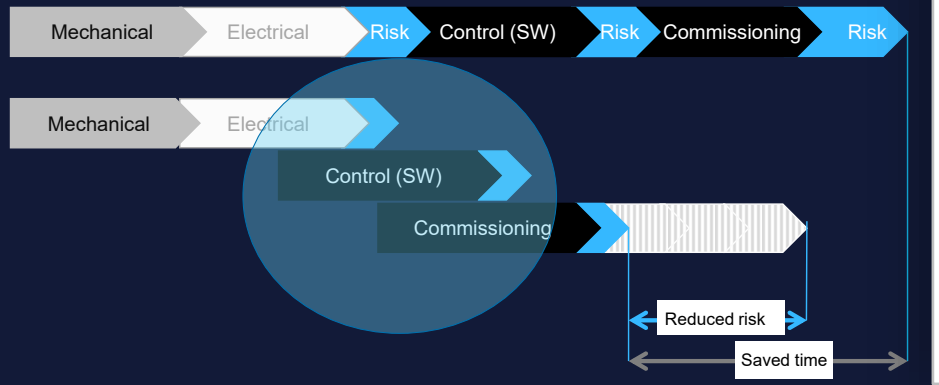


2 Virtual Sandboxes example:
De-risk integration with virtual commissioning

Virtual Commissioning



Commissioning can make up to 25% of the total project cycle time. (VDW 1997)



Virtual commissioning is the **practice** of using **modelling** and "virtual" **simulation** technology to "commission" - design, install or test - automation system with virtual machine model to **validate** software & upgrades **off-site** before you deploy it to the real system.

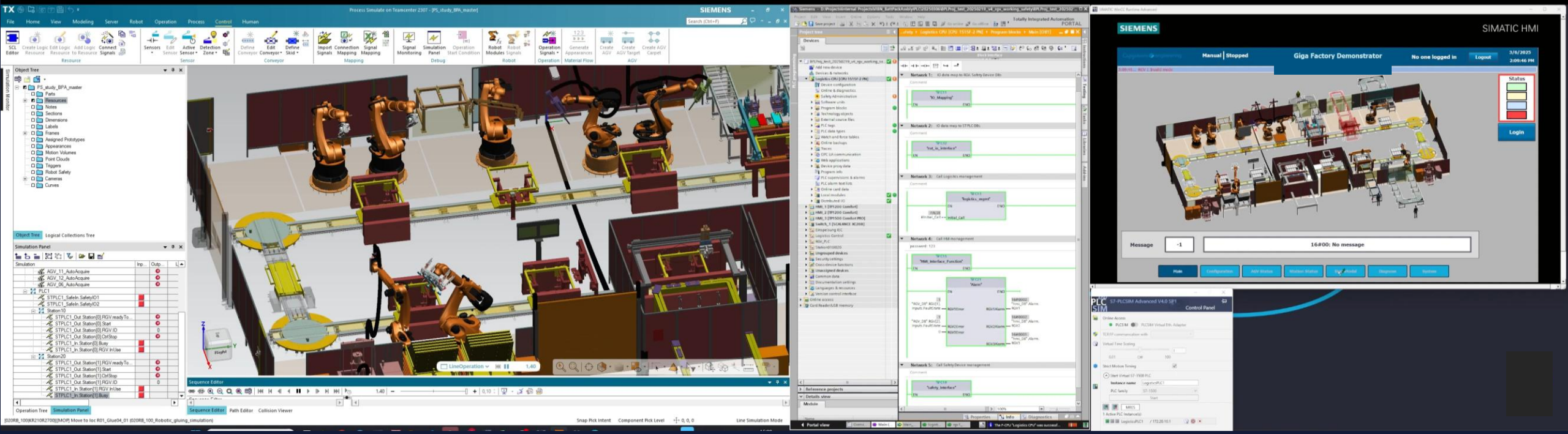
Save time	Reduce risk	Increase efficiency
Simulate effortless Debug realistic systems without real hardware	Ensure quality Verify logic, detect errors, prove quality	Ease operator training 3D simulation in best-in-class tools
Accelerate commissioning Optimized system integration	Efficient re-use Same data in simulation, reality, across projects	Convince your customers Create insight and trust with functional models

2 Virtual Sandboxes example:
De-risk integration with virtual commissioning

3D Environment

Manufacturing Software

Operation Panel



PLC Emulator

3

Production planning

Challenges & Opportunities

- A Naval Client is using simulation to support production planning within its Shipyard. This is due to the fact that there is a high level of variability and uncertainty on the duration of activities, requiring constant replanning and scheduling
- The client was looking to migrate its simulation models from Flexsim into Plant Simulation.
- Client was also looking to integrate simulation model with their PLM system to accelerate definition of the mBOM and Bill of process
- However, expertise was required to ensure model logic and behavior was successfully replicated in Siemens Software

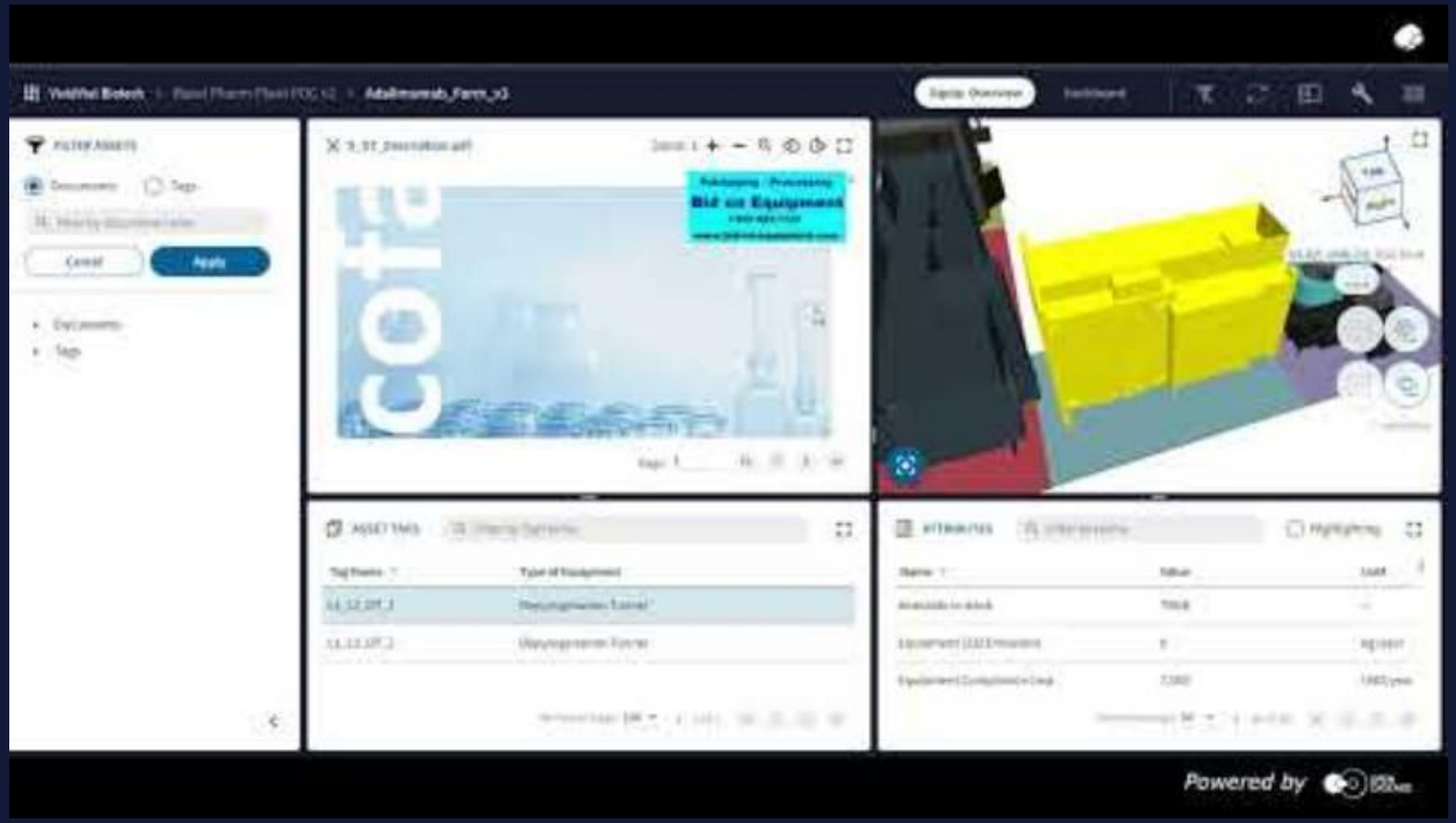
Solution

- Discrete Event Simulation (DES) or Factory Flow Simulation.
- Product Lifecycle Management Software

Results

- ✓ Time spent by production planners in –rescheduling and planning **was reduced up to 25%, saving potentially 50 man days**
- ✓ The model identify production flow improvements (reductions in lead time) **saving 1-5 days within original schedule.**
- ✓ The model was used to validate millionaire investment value of a new workshop built in the Shipyard.

4 Integration with planning and financial cycles: Line Configuration



4 AI Model Generation: Main software providers are starting to provide AI based solutions

https://blogs.sw.siemens.com/tecnomatix/introducing-the-ai-powered-copilot-for-siemens-plant-simulation-software/

AI Powered Copilot for Siemens Plant Simulation software

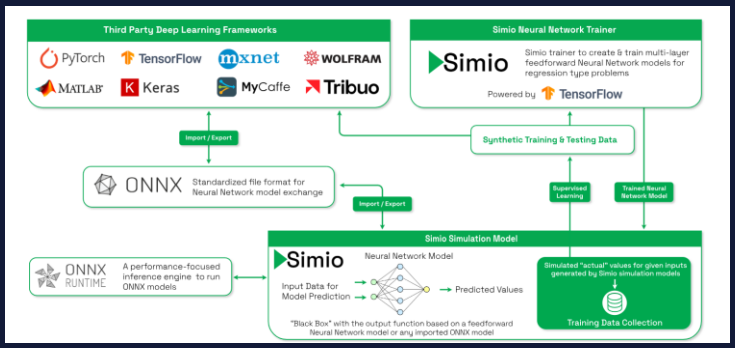
- Reduce time to create models
- Provide suggestion on how to improve productions
- Ultimately, reduce the need for expertise
- Can also help training AI models

https://www.autodesk.com/autodesk-university/class/Automating-Process-Optimization-with-AI-The-FlexSim-Optimizer-and-Live-Digital-Workplaces-2025

https://www.anylogic.com/features/artificial-intelligence/reinforcement-learning/

Anylogic and Flexsim provide API to facilitate integration with AI

- Use of chatbots or agents to support coding and programming
- Train AI models



https://www.simio.com/ai-optimization

Similar case, Simio offers an API to facilitate AI integration

Simio provides Neural Network capabilities to facilitate optimization

This capability can also be used to train AI agents in third-party Neural Networks

Expert

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Let’s connect!

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Thank you.

Make it real.