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Siemens Advanta Consulting

Capstone project @LSE: Inventory optimization

Discussion Paper | December 14, 2021

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Determining the optimal reorder point and safety stock level is crucial to avoid high stock-out and inventory costs

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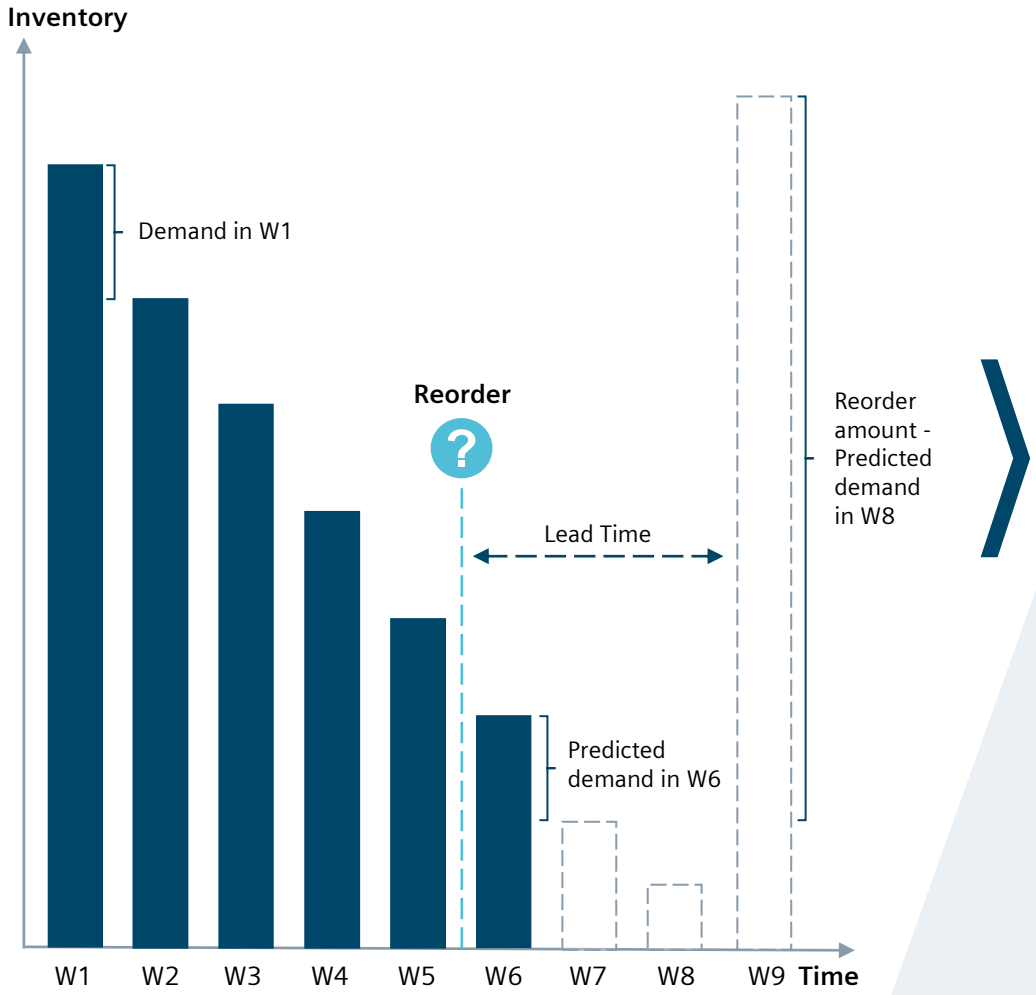
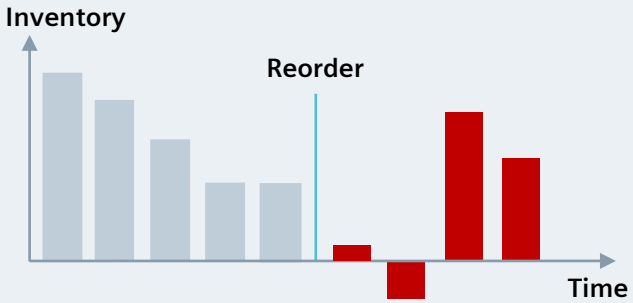
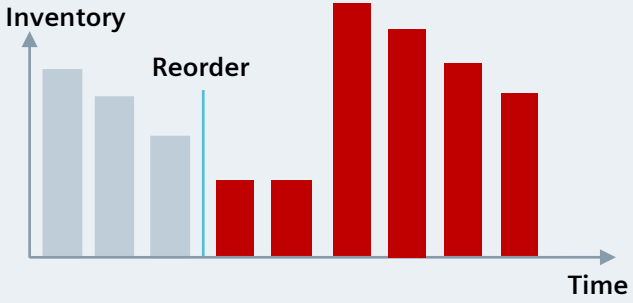


Three different scenarios for the inventory curve



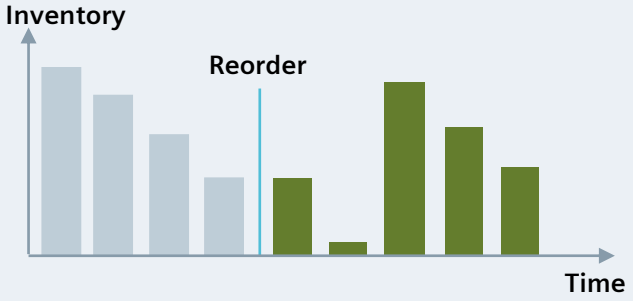
Inventory shortage

Inventory shortage results in **not being able to fulfill customer orders** and is directly associated with **stock-out costs**



Inventory excess

Inventory excess results in a **higher average inventory** than necessary and is directly associated with higher **inventory costs** and **tied-up capital**



Optimal reorder

Choosing the right reorder point leads to a **increased service level** and a **cut in inventory costs**

Source: Siemens Advanta Consulting

The expert tool provides machine-based support for the complex inventory management process

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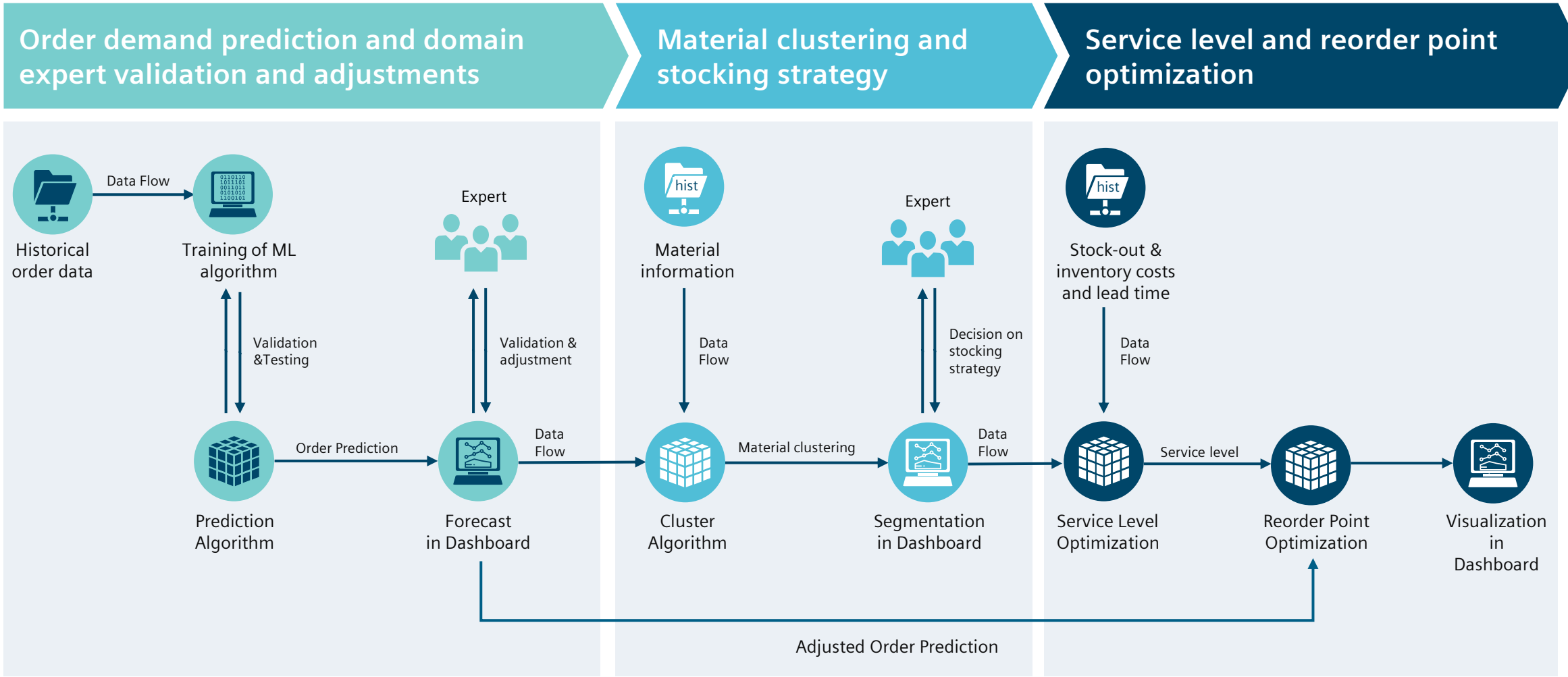

Source: Siemens Advanta Consulting

Concepts

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1. General
    - Open Book on Inventory Analytics
    - How to compute reorder-points (1)
    - How to compute reorder-points (2)
    - Book on Inventory Optimization (Preview of it)
2. Business
    - Reorder points
    - Safety stocks

3. Forecasting
    - Time-series (Prophet, Sarimax)
    - Neural Networks (Tabnet, LSTM)
    - Gradient Boosting (LightGBM)
    - Hyperparameter tuning (Bayessian optimization)

4. Optimization
    - *Access to Gurobi or similar tool*
    - Mixed integer programming in Python
    - *Inventory optimization for multi-echelon*

Source: Siemens Advanta Consulting