BE-terna Day **2021**

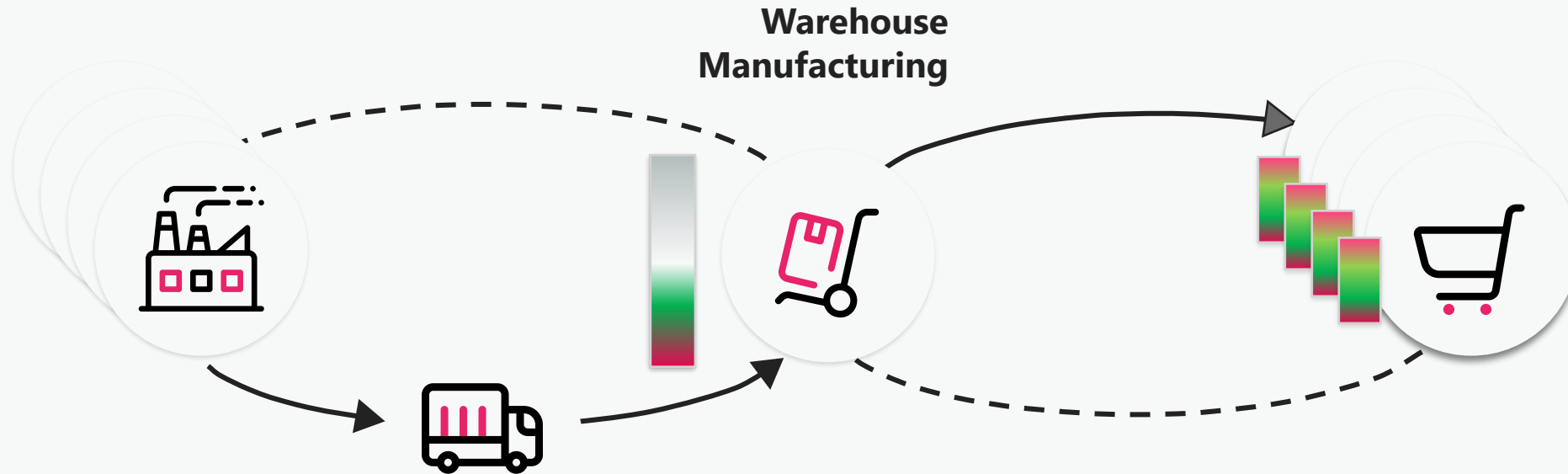# Artificial Intelligence in everyday business

Božidara Cvetković, PhD

Agenda

1. Introduction – challenge
2. Fill purchase order
    1. Manually
    2. AI
3. Case Study - Salus
4. Benefits & Conclusion
5. Q&A
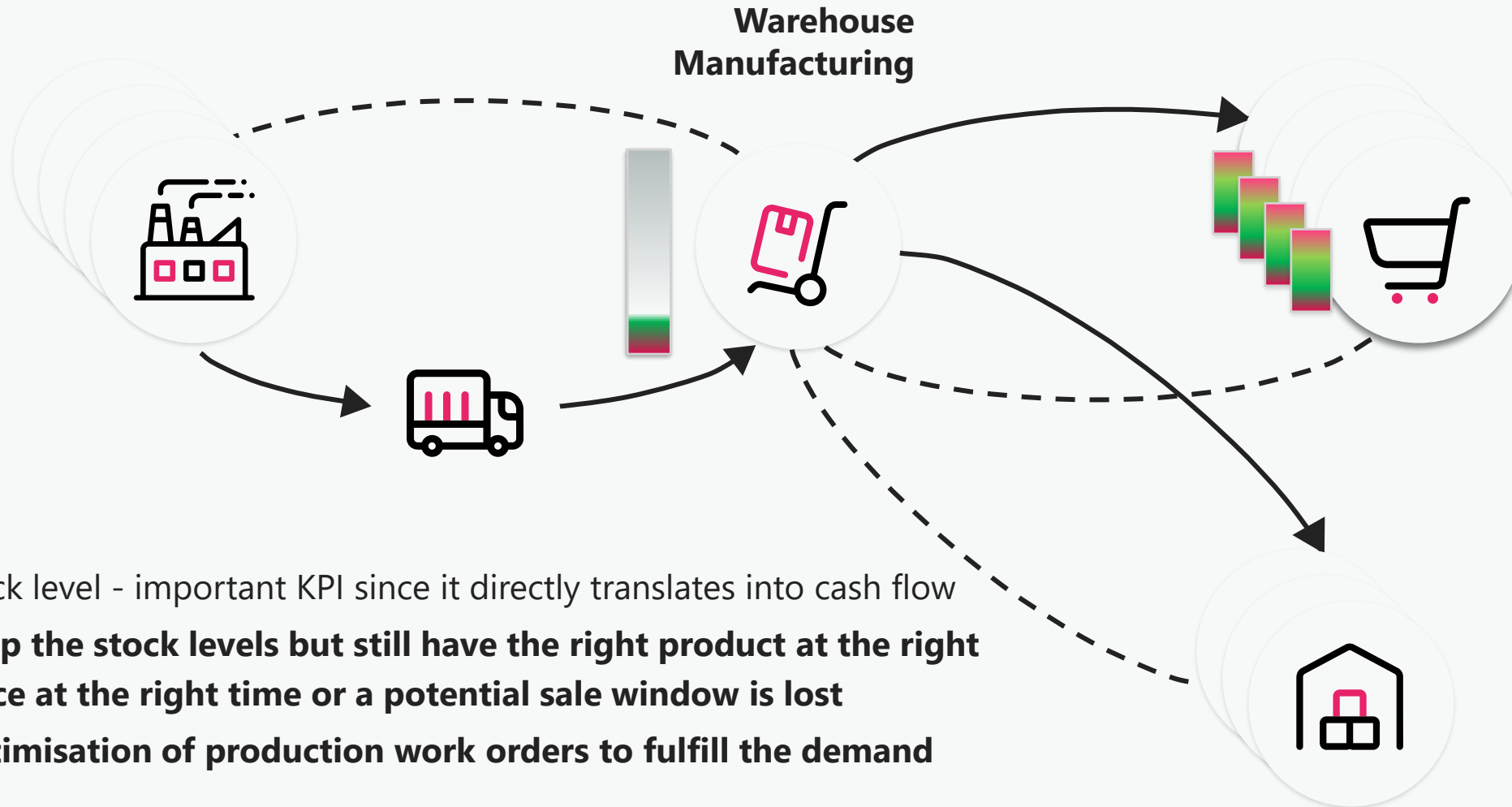
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Introduction
Challenge

Warehouse Manufacturing

- Stock level - important KPI since it directly translates into cash flow

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Challenge

Warehouse Manufacturing

- Stock level - important KPI since it directly translates into cash flow
- **Keep the stock levels but still have the right product at the right place at the right time or a potential sale window is lost**
- **Optimisation of production work orders to fulfill the demand**
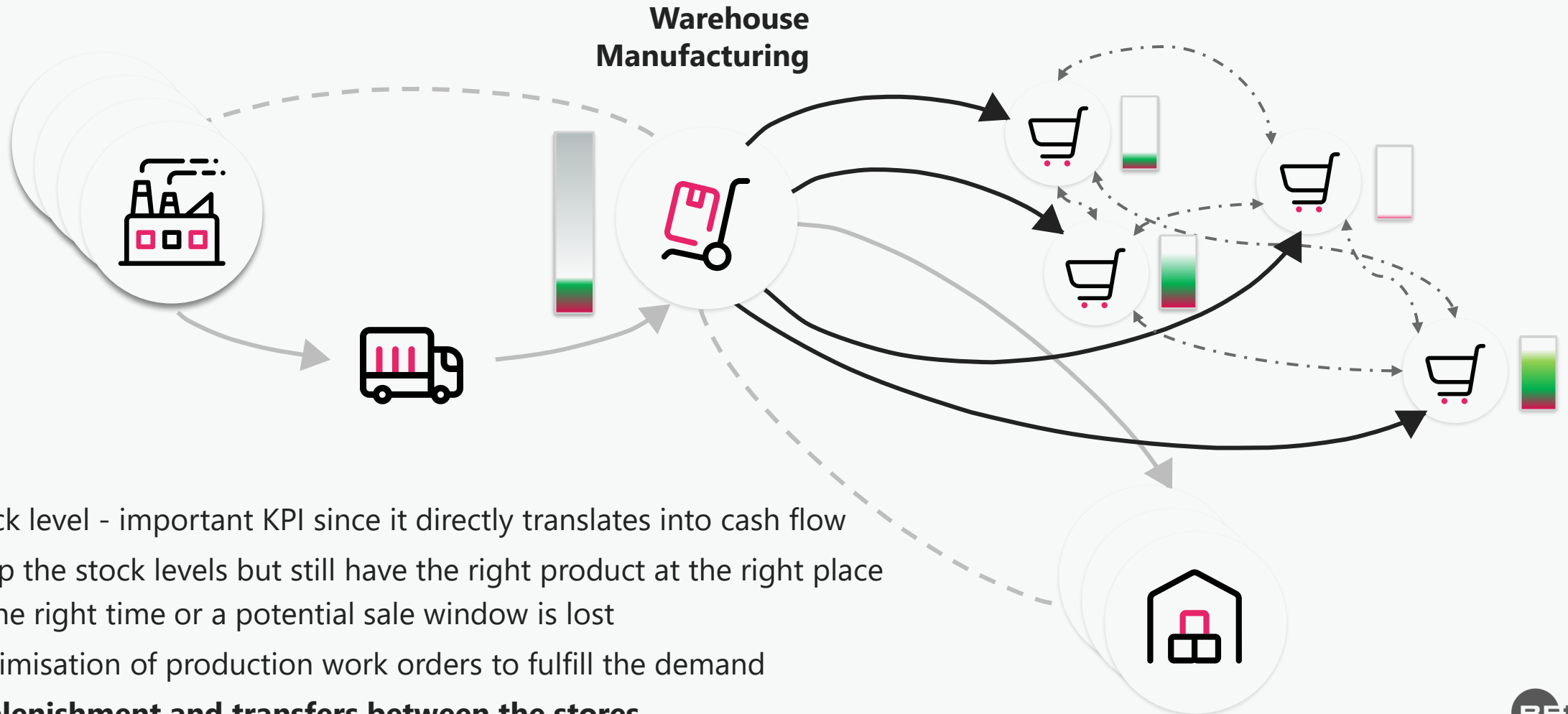
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Introduction

Challenge

Warehouse Manufacturing

- Stock level - important KPI since it directly translates into cash flow
- Keep the stock levels but still have the right product at the right place at the right time or a potential sale window is lost
- Optimisation of production work orders to fulfill the demand
- **Replenishment and transfers between the stores**

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Ordering procedure
Warehouse/Production - filling orders for ~600 items

For **each item**:

1 Analyze current stock

2 Analyze sales/production plan (weekly, monthly, seasonally)

3 Evaluate the date of the next purchase order

4 Set order quantity

5 Input order into the purchase form

Hana
Production planning

No material on stock

Ana
Purchase lead

Stock level is to high

Stock-out happened

Charles
CFO

Stock/production status explanation

Bob
Purchaser

Eva
Intern Purchaser

New person training

Dan
Warehouse mng

Warehouse gets jammed

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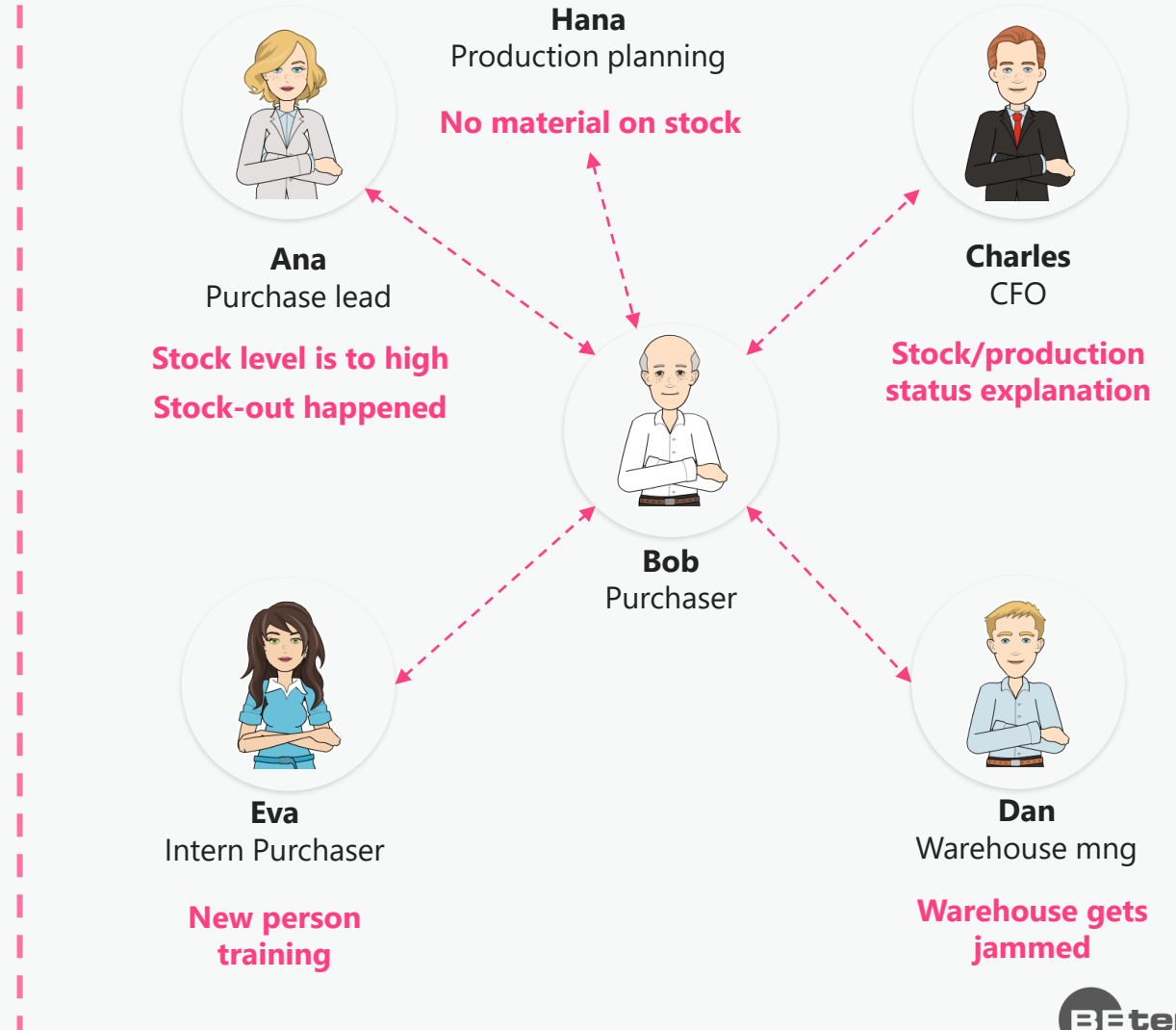
Ordering procedure

Retail store - filling orders for ~1 store (1k+ items)

For **each item**:

1 Analyze current stock

2 Analyze sales (weekly, monthly, seasonally)

3 Evaluate the date of the next purchase order

4 Set order quantity
➕ *Check availability in the warehouse*
Check for potential transfer

5 Input order into the purchase form

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Purchase lead

Stock level is to high
Stock-out happened

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Stock status explanation

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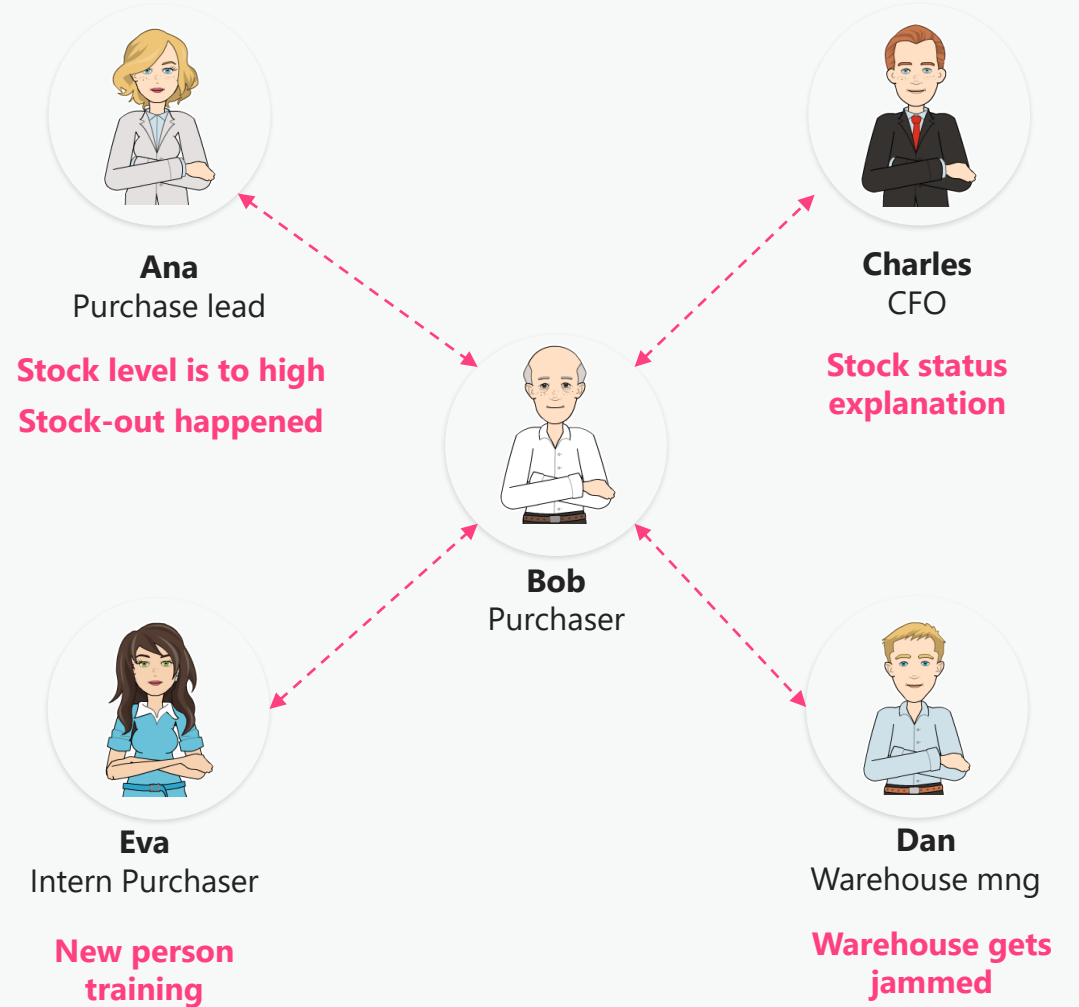
How can AI help Bob?

Stock optimisation with AI

Employ technology to crunch the data and return recommendations

- The steps Bob takes for generating a single order can be encoded into an algorithm
- Connect warehouse orders with retail store orders and introduce possibility of transfers
- Connect inventory and production plan

INPUT

CRM

ERP

BI

WEB

MOBILE

3rd PARTY
DATA

STOCK MONITOR

Detect & Quantify
- Alerts
- Overstock
- Stockouts

Decide on procedure
- Warehouse order
- Retail store replenishment
- Transfer procedure
- Planning optimisation

FORECAST & ORDER QUANTITY

Forecast sale per item
- Evaluate granularity
- ML model per type of item

Recommend order per procedure
- Evaluate forecast
- Quantify order
- Use constraints (item, vendor, …)

PLANNING

Production optimisation
- Use recommened quantities
- Schedule work orders per production line
- Recommend material orders

TRANSFER OPTIMISATION

Stock availability
- Use stock availability
- Use locations/route

CARGO & LOGISTICS

Cargo optimisation
- Use logistic constraints (truck, container, volume …)
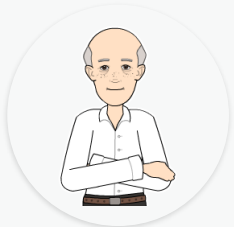
OUTPUT

CRM

ERP

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MOBILE

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How can AI help Bob?

Stock optimisation with AI

- Bob is presented with results – **Purchase order**

Requisition Worksheets | Work Date: 1/27/2022   ✓ Saved

Name   BE-TERNA D

Manage   Process   Report   Drop Shipment   Special Order   Line   Item Availability by | More options

Type	No.	Accept Action Message	Description	Location Code	Quantity	Unit of Measure Code	Direct Unit Cost	Due Date	Replenishment System
Item	70074	☑	Coca-Cola	GREEN	120	PCS	0.664	1/28/2022	Purchase
Item	70075	☑	Apple juice	GREEN	80	PCS	0.232	1/28/2022	Purchase
Item	70076	☑	Banana juice	GREEN	60	PCS	0.232	1/28/2022	Purchase
Item	70077	☑	Black coffe	GREEN	1,400	PCS	0.15	11/2/2020	Purchase
Item	70078	☑	Tea	GREEN	800	PCS	0.13	1/28/2022	Purchase

Description   Buy-from Vendor Name

Bob
Purchaser

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How can AI help Bob?

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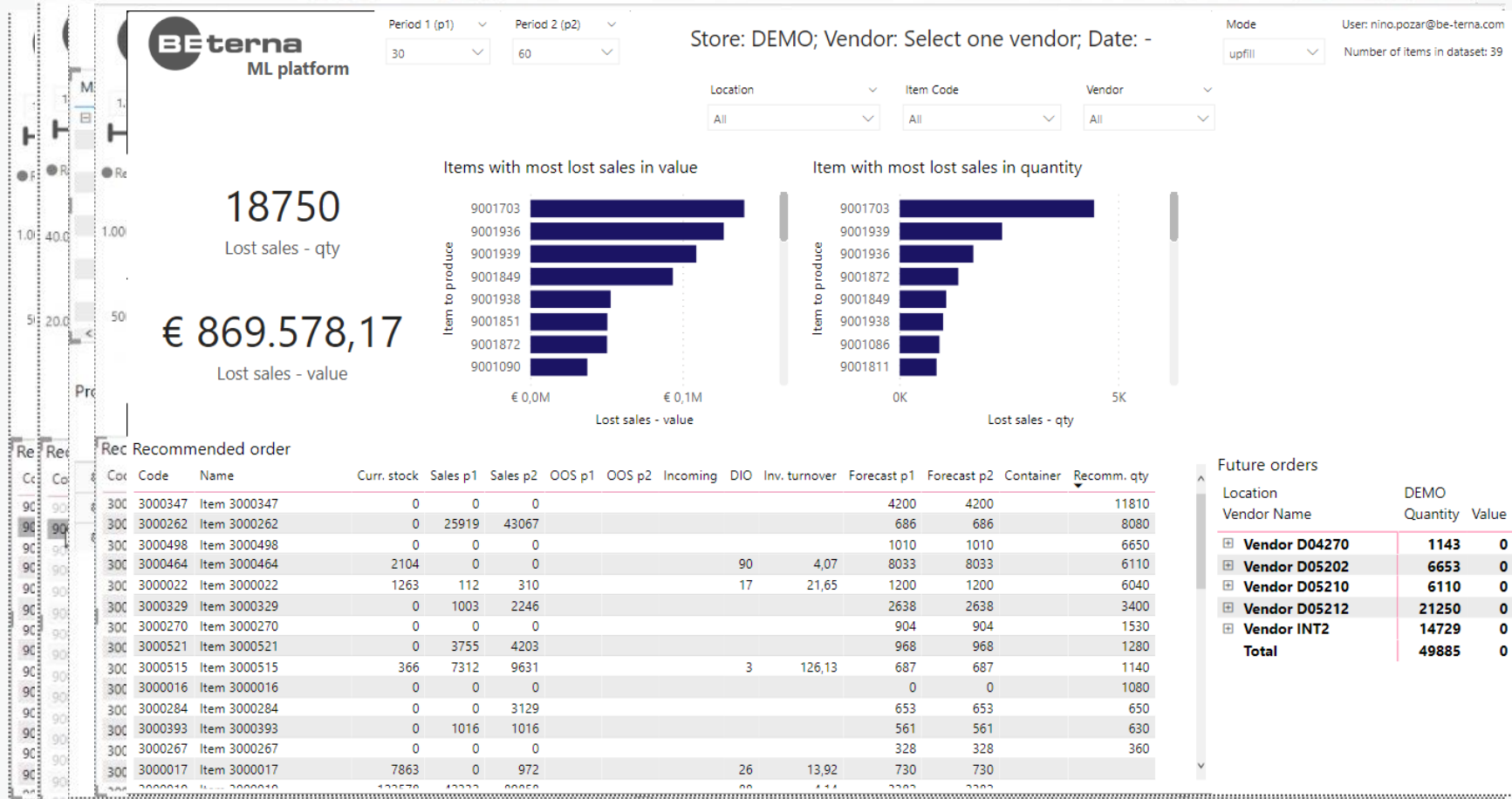
Case study

Salus Group

Status before implementation

- Pharma distribution centre
- SKUs
  - Daily sales/daily orders
  - Items with different sales characteristics
  - Seasonal, expiration date, promotinal...

- Order quantity is set by experience

- Balancing between high stock & stock outs
  - High orders out of fear
  - High stock level & dead stock

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Salus Group

INPUT

CRM

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3rd PARTY
DATA

STOCK MONITOR

Detect & Quantify
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- Overstock
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Decide on procedure
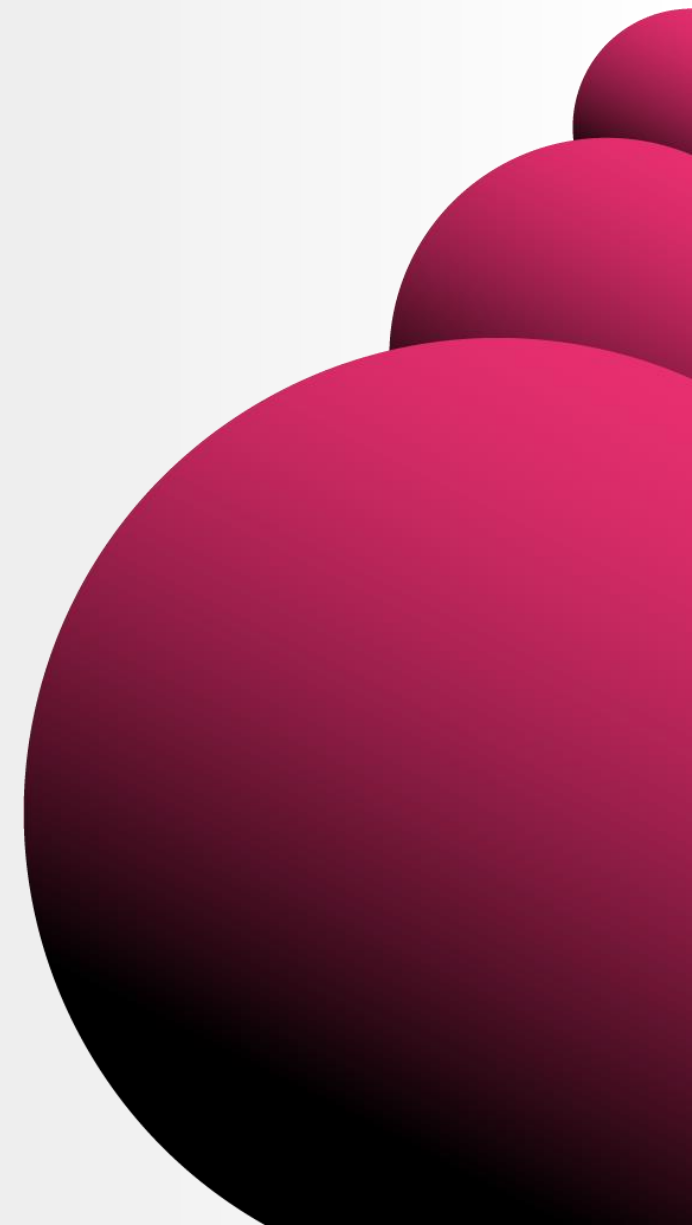- Warehouse order
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PLANNING

Production optimisation
- Use recommended quantities
- Schedule work orders per production line
- Recommend material orders

TRANSFER OPTIMISATION

Stock availability
- Use stock availability
- Use locations/route

CARGO & LOGISTICS

Cargo optimisation
- Use logistic constraints (truck, container, volume …)

OUTPUT

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Customer **Journey** (challenges)

Infrastructure

Where will it run

Data Quality

Integration

How do we know if we can trust the recommendations

The dashboard with explanation

Continuous evaluation & feedback

Comfortable in using the system

Monthly meetings

Upgrades & optimisation

Start using the recommendations

Recommendations are sent directly to ERP

Vendor & item specifics

Substitutes, promotional, expiration, tender items

Outliers, anomalies, …

How it effects the stock value

Daily stock monitor

Order evaluation

Trend in stock level

Trend in stock outs

Trend in turnover

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Salus Group – case study

>85%
Stock Automatization

Up to 50%
Lowered manual effort time

25% - 65%
Cash flow savings

SALES FORECASTING BRINGS THE FOLLOWING BENEFITS:

- Users can rely on the automatization of items that are being sold consistently with data models built on sales history, allowing for **high-precision** in processing short-term and long-term sales.
- Automatizing the vast majority (85% and more) of items, gave the purchasing department **enough time to focus** on slow-moving but high-value items and seasonal jumps, which bring a high risk of overstock and stock-out.

MAKE BETTER-INFORMED BUSINESS DECISIONS:

- Manual effort time was **lowered by up to 50%** for all team members, providing them with the opportunity to focus on non-standard, high-value items.
- **Support human decision-making** by using daily stock monitoring to spot outliers in sales and to react faster in potential stock-outs
- **ERP integration** allowed users to receive order proposals every morning and provided them with interpretability analysis in the self-service BI tool.

INVENTORY SAVINGS ARE JUST THE BEGINNING:

- **Cash flow savings** compared to the as-is scenario was 25% - 65%, depending on the item category.
- The Number of **stock-outs was minimized** and the algorithm calculated new minimum stocks which customers could supplement with some hard restrictions coming from vendors.
- **Stock coverage** in days was optimized without having an impact on the number of stock-outs.

Soft Benefits

Extra time can be spent on complex & new items & new vendors

Roll-out if new warehouses and retail stores are opened

Verification of orders through dashboard

Possibility of **controlling order frequency** per vendor

- Date of incoming trucks/containers
- Important items are in the first shipments (trucks/containers)
- Less jams in warehouses

Advantage in negotiations with vendor

Set suitable bonuses for customers / better promotional activities

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Conclusion

Using technology as a tool for crunching large amounts of data **unlocks benefits:**

- Automatisation of orders
- Controlled and optimised stock
- Increased service level
- Optimised production
- Timely detection of specific events
- Controlled movement in the warehouse

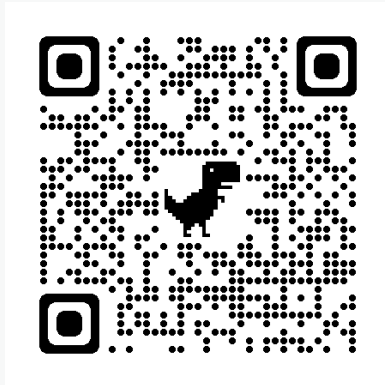... so, we are really **able to have:**

Right product

At right place

At right time

...across **different industries:**

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Thank you!

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