

# How an Online Beer Retailer Benefits From Introducing AI-Driven Inventory Replenishment

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# Why?

**Beerwulf** is a 100% daughter company of **Heineken**, setup to become the European leader in the **online sale of craft beers**.





# Why?

## Beerwulf's Challenge

- Expand an online retailer by factor 10 in three years, while
  - growing the team as little as possible in order to optimize for margin and profitability;
  - with the help of AI-driven automation.
- Learn how to **take advantage of a digital disruption in food & retail** and its ability to transform the entire value chain in FMCG & Retail.





# Why?

- **Our combined challenge:**
  - Create a **data-driven organization**, where human & artificial intelligence work hand in hand.
  - Rethink typical **retail business processes** and assess the role AI/ML can play.
  - Help **leadership** understand what AI/ML can & cannot do, where it is of value & where not.
  - Define **initial high-value usecases** that show immediate impact and implement them.
  - Build on the momentum, draft **an AI-Roadmap and supporting Data Strategy** and work from usecase to usecase.



# First Usecase: AI-Driven Inventory Replenishment

- Beerwulf was confronted with significant **amounts of out-of-stocks**, reducing total revenue & margin as well as impacting customer experience.
- Inventory replenishment was initially a **manual, labour-intensive task** leading to suboptimal results:
  - Data needed to be gathered from **multiple systems** and inserted into a **large Excel file**. This process took a lot of time and was prone to human error.
  - An estimate of the appropriate inventory level was based on a **mere, rudimentary sales and promotion impact forecast**.
  - **Supply orders** were constantly overestimated to compensate suppliers' minimum order quantities. This led to an ordering approach driven by **gut-feeling**.
  - Once the purchase orders were defined, these needed to be **manually inputted in the ERP system**, leading to even more lost time.

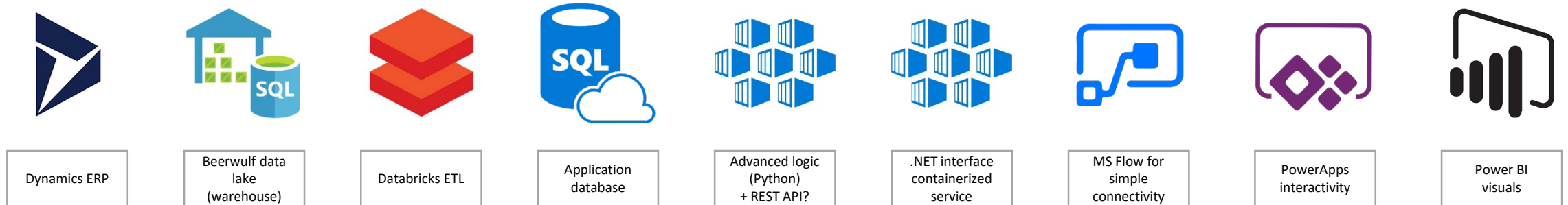


# First Usecase: AI-Driven Inventory Replenishment

- In close collaboration with the client, we restructured the process and built a **light-weight system** on top of the current available technology:
  - **One data source:** We first enabled the automated extraction of all required data from the relevant sources and consolidated the data in one place. This significantly reduced time spent on a tedious task and prevented mistakes.
  - Second, we built a **demand prediction algorithm** that accurately forecasts how many items of each product will probably be sold over the coming weeks. It takes into account historic sales, seasonality and impact of promotions.
  - The procurement manager is provided with a **dashboard**, that visually suggests the required number of items of each product that need to be purchased, considering actual stock levels, actual open orders and lead times.
  - The **procurement manager** merely needs to accept or adjust. The final decision on quantities is then **automatically pushed to the ERP system** and sent to suppliers. Even the complexity of dependencies like 'packs', multiple operators and inter warehouse transfers are fully considered by the system



# AI-Driven Inventory Replenishment: technical background



- **Technological environment**

- Especially **Microsoft Stack**. The client was already working in a Microsoft Dynamics environment, so the choice for an Azure environment was logical.
- Within **Azure**, a data lake and data warehouse were set up. **Databricks** was chosen to ensure scalability, working with large datasets.
- We used **Microsoft Power Apps** in combination with **Flows** to create light-weight tooling, Microsoft **Power Bi** for visualization purposes. To tie it all up, **Microsoft.net** was used to connect the output with the retailer's ERP system.



# AI-Driven Inventory Replenishment: technical background

- Challenges in **data quality**

- Data quality **surely is a challenge in retail**. The average operator, be it within the organization or an external third partner, isn't always as meticulous with regards to stock positions or deliveries.
- There is however **a growing attention for tracking data**. If you want to accurately predict sales based upon historical data for instance, there must be a Marketing Department that tracks promotional periods.
- Improving data quality is **a matter of culture**. Companies that start using their sheer amount of data, discover anomalies and install procedures involving human intervention to update relevant datasets.

- **Machine learning algorithms** applied

- Focused on what technique entails **the most value**, rather than the fanciest algorithm.
- Used a **variety of algorithms**, based on customer demand patterns.
- Used simpler algorithms for **low-rotation erratic product categories**, more advanced algorithms for **high-rotation smooth categories**. From 'moving average' to 'random forest'.







# Results

- Beerwulf **substantially reduced out-of-stock situations** resulting in improved customer experience and increased revenue.
- Beerwulf **substantially reduced overstock situations**, resulting in decreased costs.
- Beerwulf **substantially reduced the amount of work required** to manage the replenishment process, from 3 x 3 days to 3 x 0.5 days a week.
- **We took a first step** in demonstrating the possibilities of AI and the opportunities for revising current business processes.





# Lessons-learned

- Retail has a lot of proprietary, highly-valuable data that is **underused** for the purpose of analytics & automation, driven by AI.
- Retailers can **take a step-by-step approach** to AI, as infrastructure can be built gradually over time.
- Yet, a **proper data strategy and AI roadmap** are essential in order to focus resources on what really moves the needle.
- **Manage expectations.** The output of most use cases gets better as models are applied and receive feedback from users.

