**Phase 1**

**Product Demand Prediction With Machine Learnings**

**Problem Definition :**

The problem is to create a machine learning model that forecasts product demand based on historical sales data and external factors. The goal is to help businesses optimize inventory management and production planning to efficiently meet customer needs. This project involves data collection, data preprocessing, feature engineering, model selection, training, and evaluation.

**Problem statement :**

Create a machine learning model that forecasts product demand based on historical sales and external factors, helping businesses optimize inventory management and production planning to meet customer needs efficiently.

**Design Thinking :**

**1.Data Collection:** Collect historical sales data and external factors that influence demand, such as marketing campaigns, holidays, economic indicators, etc.

**2.Data Preprocessing**: Clean and preprocess the data, handle missing values, and convert categorical features into numerical representations

**3.Feature Engineering**: Create additional features that capture seasonal patterns, trends, and external influences on product demand.

**4.Model Selection**: Choose suitable regression algorithms (e.g., Linear Regression, Random Forest, XGBoost) for demand forecasting.

**5.Model Training**: Train the selected model using the preprocessed data.

**6.Evaluation:** Evaluate the model's performance using appropriate regression metrics (e.g., Mean Absolute Error, Root Mean Squared Error).

**Further steps :**

* **Hyperparameter Tuning**: Fine-tune the model's hyperparameters to achieve better results if necessary.
* **Deployment:** Deploy the trained model in a production environment where it can make real-time or batch predictions.
* **Monitoring and Maintenance**: Continuously monitor the model's performance in production and update it as needed to adapt to changing demand patterns.
* **Feedback Loop**: Incorporate feedback from sales and customer data to improve the model over time.