# Phase 3: Implementation of Project

# Title: AI-Supply Chain Management

## Objective

The goal of Phase 3 is to implement the core components of the AI-Powered Supply Chain Assistant based on the designs and strategies developed in Phase 2. This includes the development of and a forecasting model, a chatbot interface for real-time supply chain queries, initial IoT device integration, and data security mechanisms.

## 1. AI Model Development

### Overview

The key feature of the AI Supply Chain Assistant is its ability to forecast demand, detect anomalies, and recommend logistical decisions. In this phase, the AI model will be trained to analyze historical supply chain data.

### Implementation

- **Machine Learning Forecasting Model**: The AI system utilizes ML techniques to process historical demand, inventory levels, and logistics data to predict future needs and identify inefficiencies.
- **Data Source**: The model uses historical ERP, WMS, and POS data. Real-time data integration is deferred to future phases.

### Outcome

By the end of this phase, the AI model will provide baseline demand forecasts and alerts for stock shortages, delays, or overstocking in simple scenarios.

## 2. Chatbot Development

### Overview

The AI will be accessible through a chatbot interface that supply chain professionals can use for real-time queries and insights.

### Implementation

- **User Interaction**: Users interact via text-based chatbot that can answer questions like “What’s the inventory status for Product A?” or “Forecast for next month?”
- **Language Support**: Initial support in English; multilingual and voice integration in future versions.

### Outcome

The chatbot will be functional and capable of responding to basic supply chain queries based on AI model outputs.

## 3. IoT Device Integration (Optional)

### Overview

Initial groundwork will be laid for integrating IoT devices like RFID readers, GPS trackers, and smart warehouse systems.

### Implementation

- **Data Capture**: Collect data such as location, temperature, and package status from connected devices.
- **APIs**: Integration via APIs from logistics platforms or proprietary systems.

### Outcome

By the end of this phase, the assistant will support basic real-time updates from select IoT devices if available.

## 4. Data Security Implementation

### Overview

Given the commercial sensitivity of supply chain data, security is essential.

### Implementation

- **Encryption**: Secure transmission and storage of data such as order details, inventory status, and supplier records.
- **Access Control**: Role-based access to ensure only authorized personnel can retrieve or input data.

### Outcome

The system will have basic encryption and secure storage protocols to protect enterprise data.

## 5. Testing and Feedback Collection

### Overview

Testing will ensure functionality, reliability, and user experience of the AI assistant.

### Implementation

- **Test Scenarios**: Users simulate supply chain tasks like order tracking, demand prediction, and supplier inquiry.
- **Feedback Loop**: Collect performance data and user feedback on usability and accuracy.

### Outcome

Initial feedback will guide improvements in future phases, particularly in model accuracy and chatbot refinement.

## Challenges and Solutions

### 1.Forecast Accuracy

- **Challenge**: Limited initial data may reduce forecast precision.
- **Solution**: Incremental model training and validation using new data.

### 2.User Interface Intuitiveness

- **Challenge**: Users unfamiliar with AI interfaces.
- **Solution**: Simplify UX and incorporate feedback iteratively.

### 3.IoT Infrastructure Readiness

- **Challenge**: Limited IoT availability in some operations.
- **Solution**: Use mock data and simulations for testing purposes.

## Outcomes of Phase 3

- **Basic AI Model** for demand forecasting and anomaly detection.
- **Functional Chatbot** for interacting with supply chain data.
- **Optional IoT Integration** for tracking and monitoring.
- **Data Security** mechanisms for safe data handling.
- **Initial Testing and Feedback** collected to inform Phase 4.

## Next Steps for Phase 4

In Phase 4, the team will focus on:

1. **Improving the AI's Accuracy**: Using the feedback and results from testing, the AI model will be further refined.

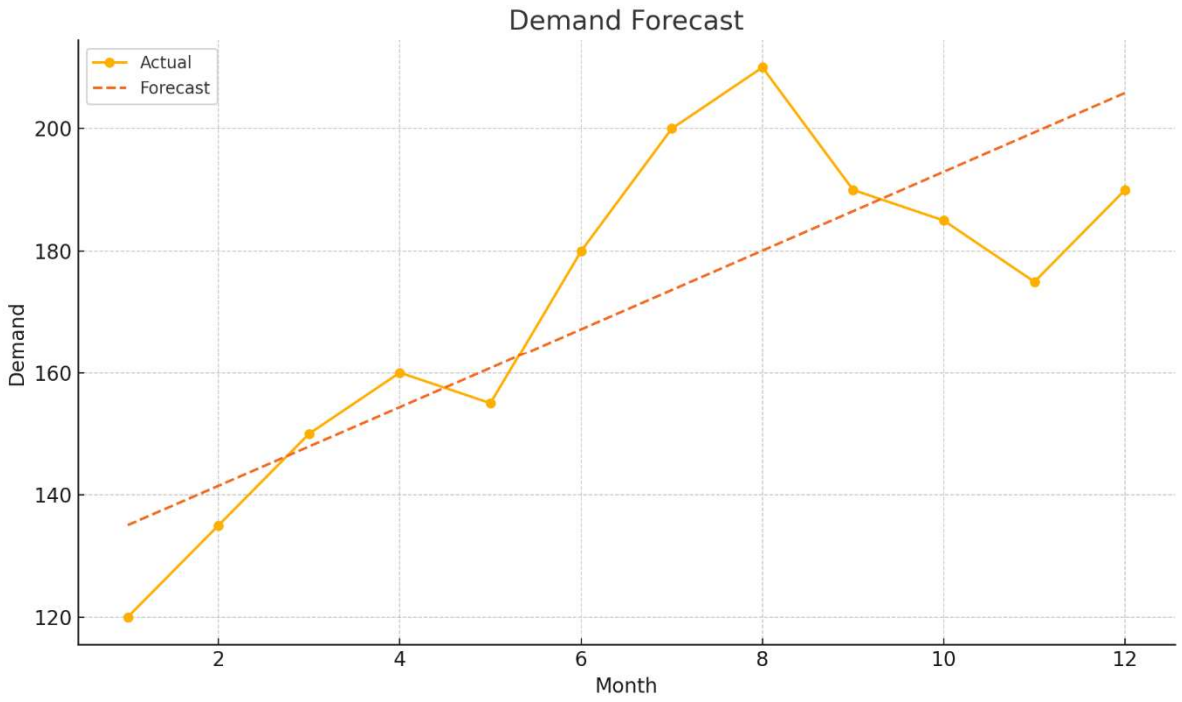
2. **Expanding Multilingual Support**: The chatbot will be expanded to support additional languages and voice commands.
3. **Scaling and Optimizing**: The system will be optimized to handle a larger number of users and more complex health queries.

## Implementation of project in code

## AI Forecasting Model using Linear Regression

```
import pandas as pd
import numpy as np
from sklearn.linear_model import LinearRegression
from sklearn.model_selection import train_test_split
import matplotlib.pyplot as plt
data = {
'month': list(range(1, 13)),
'demand': [120, 135, 150, 160, 155, 180, 200, 210, 190, 185, 175, 190]
}
df = pd.DataFrame(data)
X = df[['month']]
y = df['demand']
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, random_state=0)
model = LinearRegression()
model.fit(X_train, y_train)
predictions = model.predict(X)
df['forecast'] = predictions
plt.plot(df['month'], df['demand'], label='Actual')
plt.plot(df['month'], df['forecast'], label='Forecast', linestyle='--')
plt.xlabel('Month')
plt.ylabel('Demand')
plt.title('Demand Forecast')
plt.legend()
plt.grid()
```

plt.show()


Demand Forecast
Actual
Forecast
Demand
Month
120
140
160
180
200
2
4
6
8
10
12