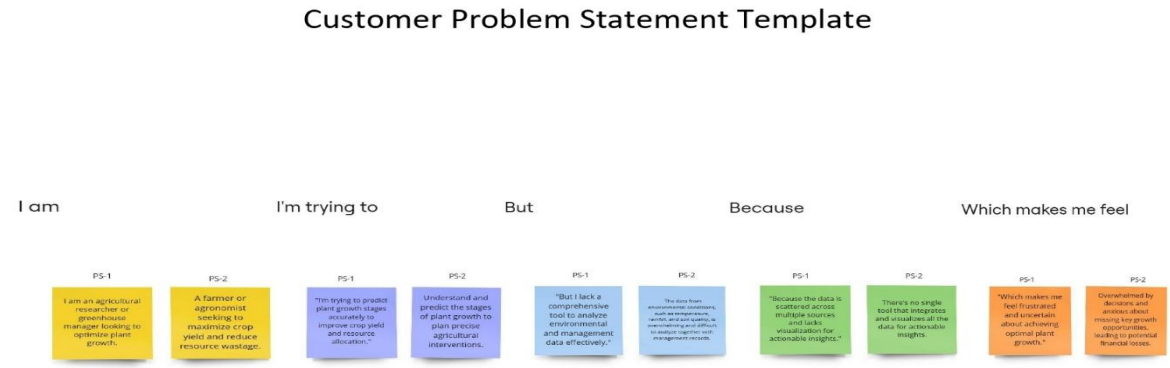
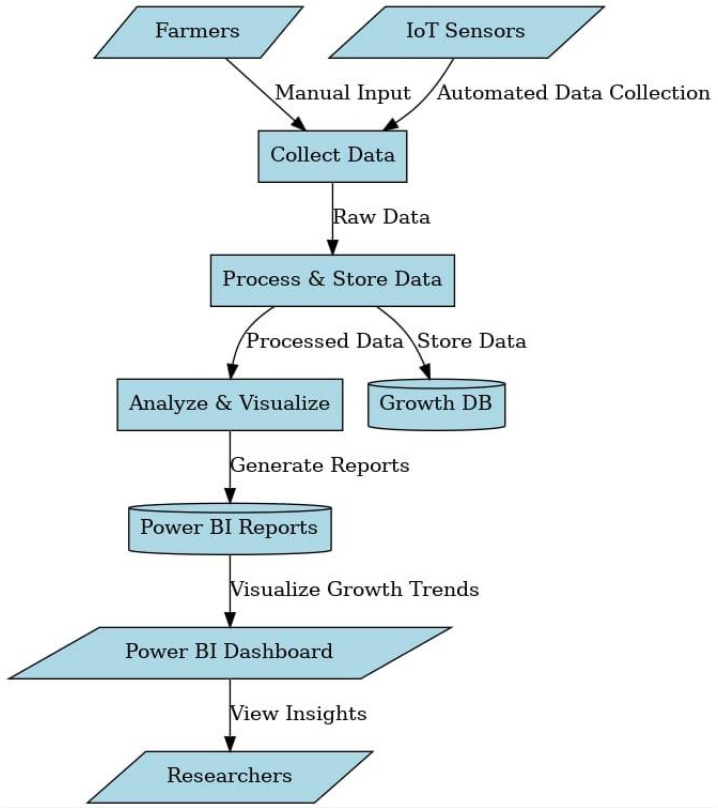
# 3. REQUIREMENT ANALYSIS

## Customer Journey map:-




## Data Flow Diagram:-



**Solution Requirement:-**

**Functional Requirements:-**

| FR No. | Functional Requirement (Epic) | Sub Requirement (Story / Sub-Task) |
|---|---|---|
| FR-1 | User Registration | - Registration through Form<br>- Registration through Gmail<br>- Registration through LinkedIn |
| FR-2 | User Confirmation | - Confirmation via Email<br>- Confirmation via OTP |
| FR-3 | Data Integration | - Import Environmental Data<br>- Import Management Data<br>- Data Cleaning and Transformation |
| FR-4 | Data Visualization | - Create Dashboards in Power BI<br>- Display Trends and Correlations<br>- Generate Customized Reports |
| FR-5 | Prediction System | - Develop Machine Learning Models<br>- Predict Plant Growth Stages<br>- Provide Recommendations |

## Non-Functional Requirements:-

| NFR No. | Non-Functional Requirement | Description |
|---|---|---|
| NFR-1 | Usability | The solution must have an intuitive and user-friendly interface. |
| NFR-2 | Security | Ensure secure data storage and user authentication. |
| NFR-3 | Reliability | The system should be highly dependable and provide accurate predictions. |
| NFR-4 | Performance | Maintain fast processing and data visualization even with large datasets. |
| NFR-5 | Availability | Ensure 99.9% system uptime to guarantee accessibility. |
| NFR-6 | Scalability | The solution must be scalable to handle increasing data volumes and users. |

## Technology Stack

## Application Components

| S.No | Component | Description | Technology |
|---|---|---|---|
| 1 | User Interface | User interfaces like Web UI or Mobile Apps to interact with the Power BI dashboards | HTML, CSS, JavaScript, ReactJS |
| 2 | Application Logic-1 | Data ingestion logic to extract environmental and management data from various sources | Python |
| 3 | Application Logic-2 | Speech-to-text logic for audio input (e.g., voice commands for querying plant growth stages) | IBM Watson STT service |

| S.No | Component | Description | Technology |
|---|---|---|---|
| 4 | Application Logic-3 | Virtual assistant to answer user queries related to plant growth predictions | IBM Watson Assistant |
| 5 | Database | Stores raw and transformed data, including historical plant growth and environmental factors | MySQL, NoSQL |
| 6 | Cloud Database | Centralized storage of large-scale data for scalability | IBM Cloudant |
| 7 | File Storage | Storage for large environmental datasets and model output | IBM Block Storage or Cloud-based storage |
| 8 | External API-1 | Provides real-time environmental data (e.g., weather conditions) | IBM Weather API |
| 9 | External API-2 | Identity verification for restricted access (if required) | Aadhar API |
| 10 | Machine Learning Model | Predicts plant growth stages based on input data | Custom ML Model (developed in Python) |
| 11 | Infrastructure (Server/Cloud) | Deployment of application on a cloud platform for scalability and availability | Kubernetes on IBM Cloud |

## Application Characteristics

| S.No | Characteristics | Description | Technology |
|---|---|---|---|
| 1 | Open-Source Frameworks | Frameworks to build the application frontend or backend | ReactJS, Flask, Django |
| 2 | Security Implementations | Implements access controls, encryptions, and secure API calls | SHA-256, IAM Controls, OWASP Guidelines |
| 3 | Scalable Architecture | Designed as microservices or a 3-tier architecture for scaling | Kubernetes, Docker |
| 4 | Availability | Load balancers and distributed servers ensure consistent access | Load Balancers, Distributed Cloud Servers |

| S.No | Characteristics | Description | Technology |
|---|---|---|---|
| 5 | Performance | Performance optimization using caching and CDNs | CDN, Redis Cache |