



Ramzy 3ada wane 3la elma5da

Mostafa Ashraf

Youssef Rayhan



Wafaa Gamal

Ahmed Ramzy

Under Supervision Of:

DR: Asmaa Saad & ENG: Juma El Mokhtar

Smart
agricultural
management
platform



AGENDA

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Introduction

- The agricultural sector is one of the fundamental pillars of the Egyptian economy, serving as a primary source for food supply, job creation, and achieving food security. The importance of agriculture in Egypt spans across history, starting from the Pharaonic civilization, which relied on the Nile River and agriculture as a foundation for economic and social growth, to the present day, where the agricultural sector significantly contributes to the national GDP. However, the agricultural sector in Egypt faces major challenges that impact its efficiency and sustainability.



Problem Statement

- Farmers face significant challenges, including inefficient resource management, unpredictable weather conditions, pest infestations, and a lack of real-time data to guide decision-making. Traditional farming methods often result in wasted resources, reduced yields, and environmental harm, while climate change intensifies these risks with unpredictable weather patterns. To address these issues, there is a pressing need for a smart agricultural management platform that leverages IoT devices, AI, and weather analytics to provide real-time insights, predictive alerts, and actionable recommendations, enabling farmers to optimize resource use, enhance productivity, and adopt sustainable farming practices.

Aims and Objectives

- **Aims:**

- To develop an intelligent agricultural management platform that empowers farmers and agricultural businesses to optimize resource usage, enhance productivity, and adopt sustainable farming practices through real-time data insights, predictive analytics, and AI-driven recommendations.

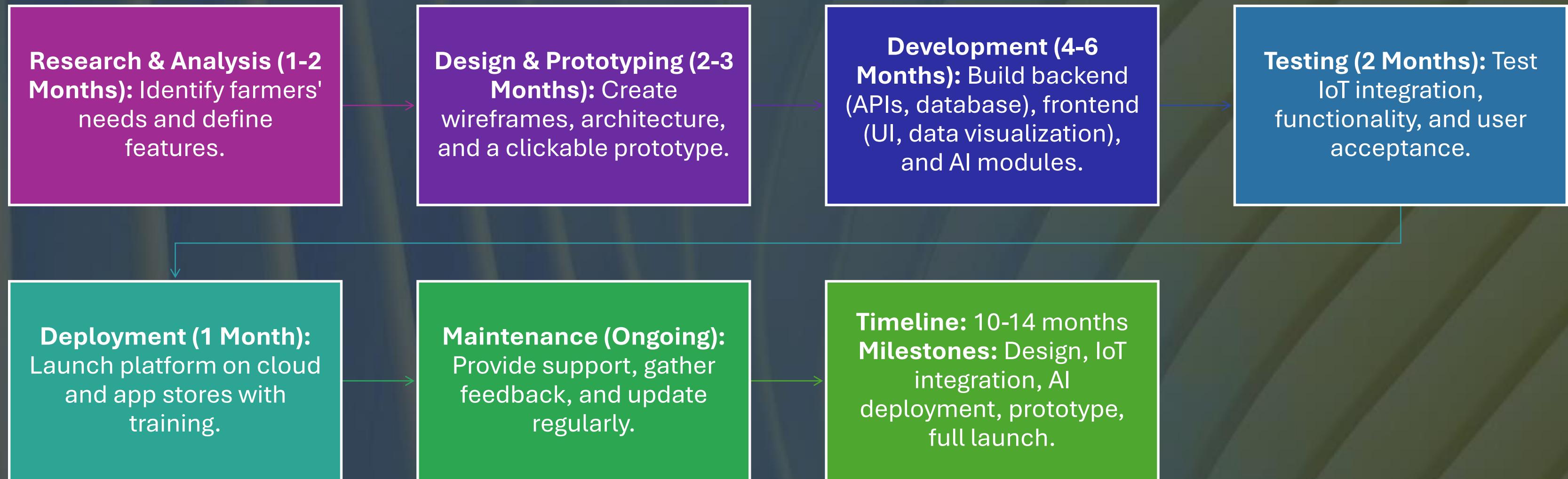
- **Objectives:**

1. **Real-Time Monitoring and Optimization:** Use IoT devices and AI to track soil conditions, crop health, and resource usage, providing actionable insights to optimize water, fertilizers, and pest control.
2. **Predictive Alerts and Recommendations:** Integrate weather data and AI-driven recommendations to proactively address risks and improve productivity with tailored suggestions.
3. **User-Friendly, Scalable Solutions:** Provide an intuitive dashboard for decision-making and scalable tools that cater to both individual farmers and large agricultural businesses, promoting sustainability.

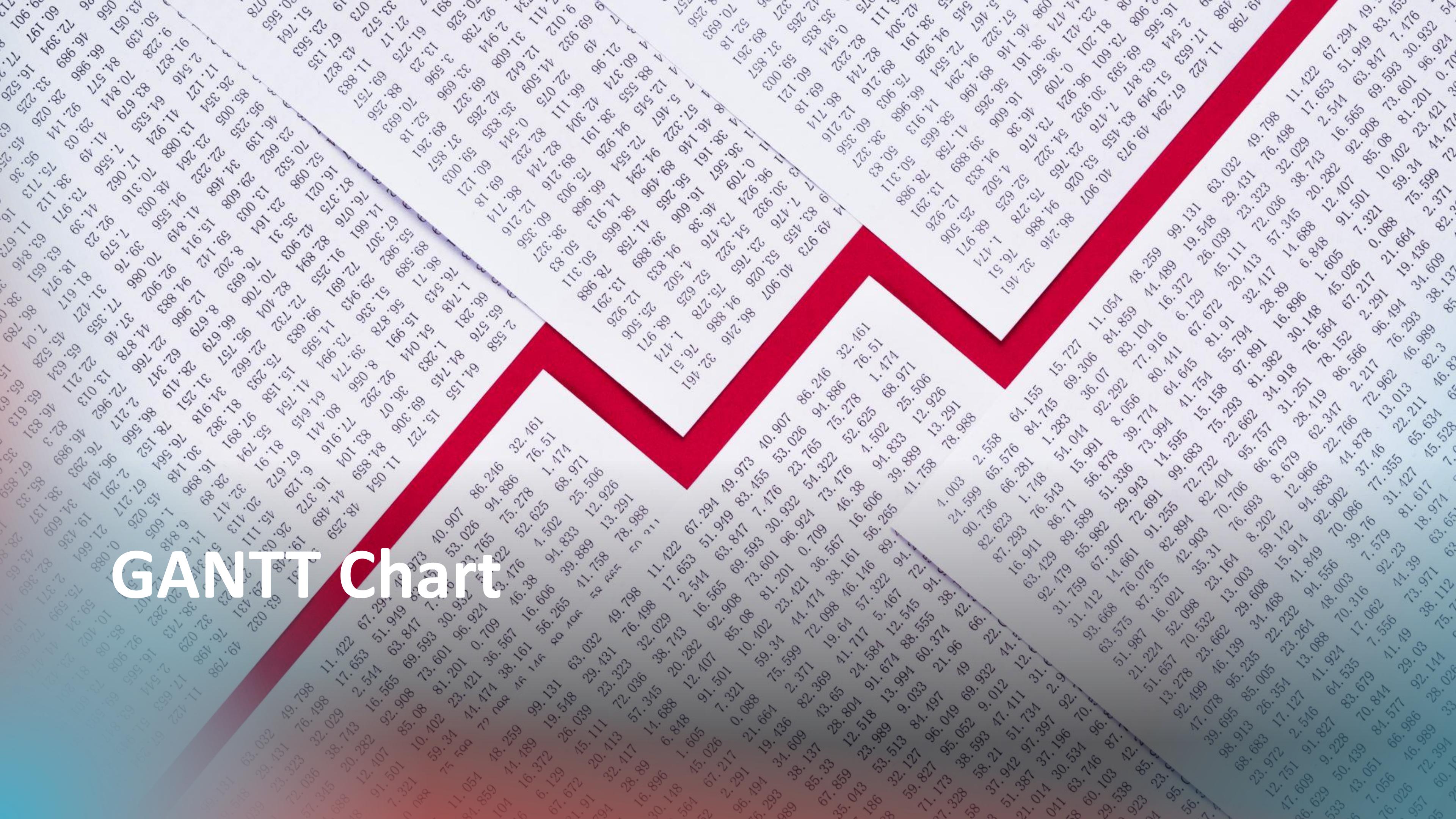
Proposed Solution

- The proposed solution is a smart agricultural management platform that leverages IoT devices, AI, and weather analytics to address key farming challenges. The platform enables real-time monitoring of soil, crop health, and environmental conditions through IoT sensors, while AI-driven analytics provide tailored recommendations for irrigation, fertilization, and pest control. It integrates predictive alerts based on weather forecasts to help farmers proactively mitigate risks such as extreme weather or infestations. With tools to optimize resource usage and promote sustainable practices, the platform offers a user-friendly dashboard accessible across devices, catering to both small-scale farmers and large agricultural enterprises. This solution empowers farmers to enhance productivity, reduce costs, and adopt eco-friendly farming methods.

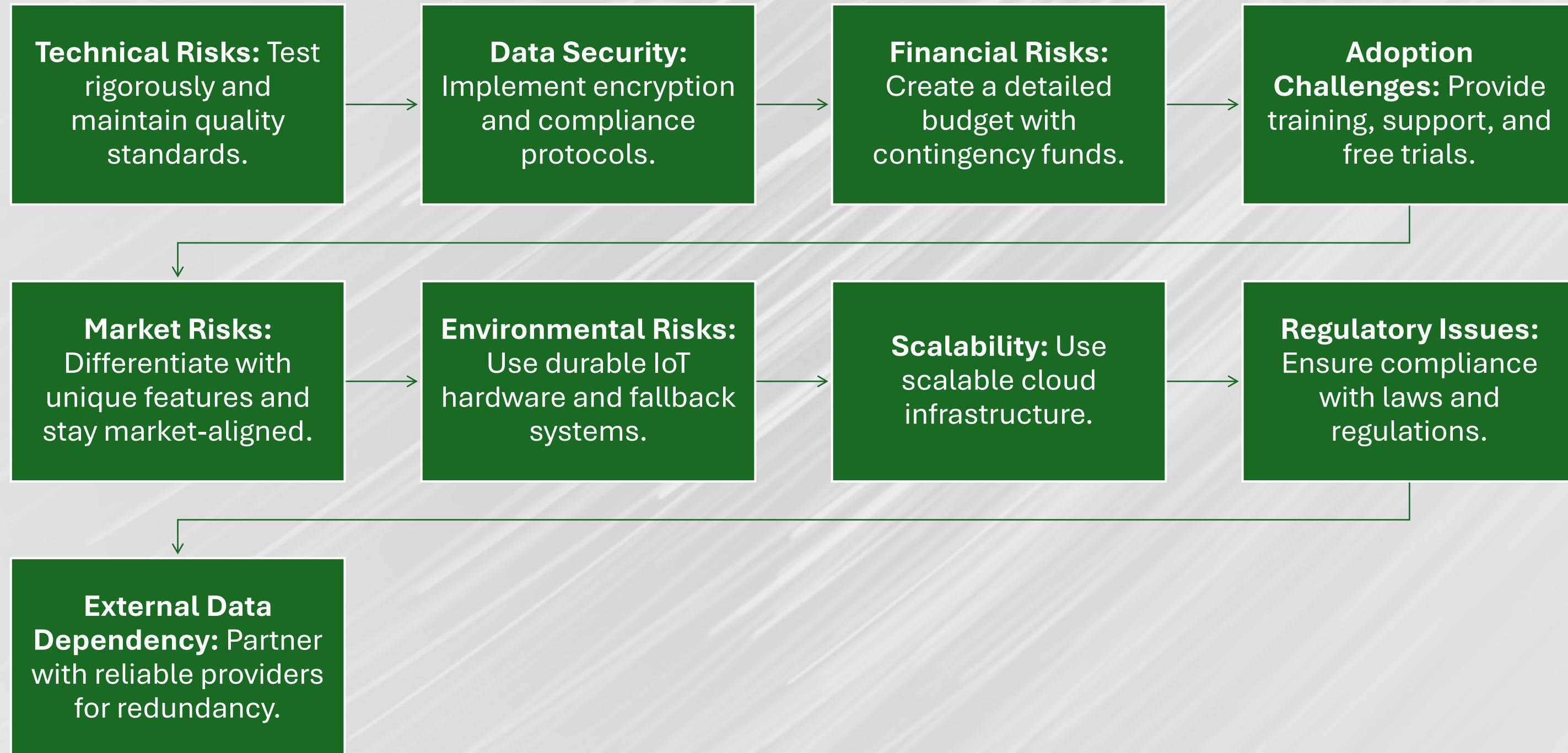
Project Plan



GANTT Chart



Risk Management



Functional and Non-Functional Requirements



Functional Requirements:



1. Moisture Level Monitoring: Utilization of IoT sensors to measure soil moisture and alert farmers of optimal irrigation times.



2. Pest Detection and Management: Integration of sensors and cameras to monitor crops for pest activity and use AI for early detection and management suggestions.



3. Weather Alert System: Real-time weather updates and notifications to farmers, enabling prompt responses to climatic changes.

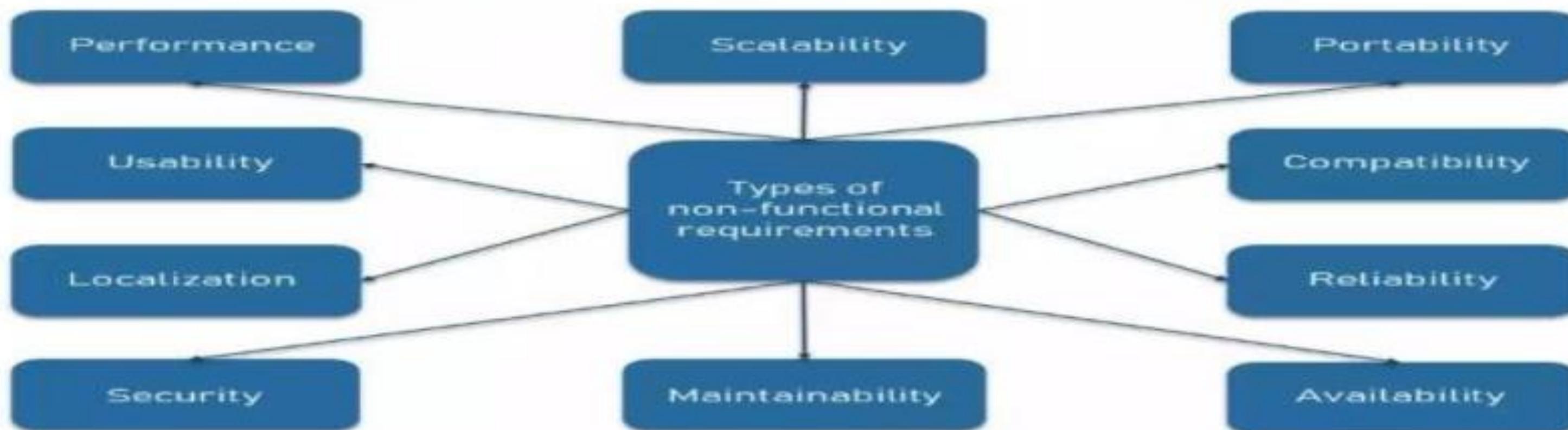


4. Soil Quality Analysis: Continuous analysis of soil data, such as nutrient levels and pH, to provide targeted fertilizer recommendations.

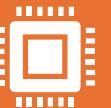


5. Crop Planning Advisory: Utilization of soil and climate data to advise on suitable crop types for various seasons and guide on planting and harvesting schedules.

KEY TYPES OF NON-FUNCTIONAL REQUIREMENTS



Non-Functional Requirements:



Scalability: The system must efficiently handle increasing data volumes from sensors as the number of users grows.



Security: Ensuring data integrity and security, particularly for users' agricultural data.



Usability: The interface should be user-friendly for non-technical users, facilitating easy access to platform features.



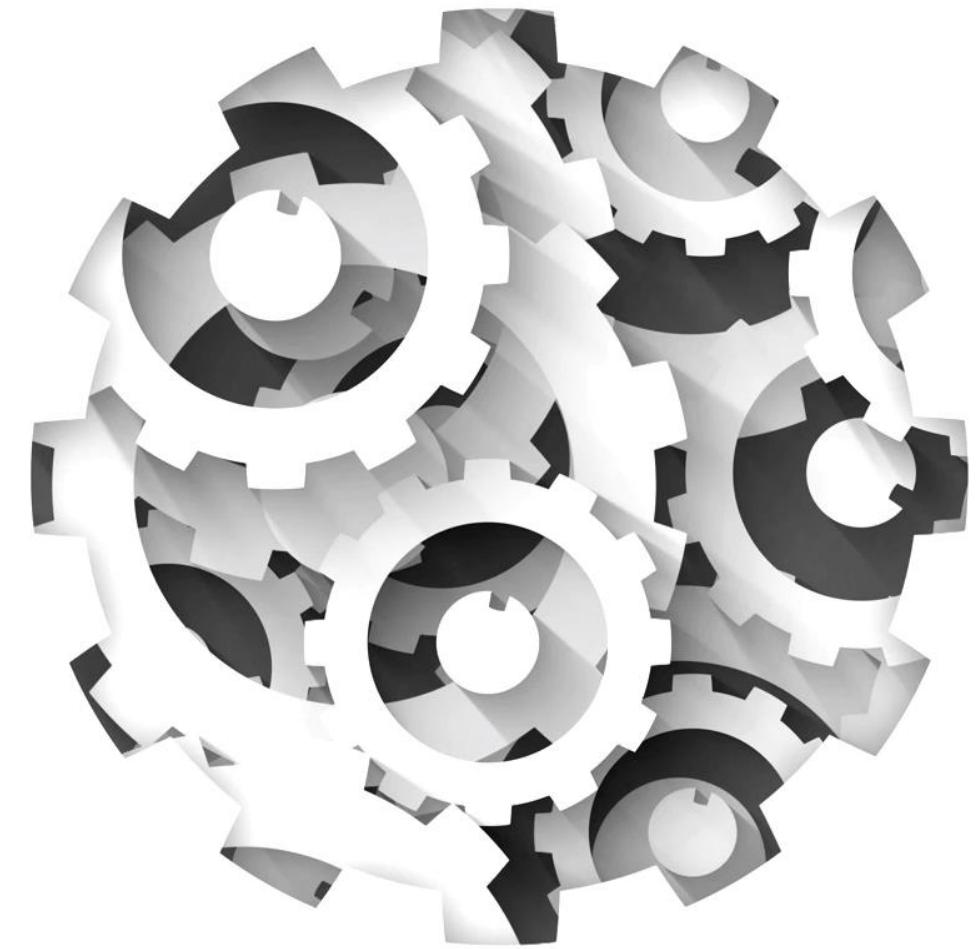
Performance: The platform should perform real-time data processing and alerts with minimal latency.



Reliability: The system should be operational with minimal downtime and capable of recovering quickly from any breakdowns.

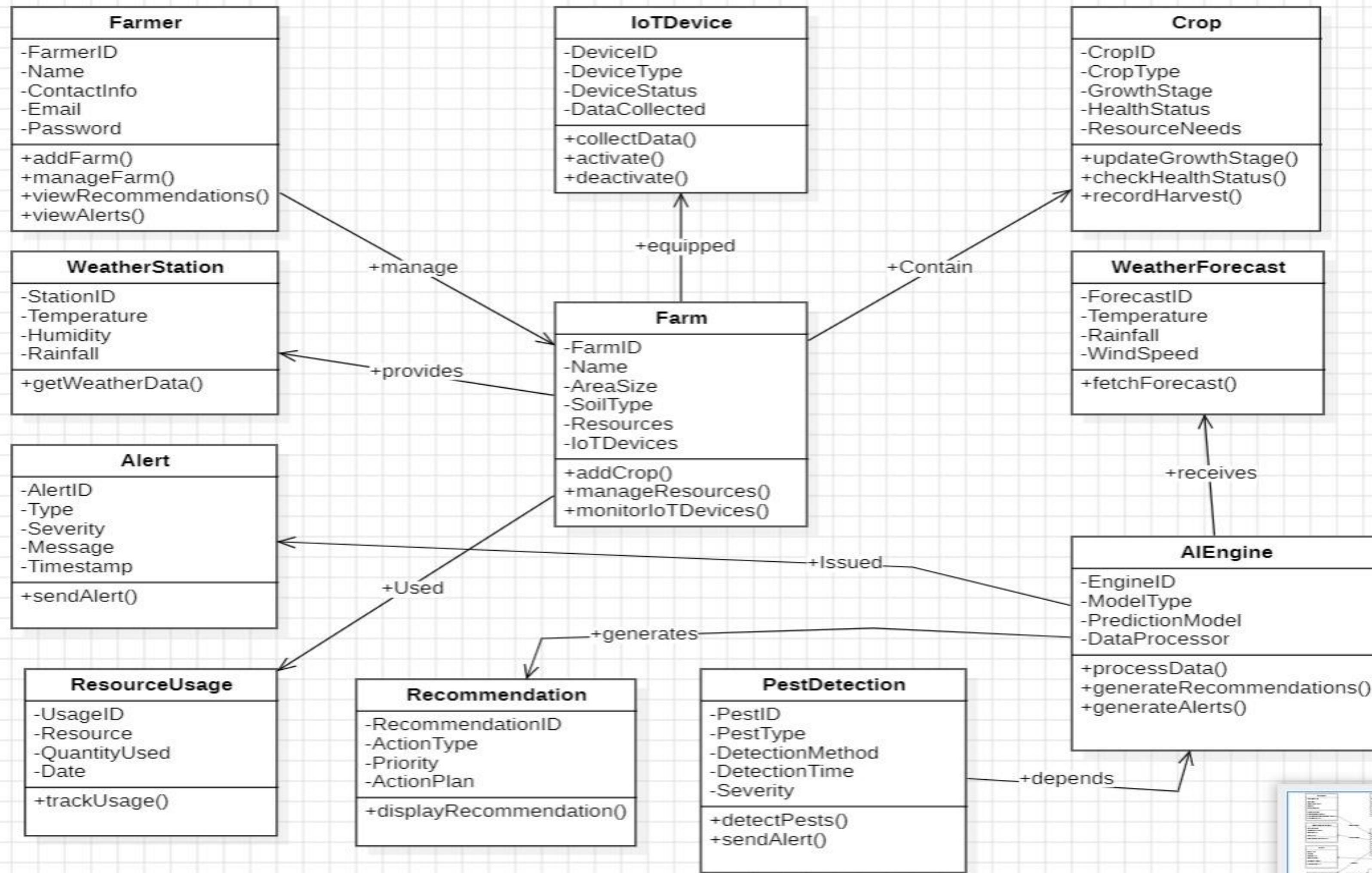


Maintainability: Code and system architecture should be designed for easy maintenance and updates



Diagrams

Class diagrams



Relationships

- **Farmer → Farm:** A farmer manages one or more farms.
- **Farm → Crop:** A farm contains multiple crops.
- **Farm → Resource:** A farm uses multiple resources (water, fertilizer, etc.).
- **Farm → IoT Device:** A farm is equipped with various IoT devices to collect data.
- **Farm → Weather Station:** Each farm has a weather station that provides real-time weather data.
- **IoT Device → Data Collection:** IoT devices collect data that is used for monitoring and decision-making.
- **Weather Forecast → AI Engine:** The weather forecast data is processed by the AI engine.
- **AI Engine → Recommendation:** AI generates recommendations for farmers based on processed data.
- **AI Engine → Alert:** AI generates alerts based on predictive models and real-time data.
- **Pest Detection → IoT Device:** Pest detection is triggered by IoT sensors or image recognition systems.

Relationships

Farmer → Farm

Kind

One-to-Many

Farm → Crop

One-to-Many

Farm → Resource

Many-to-Many

Farm → IoTDevice

One-to-Many

Farm → WeatherStation

One-to-One

IoTDevice → DataCollection

One-to-Many

WeatherForecast → AIEngine

Many-to-One

AIEngine → Recommendation

One-to-Many

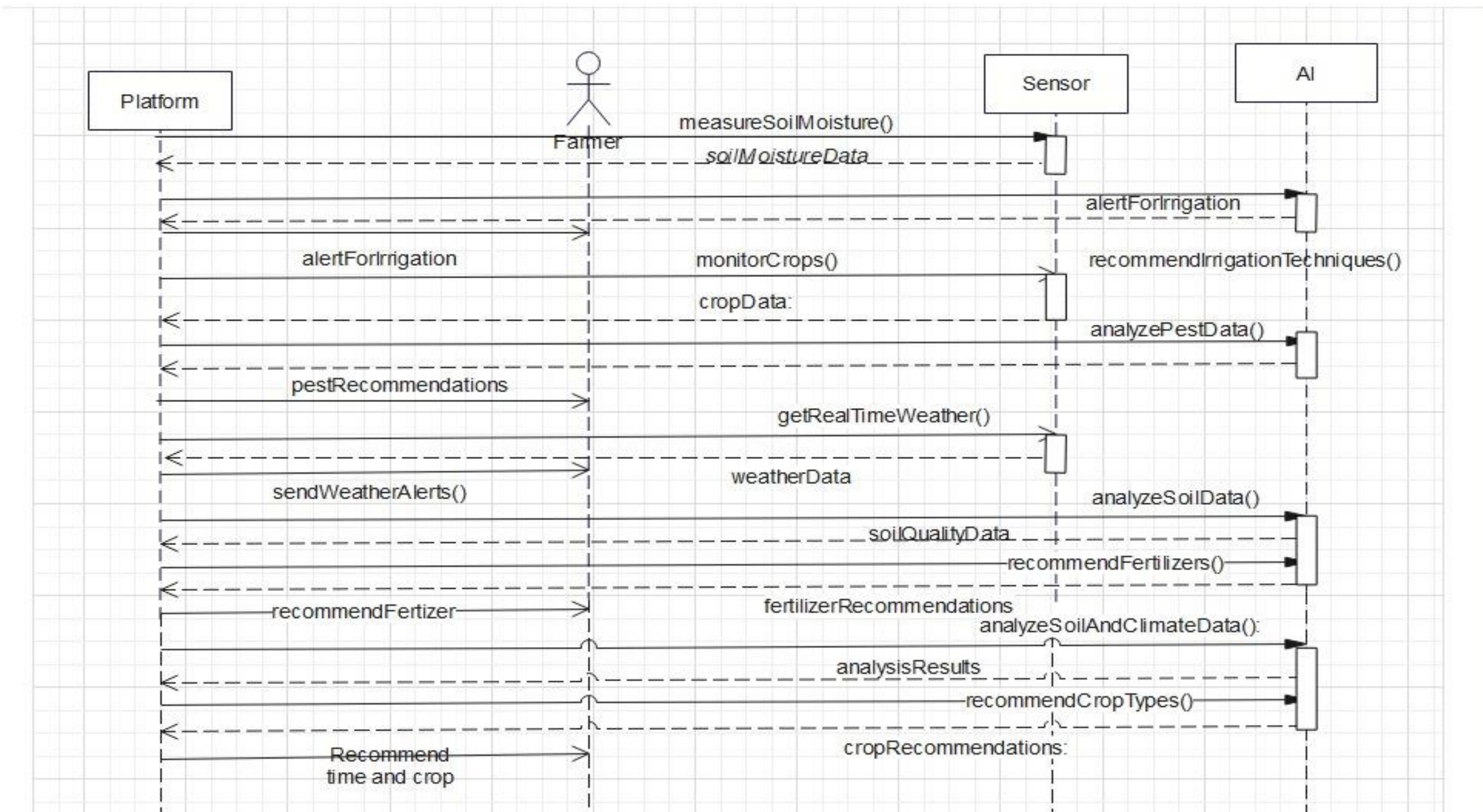
AIEngine → Alert

One-to-Many

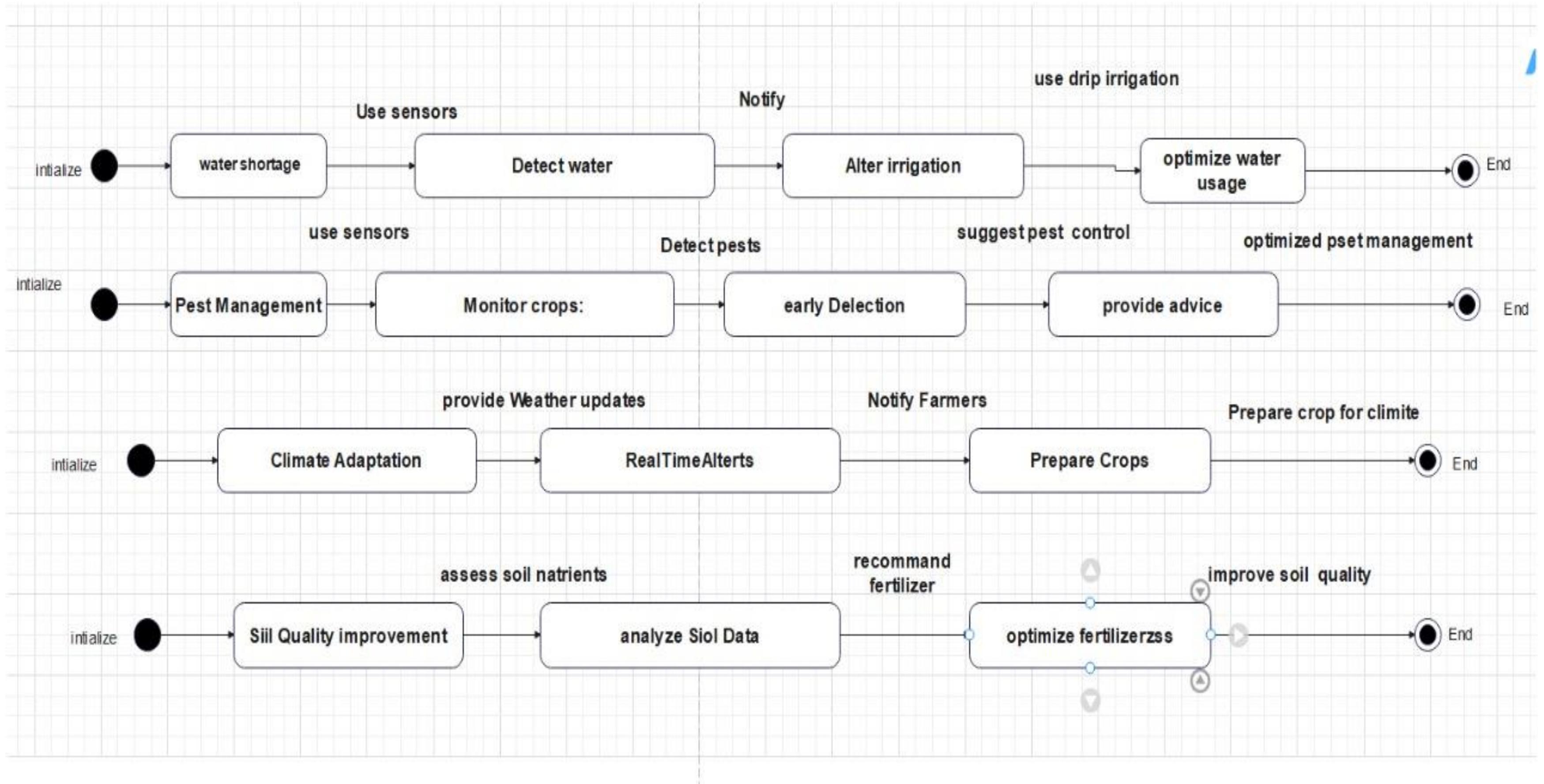
PestDetection → IoTDevice

Many-to-Many

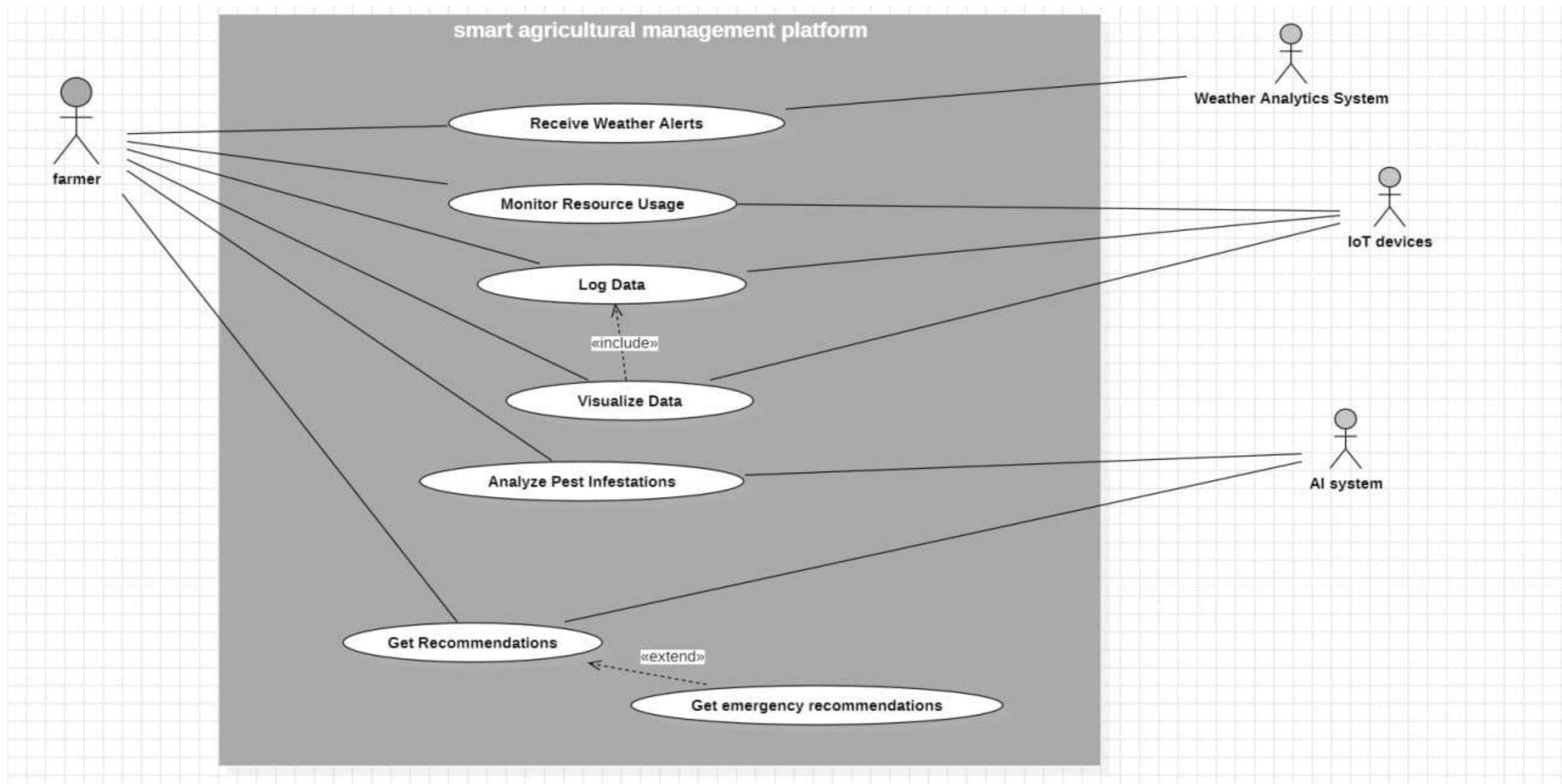
Sequence diagrams



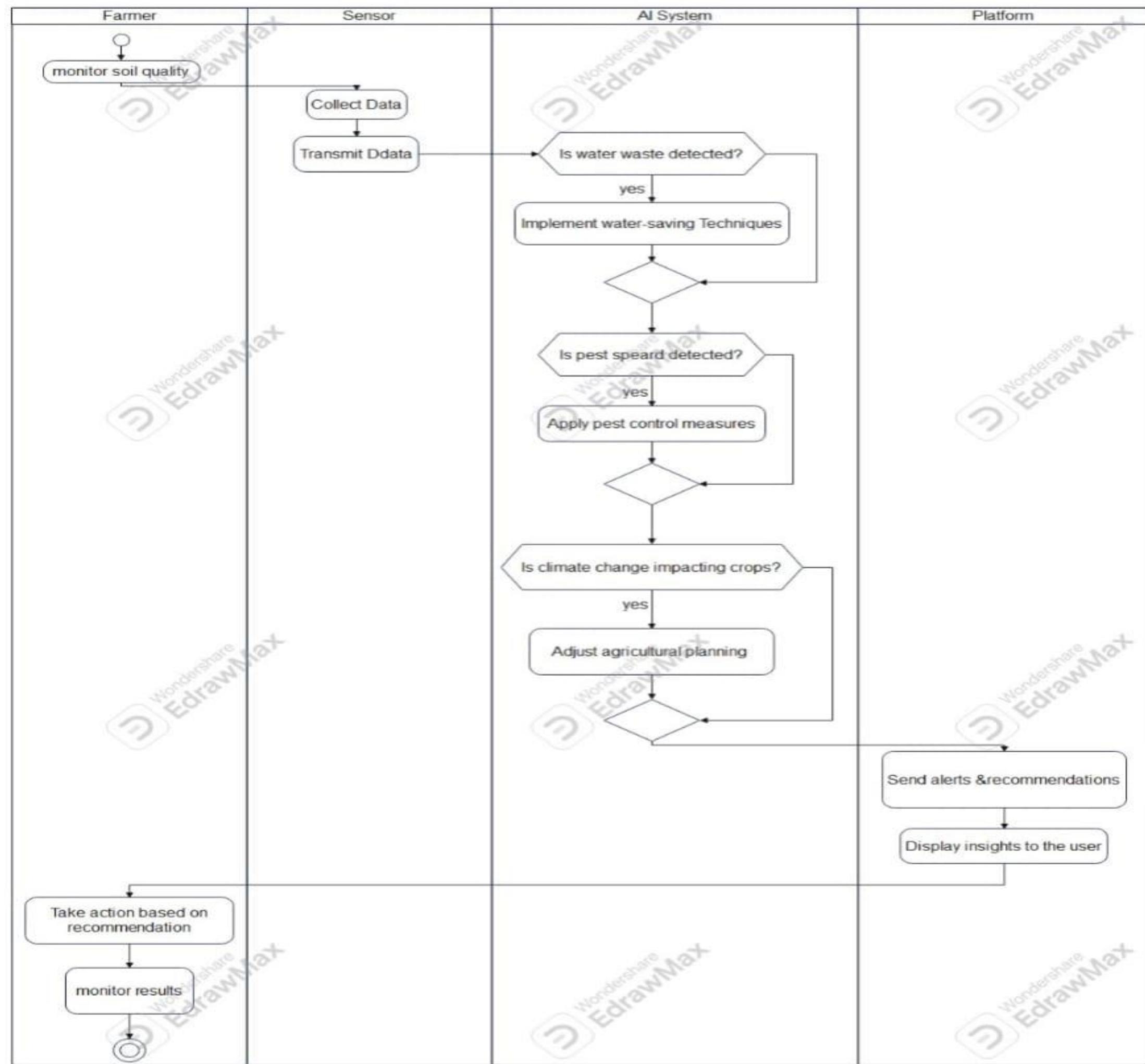
State diagrams



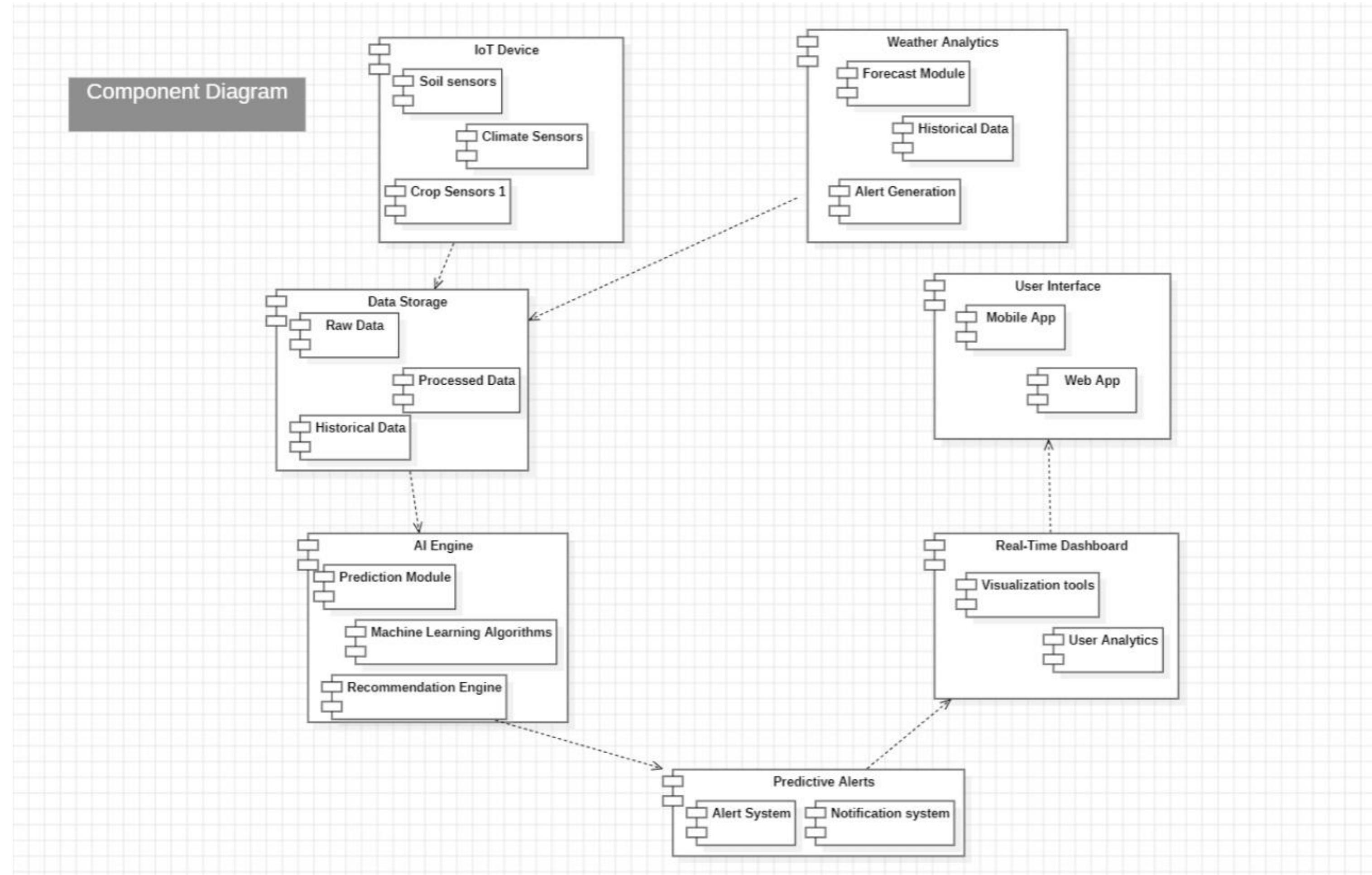
Use Case diagrams



Activity diagrams

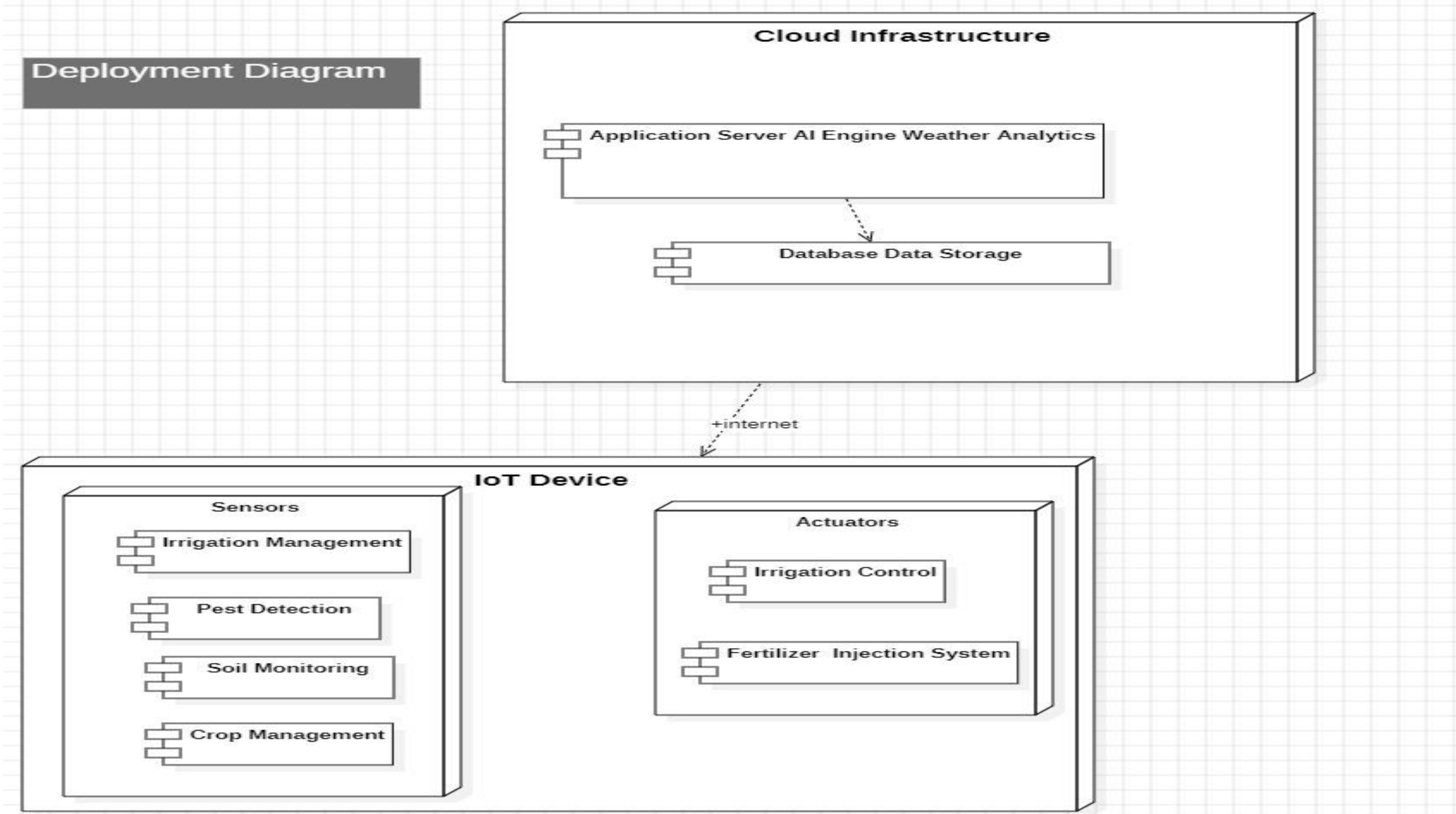


Component diagrams



Deployment diagrams

Deployment Diagram





**Thank You
For Your Attention**