Predicting plant growth stages with environmental and management using power bi.

Introduction:

XYZ Company, renowned for its innovative approach in agriculture, is embarking on a project to optimize plant growth through advanced data analytics and visualization techniques using Power BI. The project focuses on analyzing a comprehensive dataset containing key environmental and management factors such as soil type, sunlight hours, water frequency, fertilizer type, temperature, and humidity. By leveraging this data, the company aims to predict the growth milestones of plants, which are crucial for understanding the conditions that promote optimal growth. This project will involve the creation of interactive dashboards and predictive models to uncover patterns and insights that can inform and improve agricultural practices and greenhouse management.

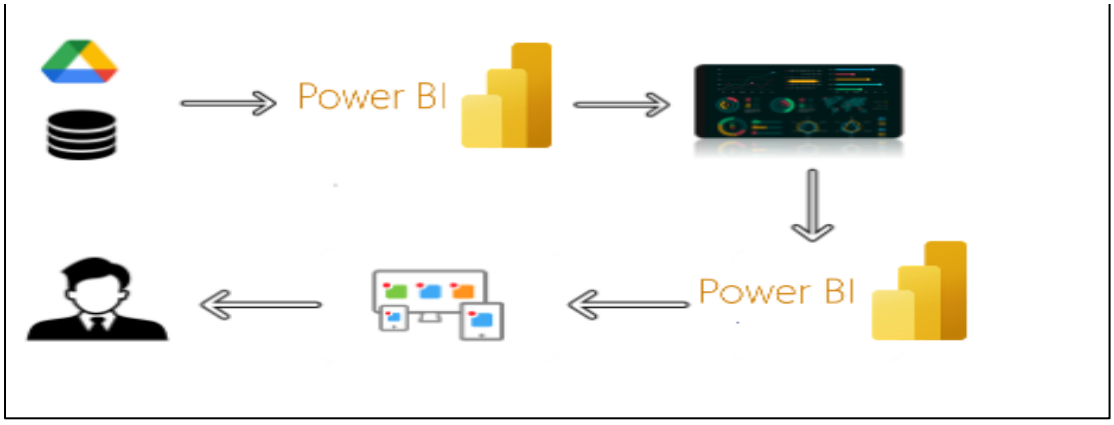
The analysis will be conducted using a decomposition tree to break down growth milestone counts by various factors, providing a clear view of the impact of each variable. Additionally, the project will include the development of several calculated columns and measures to enhance the dataset's analytical depth. Visualizations such as clustered bar charts, pie charts, scatter plots, and column charts will be utilized to present the findings effectively. By implementing this solution, XYZ Company aims to enhance crop yields, optimize resource allocation, and promote sustainable agricultural practices, ultimately solidifying its position as a leader in agricultural innovation.

Scenario 1:
ABC Greenhouses has been facing challenges with inconsistent plant growth across its different greenhouse locations. By leveraging Power BI, the company plans to identify the best combination of soil type, sunlight hours, and watering frequency that leads to the highest growth milestones. The decomposition tree will help break down growth milestone counts by these factors, revealing that loam soil combined with daily watering and 6-8 hours of sunlight yields the best results. This insight will enable ABC Greenhouses to standardize these conditions across all locations, improving overall plant health and productivity.

Scenario 2:
Green Earth Farms has noticed varying growth rates in their organic crops and wants to ensure consistency in their yield. By analyzing the dataset, the company discovers that organic fertilizer combined with loam soil and bi-weekly watering leads to the most significant growth milestones. The decomposition tree further reveals that maintaining temperatures between 20-30°C and humidity levels between 50-70% optimizes plant growth. Green Earth Farms will use these insights to adjust their farming practices, ensuring their crops achieve the best possible growth under organic farming conditions.

Scenario 3:
Future Grow Tech has been developing smart farming solutions but needs to validate their technology's effectiveness under different conditions. By using Power BI to analyze the dataset, the company identifies that their smart sensors for monitoring soil moisture and adjusting water frequency in real-time significantly improve growth milestones. The decomposition tree analysis reveals that these sensors work best with sandy soil and weekly organic fertilizer application, under moderate temperature and humidity conditions. Future Grow Tech will integrate these findings into their product development, enhancing their technology to offer precise and effective agricultural solutions.

Technical Architecture:



Project Flow

To accomplish this, we have to complete all the activities listed below,

- Data Collection
  - Collect the dataset
  - Connect Data with Power BI
- Data Preparation
  - Prepare the Data for Visualization
- Data Visualizations
  - Visualizations
- Dashboard
  - Responsive and Design of Dashboard
- Report
  - Report Creation
- Performance Testing
  - Amount of Data Rendered to DB
  - Utilization of Data Filters
  - No. of Calculation fields
  - No. of Visualizations/Graphs
- Project Demonstration & Documentation
  - Record explanation Video for project end to end solution
  - Project Documentation-Step by step project development procedure

Milestone 1: Data Collection & Extraction from Database

Data collection is the process of gathering and measuring information on variables of interest, in an established systematic fashion that enables one to answer stated research questions, test hypotheses, and evaluate outcomes and generate insights from the data.

Activity 1: Collect the dataset

Please use the link to download the dataset: https://www.kaggle.com/datasets/gororororororo23/plant-

growth-data-classification

Activity 1.1: Understand the data

Data contains all the meta information regarding the columns described in the CSV files. we have provided 5 CSV files:

Column Description of the dataset:

- Soil Type: The type or composition of soil in which the plants are grown.
- Sunlight Hours: The duration or intensity of sunlight exposure received by the plants.
- Water Frequency: How often the plants are watered, indicating the watering schedule.
- Fertilizer Type: The type of fertilizer used for nourishing the plants.
- Temperature: The ambient temperature conditions under which the plants are grown.
- Humidity: The level of moisture or humidity in the environment surrounding the plants.
- Growth Milestone: Descriptions or markers indicating stages or significant events in the growth process of the plants.

Milestone 2: Data Preparation

Activity 1: Prepare the Data for Visualization

Preparing the data for visualization involves cleaning the data to remove irrelevant or missing data, transforming the data into a format that can be easily visualized, exploring the data to identify patterns and trends, filtering the data to focus on specific subsets of data, preparing the data for visualization software, and ensuring the data is accurate and complete. This process helps to make the data easily understandable and ready for creating visualizations to gain insights into the performance and efficiency.

Explanation video link 1: data loading

https://drive.google.com/file/d/1EpAz50x3kdXD36ApibkIt5Hna-Hy1SAM/view?usp=drivesdk

Explanation video link 2: data cleaning
https://drive.google.com/file/d/1nVLFUaTOvUSRpQarOcZPTEEP3e7aZA4-/view?usp=drivesdk

Milestone 3: Data Visualization

Data visualization is the process of creating graphical representations of data in order to help people understand and explore the information. The goal of data visualization is to make complex data sets more accessible, intuitive, and easier to interpret. By using visual elements such as charts, graphs, and maps, data visualizations can help people quickly identify patterns, trends, and outliers in the data.

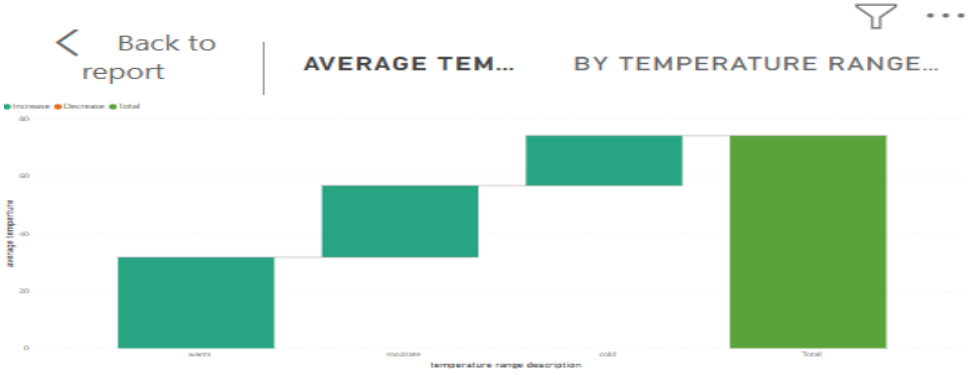
Activity 1: No of Unique Visualizations

The number of unique visualizations that can be created with a given dataset. Some common types of visualizations that can be used to analyze the performance and efficiency of Social Pulse_ Illuminating the Digital Footprint - Unveiling Social Media Engagement Dynamics include bar charts, line charts, heat maps, scatter plots, pie charts,Maps etc. These visualizations can be used to compare performance, track changes over time, show distribution, and relationships between variables, breakdown of revenue and demographics, workload, resource allocation and location.

Activity 1.1: Water Frequency According to its soil type

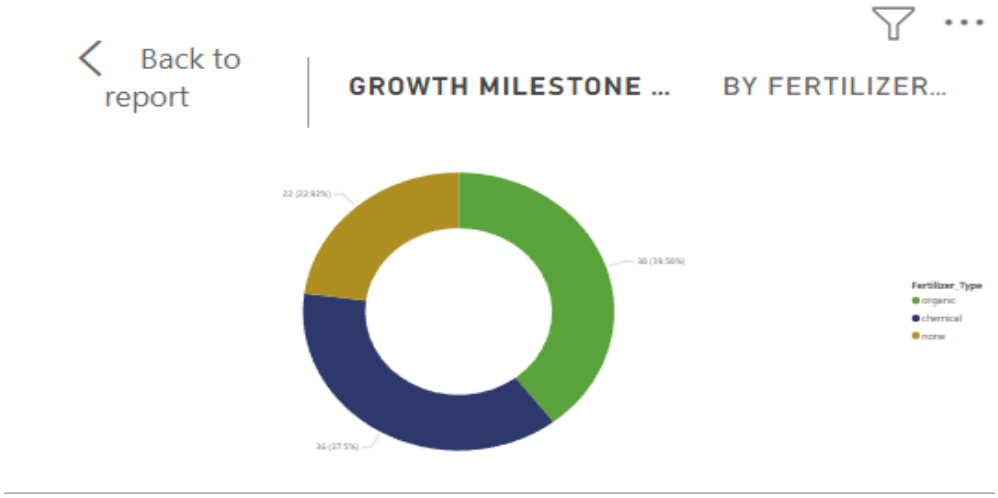
Soil_Type	high	modrate	Total
clay	280.24	207.13	487.37
bi-weekly	59.80	68.15	127.95
daily	95.42	40.66	136.09
weekly	125.02	98.32	223.34
loam	191.61	205.65	397.25
bi-weekly	82.53	99.66	182.19
daily	64.02	54.73	118.75
weekly	45.06	51.26	96.31
sandy	215.43	217.46	432.88
bi-weekly	33.29	60.49	93.78
daily	146.87	86.32	233.19
weekly	35.27	70.65	105.92
Total	687.28	630.24	1,317.51

Activity 1.2: Average Temperature by Temperature range description

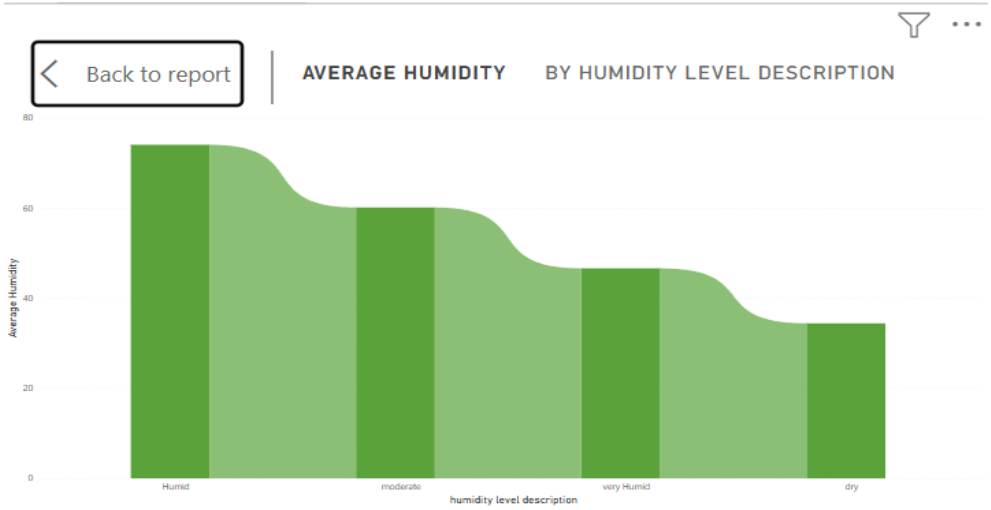


Activity 1.3: Temperature and its description According to plant growth

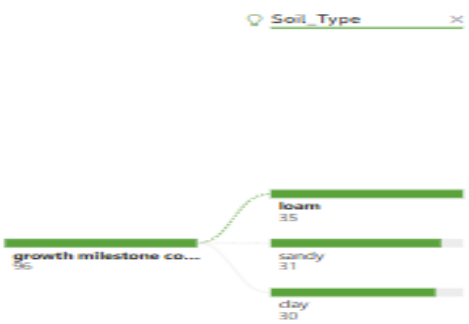
Activity 1.4: Growth Milestone count by Fertilizer type



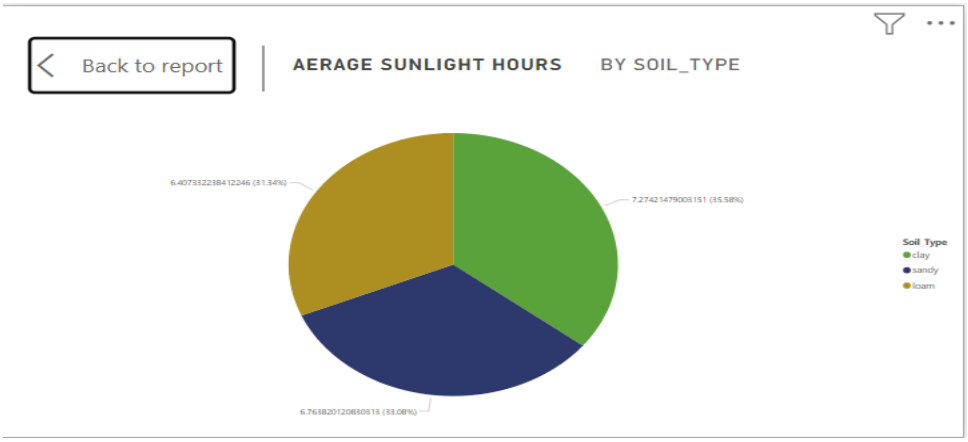
Activity 1.5: Average Humidity by Humidity level description



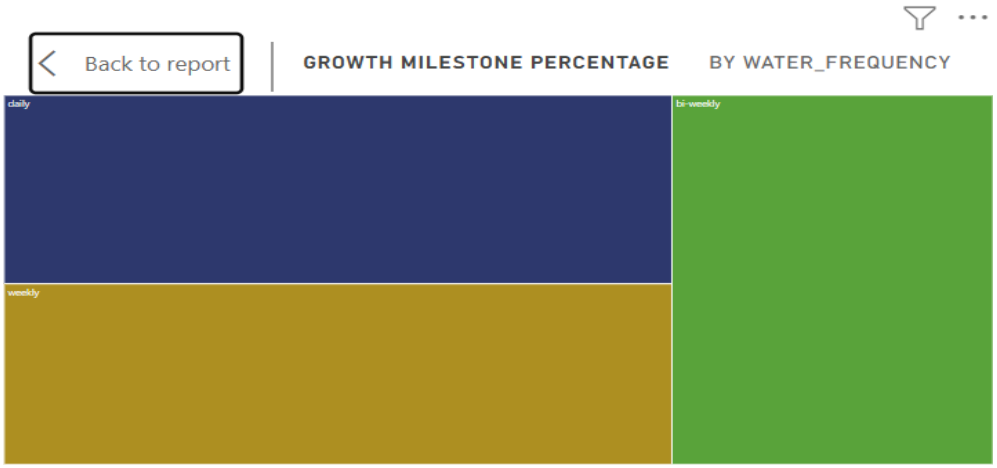
Activity 1.6: Growth Milestone Count according to Soil Type



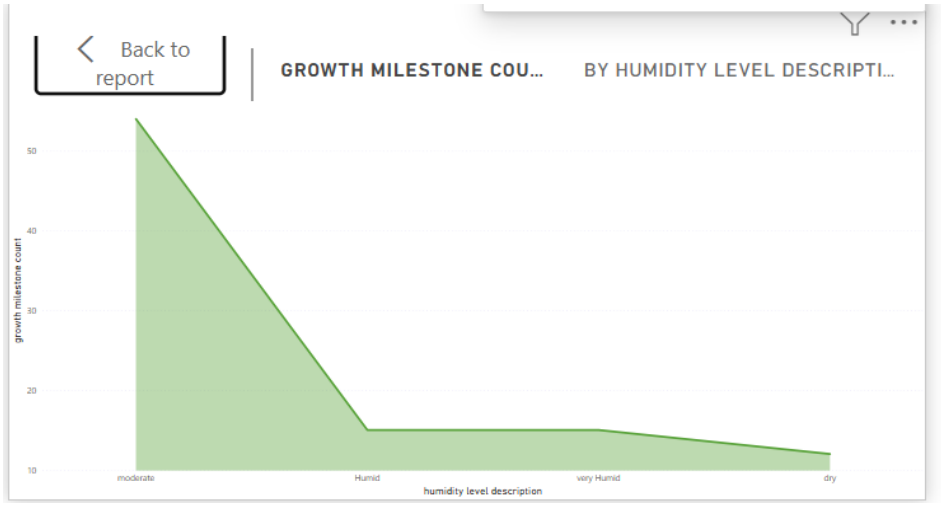
Activity 1.7: Average Sunlight Hours by soil type



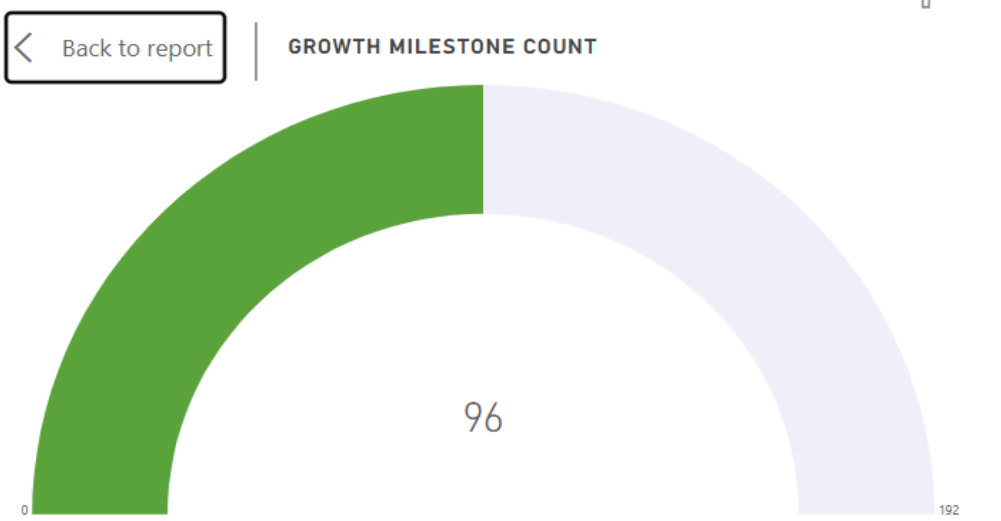
Activity 1.8: Growth Milestone Percentage by Water Frequency



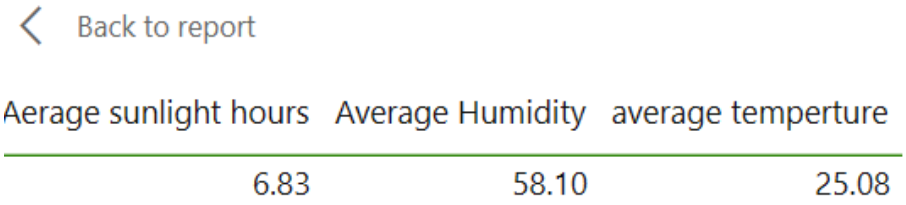
Activity 1.9: Growth Milestone Count by Humidity Level Description



Activity 1.10: Growth Milestone Count



Activity 1.11 Average humidity, Average Temperature, Average Sunlight Hours



Milestone 4: Dashboard

A dashboard is a graphical user interface (GUI) that displays information and data in an organized, easy-to-read format. Dashboards are often used to provide real-time monitoring and analysis of data, and are typically designed for a specific purpose or use case. Dashboards can be used in a variety of settings, such as business, finance, manufacturing, healthcare, and many other industries. They can be used to track key performance indicators (KPIs), monitor performance metrics, and display data in the form of charts, graphs, and tables.

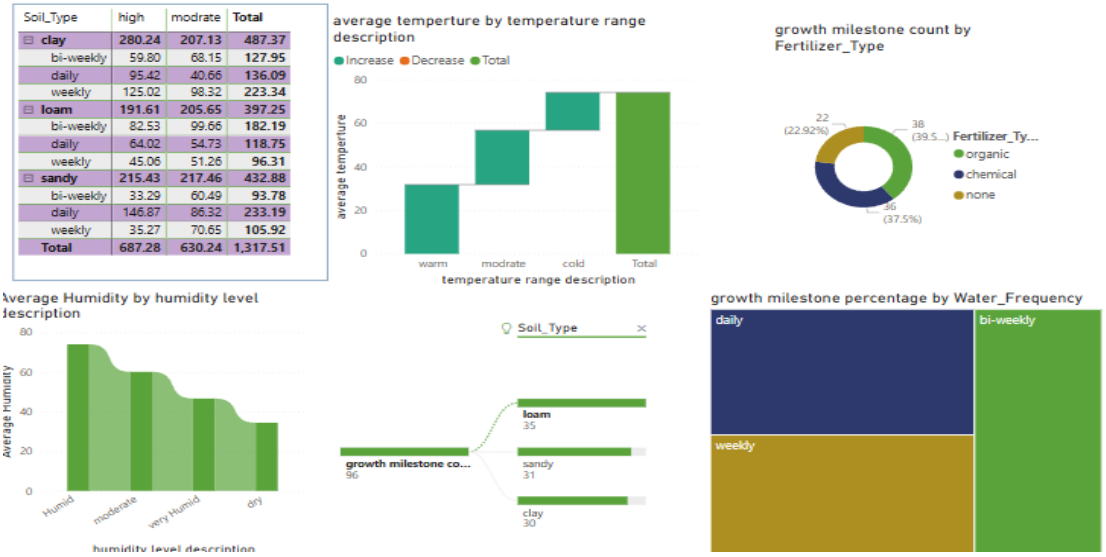
Activity :1- Responsive and Design of Dashboard

The responsiveness and design of a dashboard for Social Pulse Illuminating the Digital Footprint Unveiling Social Media Engagement Is crucial to ensure that the information is easily understandable and actionable. Key considerations for designing a responsive and effective dashboard include user-centred design, clear and concise information, interactivity, data-driven approach, accessibility, customization, and security. The goal is to create a dashboard that is user-friendly, interactive, and data-driven, providing actionable insights to improve the performance and efficiency of Social Pulse Illuminating the Digital Footprint Unveiling Social Media Engagement.

Once you have created views on different sheets in Power Bi you can pull them into a dashboard.

Dashboard 1 :

Explanation video link: https://drive.google.com/file/d/12wsq-6RPoYvXhe371tU1tSEh5LF4QiVB/view?usp=drivesdk

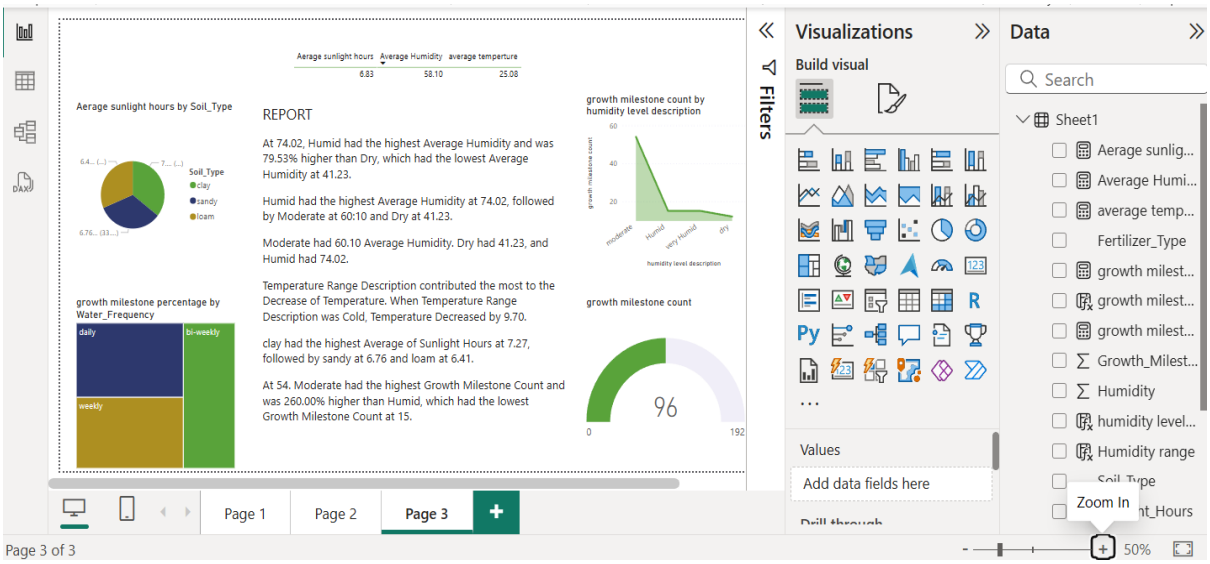


Milestone 5: Report

A data report is a way of presenting data and analysis in a narrative format, with the goal of making the information more engaging and easier to understand. A data story typically includes a clear introduction that sets the stage and explains the context for the data, a body that presents the data and analysis in a logical and systematic way, and a conclusion that summarizes the key findings and highlights their implications. Data Report can be told using a variety of mediums, presentations, interactive visualizations, and videos.

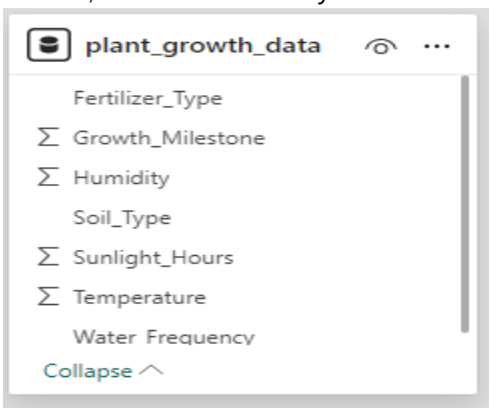
Report 1:

Explanation video link:
https://drive.google.com/file/d/1LSuOVW5qYjrvZg4HPXk45obBzLUZxI3f/view?usp=drivesdk



Milestone 6: Performance Testing

"Amount of Data Loaded" refers to the quantity or volume of data that has been imported, retrieved, or loaded into a system, software application, database, or any other data storage or processing environment. It's a measure of how much data has been successfully processed and made available for analysis, manipulation, or use within the system.



Activity 1: Utilization of DAX Expression

The utilization of data filters plays a pivotal role in streamlining information processing and analysis across various domains. By selectively extracting or excluding specific data points based on predefined criteria, filters enable efficient data management and enhance decision-making processes.

```
Average Humidity = AVERAGE(Sheet1[Humidity])
```

```
Aerage sunlight hours = AVERAGE(Sheet1[Sunlight_Hours])
```

```
iverage temperture = AVERAGE(Sheet1[Temperature])
```

```
growth milestone count = COUNTROWS(FILTER(Sheet1,Sheet1[Growth_Milestone]))
```

```
growth milestone percentage = DIVIDE([growth milestone count],COUNTROWS(Sheet1))
```

```
water frequency numaric = SWITCH([Water_Frequency], "daily",1, "bi weekly",2, "weekly",3,
BLANK())
```

```
temperature range = SWITCH( TRUE(),[Temperature]<15,"low",[Temperature]>= 15 &&
[Temperature]<25,"modrate",[Temperature]>=25, "high")
```

Activity 2 : No of Visualizations/ Graphs

1. Water Frequency According to Its Soil Type
2. Average Temperature by Temperature Range Description
3. Temperature and Its Description According to Plant Growth
4. Growth Milestone Count by Fertilizer Type
5. Average Humidity by Humidity Level Description
6. Growth Milestone Count According to Its Soil Type
7. Average Sunlight Hours by Soil Type
8. Growth Milestone Percentage by Water Frequency
9. Growth Milestone Count by Humidity Level Description
10. Growth Milestone Count
11. Average Humidity, Average Temperature, Average Sunlight Hours

Milestone 7: Project Demonstration & Documentation

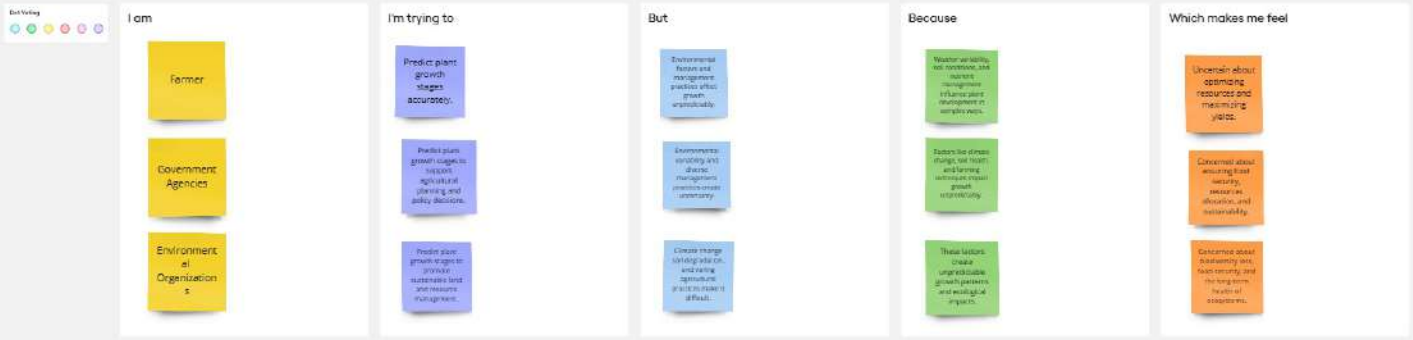
Below mentioned deliverables to be submitted along with other deliverables

Activity 1:- Record explanation Video for project end to end solution

Activity 2:- Project Documentation-Step by step project development procedure

Create document as per the template provided

Customer Problem Statement Template



Template

Empathy map canvas

Use this framework to empathize with a customer, user, or any person who is affected by a team's work. Document and discuss your observations and note your assumptions to gain more empathy for the people you serve.

Originally created by Dave Gray at

XPLANE

Share template feedback

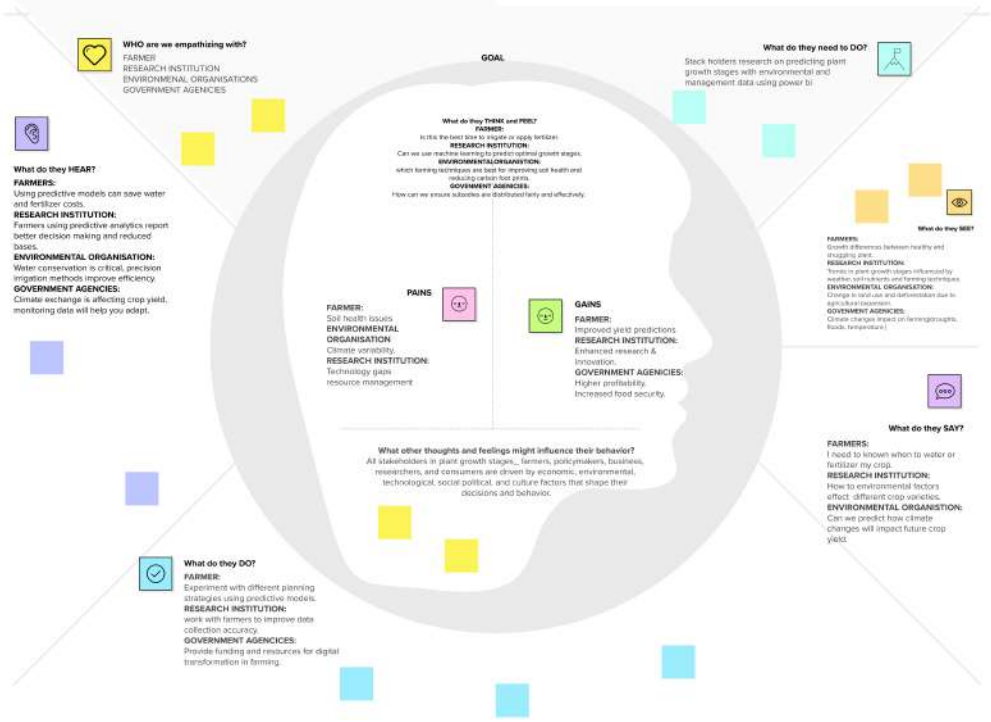
Need some inspiration?

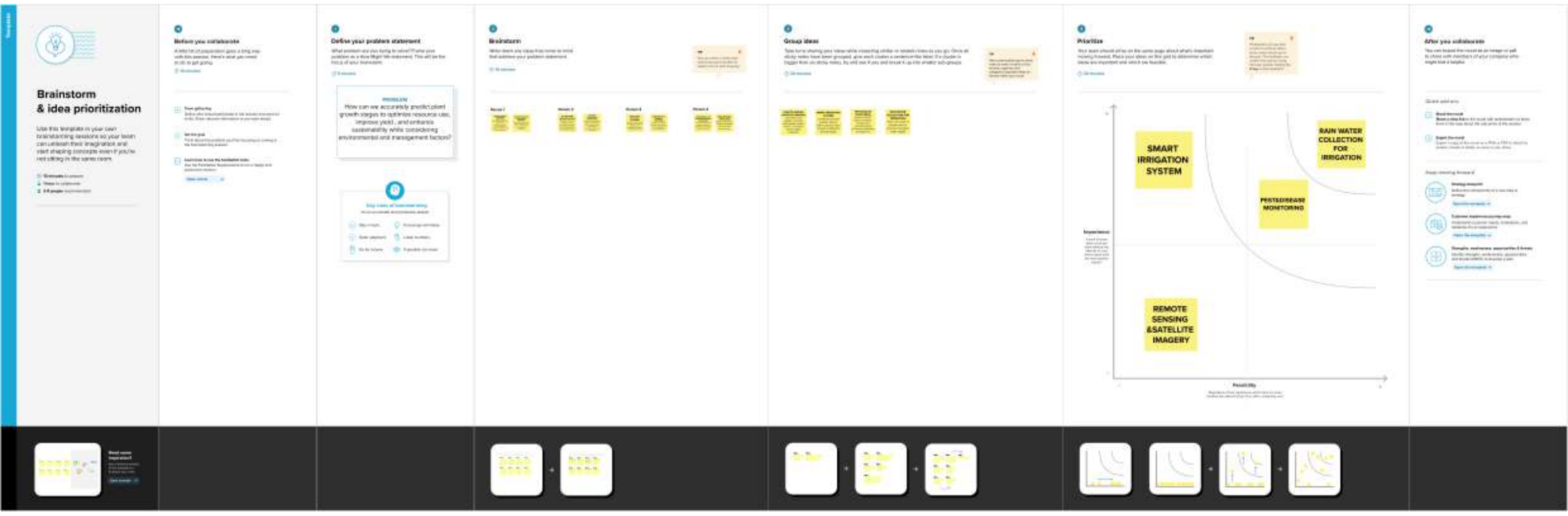
See a finished version of this template to kickstart your work.

Open example →

Develop shared understanding and empathy

Summarize the data you have gathered related to the people that are impacted by your work. It will help you generate ideas, prioritize features, or discuss decisions.




Brainstorm
& idea prioritization
Before you collaborate
Define your problem statement
PROBLEM
How can we accurately predict plant growth stages to optimize resource use, improve yield , and enhance sustainability while considering environmental and management factors?
Brainstorm
Prioritize
SMART IRRIGATION SYSTEM
RAIN WATER COLLECTION FOR IRRIGATION
PESTS&DISEASE MONITORING
REMOTE SENSING &SATELLITE IMAGERY
After you collaborate

Scenario: [Existing experience through a product or service]	**Entice** How does someone become aware of this service?	**Enter** What do people experience as they begin the process?	**Engage** In the core moments in the process, what happens?	**Exit** What do people typically experience as the process finishes?	**Extend** What happens after the experience is over?
Experience steps What does the person (or people) at the center of this scenario typically experience in each step?	Farmers learn about plant growth prediction tools from agronomists, online platform, or government programs .	Farmers explore predictive tools,compare different option,and seek recommendations	Famers input weather ,soil and crop data into predictive models receive real-time insights	Farmers access the tools impact on yield ,share feedback with peers and developers.	Farmers integrate the tool into theirl ong term farming strategy. Advocate for it use
Interactions What interactions do they have at each step along the way? • **People:** Who do they see or talk to? • **Places:** Where are they? • **Things:** What digital touchpoints or physical objects do they use?	Attend agricultural fairs ,consult local experts, watch online tutorials, discuss with other farmers	Consult agronomists test free version of apps, attend training sessions.	Regularly consult agronomists, share experiences with peer, interact with the support.	Join farmer cooperatives, provide feed back to agronomists participate in case studies.	Become community leaders, mentor other farmers ,join innovation programs
Goals & motivations At each step, what is a person's primary goal or motivation? ("Help me..." or "Help me avoid...")	Reduce risks increase productivity adopt modern techniques.	Find affordable, easy to use solutions ensure decisions benefits crop yields.	Achieve higher yields, optimize irrigation and fertilizer use, prevent crop diseases.	Validate effectiveness of tools. refine farming strategies.	Keep improving form productivity stay updated with new innovations.
Positive moments What steps does a typical person find enjoyable, productive, fun, motivating, delightful, or exciting?	Excitement about technology improving yields, exposure to new farming methods.	Confidence in selecting the right tool, encouragement from peers who had success.	Seeing accurate predictions lead to better farming decisions, improved crop health.	Positive yield impact recognition among farming communities.	Enhanced form sustainability, ability to fore case seasons, long term cost savings.
Negative moments What steps does a typical person find frustrating, confusing, angering, costly, or time-consuming?	Uncertainty about accuracy, concerns about cost and usability.	High cost of some tools, difficulty in understanding features, lack of technical support.	Inconsistent data accuracy, challenges with internet access, lack of training.	Frustration if predictions were inaccurate, feelings misled if expectations were not met.	Dependence on external technology, potential over-reliance on predictions.
Areas of opportunity How might we make each step better? What ideas do we have? What have others suggested?	Conduct local awareness programs, simplify information for farmers.	Offer government subsidie, provide user friendly mobile apps with local language support.	Imporove model accuracy integrate offline functionality, provide training workshops.	Contiuous feedback loop, incentives for long-term user, localized model improvements.	Encourage peer to peer knowledge sharing improve adoptability of tools for differnt regions.

Project Design Phase-II
Solution Requirements (Functional & Non-functional)

Date	31 January 20
Team ID	LTVIP2025TMID21336
Project Name	Predicting plant growth stages with environmental and management data using power BI
Maximum Marks	4 Marks

Functional Requirements:

Following are the functional requirements of the proposed solution.

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	Data collection &integration	Integrates environmental data from various source (ex: weather stations, soil sensors).
FR-2	Data cleaning and processing	Handling missing or duplicate data, perform data validation and quality checks, transform and normalize data for analysis.
FR-3	Data Visualization	Create interactive and dynamic visualizations of plant growth stages. Use charts, tables, maps, and other visualization tools to facilitate exploration and analysis.
FR-4	Plant growth prediction	Use historical data and AI models to predict future plant growth stages.
FR-5	Report Creation	Generate reports on plant growth, environmental impact, and management effectiveness.
FR-6	Data Reporting	Generate reports on plant growth stages, environmental conditions, and management practices.

Non-functional Requirements:

Following are the non-functional requirements of the proposed solution.

FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	Intuitive and user friendly interface for data visualization and analysis. Clear and concise documentation for users.
NFR-2	**Security**	Implement robust security measures to protect sensitive data. Ensure compliance with relevant data protection regulation.
NFR-3	**Reliability**	Ensure high optimise and availability of the system, Monitor system performance and address issues promptly.
NFR-4	**Performance**	Optimize system performance for fast data processing and visualization.
NFR-5	**Availability**	Ensure the system in accessible 24/7. Provide redundant infrastructure to minimize downtime.
NFR-6	**Scalability**	Provide flexible and modular architecture for easy upgrades and expansions

Project Design Phase-II
Data Flow Diagram & User Stories

Date	31 January 2025
Team ID	LTVIP2025TMID21336
Project Name	Predicting plant growth stages with environmental and management data using power BI
Maximum Marks	4 Marks

Data Flow Diagrams: A Data Flow Diagram (DFD) is a traditional visual representation of the information flows within a system. A neat and clear DFD can depict the right amount of the system requirement graphically. It shows how data enters and leaves the system, what changes the information, and where data is stored.

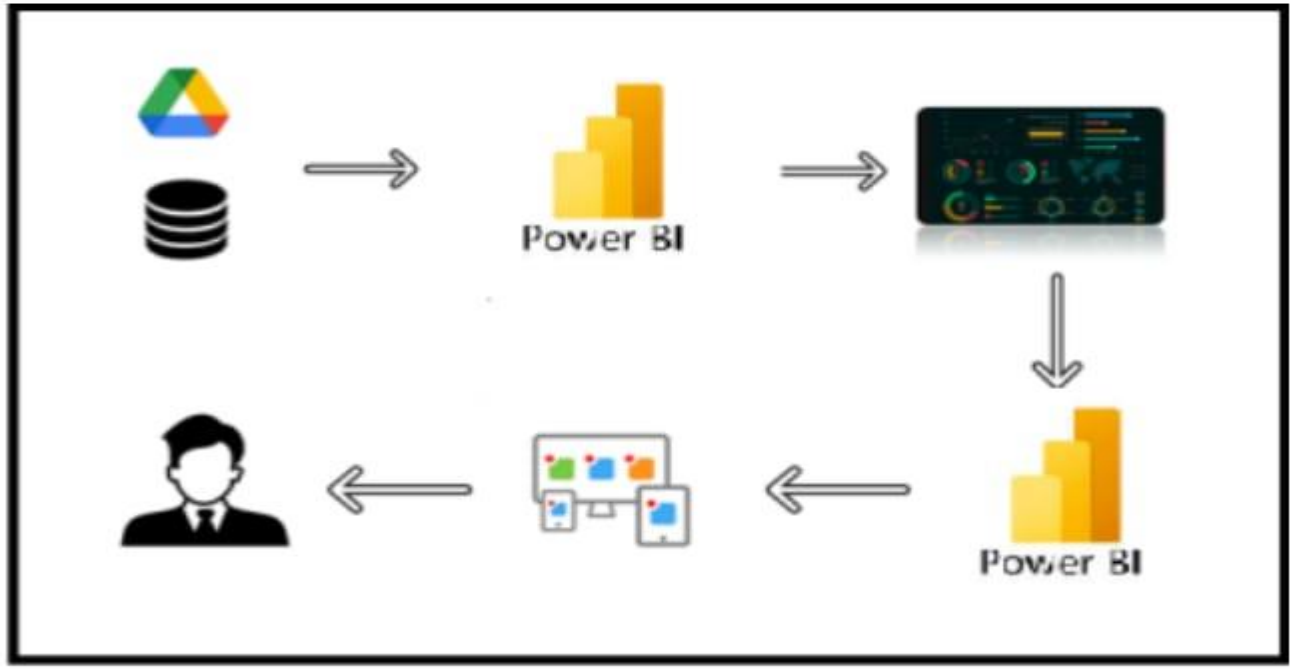
User Stories

Use the below template to list all the user stories for the product.

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Data analyst	Data Collection	USN-1	As a data analyst, I want to collect plant growth data from greenhouse sensors, weather stations, and farm records.	Data collected from IoT sensors, climate data sources, and manual farm logs.	high	Sprint-1
Data analyst	Data Cleaning	USN-2	As a data analyst, I want to preprocess plant growth data so that it is free from errors and inconsistencies.	Data is cleaned, missing values handled, and formats standardized.	medium	Sprint-1
Data analyst	Data Visualization	USN-3	As a data analyst, I want to visualize plant growth trends using Power BI so that I can generate meaningful insights.Power BI dashboards display plant	Power BI dashboards display plant growth patterns by soil type, water frequency, and temperature.	high	Sprint-2
Greenhouse Manager	Plant growth prediction	USN-4	As a greenhouse manager, I want to analyze historical plant growth trends to standardize best practices.	Reports highlight optimal environmental conditions for plant growth.	high	Sprint-2
Agri-Tech Company	Report creation	USN-5	As a arri-tech company, user can exports for further analysis.	I can create reports.	medium	Sprint-2
Farmers	Data Export	USN-6	As a farmer, I want to export analyzed plant growth data so that I can use it for yield planning.	Users can export data in CSV, PDF, and Excel formats.	medium	Sprint-2

Project Design Phase-II
Technology Stack (Architecture & Stack)

Date	31 January 3035
Team ID	LTVIP2025TMID21336
Project Name	Predicting plant growth stages with environmental and management data using power BI
Maximum Marks	4 Marks



Technical Architecture:

The Deliverable shall include the architectural diagram as below and the information as per the table1 & table 2

Table-1 : Components & Technologies:

S. No	Component	Description	Technology
1.	Data Collection	Gathering plant growth and environmental data.	Power BI, Excel
2.	Data Loading	Importing data into the analysis environment.	Power BI
3.	Data Cleaning	Handling missing values, standardizing formats.	Power BI
4.	Data Visualization	Creating growth stage charts, trends, and dashboards.	Power BI
5.	Scenario 1	Water Frequency According to Its Soil Type	Power BI Visualization (Matrix)
6.	Scenario 2	Average Temperature by Temperature Range Description	Power BI Visualization(waterfall chart)
7.	Scenario 3	Temperature and Its Description According to Plant Growth	Power BI Visualization(Key influencers)
8.	Scenario 4	Growth Milestone Count by Fertilizer Type	Power BI Visualization(Donut chart t)
9.	Scenario 5	Average Humidity by Humidity Level Description	Power BI Visualization(Ribbon chart)
10.	Scenario 6	Growth Milestone Count According to Its Soil Type	Power BI Visualization(Decomposition tree)
11.	Scenario 7	Average Sunlight Hours by Soil Type	Power BI Visualization(Pie chart)
12.	Scenario 8	Growth Milestone Percentage by Water Frequency	Power BI Visualization(Tree map)
13.	Scenario 9	Growth Milestone Count by Humidity Level Description	Power BI Visualization(Area chart)
14.	Scenario10	Growth Milestone Count	Power BI Visualization (Gauge)
15.	Scenario 11	Average Humidity, Average Temperature, Average Sunlight Hours	Power BI Visualization(Table)

16.	Report Creation	Generating interactive reports on plant growth.	Power BI
17.	Data Export	Exporting processed insights.	Power BI, Excel

Table-2: Application Characteristics:

S. No	Characteristics	Description	Technology
1.	Scalability	Handles large datasets covering multiple plant types.	Power BI, Excel
2.	Interactivity	Allows filtering by plant type, environment factors.	Power BI (DAX, Power Query)
3.	Performance	Optimized queries for efficient analysis.	Power BI (DAX)
4.	Usability	User-friendly dashboards for agricultural insights.	Power BI
5.	Automation	Automated data refresh for updated insights.	Power BI

Problem-Solution fit canvas 2.0

Purpose / Vision

Define CS, fit into

1. CUSTOMER SEGMENT(S) — CS

ABC Greenhouses (Commercial greenhouse operators seeking standardized growth conditions)
Green Earth Farms (Organic farmers optimizing yield consistency)
Future Grow Tech (Smart farming technology developers validating their solutions)

6. CUSTOMER CONSTRAINTS — CC

Budget limitations for advanced technology adoption
Limited technical expertise in data analytics among greenhouse operators
Availability of accurate, real-time environmental data

5. AVAILABLE SOLUTIONS — AS

Manual observation and trial-and-error adjustments
Traditional farming knowledge passed down without data-driven insights
Generic agricultural software without predictive capabilities

Explore AS,

Focus on J&P, tap into BE, understand

2. JOBS-TO-BE-DONE / PROBLEMS — J&P

Identifying optimal environmental and management conditions for plant growth
Standardizing growth conditions across different locations
Ensuring consistent organic crop yields
Validating smart farming solutions for better growth predictions

9. PROBLEM ROOT CAUSE — RC

Lack of precise, data-driven insights into how environmental and management factors affect plant growth
Inconsistent application of best farming practices across different locations

7. BEHAVIOUR — BE

Experimenting with different soil types, watering schedules, and fertilizers
Seeking recommendations from agronomists or online farming communities
Adopting smart farming technologies for monitoring and automation

Focus on J&P, tap into BE, understand

Identify strong TR & EM

3. TRIGGERS — TR

Inconsistent plant growth across different greenhouses
Variability in organic crop yields impacting business profitability
Need to validate and improve smart farming technology to gain market trust

4. EMOTIONS: BEFORE / AFTER — EM

Before: Frustration, uncertainty about growth variability, inefficiency in resource allocation
After: Confidence in decision-making, optimized growth conditions, improved yield and productivity

.

10. YOUR SOLUTION — SL

A Power BI-driven predictive analytics solution that helps farmers analyze growth factors and optimize conditions
Interactive dashboards for easy visualization and decision-making
Decomposition tree analysis to break down key factors influencing growth
Standardized recommendations for soil, watering, and environmental conditions
Would you like me to refine this further for specific use cases or stakeholders

8. CHANNELS of BEHAVIOUR — CH

Online: Researching agricultural best practices, engaging in farming forums, using farm management software

8.2 OFFLINE

Consulting agronomists, attending farming expos, trialing different growing conditions manually

Extract online & offline CH of BE

AMALTAMA

Project Design Phase
Proposed Solution Template

Date	15 February 2025
Team ID	LTVIP2025TMID21336
Project Name	Predicting plant growth stages with environmental and management data using power BI
Maximum Marks	2 Marks

Proposed Solution Template:

Project team shall fill the following information in the proposed solution template.

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	Inconsistent plant growth due to variations in environmental and management factors. The project aims to optimize plant growth by analyzing factors such as soil type, sunlight hours, water frequency, fertilizer type, temperature, and humidity using Power BI.
2.	Idea / Solution description	The project will leverage Power BI's advanced analytics and visualization capabilities to predict plant growth milestones. It includes interactive dashboards, decomposition trees, and various charts to analyze patterns and trends.
3.	Novelty / Uniqueness	The use of Power BI's decomposition tree for agricultural data analysis is a unique approach, allowing granular insights into factors affecting plant growth. Additionally, real-time monitoring and predictive analytics offer innovative solutions for smart farming.
4.	Social Impact / Customer Satisfaction	The project helps farmers and agricultural businesses optimize resource allocation, improve yield consistency, and promote sustainable farming. By standardizing best practices, it contributes to food security and efficiency in agriculture.
5.	Business Model (Revenue Model)	The solution can be monetized through subscription-based analytics dashboards for farms and agribusinesses, consulting services, and integration with IoT-based smart farming solutions.
6.	Scalability of the Solution	The model is scalable across different agricultural settings, from small farms to large agribusinesses. It can be expanded to include IoT sensor integration for real-time data collection and AI-driven predictive analytics.

Project Design Phase
Solution Architecture

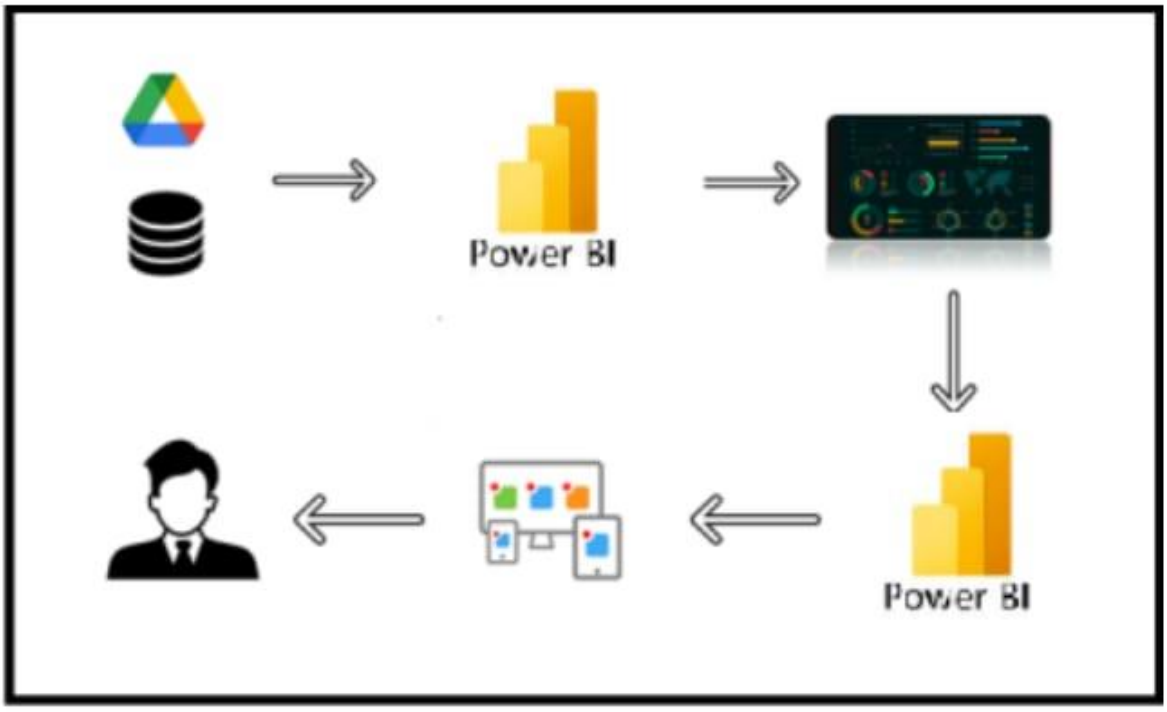
Date	15 February 2025
Team ID	LTVIP2025TMID21336
Project Name	Predicting plant growth stages with environmental and management using data with power bi
Maximum Marks	4 Marks

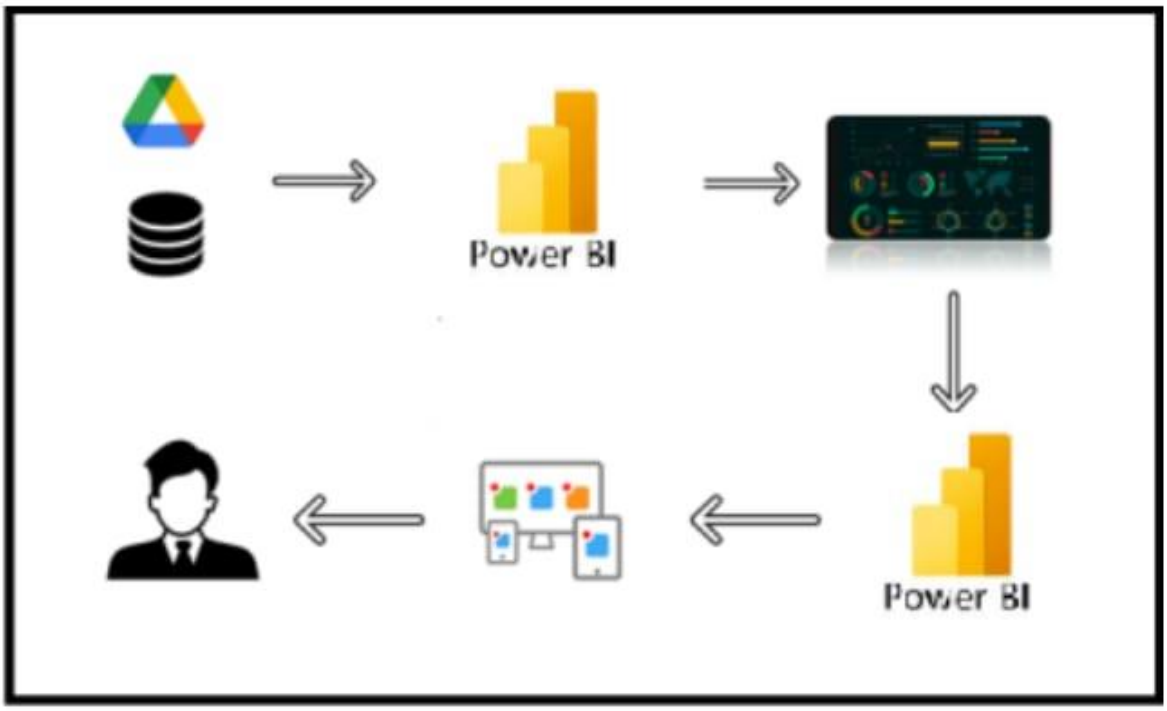
Solution Architecture:

Solution architecture is a complex process – with many sub-processes – that bridges the gap between business problems and technology solutions. Its goals are to:

- Find the best tech solution to solve existing business problems.
- Describe the structure, characteristics, behaviour, and other aspects of the software to project stakeholders.
- Define features, development phases, and solution requirements.
- Provide specifications according to which the solution is defined, managed, and delivered.

Example - Solution Architecture Diagram:




Power BI
Power BI

Project Planning Phase

Project Planning Template (Product Backlog, Sprint Planning, Stories, Storypoints)

Date	15 February 2025
Team ID	LTVIP2025TMID21336
Project Name	Predicting plant growth stages with environmental and management data using power BI
Maximum Marks	5 Marks

Product Backlog, Sprint Schedule, and Estimation (4 Marks)

Use the below template to create product backlog and sprint schedule

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Data Collection	USN-1	As a data analyst, I want to collect food production data from reliable sources.	2	High	G. Babi
Sprint-1	Data Cleaning	USN-2	As a data analyst, I want to preprocess plant growth data so that it is free from errors and inconsistencies.	3	medium	G.Mohini
Sprint-2	Data Visualization	USN-3	As a data analyst, I want to visualize plant growth trends using Power BI so that I can generate meaningful insights.	5	high	I.Kumari
Sprint-2	Plant growth prediction	USN-4	As a greenhouse manager, I want to analyze historical plant growth trends to standardize best practices.	3	high	I.Kumari
Sprint-2	Report creation	USN-5	As a argi-tech company, user can exports for further analysis.	3	medium	J.Krupa
Sprint-2	Data Export	USN-6	As a farmer, I want to export analyzed plant growth data so that I can use it for yield planning.	2	low	J.Krupa

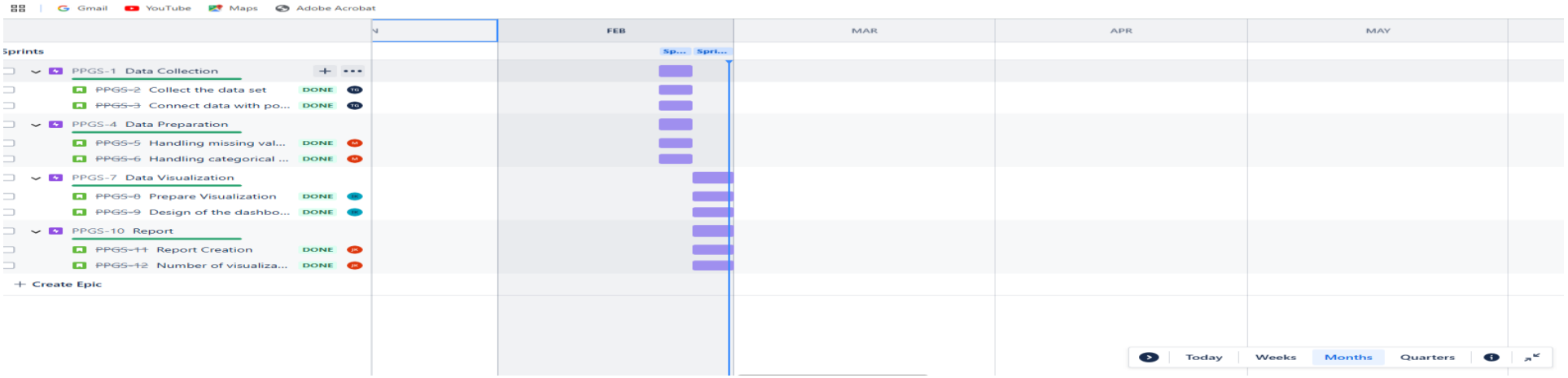
Project Tracker, Velocity & Burndown Chart: (4 Marks)

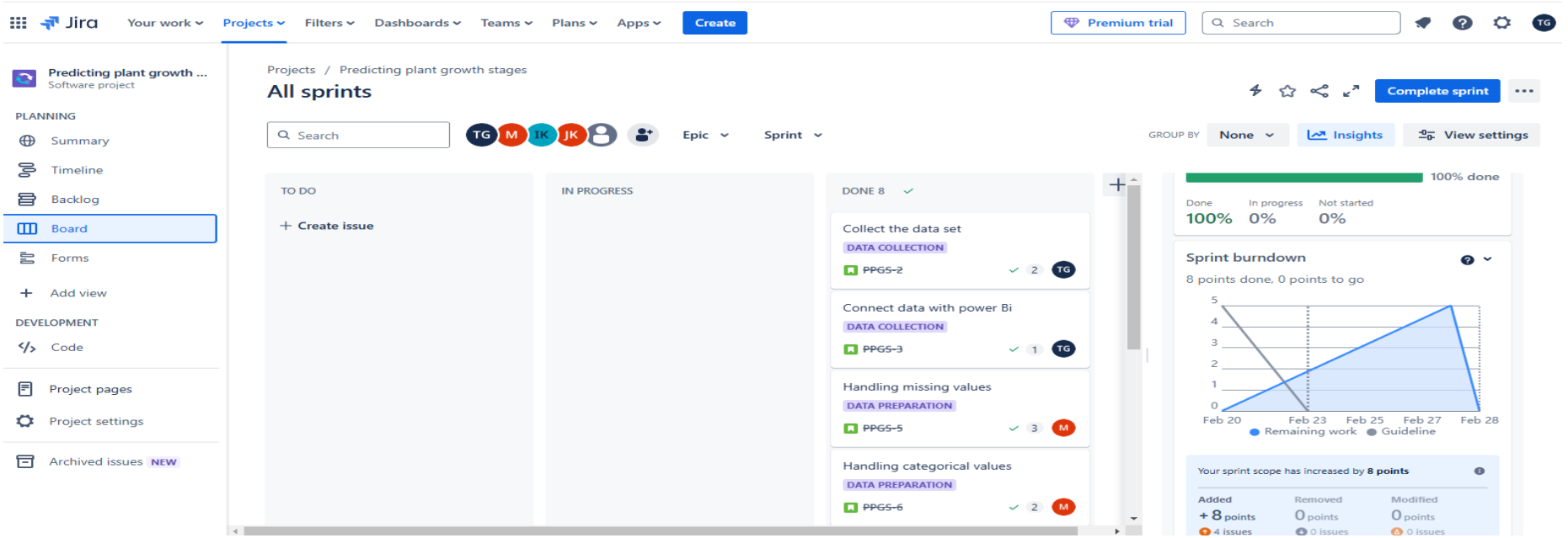
Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date (Actual)
Sprint-1	24	2 Days	20FEB 2025	21FEB 2025	24	21 FEB 2025
Sprint-2	24	2 Days	22FEB 2025	23FEB 2025	24	23FEB 2025
Sprint-3	24	2 Days	24FEB 2025	26FEB 2025	24	26FEB 2025
Sprint-4	24	2 Days	27FEB 2025	28 FEB 2025	24	28FEB 2025

Velocity:

Imagine we have a 10-day sprint duration, and the velocity of the team is 20 (points per sprint). Let's calculate the team's average velocity (AV) per iteration unit (story points per day)

$$AV = \frac{sprint\ duration}{velocity} = \frac{20}{10} = 2$$


Gmail
YouTube
Maps
Adobe Acrobat
FEB
MAR
APR
MAY
Sprints
PPGS-1 Data Collection
PPGS-2 Collect the data set DONE
PPGS-3 Connect data with po... DONE
PPGS-4 Data Preparation
PPGS-5 Handling missing val... DONE
PPGS-6 Handling categorical ... DONE
PPGS-7 Data Visualization
PPGS-8 Prepare Visualization DONE
PPGS-9 Design of the dashbo... DONE
PPGS-10 Report
PPGS-11 Report Creation DONE
PPGS-12 Number of visualiza... DONE
Create Epic
Today
Weeks
Months
Quarters

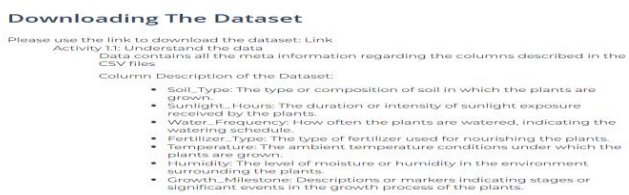
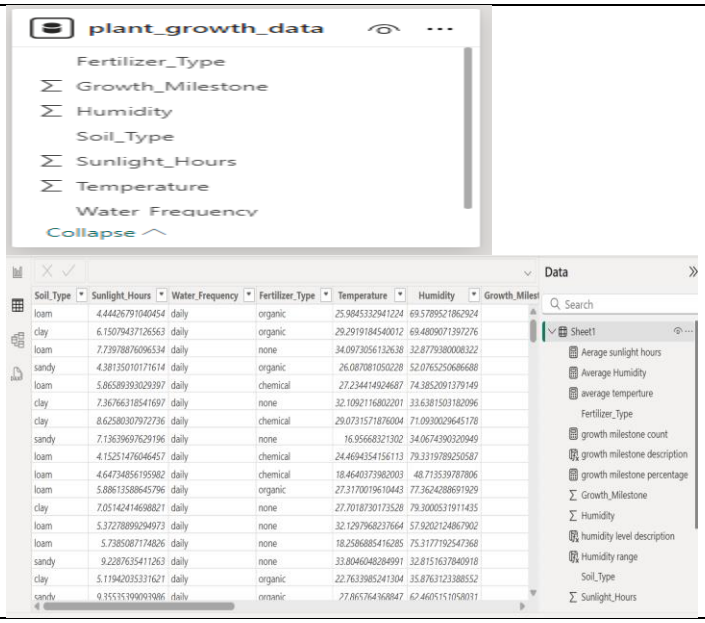

Jira
Your work
Projects
Filters
Dashboards
Teams
Plans
Apps
Create
Premium trial
Search
Predicting plant growth ...
Software project
PLANNING
Summary
Timeline
Backlog
Board
Forms
Add view
DEVELOPMENT
Code
Project pages
Project settings
Archived issues NEW
Projects / Predicting plant growth stages
All sprints
Complete sprint
Search
Epic
Sprint
GROUP BY None
Insights
View settings
TO DO
Create issue
IN PROGRESS
DONE 8
Collect the data set
DATA COLLECTION
PPGS-2
Connect data with power Bi
DATA COLLECTION
PPGS-3
Handling missing values
DATA PREPARATION
PPGS-5
Handling categorical values
DATA PREPARATION
PPGS-6
100% done
Done 100%
In progress 0%
Not started 0%
Sprint burndown
8 points done, 0 points to go
Feb 20
Feb 23
Feb 25
Feb 27
Feb 28
Remaining work
Guideline
Your sprint scope has increased by 8 points
Added +8 points
Removed 0 points
Modified 0 points

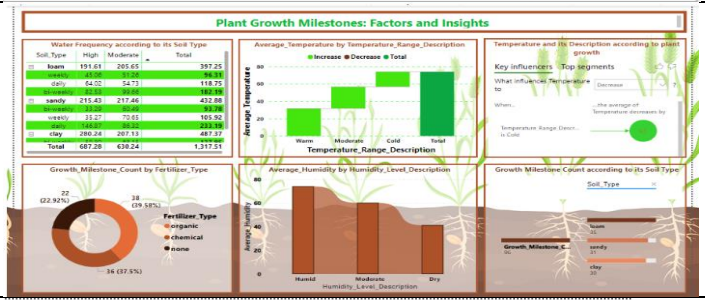
Project Development Phase
Model Performance Test

Date	10 February 2025
Team ID	LTVIP2025TMID21336
Project Name	Predicting plant growth stages with environmental and management data using power BI
Maximum Marks	

Model Performance Testing:

Project team shall fill the following information in model performance testing template.

S.No.	Parameter	Screenshot / Values
1.	Data Rendered	
2.	Data Preprocessing	
3.	Utilization of Data Filters	

4.	DAX Queries Used	Average Humidity = AVERAGE(Sheet1[Humidity]) Aerage sunlight hours = AVERAGE(Sheet1[Sunlight_Hours]) iverage temperture = AVERAGE(Sheet1[Temperature]) growth milestone count = COUNTROWS(FILTER(Sheet1,Sheet1[Growth_Milestone])) growth milestone percentage = DIVIDE([growth milestone count],COUNTROWS(Sheet1)) water frequency numaric = SWITCH([Water_Frequency], "daily",1, "bi weekly",2, "weekly",3, BLANK()) temperature range = SWITCH(TRUE(),[Temperature]<15,"low",[Temperature]>= 15 && [Temperature]<25,"modrate",[Temperature]>=25, "hieh")
5.	Dashboard design	
6	Report Design