I am	I'm trying to	But	Because	Which makes me feel
FARMER AGRI-BUSINESS GOVERNMENT	Plan my Agricultural production like rice, maize, tea coffee and fruits. Analyze global production trends for market expansion. Analyze global production trends to ensure food security.	I lack accurate data related to past production trends climate impact. I lack data related to the demand patterns and production fluctuations. I lack data related to the production trends and international trade.	Crop yields fluctuate due to changing weather patterns and consumer preferences. Agricultural production is influenced by climated and changing consumer preferences. Agriculture is effected by climate change, population growth.	Which crops to cultivate and how to ensure profit. Which effects long term business sustainability. Challenged in making decisions for sustainable agriculture, subsides allocation and market regulations.

Template

Brainstorm & idea prioritization

Use this template in your own brainstorming sessions so your team can unleash their imagination and start shaping concepts even if you're not sitting in the same room.

10 minutes to prepare
1 hour to collaborate
2-8 people recommended

Before you collaborate

A little bit of preparation goes a long way with this session. Here's what you need to do to get going.

10 minutes

A **Team gathering**
Define who should participate in the session and send an invite. Share relevant information or pre-work ahead.

B **Set the goal**
Think about the problem you'll be focusing on solving in the brainstorming session.

C **Learn how to use the facilitation tools**
Use the Facilitation Superpowers to run a happy and productive session.

Open article →

1 Define your problem statement

What problem are you trying to solve? Frame your problem as a How Might We statement. This will be the focus of your brainstorm.

5 minutes

PROBLEM

Predict plant growth stages to optimize irrigation fertilization an harvesting

Key rules of brainstorming

To run an smooth and productive session

- Stay in topic.
- Encourage wild ideas.
- Defer judgment.
- Listen to others.
- Go for volume.
- If possible, be visual.

2 Brainstorm

Write down any ideas that come to mind that address your problem statement.

10 minutes

TIP
You can select a sticky note and hit the pencil [switch to sketch] icon to start drawing!

Person 1

Person 2

Person 3

Person 4

3 Group ideas

Take turns sharing your ideas while clustering similar or related notes as you go. Once all sticky notes have been grouped, give each cluster a sentence-like label. If a cluster is bigger than six sticky notes, try and see if you and break it up into smaller sub-groups.

20 minutes

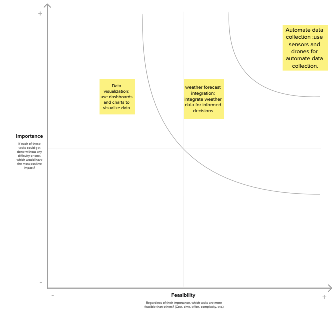
TIP
Add customizable tags to sticky notes to make it easier to find, browse, organize, and categorize important ideas as themes within your mural.

4 Prioritize

Your team should all be on the same page about what's important moving forward. Place your ideas on this grid to determine which ideas are important and which are feasible.

20 minutes

TIP
Participants can use their cursors to point at where sticky notes should go on the grid. The facilitator can confirm the spot by using the laser pointer holding the **H key** on the keyboard.



After you collaborate

You can export the mural as an image or pdf to share with members of your company who might find it helpful.

Quick add-ons

A **Share the mural**
Share a view link to the mural with stakeholders to keep them in the loop about the outcomes of the session.

B **Export the mural**
Export a copy of the mural as a PNG or PDF to attach to emails, include in slides, or save in your drive.

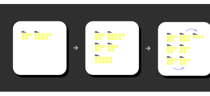
Keep moving forward

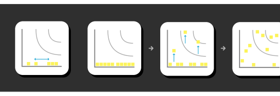
Strategy blueprint
Define the components of a new idea or strategy.
Open the template →

Customer experience journey map
Understand customer needs, motivations, and obstacles for an experience.
Open the template →

Strengths, weaknesses, opportunities & threats
Identify strengths, weaknesses, opportunities, and threats (SWOT) to develop a plan.
Open the template →

Need some inspiration?
See a finished version of this template to kickstart your work.
Open example →





Template

Empathy map canvas

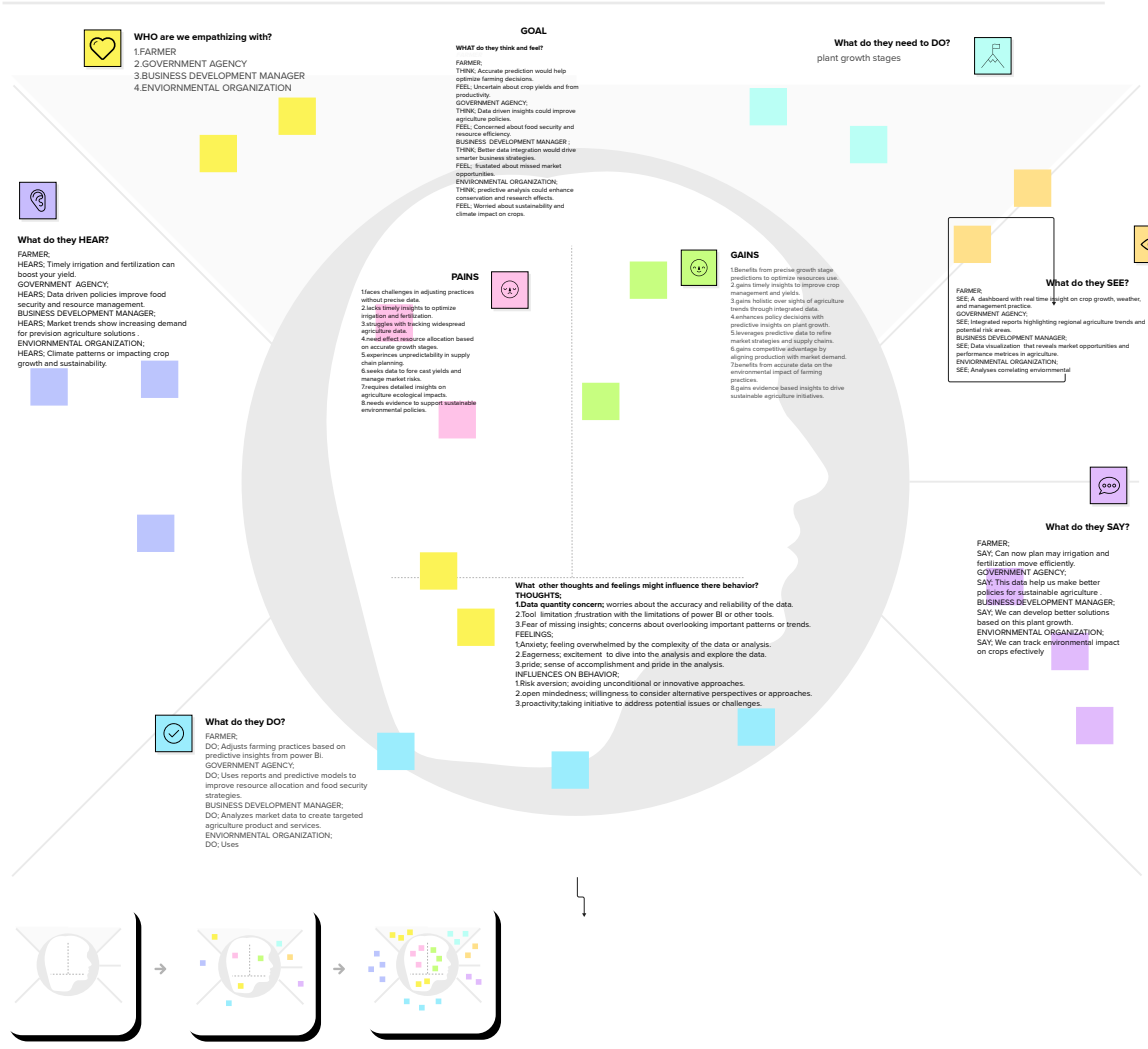
Use this framework to empathize with a customer, user, or any person who is affected by a team's work. Document and discuss your observations and note your assumptions to gain more empathy for the people you serve.

Originally created by Dave Gray at XPLANE®

Share template feedback

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.



Need some inspiration?

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

Open example →

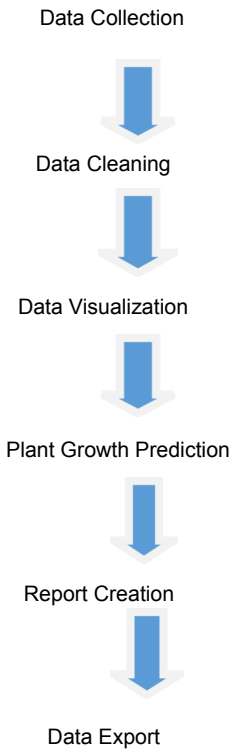
Scenario: [Existing experience through a product or service]	**Entice** How does someone become aware of this service?	**Enter** What do people experience as they begin the process?	**Engage** In the core moments in the process, what happens?	**Exit** What do people typically experience as the process 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?	IN APP GUIDENCE ;farmer receives in app guidance and tutorials on how to use the dashboard and interpret the data.	FARMER ON BOARDING; farmer signs up for the power BI dashboard and provides basic information about their farm.	PERSONALIZED DASHBOARD ;farmer receives personalized power BI dashboard with visualization and insights tailored to their farm.	OFF BORADING PROCESS; farmer goes through an off boarding process when they decide to leave the platform.	ADDITIONAL FEATURES; farmer has access to additional features, such as weather forecasting and soil analysis.
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?	NEW FEATURE NOTIFICATION ;farmer receives notification about new feature soil moisture forecasting.	INITIAL DASHBOARD VIEW; farmer views personalized dashboard with environmental and management data.	EXPLORING VISUALIZATION; farmer interacts with dashboard visualizations (Eg ; clicks, hovers ,zooms.)	EXIT SURVEY; farmer receives exit survey and provides feedback.	premium subscription farmer upgrades to premium subscription for additional features.
Goals & motivations At each step, what is a person's primary goal or motivation? ("Help me..." or "Help me avoid...")	GOAL; evaluate power BI s capabilities for predictive analytics and data visualization.	power bi response provide educational resources, webinar and case studies showcasing power bis predictive capabilities.	MOTIVATION; improve plant growth stage predictions, optimize crop yields, and reduce waste.	POINT POINTS; steep learning curve, difficulty integrate data sources.	Goal explore advanced power BI features and integrates with other agricultural tools.
Positive moments What steps does a typical person find enjoyable, productive, fun, motivating, delightful, or exciting?	INITIAL AWARNESS ;farmer/ agricultural professional experiences power BIS ease of use and feature rich capabilities.	INITIAL AWARNESS; farmer/ agricultural professional discovers power bis capabilities for predictive analytics and visualization.	positive moment sense accomplishment and confidence in using power BI.	EMOTION; satisfaction pride.	Advanced feature adoption; farmer agricultural professional explores and adopts advanced power BI features.
Negative moments What steps does a typical person find frustrating, confusing, angering, costly, or time-consuming?	Difficulty understanding complex data; farmer agricultural professional struggles to understand how power bi can help then with predictive analytics.	Negative moment frustration and confusion about where to start . EMOTION; over whelm , anxiety.	TECHNICAL DIFFICULTIES ; farmer agricultural professional experiences technical issues while integrating environmental and management data into power BI.	negative moment disappointment and frustration with the overall experience.	feeling abandoned or unsupported by power bi. EMOTION; frustration ,disappointment.
Areas of opportunity How might we make each step better? What ideas do we have? What have others suggested?	INTERACTIVE DEMOS; develop interactive demos to show case power bis features and benefits.	SIMPLIFIED MESSAGING; clarify and simplicity messaging to reduce information overload and increase understanding.	STREAMLINED ONBOARDING ; simplify and streamline the on boarding process with clear documentation and support resources.	UPSELL/CROSS CELL OPPORTUNITIES; identify opportunities to upsell or cross cell relevant power bi features or services.	Advanced feature training provide training and resources to help users adopt advanced power bi feature.

Project Design Phase-II
Data Flow Diagram & User Stories

Date	31 January 2025
Team ID	LTVIP2025TMID21348
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 pre-process 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 creations	USN-5	As a agri-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
Solution Requirements (Functional & Non-functional)

Date	31 January 2025
Team ID	LTVIP2025TMID21348
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 Integration & Processing	1. Import environmental data (temperature, humidity rainfall, soil moisture etc.) 2. Import management data (fertilization, irrigation, pesticide use etc.) 3. Data transformation and cleaning in power BI using power query.
FR-2	Growth Stage Prediction	1. The system should predict plant growth stages (germination flowering, maturity) based on historical and real time environmental conditions. (Temperature, humidity, rainfall, soil moisture.)
FR-3	Dash board & Visualization	1. Integrative report on plant growth stages. 2. Time series analysis for tracking growth over time. 3. Heat maps and geospatial analysis for form monitoring.
FR-4	Alerts & Notification	1. Notify users when environmental conditions may affect growth. 2. Trigger alerts when a plant reaches a specified growth stages.
FR-5	User integration & customization	1. Allow users to filter data by form crop type or environmental conditions. 2. Enable scenario analysis (adjusting irrigation to see predicted impact.)
FR-6	Historical Data Analysis	1. Users should be able to analyze historical data and trends to predict future growth stages, improve decision-making and optimize farming practices.

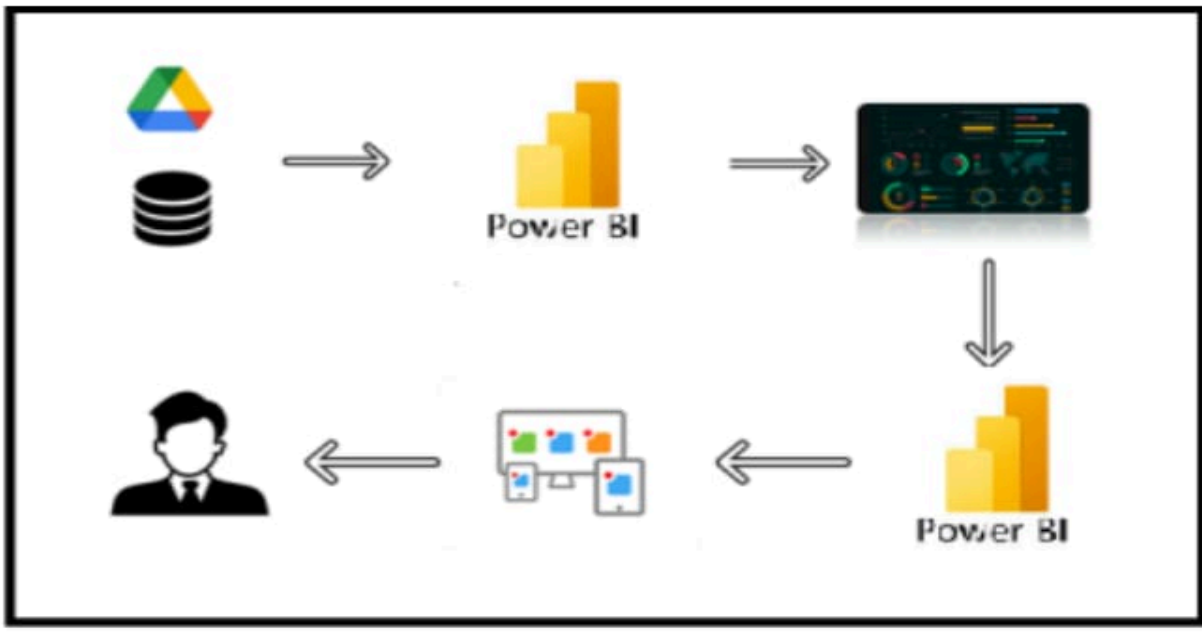
Non-functional Requirements:

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

FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	The Power BI interface should be intuitive and user-friendly even for users with minimal technical expertise.
NFR-2	**Security**	The system should ensure secure access to sensitive data it must comply with data protection regulation, including encryption of data at rest and in transit, unauthorized access.
NFR-3	**Reliability**	99.9% uptime to ensure real time monitoring. Redundant data backup mediatises.
NFR-4	**Performance**	The system should be capable of providing real-time prediction and visualization without significant delays, ensuring that farmers based on up-to date data.
NFR-5	**Availability**	The system should be highly available, with minimal downtime; it should have a backup and recovery plan to ensure continuity of service in case of hardware on software failures.
NFR-6	**Scalability**	The system should be scalable to handle large volumes of data from multiple farms, sensors, and data sources, without a significant degradation in performance.

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

Date	31 January 3035
Team ID	LTVIP2025TMID21348
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 CC

1. CUSTOMER SEGMENT(S) CS

Commercial greenhouse operator's struggling with inconsistent plant growth

Organic farmers aiming for consistent yield.

Agra-tech companies developing smart farming solutions.

6. CUSTOMER CC

CONSTRAINTS

Budget limitations for tech adoption.

Limited data analytics expertise.

Resistance.

5. AVAILABLE SOLUTIONS AS

Traditional trial and error farming methods.

Basic environmental monitoring tools without predictive analytics.

Generic farming recommendations not tailored to specific conditions.

Explore AS, differentiate

Focus on J&P, tap into BE, understand RC

2. JOBS-TO-BE-DONE / PROBLEMS J&P

Need to standardize optimal growing conditions across limitations.

Ensure consistent growth rates in organic crops.

Validate the effectiveness of smart forming technologies.

9. PROBLEM ROOT CAUSE RC

Lack of data driven insights into plant growth conditions.

Inconsistent environmental and management practices.

Unclear impact of smart forming on different soil and climate conditions.

7. BEHAVIOUR BE

Reactive adjustment based on past experience.

Trial and error approach for optimizing conditions.

Interactive development with limited field validation.

Focus on J&P, tap into BE, understand RC

Identify strong TR & EM

3. TRIGGERS

Inconsistent growth leading to reduced productivity.

Variation in yield affecting profitability.

Need for data backed validation of their technology. TR

4. EMOTIONS: BEFORE / AFTER

Frustration, uncertainty, inefficiency.

Confidence, control, improved, productivity, innovation. EM.

10. YOUR SOLUTION

Power BI analytics to identify optimal soil, water and sunlight conditions.

Predicting modelling to determine the best organic farming strategies.

Validation of smart sensors effectiveness using power BI insights. SL

8. CHANNELS of BEHAVIOUR

Power BI dashboard real time monitoring.

Data driven farming adjustments.

Integration of power BI insights into smart forming solutions. CH

Extract online & offline CH of BE

AMALTAMA

Project Design Phase
Proposed Solution Template

Date	15 February 2025
Team ID	LTVIP2005TMID21348
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)	ABC greenhouse faces inconsistent plant growth across its locations, Green Earth farms struggles with Varying organic crop yields; Future Grow tech needs to validate smart farming technology under diverse conditions. There is a need for optimized growth conditions through data-driven insights.
2.	Idea / Solution description	Use Power BI to analyze environmental and management data (soil type, sunlight, watering frequency, temperature, humidity, fertilizer type) to predict plant GROWTH STAGES. Leverage decomposition tress and predictive models to uncover.
3.	Novelty / Uniqueness	The project combines advanced data analytics (decomposition trees, predictive models) with real-time insights to optimize plant growth stages across different farming and greenhouse environments. It integrates multiple variables into actionable insights, making it unique in predicting growth milestones for various crops.
4.	Social Impact / Customer Satisfaction	The solution promotes sustainable farming practices, ensuring optimal use of resources such as water, fertilizers, and energy. By improving crop yields, the project contribute to food security, enhances environmental sustainability, and ensures that farming practices are more effective and environmentally responsible.
5.	Business Model (Revenue Model)	XYZ company offers Data-driven agriculture solutions through a subscription- based model, providing clients with regular updates,

		customized dashboards, and predictive growth insights. It may also offers consulting services to help implement optimized farming practices based on the generated insights.
6.	Scalability of the Solution	The solution can be scaled across various Farming operations and greenhouse locations globally. Power BI dashboards and models can be easily adapted to new locations or crops, making the solution suitable for large-scale adoption across different agriculture sectors, improving efficiency and productivity at scale.

Project Design Phase
Solution Architecture

Date	15 February 2025
Team ID	LTVIP2025TMID21348
Project Name	Predicting Plant Stage with Environmental And Management Data Using Power Bl
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, behavior, 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:

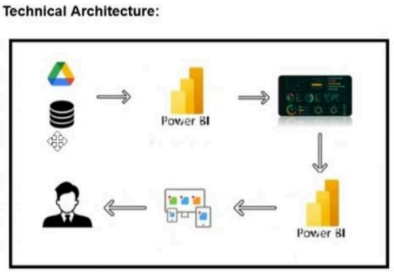


Figure 1: Architecture and data flow of the voice patient diary sample application

Project Planning Phase

Project Planning Template (Product Backlog, Sprint Planning, Stories, Story Points)

Date	15 February 2025
Team ID	LTVIP2025TMID21348
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	M. Jyothilaxmi
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	L. Bhavani
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	M.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	M.Kumari
Sprint-2	Report creation	USN-5	As a agri-tech company, user can exports for further analysis.	3	medium	M. Padma
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	M. Padma

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

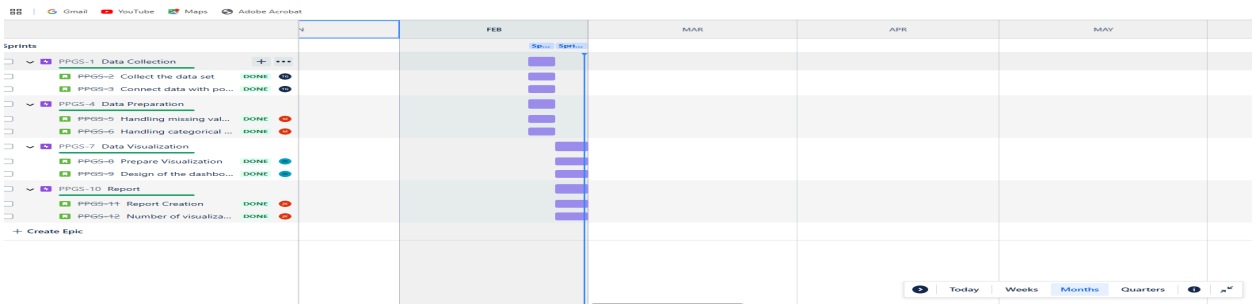
Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date (Actual)
Sprint-1	24	2 Days	20 FEB 2025	21FEB 2025	24	21 FEB 2025

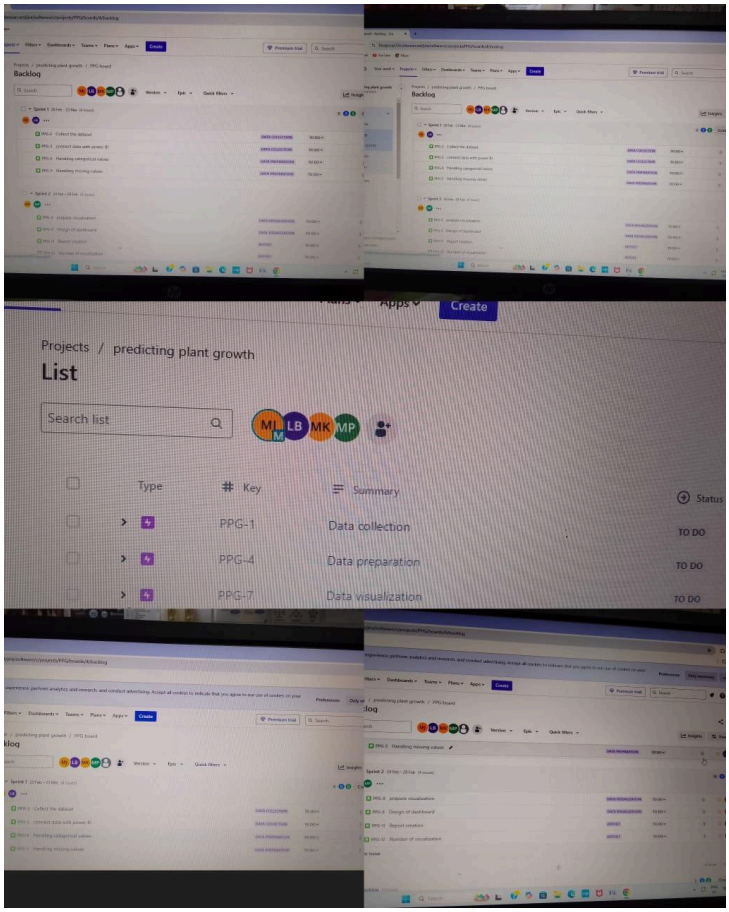
Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date (Actual)
Sprint-2	24	2 Days	22 FEB 2025	23FEB 2025	24	23FEB 2025
Sprint-3	24	2 Days	24FEB 2025	26FEB 2025	24	26FEB 2025
Sprint-4	24	2 Days	27FEB 2025	28 FEB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

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



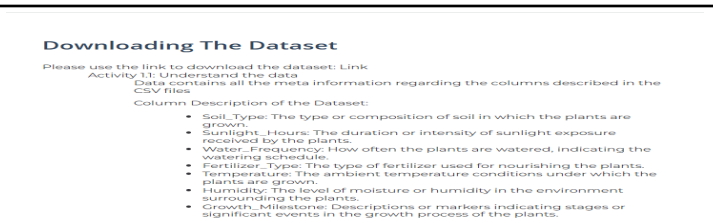
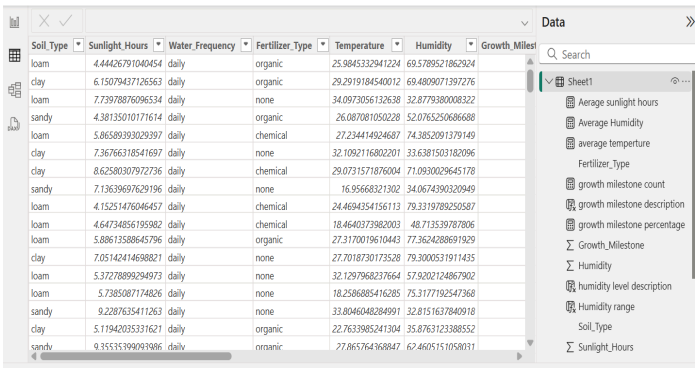

Backlog
Create
Projects / predicting plant growth
List
Search list
Type
Key
Summary
Status
PPG-1
Data collection
TO DO
PPG-4
Data preparation
TO DO
PPG-7
Data visualization
TO DO

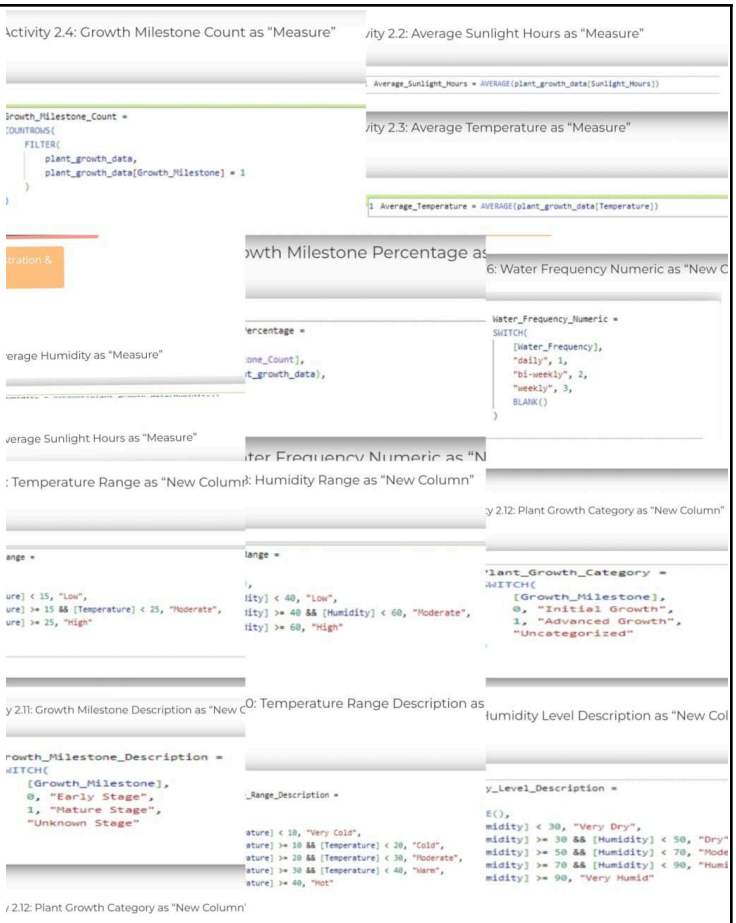
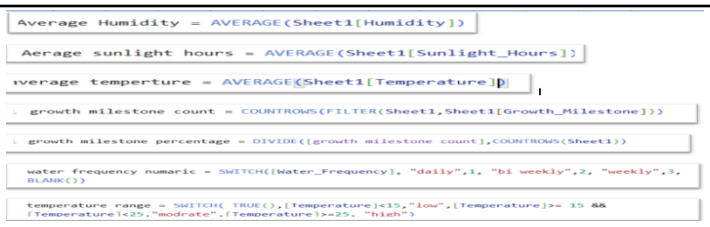
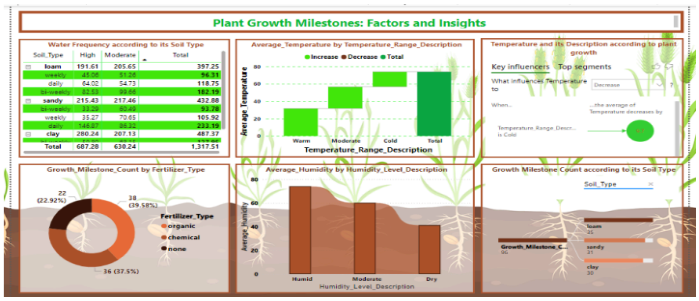
Project Development Phase
Model Performance Test

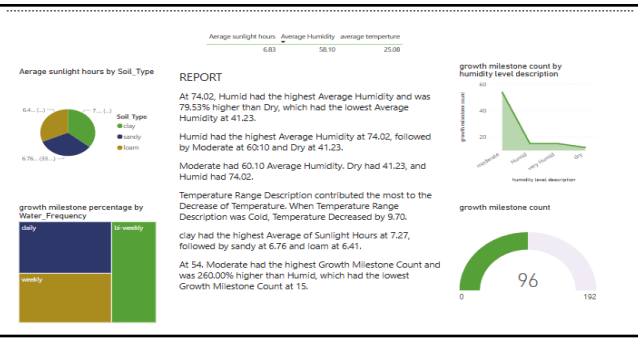
Date	10 February 2025
Team ID	LTVIP2025TMID21348
Project Name	Predicting plant growth stages with environmental and management data using power BI
Maximum Marks	

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	
5.	Dashboard design	

6	Report Design	

Predicting Plant Growth Stages with Environmental and Management Data 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.BI

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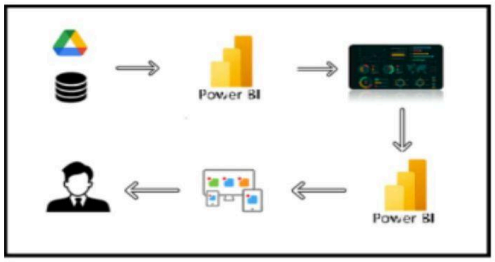
Scenario 2:

GreenEarth 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. GreenEarth Farms will use these insights to adjust their farming practices, ensuring their crops achieve the best possible growth under organic farming conditions.

Scenario 3:

FutureGrow 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. FutureGrow 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

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, evaluate outcomes and generate insights from the dataset

Downloading the dataset

Please use the link to download the dataset: Link

Activity 1.1: Understand the data

Data contains all the meta information regarding the columns described in the 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.

Prepare the Data for Visualization

Prepare the Data for Visualization

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. Since the data is already cleaned, we can move to visualization.
3.1: Data Loading
Link
3.2 Data Cleaning
Link

Data Visualization

Data visualization is the process of creating graphical representations of data 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.

Plant Growth Classification

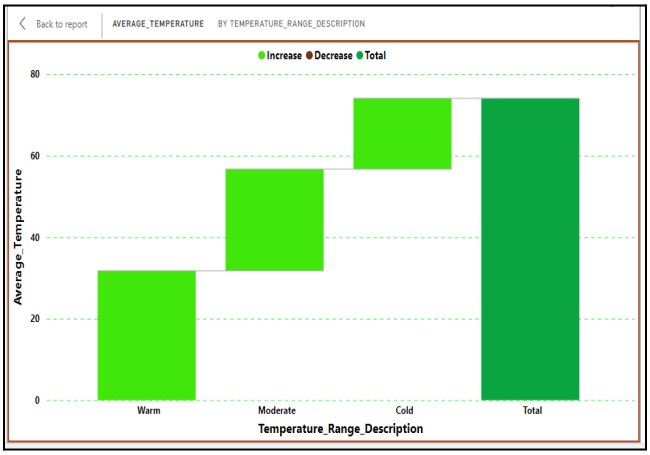
Activity 1.1: Water Frequency According to Its Soil Type

Back to report | WATER FREQUENCY ACCORDING TO ITS SOIL TYPE

Soil_Type	High	Moderate	Total
loam	**191.61**	**205.65**	**397.25**
weekly	45.06	51.26	**96.31**
daily	64.02	54.73	**118.75**
bi-weekly	82.53	99.66	**182.19**
sandy	**215.43**	**217.46**	**432.88**
bi-weekly	33.29	60.49	**93.78**
weekly	35.27	70.65	**105.92**
daily	146.87	86.32	**233.19**
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**
Total	**687.28**	**630.24**	**1,317.51**

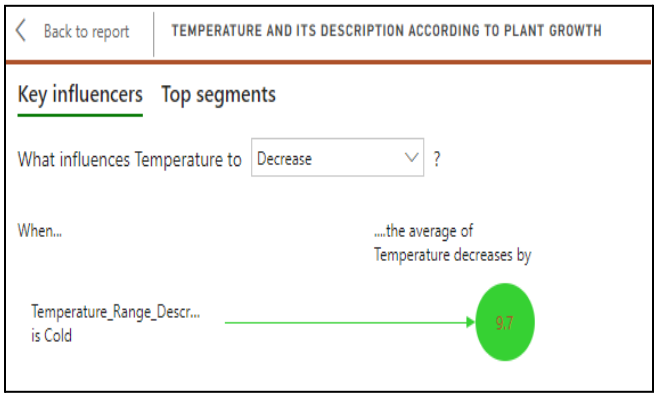
Insight: Loam soil with high water frequency results in the highest total water frequency, indicating that loam soil may require or benefit from more frequent watering compared to sandy and clay soils.

Activity 1.2: Average Temperature by Temperature Range Description

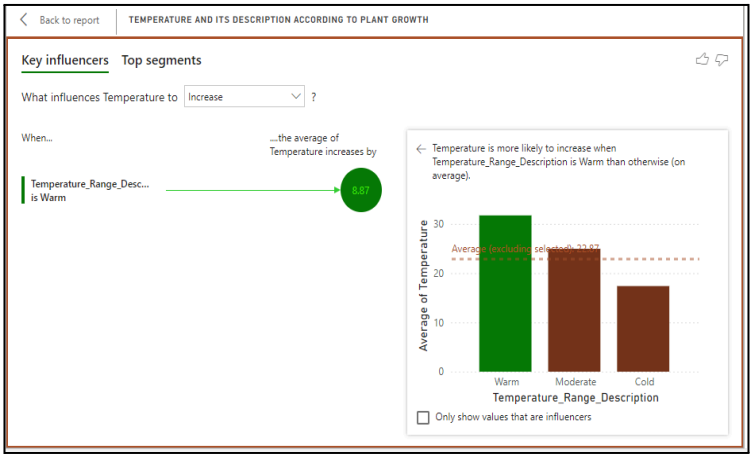


Insight: Moderate temperature ranges have the highest average temperature increase, suggesting that plants in this range experience the most growth.

Activity 1.3: Temperature and Its Description According to Plant Growth

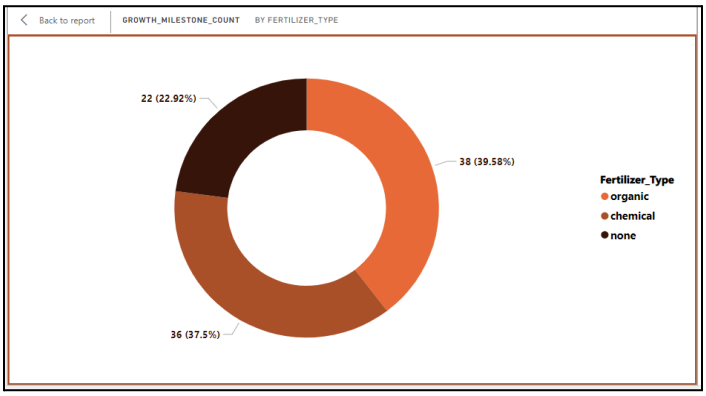


Insight: Cold temperature range decreases plant growth, highlighting the negative impact of cold temperatures on plant development.



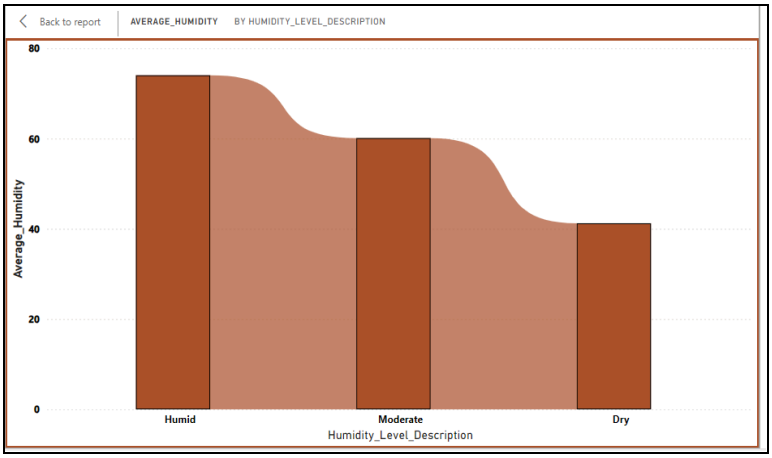
Insight: Warm temperature range increases plant growth, highlighting the positive impact of warm temperatures on plant development.

Activity 1.4: Growth Milestone Count by Fertilizer Type



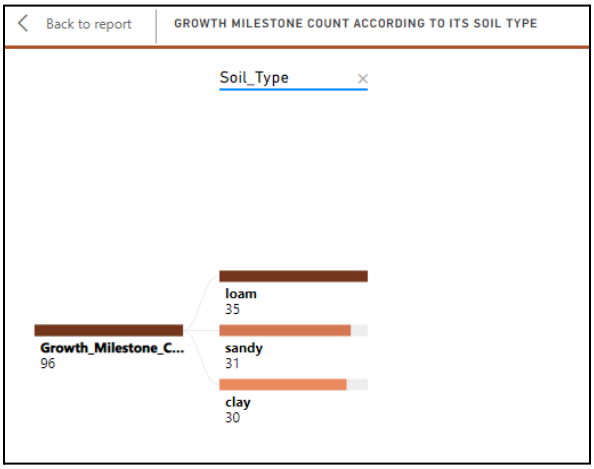
Insight : Chemical fertilizers account for the highest growth milestone count, indicating their effectiveness in promoting plant growth milestones compared to organic fertilizers or no fertilizer.

Activity 1.5: Average Humidity by Humidity Level Description



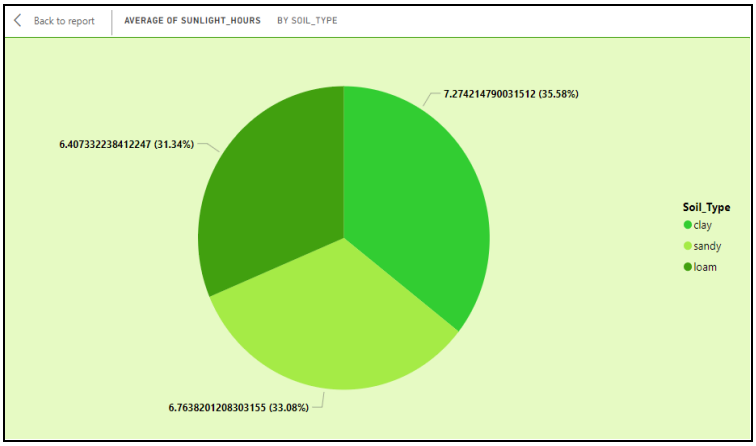
Insights : Humid conditions lead to the highest average humidity, emphasizing the importance of maintaining high humidity levels for optimal plant growth.

Activity 1.6: Growth Milestone Count According to Its Soil Type



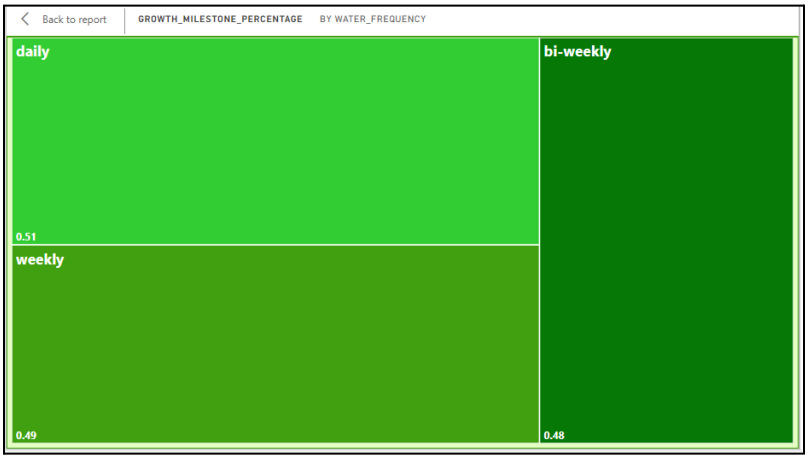
Insights : Loam soil has the highest growth milestone count, suggesting it is the most conducive soil type for achieving plant growth milestones.

Activity 1.7: Average Sunlight Hours by Soil Type



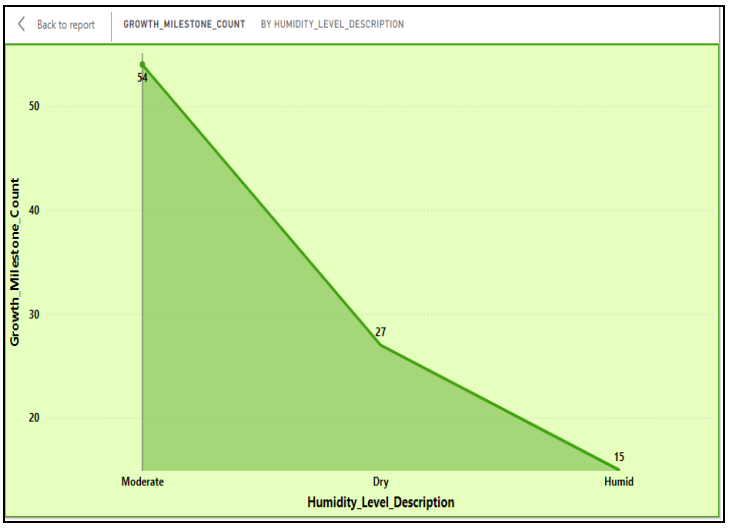
Insights : Sandy soil receives the highest average sunlight hours, which may contribute to its growth performance under sufficient light conditions.

Activity 1.8: Growth Milestone Percentage by Water Frequency



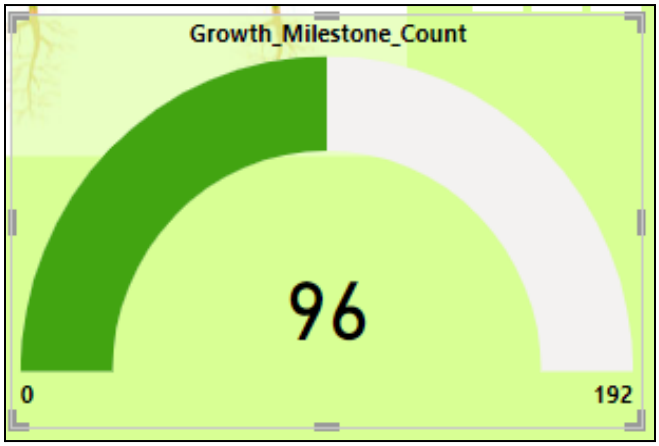
Insights : Daily watering results in the highest percentage of growth milestones, showing that frequent watering is crucial for plant growth.

Activity 1.9: Growth Milestone Count by Humidity Level Description



Insights: Humid conditions lead to the highest growth milestone count, reinforcing the importance of maintaining adequate humidity levels for optimal growth

Activity 1.10 : Growth Milestone Count



Insights: The total growth milestone count is 96, with the highest contributions coming from environments with optimal humidity and temperature conditions.

Activity 1.11: Average Humidity, Average Temperature, Average Sunlight Hours

Insights:-The data indicates a temperate and comfortable climate with an average temperature of 25.08°C, moderate humidity of 58.10%, and a reasonable amount of sunlight averaging 6.83 hours per day.

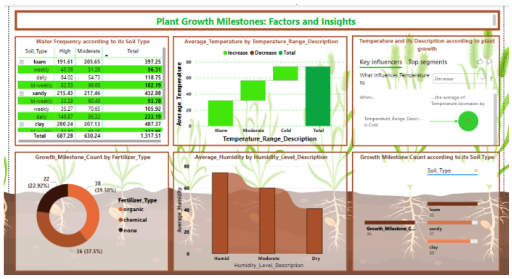
NOTE: Video Explanations for the above Visualizations are in Dashboard and Report sections.

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.

Responsive and Design of Dashboard

Dashboard:



Design of Report

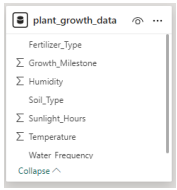
Designing a report in Power BI involves connecting to data sources, creating visualizations like charts and graphs, customizing their appearance and interactivity, organizing them logically on the canvas, formatting elements for consistency and clarity, and optionally creating dashboards for a summarized view. Throughout the process, it's essential to consider the audience's needs and ensure the report effectively communicates insights from the data. Finally, iterate based on feedback to continually improve the report's design and usefulness.

Report

Report:

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.



Utilization of DAX Expressions

DAX (Data Analysis Expressions) in Power BI is a powerful formula language used to create custom calculations in calculated columns, measures, and tables. DAX expressions can be employed to manipulate data and perform complex calculations that are not possible with basic aggregations. They are similar to Excel formulas but are designed for relational data and can include functions for aggregation, time intelligence, and table manipulation. Understanding DAX is essential for unlocking the full potential of Power BI, as it allows users to create dynamic, interactive reports and dashboards that provide deep insights into data.

Activity 2.1: Average Humidity as “Measure”

```
1  Average_Humidity = AVERAGE(plant_growth_data[Humidity])
```

Activity 2.2: Average Sunlight Hours as “Measure”

```
1 Average_Sunlight_Hours = AVERAGE(plant_growth_data[Sunlight_Hours])
```

Activity 2.3: Average Temperature as “Measure”

```
Average_Temperature = AVERAGE(plant_growth_data[Temperature])
```

Activity 2.4: Growth Milestone Count as “Measure”

```
Growth_Milestone_Count =
COUNTROWS(
    FILTER(
        plant_growth_data,
        plant_growth_data[Growth_Milestone] = 1
    )
)
```

Activity 2.5: Growth Milestone Percentage as “Measure”

```
Growth_Milestone_Percentage =
DIVIDE(
    [Growth_Milestone_Count],
    COUNTROWS(plant_growth_data),
    0
)
```

Activity 2.6: Water Frequency Numeric as “New Column”

```
Water_Frequency_Numeric =
SWITCH(
    [Water_Frequency],
    "daily", 1,
    "bi-weekly", 2,
    "weekly", 3,
    BLANK()
)
```

Activity 2.7: Temperature Range as “New Column”

```
Temperature_Range =
SWITCH(
    TRUE(),
    [Temperature] < 15, "Low",
    [Temperature] >= 15 && [Temperature] < 25, "Moderate",
    [Temperature] >= 25, "High"
)
```

Activity 2.8: Humidity Range as “New Column”

```
Humidity_Range =
SWITCH(
    TRUE(),
    [Humidity] < 40, "Low",
    [Humidity] >= 40 && [Humidity] < 60, "Moderate",
    [Humidity] >= 60, "High"
)
```

Activity 2.9: Humidity Level Description as “New Column”

```
Humidity_Level_Description =
SWITCH(
    TRUE(),
    [Humidity] < 30, "Very Dry",
    [Humidity] >= 30 && [Humidity] < 50, "Dry",
    [Humidity] >= 50 && [Humidity] < 70, "Moderate",
    [Humidity] >= 70 && [Humidity] < 90, "Humid",
    [Humidity] >= 90, "Very Humid"
)
```

Activity 2.10: Temperature Range Description as “New Column”

```
Temperature_Range_Description =
SWITCH(
    TRUE(),
    [Temperature] < 10, "Very Cold",
    [Temperature] >= 10 && [Temperature] < 20, "Cold",
    [Temperature] >= 20 && [Temperature] < 30, "Moderate",
    [Temperature] >= 30 && [Temperature] < 40, "Warm",
    [Temperature] >= 40, "Hot"
)

```

Activity 2.11: Growth Milestone Description as “New Column”

```
Growth_Milestone_Description =
SWITCH(
    [Growth_Milestone],
    0, "Early Stage",
    1, "Mature Stage",
    "Unknown Stage"
)

```

Activity 2.12: Plant Growth Category as “New ColumHours

```
Plant_Growth_Category =
SWITCH(
    [Growth_Milestone],
    0, "Initial Growth",
    1, "Advanced Growth",
    "Uncategorized"
)

```

Noof Visualizations/ Graphs

- Water Frequency According to Its Soil Type
- Average Temperature by Temperature Range Description
- Temperature and Its Description According to Plant Growth
- Growth Milestone Count by Fertilizer Type
- Average Humidity by Humidity Level Description
- Growth Milestone Count According to Its Soil Type
- Average Sunlight Hours by Soil Type
- Growth Milestone Percentage by Water Frequency
- Growth Milestone Count by Humidity Level Description
- Growth Milestone Count
- Average Humidity, Average Temperature, Average Sunlight Hours

Project Demonstration & Documentation

Below mentioned deliverables to be submitted along with other deliverables

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

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

Create document as per the template provided