PROJECT EXECUTION PLAN FOR LEAF SCARRING

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Executive Summary

The whole purpose of the project is to determine the extent of damage from the biocontrol agent on the plant . The biocontrol agent is an organism such as a plant disease , that causes scarring and damage on the leafy part, resulting in small brown patches on the leaf . The leafy part is also known as the lamina of the water hyacinth plant . Water hyacinth plant is an aquatic plant , originating from South America . It has leaves that are thick, glossy, and rounded , flowers are type of lavender to pink flowers and their roots are of dark purple or black colour that hang down in the water, absorbing nutrients. Bulk or collective water hyacinth plants is causing problems in the environment , such as obstructing water flow, block sunlight, and depleting oxygen levels . Due to these problems, it is making boating , fishing , and all other water activities impossible to do .

Objectives

Objectives of the project are :

• To provide something that can count the number of scars on a water hyacinth lamina.

• To find out the surface area of the lamina.

• To calculate the surface area of the scars on the lamina.

• To calculate the percentage damage on the lamina.

• To determine the length of the petiole or stem.

Scope

The project scope will contain :

• Design and production of the calibration cube using a 3D printer.

• Visting a location to obtain samples of water hyacinth leaves that have been damaged by the biocontrol agents.

• Taking photographs of the front and back of the plants, together with the calibration cubes.

• Image processing of photographs of a water hyacinth leaf and stem (lamina and petiole).

• Detecting the damage caused on the leaf.

• Counting the number of scars on the leaf.

• Usage of the calibration cube to calculate the length scales on the photographs.

• Estimating the dimensions and overall surface area of the leaf.

• Estimating the surface area of the scars on the leaf.

• Estimating the length of the stem (petiole).

Deliverables

Deliverables to be included in the project are :

• Calibration cubes to be utilized.

• Sample photographs of damaged plants.

• A program with an easy-to-use interface that can load, label and process images.

• Pairs of photographs (front and back), to provide relevant data of the plant.

• To provide large volume of data generation from the set of photographs.

• To produce bulk exporting of data to either a csv or Excel file.

The data to be supplied includes :

• Date of the photographs taken.

• The label of the leaf.

• The surface area of the leafy part.

• The surface area of the scarring (front and back).

• Count of the number of scars on the leaf (front and back).

• The percentage damage (front and rear).

• The approximate length and breadth of the leaf.

• The length of the stem (petiole).

Requirement Analysis

Functional requirements :

The system will :

1. Determine length measurements of the scarred leaf from the photographs.
2. Detect and do the calculations of the leaf.

3. Show a user view of all the details of the leaf characteristics in one go , such as the leaf photographs , measurements of the photographs , calculations of the leaf scar damage etc.

Non-Functional requirements :

How the system will do it :

1. From the calibration cube , you can calibrate length measurements from the photographs. It can be used to improve accuracy by improving measurement precision . Calibration cube can be done using a 3D printer.

2. By utilizing a machine learning algorithm , to the count of the number of scars on the leaf (front and rear) , the percentage damage on the leaf etc. An algorithm like this , can improve accuracy of the results by finding patterns in data , identifying outliers etc.

3. By developing and implementing a user interface application that is suitable for the end user .

Project Timeline

Phase 1 : Planning phase , this phase involves the group coming together and establishing key roles and responsibilities among themselves , such as the group leader . The group members will bring up thoughts and ideas on how to design and execute the project . The tasks involved in this phase are :

- Defining project goals and objectives
- Identifying methods to accomplish those goals and objectives.
- Establishing sets of tasks and activities for each group member.
- The group agreeing on realistic project deadlines.

The duration of this phase is from 2024-05-20 to 2024-07-21 . As the deadline for this phase is on 2024-07-21.

Phase 2 : Design . This phase includes team members gathering requirements and tools needed to accomplish the objectives and goals of the project . Activities for this phase are :

- Requirements gathering and analysis.
- Deep understanding of stakeholder needs to accomplish appropriate system design .
- Development and coding.

- Testing.
- Deployment.
- Maintenance and support.

The time for this phase is from 2024-07-01 to 2024-09-06 . Deadline for this phase is on 2024-09-06 .

Phase 3 : Implementation, test and demo phase is where the team members build the system and conducts various tests to ensure the system functions as intended. In this phase , there could potentially be changes to the system in multiple ways to ensure that it runs or executes properly . Tasks involved in this phase are :

- Understanding of system Interactions
- Handling complexities and uncertainties of the system.
- Identifying , analysing and addressing problems in project design and construction.
- Identifying and addressing ethical issues in project construction.

Time span of this phase is from 2024-09-16 to 2024-11-01 . Deadline for this phase is on 2024-11-01 .

Phase 4 : This is the final phase of the project , as it includes the final product that will be presented at the expo to the public , and the team members may be given questions on how they managed to build the system. Duration of this phase is from 2024-11-18 to 2024-11-22.

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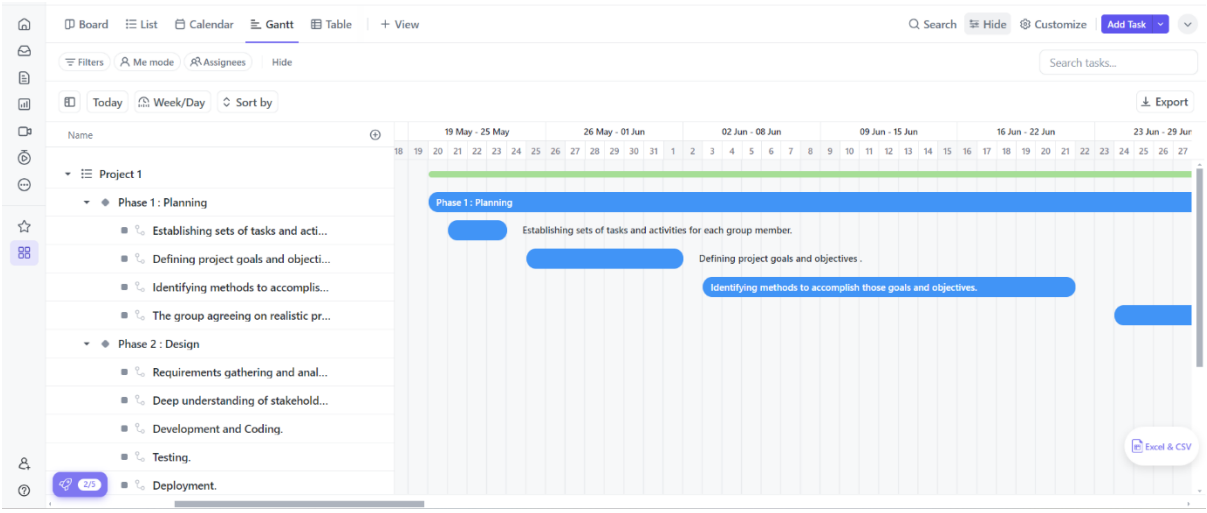

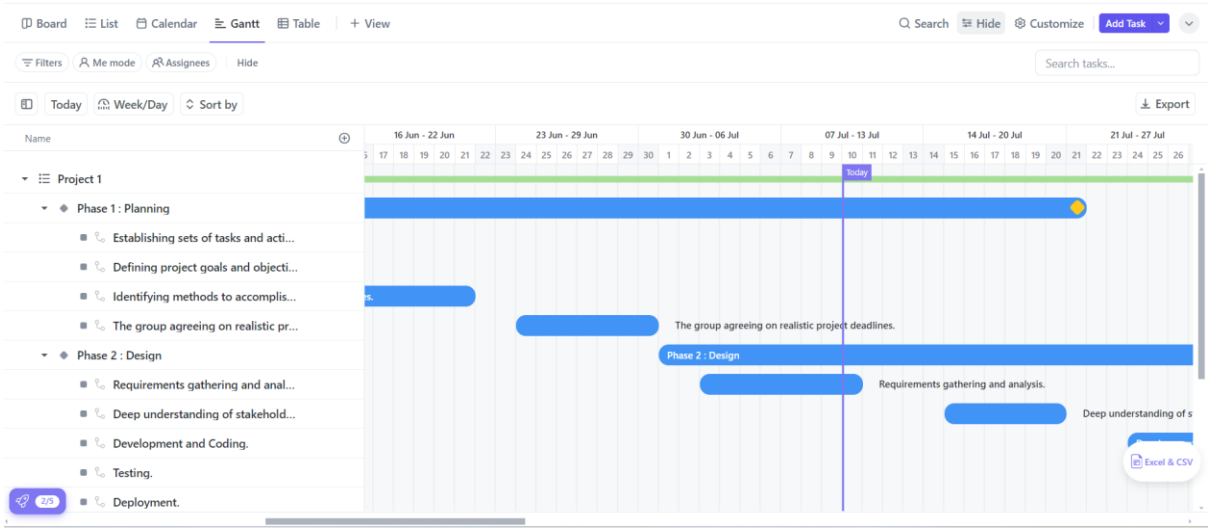
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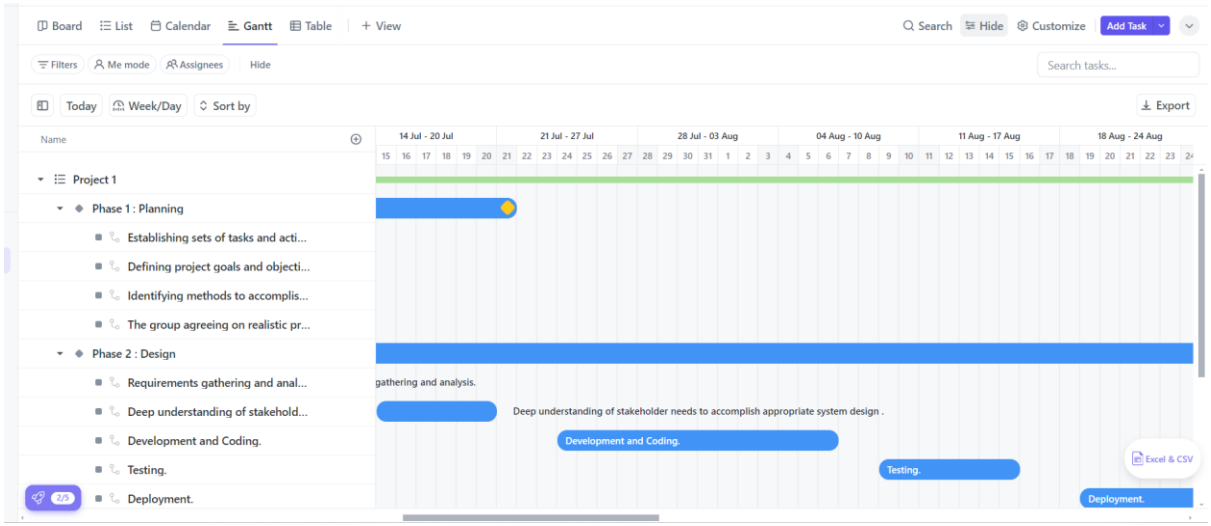
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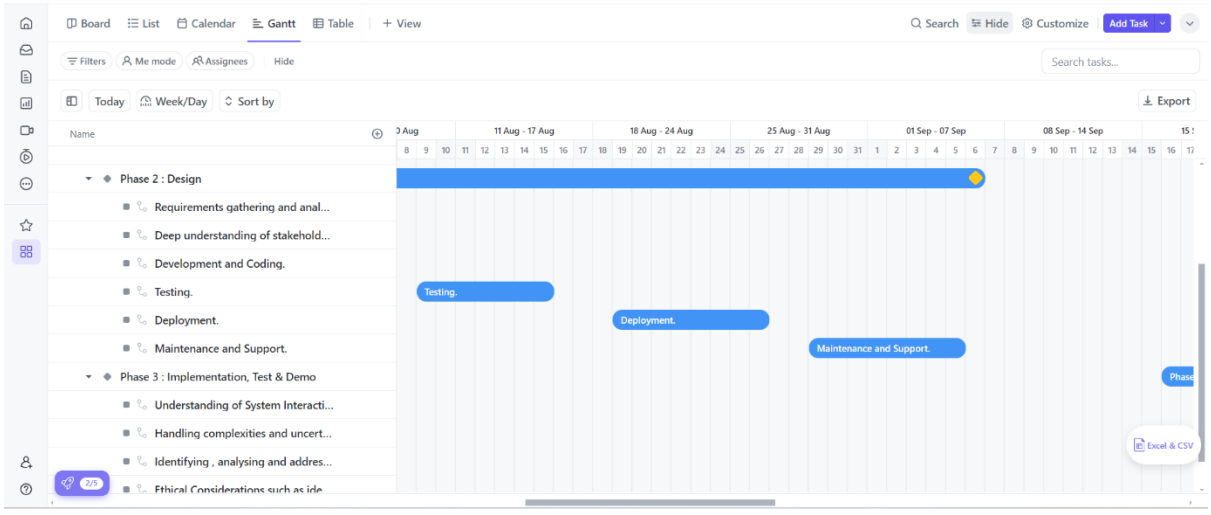
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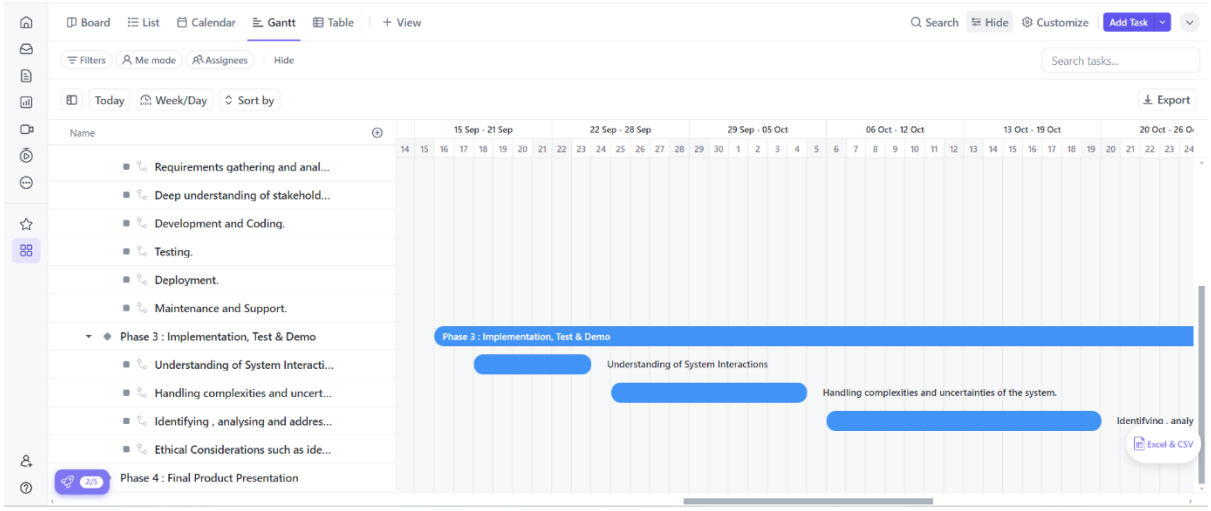
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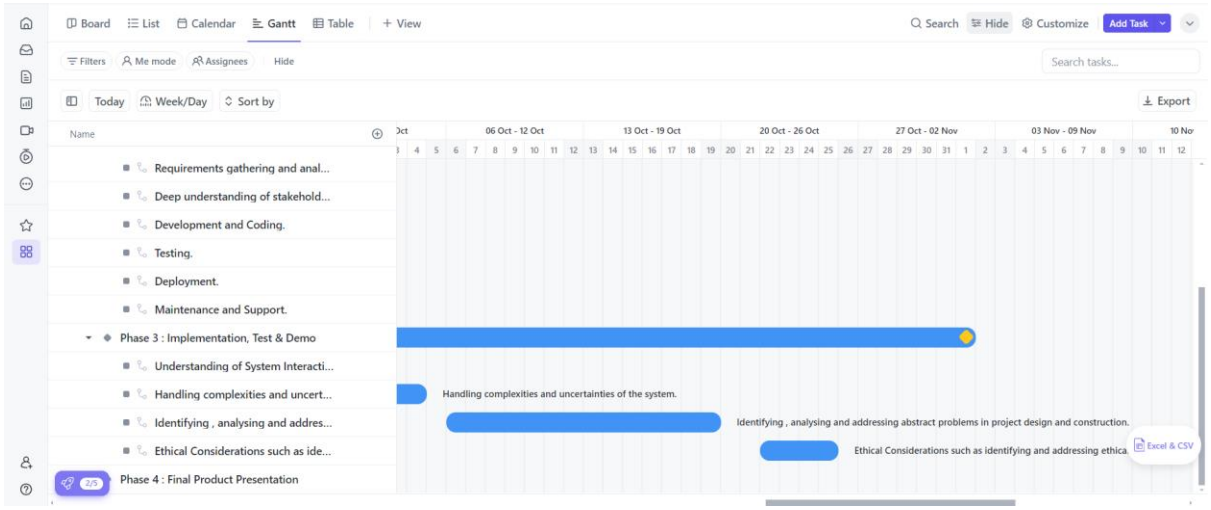
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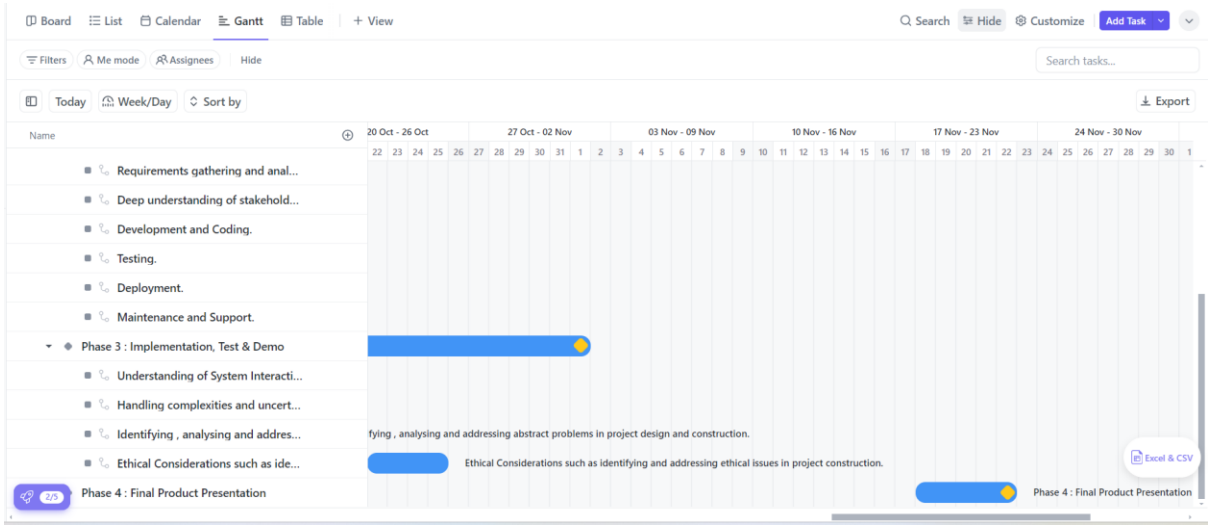
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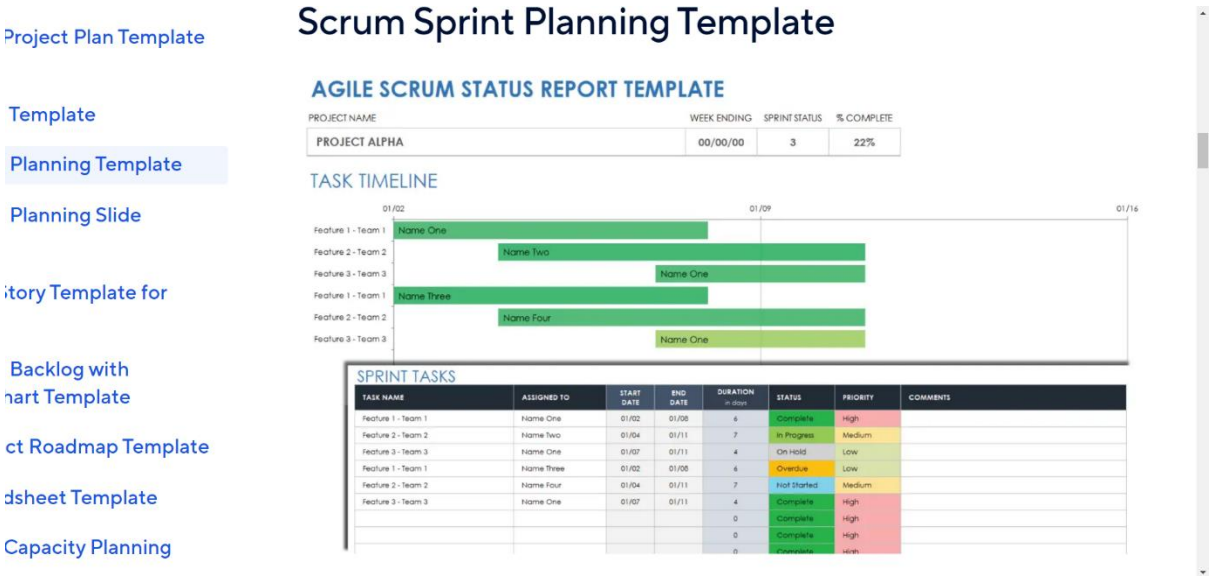
Methodology

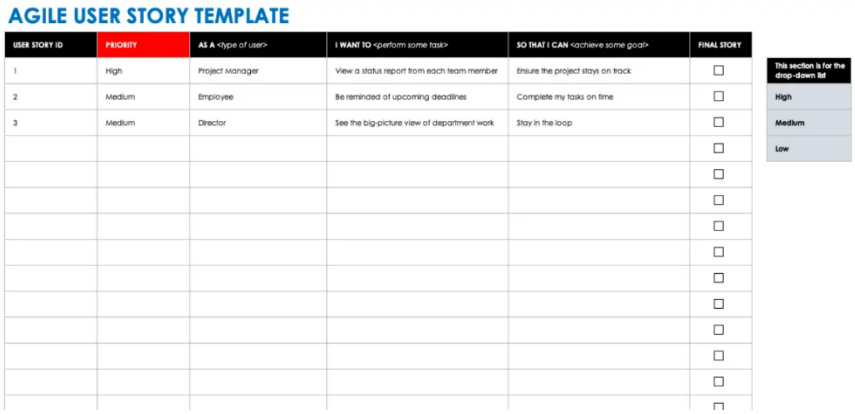
Scrum methodology is an agile approach that delivers project goals and objectives in short , iterative sprints . This methodology can be suitable to the project , as it can break parts of the projects into scrum objectives and goals . Hence , we can assign roles and responsibilities for each individual , so that every group member can focus on their solo objectives for a certain period. This can allow individuals to create the application while focusing on group collaboration. After each sprint , the group can ask the project supervisor on whether they are meeting the correct requirements of the project , and the supervisor can advise on ways they can improve the performance of the project. Agile methodology like scrum can change and adapt to new modifications or inclusions , unlike the waterfall or v-model methodology.

Examples of Templates

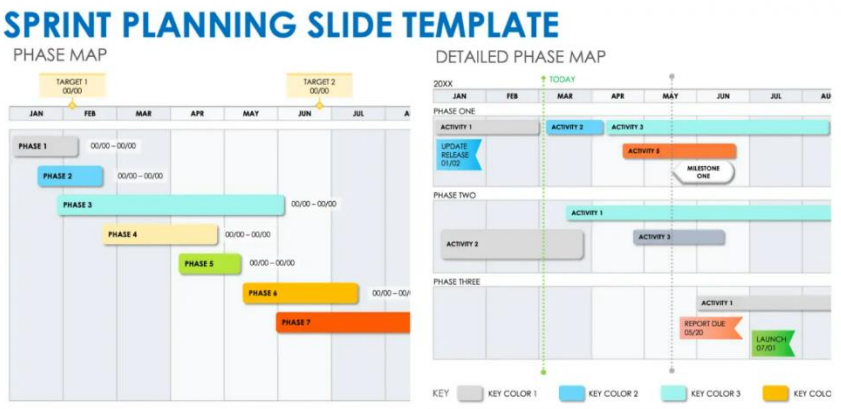


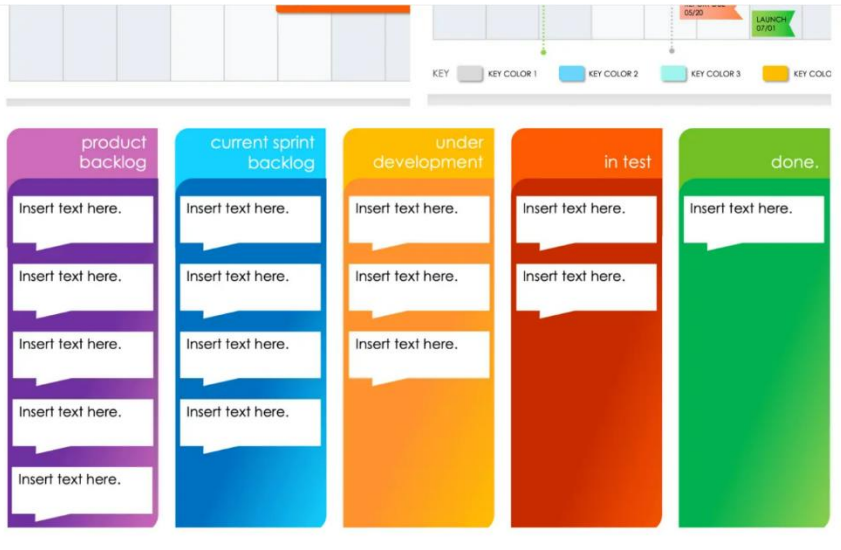
provide team members and project sponsors with a better understanding of your project.

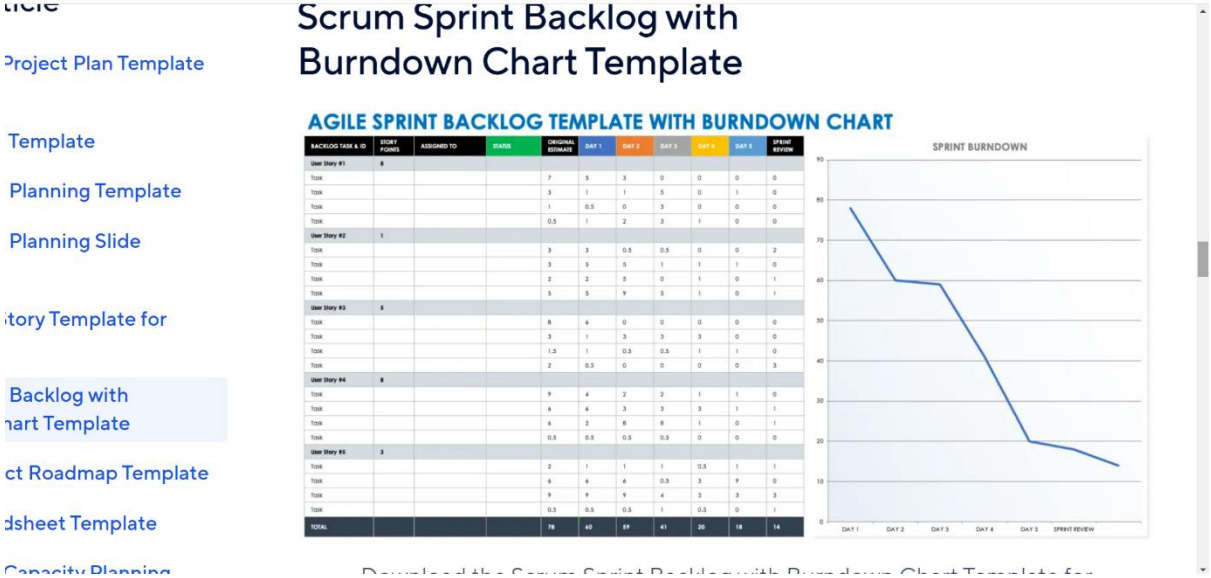
Scrum User Story Template for Excel



Scrum Sprint Planning Slide Template







Product backlog

Take photographs of the scarred leaves.
Buy a 3D printer , so that the calibration cube can be utilised to calibrate length measurements from the photographs.
Use an Image processing algorithm to process the photographs of the scarred leaves .
Use a Machine learning algorithms to predict results of the leaf scarring .
Create a User Interface design application that is convenient for the end-users to use .

Key features of Daily Standup Meetings

- Set a regular time and place for the meetings .
- Keep it short and concise so that it is not too much excessive information for the team members.
- Provide a daily standup agenda.
- Address and resolve any challenges faced by any team members regarding the work on the project.
- Have recordings of the meeting or let someone take notes during the meeting , as the notes or the recording can be shared afterward to ensure that everyone is on the same page.
- End the meeting with a summary or recap of the key takeaways.
- The group leader should encourage active listening from each group member , so that members can listen to each other's updates on the project work .

Resource management

The resources required for the project are :

• 3D Printer : Printing of the object using a 3D printer.

• File I/O: Importing and exporting of data files.

• Image Processing: Selecting appropriate image processing algorithm.

• Machine Learning: Choosing the correct machine learning algorithm to predict results of the leaf scarring .

• User Interface Design: Developing an appropriate application with a suitable user interface , that can be used by end-users .

• Mobile device or a camera to take photographs of the leaf .

• Mobile Device for testing of application.

• Personnel: Six existing group members.

• Budget: Cost of a calibration cube is around R 1000 .

Risk Management

Potential risks of the project are :

1. Scope creep : Scope creep is a problem where changes are made to the project scope , therefore those changes lead to new additional requirements to the project . Hence the additional requirements can lead to more headaches and problems for the project members (Asana, 2024) .
2. Time risk : This is when tasks in your project will take longer than expected. This risk can lead to delay in timelines , as that can impact other factors such as failure to delivery date or low overall performance in the project (Asana, 2024).
3. Operational changes : This risk involves changes in team processes such as , an unexpected shift in team roles or a or new processes that a team must adjust to. This can lead to distractions , adjustments in workflows and negatively effecting project timelines (Asana, 2024).

4. Lack of clarity : This risk can come in the form of miscommunication from stakeholders , team members , vague project scopes , or unclear deadlines.

Mitigation strategies :

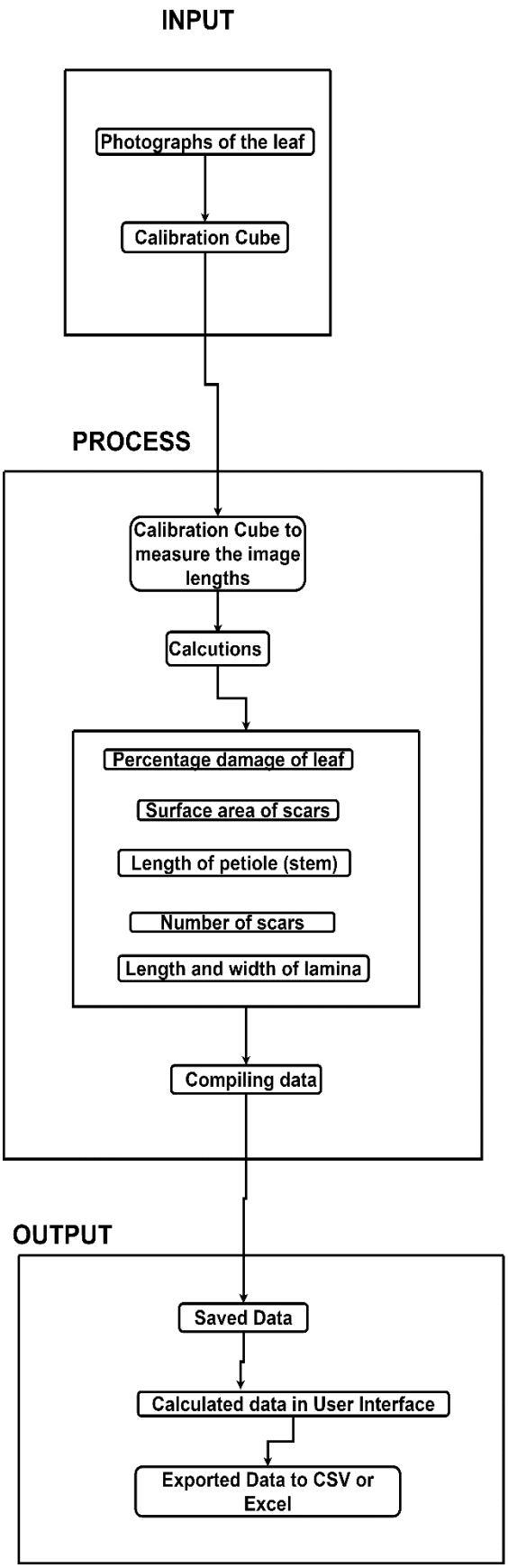
1. Members in the project can create and agree on the boundaries of the project scope from the beginning , as it can less likely cause scope creep. By scheduling regular progress check-ins , can also ensure the project stays in line with the original project scope (Asana, 2024) .

2. To mitigate time risk , project members can overestimate the time needed to complete tasks in the planning phase , so that it can lead to more time to complete tasks. Also, a project schedule can be created using a Timeline or Gantt chart , as that can lead to more clarity into work (Asana, 2024).

3. If the project team knows beforehand a team shift or process change is coming , the team members must ensure they are prepared for the change and make time to adjust through it from team meetings, scheduling tools, or additional trainings and etc (Asana, 2024) .

4. When planning the project , the project group must check and recheck all the requirements to ensure everything is in place . For example , is every group member on the same page ? Are the scopes clearly defined ? It's also important to make sure project information is accessible to all (Asana, 2024).

High-level Design


INPUT
Photographs of the leaf
Calibration Cube
PROCESS
Calibration Cube to measure the image lengths
Calcutions
Percentage damage of leaf
Surface area of scars
Length of petiole (stem)
Number of scars
Length and width of lamina
Compiling data
OUTPUT
Saved Data
Calculated data in User Interface
Exported Data to CSV or Excel

References

Asana, 2024. *Resources and project risks*. [Online]
Available at: https://asana.com/resources/project-risks
[Accessed 13 July 2024].