Ideation Phase
Brainstorm & Idea Prioritization Template

Date	31 January 2025
Team ID	PNT2025TMID01497
Project Name	Grain Palette A Deep Learning Odyssey In Rice Type Classification Through Transfer Learning
Maximum Marks	4 Marks

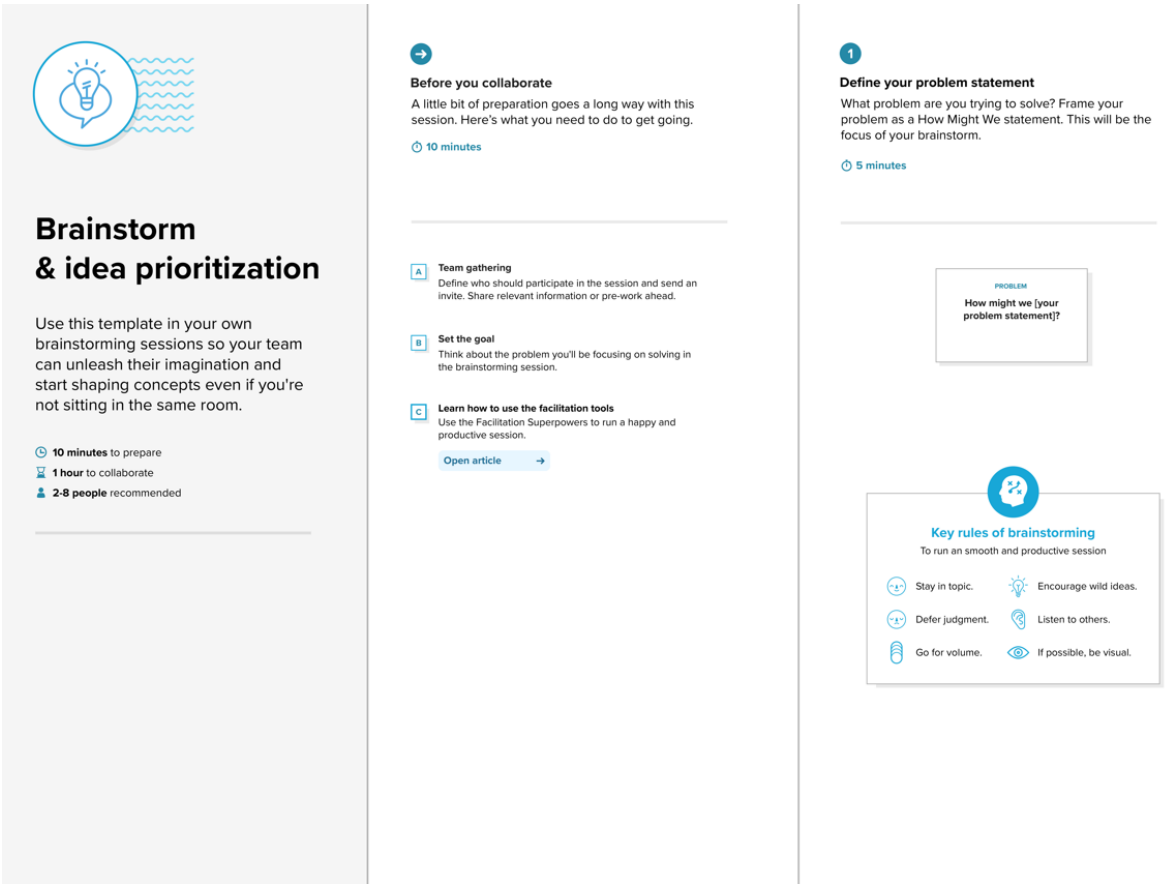
Brainstorm & Idea Prioritization Template:

Brainstorming provides a free and open environment that encourages everyone within a team to participate in the creative thinking process that leads to problem solving. Prioritizing volume over value, out-of-the-box ideas are welcome and built upon, and all participants are encouraged to collaborate, helping each other develop a rich amount of creative solutions.

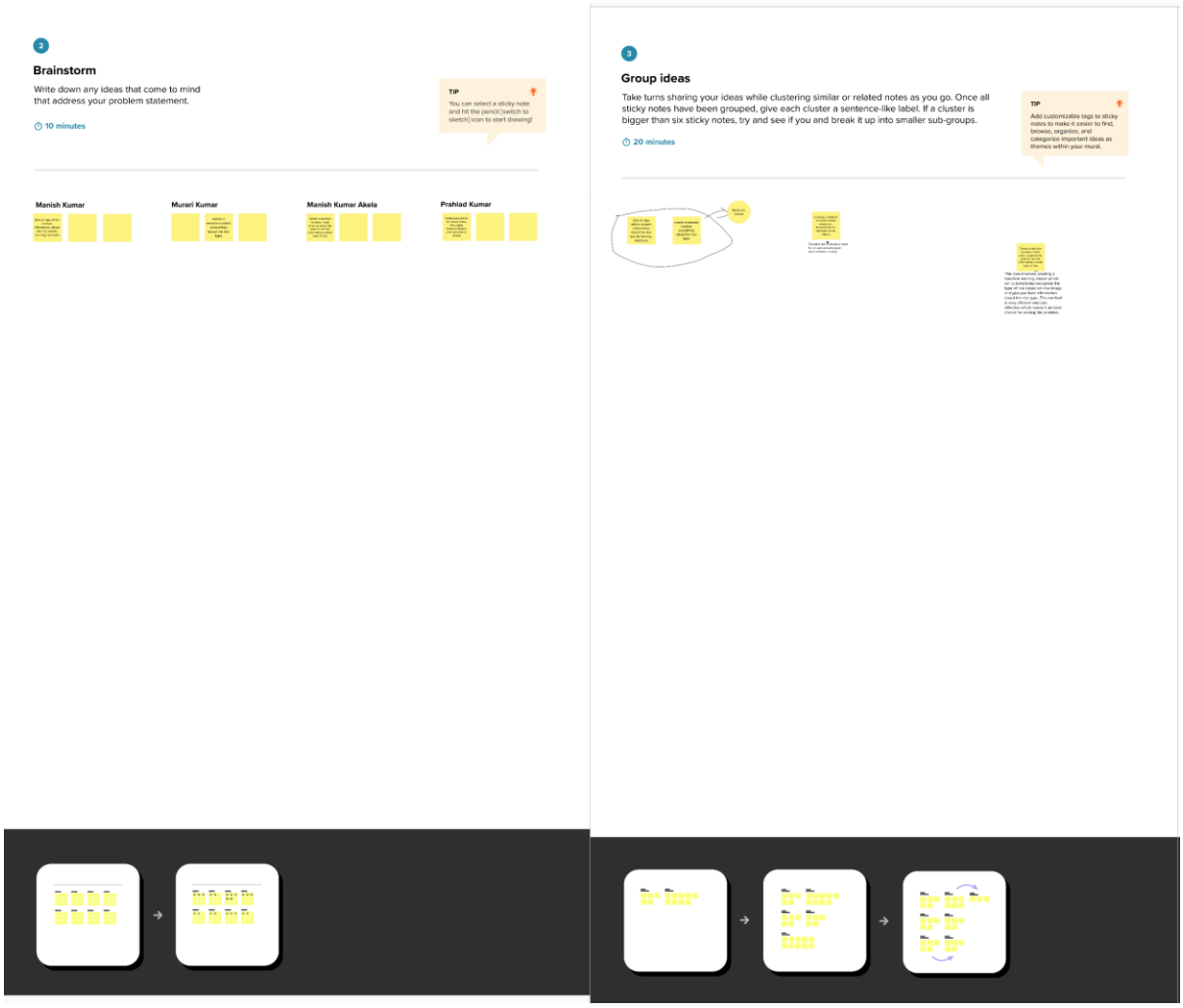
Use this template in your own brainstorming sessions so your team can unleash their imagination and start shaping concepts even if you're not sitting in the same room.

Reference: https://www.mural.co/templates/brainstorm-and-idea-prioritization

Step-1: Team Gathering, Collaboration and Select the Problem Statement



Step-2: Brainstorm, Idea Listing and Grouping



Step-3: Idea Prioritization

4

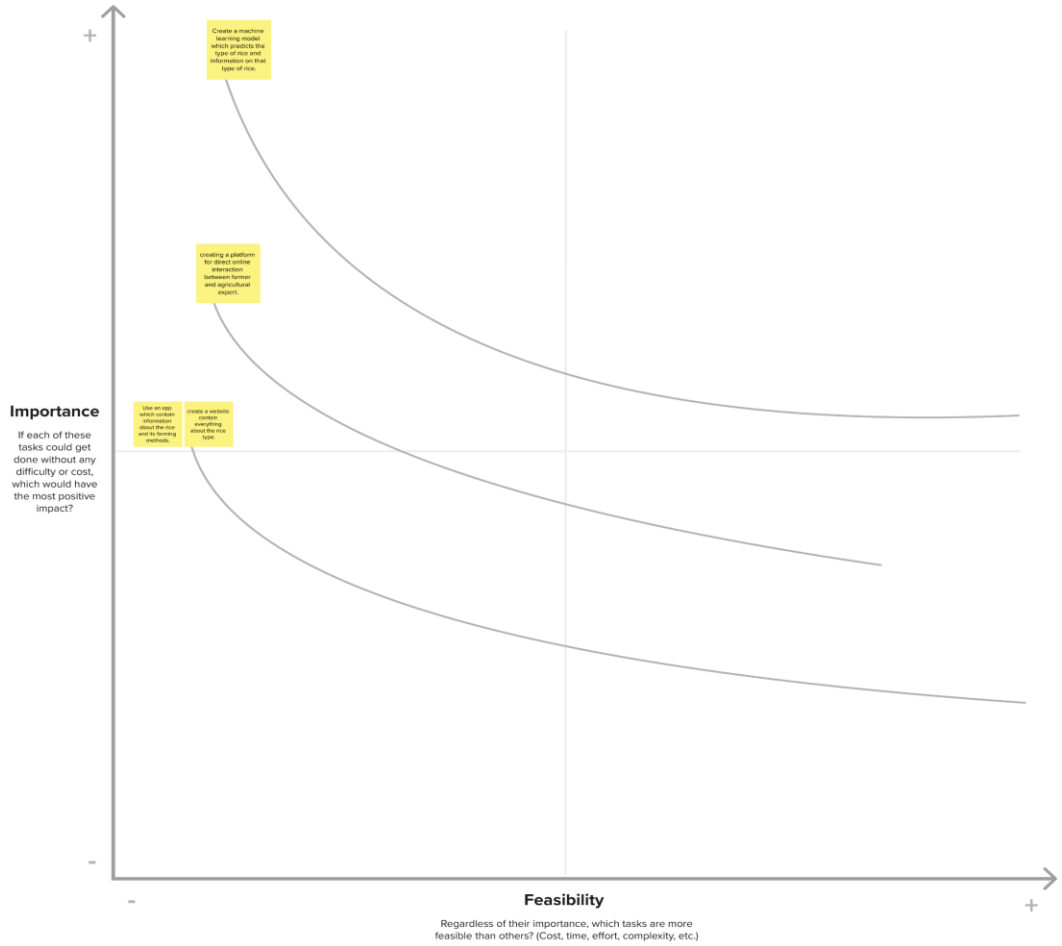
Prioritize

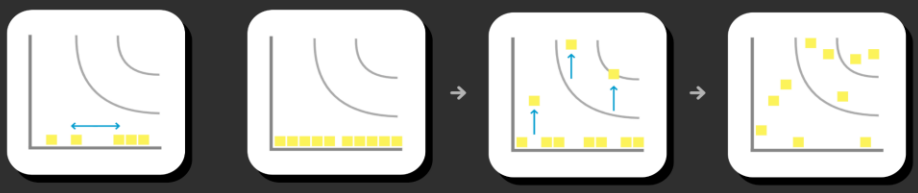
Your team should all be on the same page about what's important moving forward. Place your ideas on this grid to determine which ideas are important and which are feasible.

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.





Project Design Phase
Problem – Solution Fit Template

Date	15 February 2025
Team ID	PNT2025TMID01589
Project Name	**GrainPalette-A-Deep-Learning-Odyssey-In-Rice-Type-Classification-Through-Transfer-Learning**
Maximum Marks	2 Marks

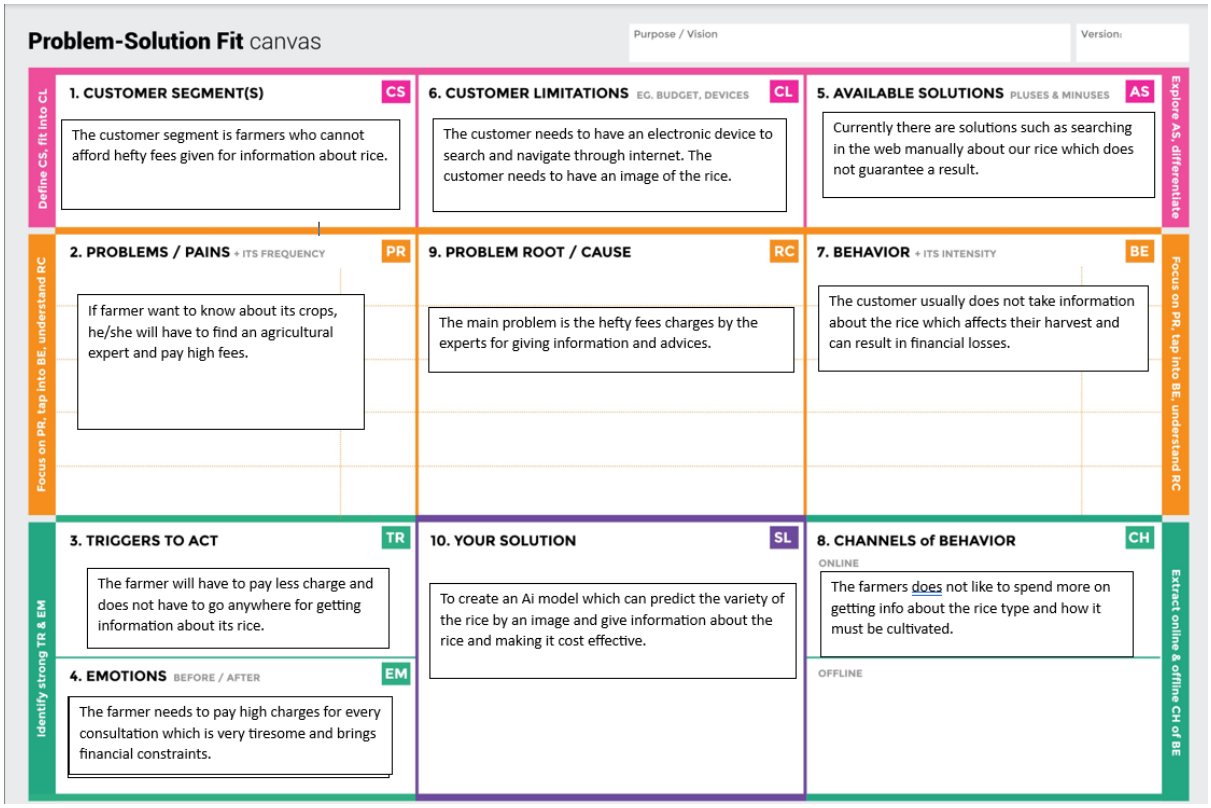
Problem – Solution Fit Template:

The Problem-Solution Fit simply means that you have found a problem with your customer and that the solution you have realized for it actually solves the customer's problem. It helps entrepreneurs, marketers and corporate innovators identify behavioral patterns and recognize what would work and why

Purpose:

- ❑ Solve complex problems in a way that fits the state of your customers.
- ❑ Succeed faster and increase your solution adoption by tapping into existing mediums and channels of behavior.
- ❑ Sharpen your communication and marketing strategy with the right triggers and messaging.
- ❑ Increase touch-points with your company by finding the right problem-behavior fit and building trust by solving frequent annoyances, or urgent or costly problems.
- ❑ **Understand the existing situation in order to improve it for your target group.**

Template:



Ideation Phase
Empathize & Discover

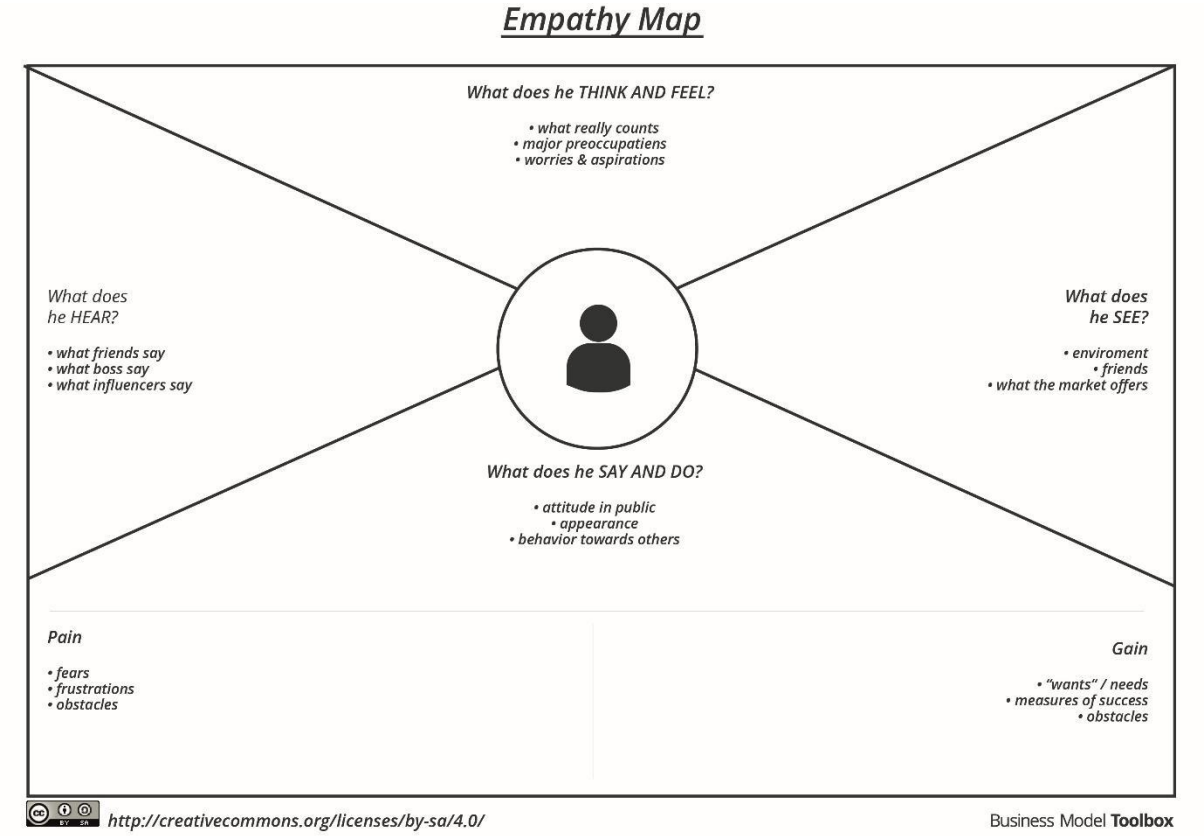
Date	31 January 2025
Team ID	PNT2025TMID01497
Project Name	Grain Palette A Deep Learning Odyssey In Rice Type Classification Through Transfer Learning
Maximum Marks	4 Marks

Empathy Map Canvas:

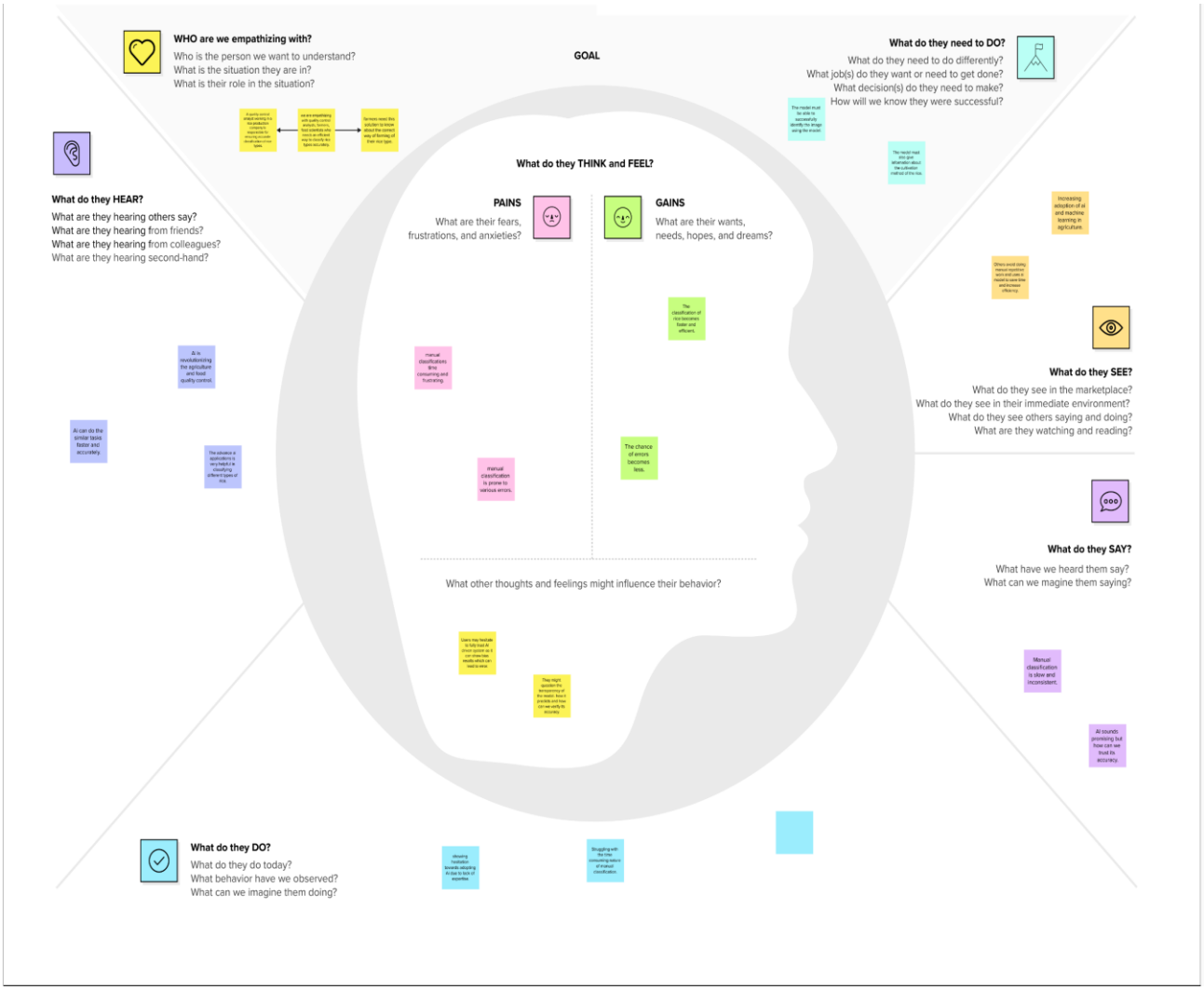
An empathy map is a simple, easy-to-digest visual that captures knowledge about a user's behaviours and attitudes.

It is a useful tool to helps teams better understand their users.
Creating an effective solution requires understanding the true problem and the person who is experiencing it. The exercise of creating the map helps participants consider things from the user's perspective along with his or her goals and challenges.

Example:



Reference: https://www.mural.co/templates/empathy-map-canvas


WHO are we empathizing with?
Who is the person we want to understand?
What is the situation they are in?
What is their role in the situation?
GOAL
What do they need to DO?
What do they need to do differently?
What job(s) do they want or need to get done?
What decision(s) do they need to make?
How will we know they were successful?
What do they HEAR?
What are they hearing others say?
What are they hearing from friends?
What are they hearing from colleagues?
What are they hearing second-hand?
What do they THINK and FEEL?
PAINS
What are their fears, frustrations, and anxieties?
GAINS
What are their wants, needs, hopes, and dreams?
What do they SEE?
What do they see in the marketplace?
What do they see in their immediate environment?
What do they see others saying and doing?
What are they watching and reading?
What do they SAY?
What have we heard them say?
What can we magine them saying?
What other thoughts and feelings might influence their behavior?
What do they DO?
What do they do today?
What behavior have we observed?
What can we imagine them doing?

Ideation Phase
Define the Problem Statements

Date	31 January 2025
Team ID	PNT2025TMID01497
Project Name	Grain Palette- A Deep Learning Odyssey In Rice Type Classification Through Transfer Learning
Maximum Marks	2 Marks

Customer Problem Statement Template:

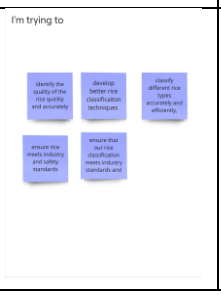
Create a problem statement to understand your customer's point of view. The Customer Problem Statement template helps you focus on what matters to create experiences people will love.

A well-articulated customer problem statement allows you and your team to find the ideal solution for the challenges your customers face. Throughout the process, you'll also be able to empathize with your customers, which helps you better understand how they perceive your product or service.

I am	Describe customer with 3-4 key characteristics - *who are they?*	Describe the customer and their attributes here
I'm trying to	*List their outcome or "job" the care about - what are they trying to achieve?*	List the thing they are trying to achieve here
but	Describe what problems or barriers stand in the way – *what bothers them most?*	Describe the problems or barriers that get in the way here
because	Enter the "root cause" of why the problem or barrier exists – *what needs to be solved?*	Describe the reason the problems or barriers exist
which makes me feel	Describe the emotions from the customer's point of view – *how does it impact them emotionally?*	Describe the emotions the result from experiencing the problems or barriers

Reference: https://miro.com/templates/customer-problem-statement/

Example:

Problem Statement (PS)	I am (Customer)	I’m trying to	But	Because	Which makes me feel
PS-1					

Scenario:
Upload image of any type of rice, processing and see results of what type of rice it is.

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?

Entice	Enter	Engage	Exit	Extend
Potential users discover GrainPalette through social media ads, agricultural forums, and industry conferences.	Users are welcomed with a simple onboarding process explaining the app's purpose.	Users upload images of rice grains through the app's camera or file upload feature.	The app displays a summary report of the classification results.	Users receive periodic updates and new features via notifications.
Positive reviews and testimonials from farmers and agricultural experts build curiosity.	A guided tutorial demonstrates how to upload rice grain images for classification.	The deep learning model quickly processes the images and provides classification results.	Users receive recommendations for improving rice quality and market positioning.	Feedback channels allow users to report issues and suggest improvements.
A compelling value proposition, such as "Accurate Rice Classification in Seconds," grabs attention.		The app suggests insights such as grain quality, type, and potential market value.		Data from past classifications helps improve future accuracy through machine learning.
		Real-time feedback allows users to refine their inputs for better accuracy.		
		User satisfaction grows as the app's high accuracy saves time and effort.		

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?

Entice	Enter	Engage	Exit	Extend
Users may see promotional content from social media influencers, agricultural experts, or industry leaders.	Users interact with customer support through chat or FAQs during onboarding.	Users may seek guidance from customer support or other farmers when using the app.	Users may share their results with agricultural experts or other farmers.	Users receive follow-ups from the GrainPalette team through emails or notifications.
They encounter GrainPalette through online ads, agricultural fairs, and farming seminars.	They are usually at home, on the farm, or in agricultural offices while setting up the app.	They are typically in rice fields, warehouses, or grain processing centers during use.	They are usually back at home or in their office while reviewing reports.	They might discuss app performance and results with industry peers at events or meetings.
They interact with social media platforms (e.g., Facebook, Instagram), the GrainPalette website, and online video demos.		They use smartphone cameras to capture rice images and the app's interface to process them.		Push notifications inform users about app updates and new features.
		Some users might consult experts or team members to validate results.		
		Real-time feedback through the app's dashboard enhances user interaction.		

Goals & motivations

At each step, what is a person's primary goal or motivation? ("Help me..." or "Help me avoid...")

Entice	Enter	Engage	Exit	Extend
"Help me find a reliable solution for rice classification."	"Help me understand how to use the app quickly and easily."	"Help me classify rice types accurately and quickly."	"Help me understand the classification report clearly."	"Help me stay updated with app improvements and new features."
"Help me improve the efficiency of sorting rice grains."	"Help me avoid confusion during the onboarding process."	"Help me understand the differences between rice varieties."	"Help me apply the insights to improve rice quality and sales."	"Help me track classification accuracy over time."
"Help me reduce errors in rice type identification."		"Help me make informed decisions based on classification results."		"Help me compare past and present classification trends."
		"Help me avoid misclassifications that could affect quality and pricing."		
		1. "Help me improve efficiency and reduce labor costs."		

Positive moments

What steps does a typical person find enjoyable, productive, fun, motivating, delightful, or exciting?

Entice	Enter	Engage	Exit	Extend
Discovering that GrainPalette can automate and simplify rice classification is exciting.	A smooth and quick onboarding process feels easy and welcoming.	Getting fast and accurate results from the deep learning model feels satisfying.	Viewing a detailed and well-organized classification report feels informative and useful.	Receiving helpful tips and updates through notifications feels engaging.
Positive testimonials and high ratings build motivation to try the app.	Successfully uploading the first image without issues creates confidence.	Seeing detailed insights about rice quality and type boosts confidence.	Being able to share or export the results with one click feels seamless.	Tracking classification history and trends over time builds a sense of progress.
Seeing a demo of quick and accurate rice classification feels impressive and promising.		Real-time feedback and improvement suggestions feel empowering.		Seeing improvements in classification accuracy over repeated use feels rewarding.
		High accuracy rates make the process feel productive and rewarding.		
		The ability to compare different rice types side-by-side adds an element of curiosity and learning.		

Negative moments

What steps does a typical person find frustrating, confusing, angering, costly, or time-consuming?

Entice	Enter	Engage	Exit	Extend
Difficulty finding reliable information about the app online creates frustration.	A complicated or lengthy onboarding process can discourage users.	Inaccurate classification results can frustrate and discourage users.	Confusing report formats make it hard to understand the results.	Frequent or irrelevant push notifications may feel intrusive.
Confusing or inconsistent marketing messages reduce trust and interest.	Poor internet connectivity causing delays during setup creates annoyance.	Slow processing times during image analysis can waste time.	Difficulties in exporting or sharing results can create frustration.	Poor customer support when seeking clarification reduces trust.
Lack of clear pricing or hidden costs can make users feel hesitant.		Poor camera integration or image quality issues may lead to failed classification.		Data loss or unavailability of previous reports can anger users.
		Lack of detailed insights or explanations about the classification process may confuse users.		
		Receiving inconsistent results from similar images reduces confidence in the app's accuracy.		

Areas of opportunity

How might we make each step better? What ideas do we have? What have others suggested?

Entice	Enter	Engage	Exit	Extend
Improve visibility by partnering with agricultural organizations and influencers.	Introduce a step-by-step onboarding wizard to simplify the setup process.	Enhance the image recognition model to improve accuracy and reduce processing time.	Provide a clear summary of classification results with actionable insights.	Send personalized notifications about app updates and new features.
Create targeted social media campaigns to reach farmers and agribusinesses directly.	Improve UI/UX design for better navigation and faster understanding of features.	Introduce a progress bar to show how long the classification will take.	Improve report formatting to make data easier to interpret and share.	Allow users to track classification history and trends over time.
Develop a series of short, clear demo videos to explain the app's benefits.		Provide detailed insights about classification criteria to increase user understanding.		Use machine learning to improve classification accuracy based on user feedback.
		Allow users to compare classification results side-by-side for better decision-making.		
		Offer an offline mode for areas with poor internet connectivity.		

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

Date	31 January 2025
Team ID	PNT2025TMID01497
Project Name	**GrainPalette-A-Deep-Learning-Odyssey-In-Rice-TypeClassification-Through-Transfer-Learning**
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	Browsing through URL	website link
FR-2	Get Image	Upload the image
FR-3	Prediction	Machine learning model
FR-4	Details	View the details based on prediction

Non-functional Requirements:

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

FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	The system should have an intuitive, user-friendly interface with clear instructions.
NFR-2	**Reliability**	The prediction must be correct and accurate.
NFR-3	**Performance**	The model must not take much time to predict.
NFR-4	**Availability**	The availability to everyone must be maintained.
NFR-5	**Scalability**	It must be scalable for predicting other types of rice too.

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

Date	31 January 2025
Team ID	PNT2025TMID01497
Project Name	**GrainPalette-A-Deep-Learning-Odyssey-In-RiceType-Through-Transfer-Learning Classification**
Maximum Marks	4 Marks

Technical Architecture:

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

Rice Type Classification:

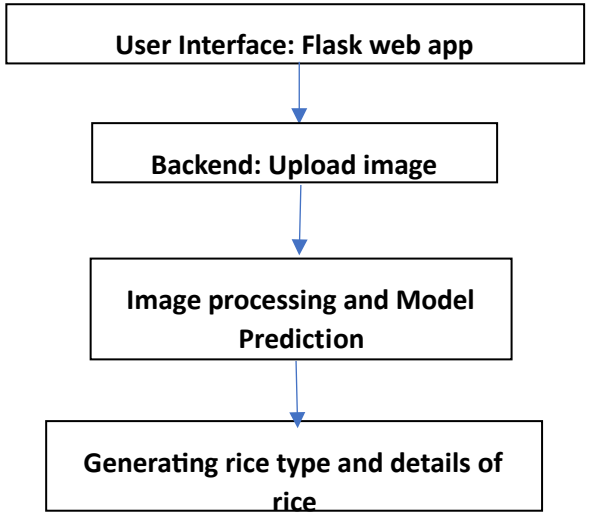


Table-1: Components & Technologies:

S. No	Component	Description	Technology
1.	User Interface	The user interacts with the application via a web interface.	Flask, HTML, CSS
2.	Application Logic-1	Handles user input and processes it for Image prediction.	Python
3.	Application Logic-2	Predicts the Image	MobilenetV2, python
4.	Database	If data storage is required	MySQL
5.	File Storage	Use internal storage to upload the image	Flask
6.	External API-1	Purpose of External API used in the application	IBM Weather API, etc.
7.	Machine Learning Model	Predicts the Image	Image classification
8.	Infrastructure (Server / Cloud)	Application Deployment on Local System	Flask

Table-2: Application Characteristics:

S. No	Characteristics	Description	Technology
1.	Open-Source Frameworks	List the open-source frameworks used	MobilenetV2, Flask, Python
2.	Scalable Architecture	Justify the scalability of architecture (3 – tier, Microservices)	Parallel processing (if required)
3.	Availability	Justify the availability of application (e.g. use of load balancers, distributed servers etc.)	Flask
4.	Performance	Design consideration for the performance of the application (number of requests per sec, use of Cache, use of CDN's) etc.	MobilenetV2

References:

https://c4model.com/ https://developer.ibm.com/patterns/online-order-processing-system-during-pandemic/ https://www.ibm.com/cloud/architecture https://aws.amazon.com/architecture

https://medium.com/the-internal-startup/how-to-draw-useful-technical-architecture-diagrams-2d20c9fda90d

Project Design Phase
Problem – Solution Fit Template

Date	15 February 2025
Team ID	PNT2025TMID01497
Project Name	**GrainPalette-A-Deep-Learning-Odyssey-In-RiceType-Classification-Through-Transfer-Learning**
Maximum Marks	2 Marks

Problem – Solution Fit Template:

The Problem-Solution Fit simply means that you have found a problem with your customer and that the solution you have realized for it actually solves the customer's problem. It helps entrepreneurs, marketers and corporate innovators identify behavioural patterns and recognize what would work and why

Purpose:

- ❑ Solve complex problems in a way that fits the state of your customers.
- ❑ Succeed faster and increase your solution adoption by tapping into existing mediums and channels of behaviour.
- ❑ Sharpen your communication and marketing strategy with the right triggers and messaging.
- ❑ Increase touch-points with your company by finding the right problem-behaviour fit and building trust by solving frequent annoyances, or urgent or costly problems.
- ❑ **Understand the existing situation in order to improve it for your target group.**

Template:

Problem-Solution Fit canvas

Purpose / Vision

Version:

Define CS, fit into CL

1. CUSTOMER SEGMENT(S) CS

The customer segment is farmers who cannot afford hefty fees given for information about rice.

6. CUSTOMER LIMITATIONS EG. BUDGET, DEVICES CL

The customer needs to have an electronic device to search and navigate through internet. The customer needs to have an image of the rice.

5. AVAILABLE SOLUTIONS PLUSES & MINUSES AS

Currently there are solutions such as searching in the web manually about our rice which does not guarantee a result.

Explore AS, differentiate

Focus on PR, tap into BE, understand RC

2. PROBLEMS / PAINS + ITS FREQUENCY PR

If farmer want to know about its crops, he/she will have to find an agricultural expert and pay high fees.

9. PROBLEM ROOT / CAUSE RC

The main problem is the hefty fees charges by the experts for giving information and advices.

7. BEHAVIOR + ITS INTENSITY BE

The customer usually does not take information about the rice which affects their harvest and can result in financial losses.

Focus on PR, tap into BE, understand RC

Identify strong TR & EM

3. TRIGGERS TO ACT TR

The farmer will have to pay less charge and does not have to go anywhere for getting information about its rice.

4. EMOTIONS BEFORE / AFTER EM

The farmer needs to pay high charges for every consultation which is very tiresome and brings financial constraints.

10. YOUR SOLUTION SL

To create an Ai model which can predict the variety of the rice by an image and give information about the rice and making it cost effective.

8. CHANNELS of BEHAVIOR CH

ONLINE

The farmers does not like to spend more on getting info about the rice type and how it must be cultivated.

OFFLINE

Extract online & offline CH of BE

Project Design Phase
Proposed Solution Template

Date	15 February 2025
Team ID	PNT2025TMID01497
Project Name	**Grain Palette-A-Deep-Learning-Odyssey-InRice-Type-Classification-Through-Transfer-Learning**
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)	It is not possible for the farmers to pay the agriculture experts hefty fees every time they have a new produce. We have to come up with a solution to this problem
2.	Idea / Solution description	Train an AI model which can be used by farmers to check the type of rice. The users need to upload image of a rice grain and click on the submit button.
3.	Novelty / Uniqueness	The prediction will be done automatically without any human intervention using a machine learning model.
4.	Social Impact / Customer Satisfaction	The model can predict the rice in very less time and provide services to a very large customer base.
5.	Business Model (Revenue Model)	We can charge amount per prediction which can generate a good profit.
6.	Scalability of the Solution	The model can be scalable by training the model on various different types of rice.

fProject Design Phase
Solution Architecture

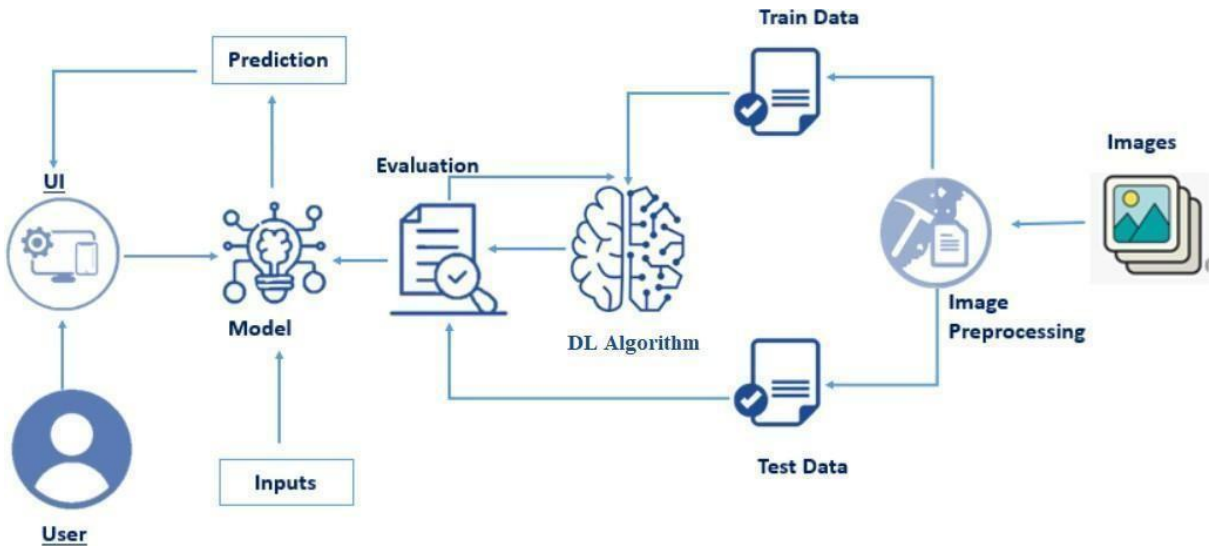
Date	15 February 2025
Team ID	PNT2025TMID01497
Project Name	**Grain Palette-A-Deep-Learning-Odyssey-In-Rice-Type-Through-Transfer-Learning Classification**
Maximum Marks	4 Marks

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:



Key Components of the solution:

1. User Interface (Frontend)

Provides an interface for users to upload rice images and view classification results. Uses HTML, JavaScript, or React to send images to the backend and display predictions.

2. Backend Logic (Flask API)

Handles image preprocessing, runs inference using MobileNetV2, and returns classification results as JSON. Built with Flask/ Fast API for easy deployment.

3. MobileNetV2 (Deep Learning Model)

A lightweight CNN optimized for mobile/web, trained to classify different rice types. Uses depth wise separable convolutions for efficiency and is fine-tuned for accuracy.

4. Output (Rice Classification Result)

Returns a predicted rice category (e.g., Basmati, Jasmine) as JSON, which is displayed on the frontend. Can be integrated into web or mobile apps for real-time use.

Features and Deployment phases:

Features:

User-Friendly UI: Simple interface for image upload and displaying results.

Efficient Backend: Uses Flask/Fast API to handle requests and process images.

Accurate Predictions: MobileNetV2 ensures fast and reliable rice classification.

Deployment phases:

Model Training & Saving: Train MobileNetV2, fine-tune it, and save as .h5.

Backend & API Setup: Develop a Flask API for model inference and JSON response.

Hosting & Deployment: Deploy on Render, AWS, or Google Cloud for public access.

Solution Requirements:

1.Technical requirements:

Frameworks & Libraries: TensorFlow/ Keras for model training, Flask/Fast API for API, and React/HTML for frontend.

Infrastructure: A cloud server (AWS, GCP) or containerized deployment (Docker, Kubernetes).

Storage & Processing: GPU support for training, cloud or local storage for model files and images.

2.Functional requirements:

Image Upload & Processing: Users can upload rice images for classification.

Model Inference & Prediction: Backend processes images and returns the rice type.

Result Display & API Integration: Predictions are displayed in the UI with real-time responses.

Project Planning Phase

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

Date	15 February 2025
Team ID	PNT2025TMID01497
Project Name	**GrainPalette-A-Deep-Learning-Odyssey-InRice-Type-Classification-Through-Transfer-Learning**
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	Visiting website	USN-1	As a user, I can visit the site simply using website URL.	2	High	Manish Kumar Akela
Sprint-2	Accessing upload page	USN-2	To use the model for prediction, I need to go to image upload page.	1	High	Manish Kumar
Sprint-3	Image uploading	USN-3	In the Image upload page, I can simply upload the image from my device files.	2	Low	Murari Kumar
Sprint-4	Rice type prediction	USN-4	After uploading the image, I get the rice type prediction and addition information related to farming of that particular rice variety.	2	Medium	Prahlad Kumar

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	20	2 Days	25 Feb 2025	26 Feb 2025	20	10 Mar 2025
Sprint-2	20	3 Days	27 Feb 2025	01 Mar 2025	20	10 Mar 2025
Sprint-3	20	5 Days	02 Mar 2025	06 Mar 2025	20	10 Mar 2025
Sprint-4	20	3 Days	07 Mar 2025	09 Mar 2025	20	10 Mar 2025

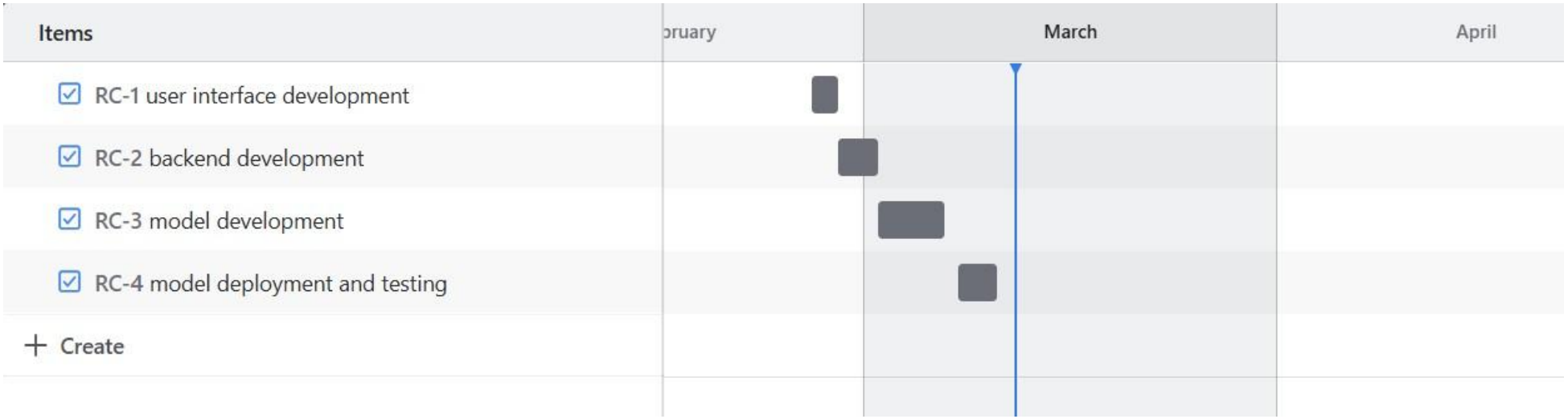
Velocity:

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)

$$AV=(\text{sprint duration})/\text{Velocity}=13/6=2.16$$

Burndown Chart:

A burn down chart is a graphical representation of work left to do versus time. It is often used in agile software development methodologies such as Scrum. However, burn down charts can be applied to any project containing measurable progress over time.



https://www.visual-paradigm.com/scrum/scrum-burndown-chart/

https://www.atlassian.com/agile/tutorials/burndown-charts

Reference:

https://www.atlassian.com/agile/project-management

https://www.atlassian.com/agile/tutorials/how-to-do-scrum-with-jira-software

https://www.atlassian.com/agile/tutorials/epics

https://www.atlassian.com/agile/tutorials/sprints

https://www.atlassian.com/agile/project-management/estimation

https://www.atlassian.com/agile/tutorials/burndown-charts