# Ideation Phase Brainstorm & Idea Prioritization Template

Date	28 June 2025	
Team ID	LTVIP2025TMID34819	
Project Name	GrainPalette 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

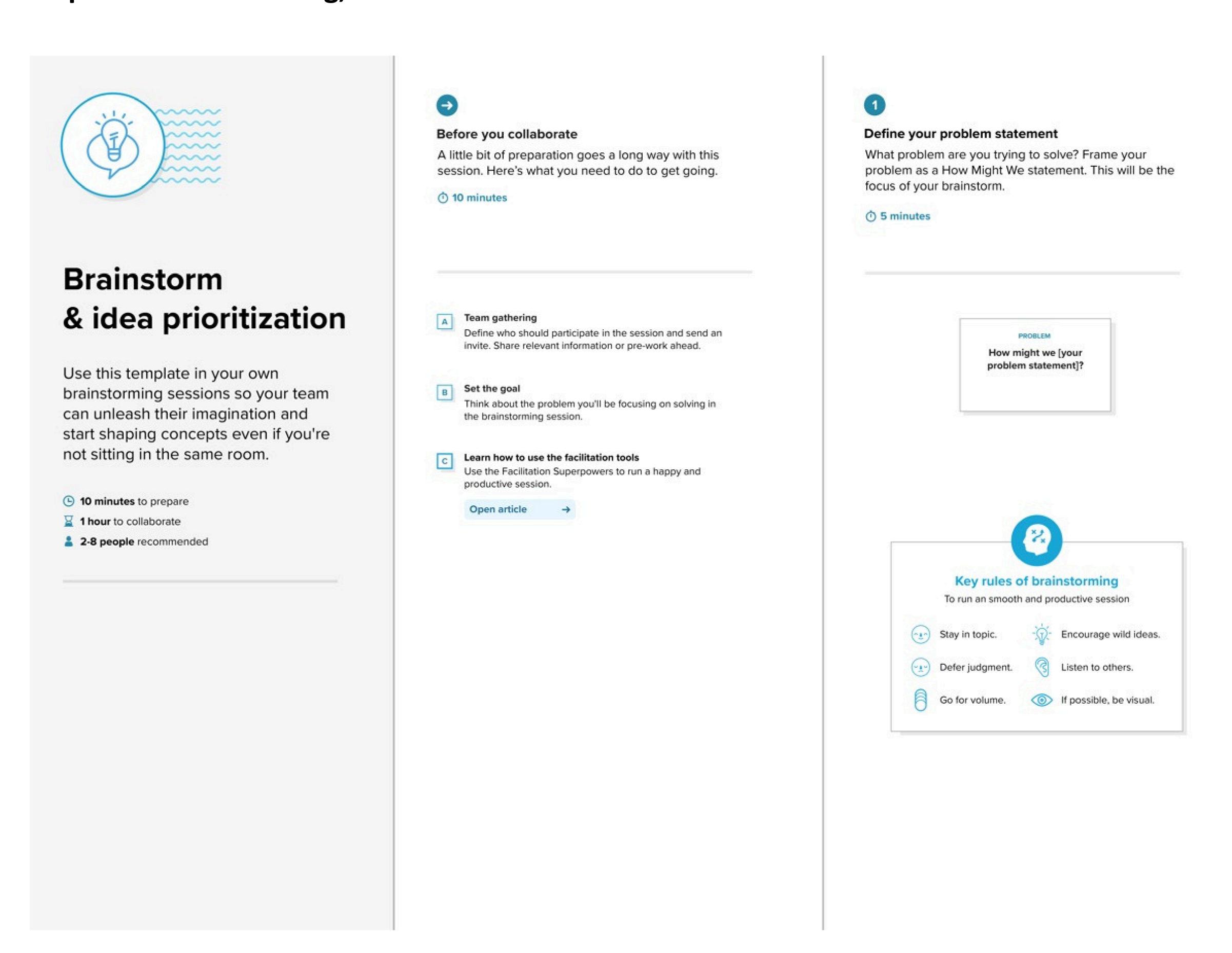
environment that encourages everyone within a

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



# 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.

① 5 minutes

# **PROBLEM**

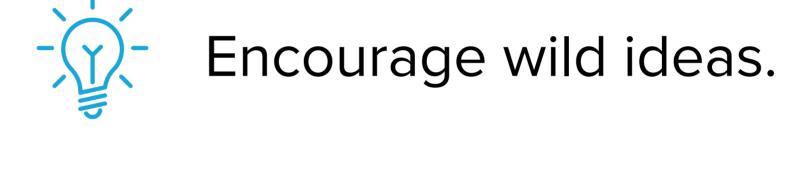
How might we make accurate rice type identification affordable and accessible to all farmers, regardless of their resources?



# Key rules of brainstorming

To run an smooth and productive session















# Brainstorm

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

(1) 10 minutes

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

# Saket Kumar

Improve the offline mode so it can do more processing locally, even if the initial model download needs internet.

Allow farmers to
anonymously
contribute rice grain
images to a
community dataset
to improve model
accuracy over time.

Add support for more local languages beyond just the most common ones.

Include short
videos or guides
within the app
explaining rice
types and
farming practices.

Make the image capture process a little game to teach farmers how to take good pictures for accurate Al analysis.

Allow farmers to anonymously contribute rice grain images to a community dataset to improve model accuracy over time.

# Shaik Thasmiya

After rice type prediction, show current market prices for that rice type in local markets.

Investigate if there are even more efficient, open-source transfer learning models we could use to reduce app size and processing needs.

Make the app interface extremely basic with large icons, minimal text — think grandpafriendly!

Explore partnerships with mobile network providers to offer discounted data packs specifically for agricultural apps like ours.

Create a simplified, smaller app version that uses less data and works better on basic smartphones.

Collect and share success stories from farmers who have used GrainPalette and seen positive results to build trust and encourage adoption.

# Shaik Asfiya Anjum

Offer a basic free version with limited daily predictions, and a premium subscription for unlimited use and extra features.

Actively pursue
government grants or
subsidies for
agricultural technology
initiatives to make the
app free or heavily
discounted for farmers.

Partner with local agricultural content creators (YouTubers, bloggers, etc.) to promote the app in regional languages and styles.

In very resourcepoor areas, explore
partnerships to offer
extremely basic, lowcost smartphones
pre-loaded with the
GrainPalette app.

Set up a system for automatically retraining the Al model with new farmer-contributed data to keep improving accuracy over time.

Make the app show a
"confidence score"
for each prediction,
so farmers know how
certain the Al is.

# Shaik Kalesha

Partner with agricultural NGOs who work directly with farmers to distribute the app and provide training.

Direct button in the app to connect to a human agricultural expert for more complex questions (maybe a paid premium feature, or limited free initial consultations).

Instead of just
MobileNetV4, experiment
with combining multiple
transfer learning models
for potentially higher
accuracy (but might
increase complexity).

Easy way for farmers
to report if the
prediction was wrong
and ideally, provide
the correct rice type,
to use as error
correction data.

Provide
downloadable guides
(PDF or video) on
how to collect and
photograph rice
grains for best Al
analysis.

Collaborate with fertilizer/seed companies to bundle app access with their products.

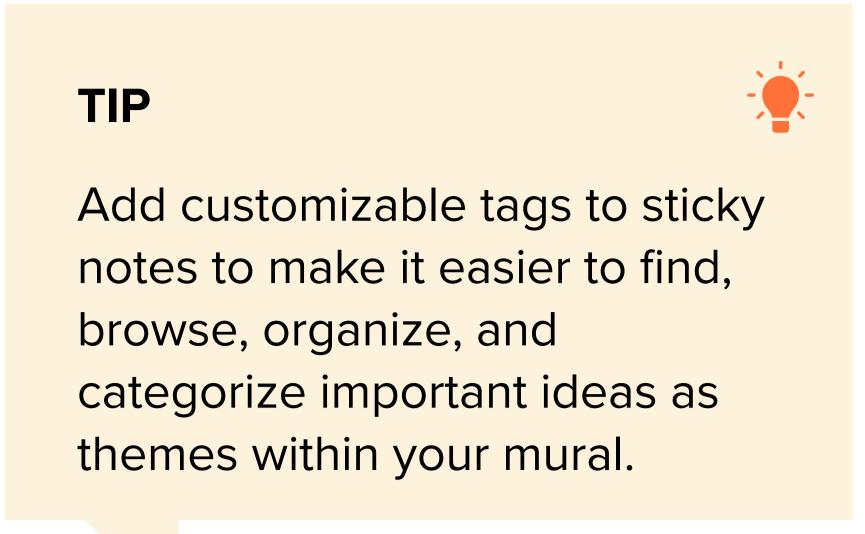




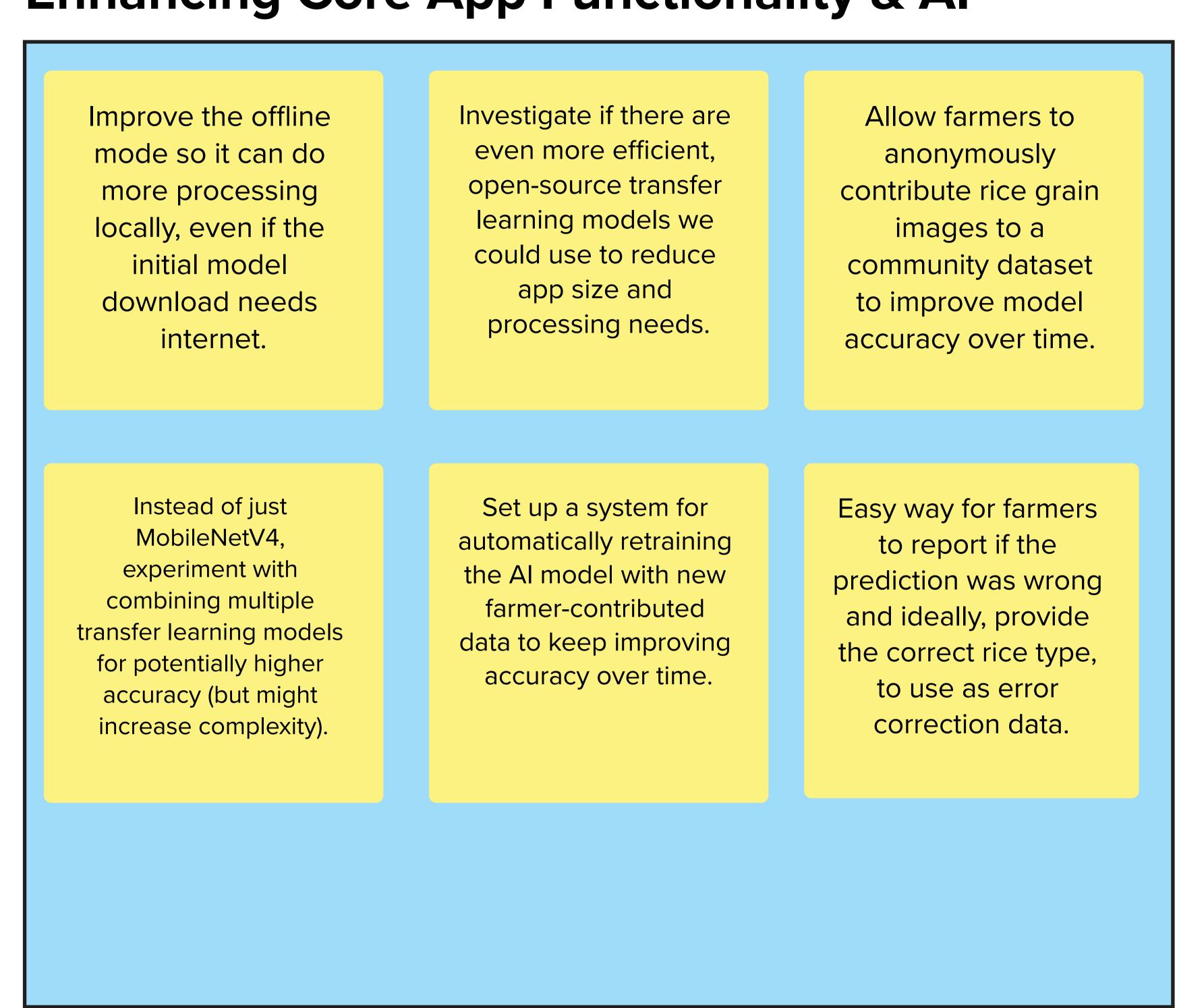
# Group ideas

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.

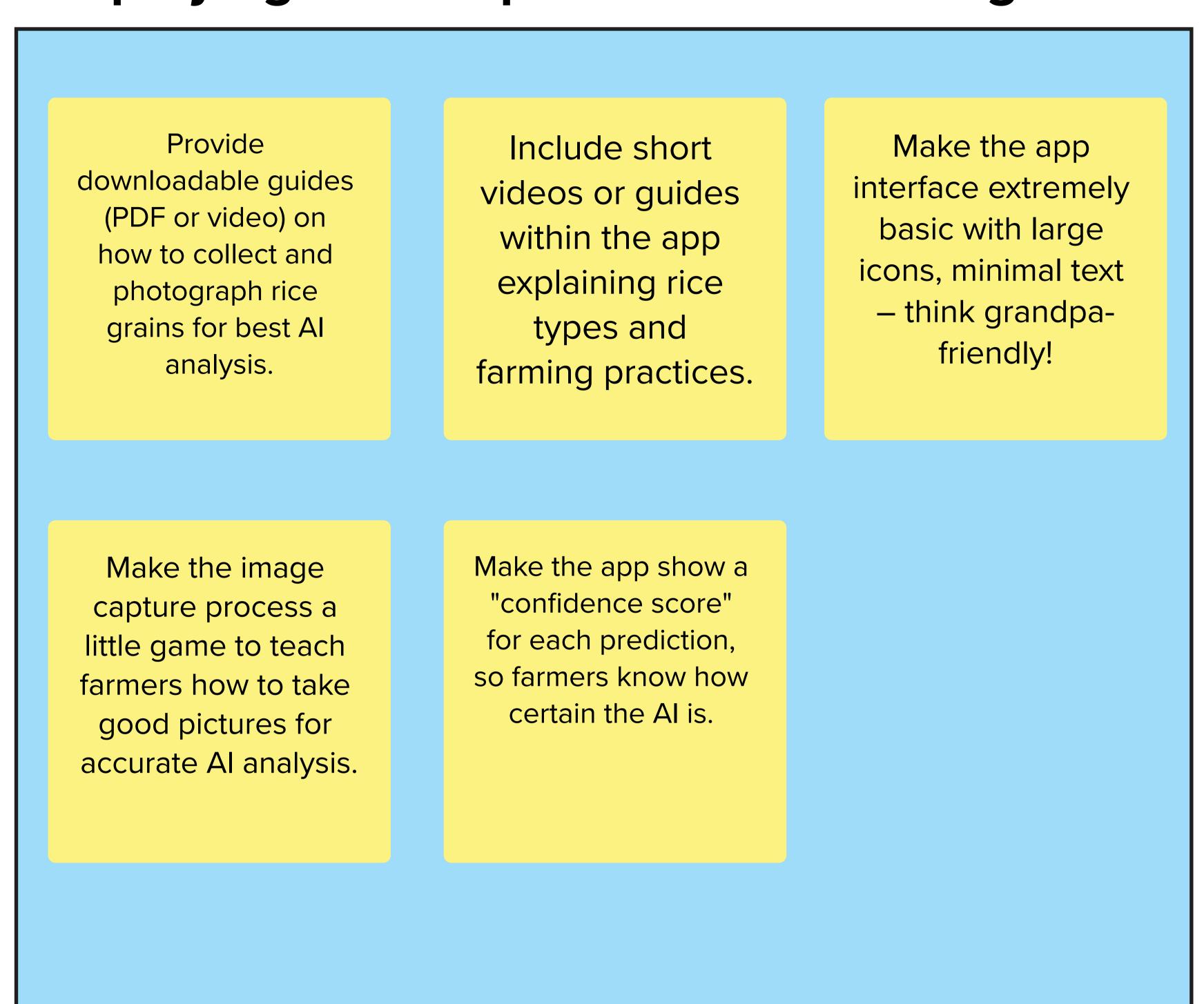
① 20 minutes



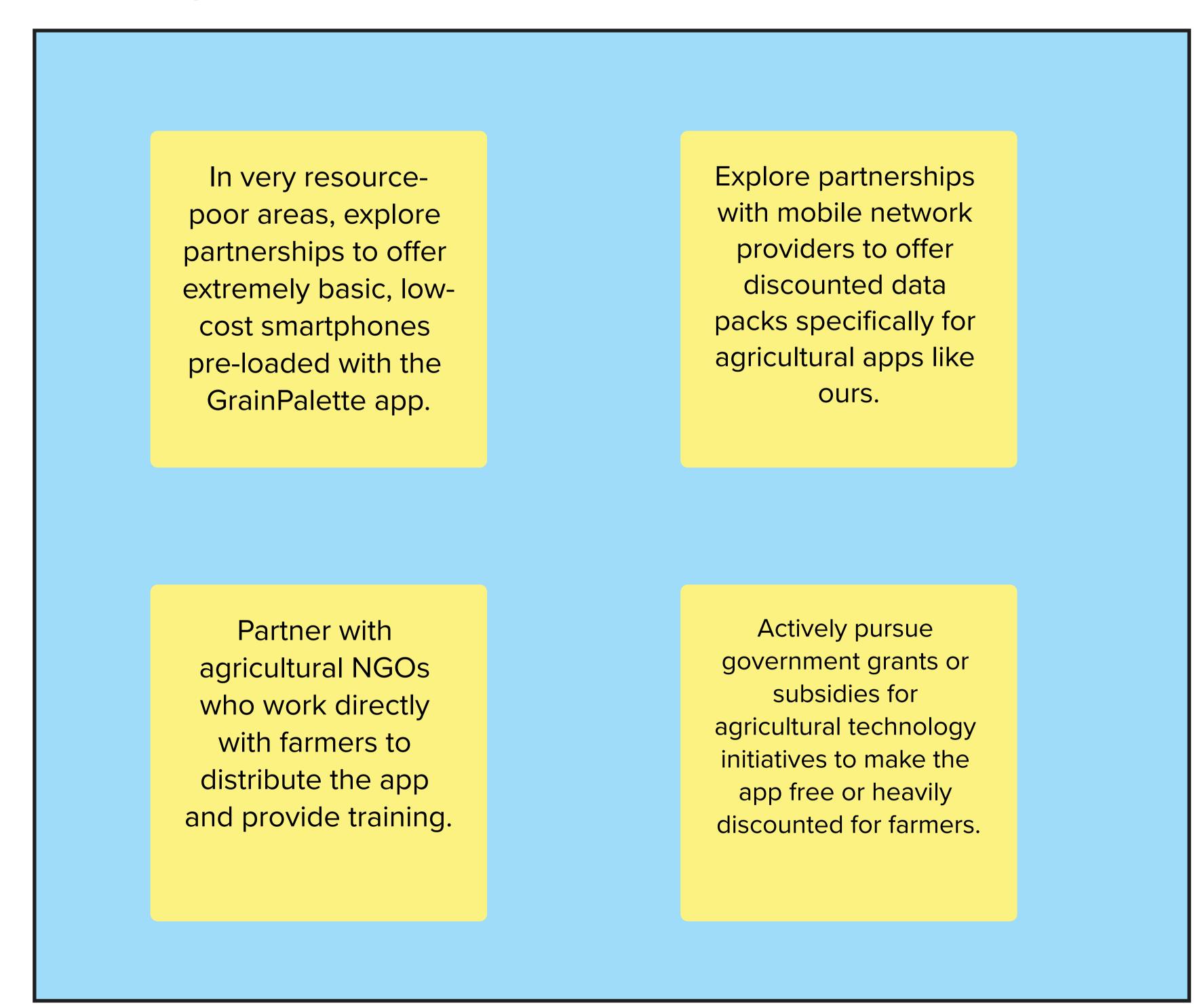
# Enhancing Core App Functionality & Al



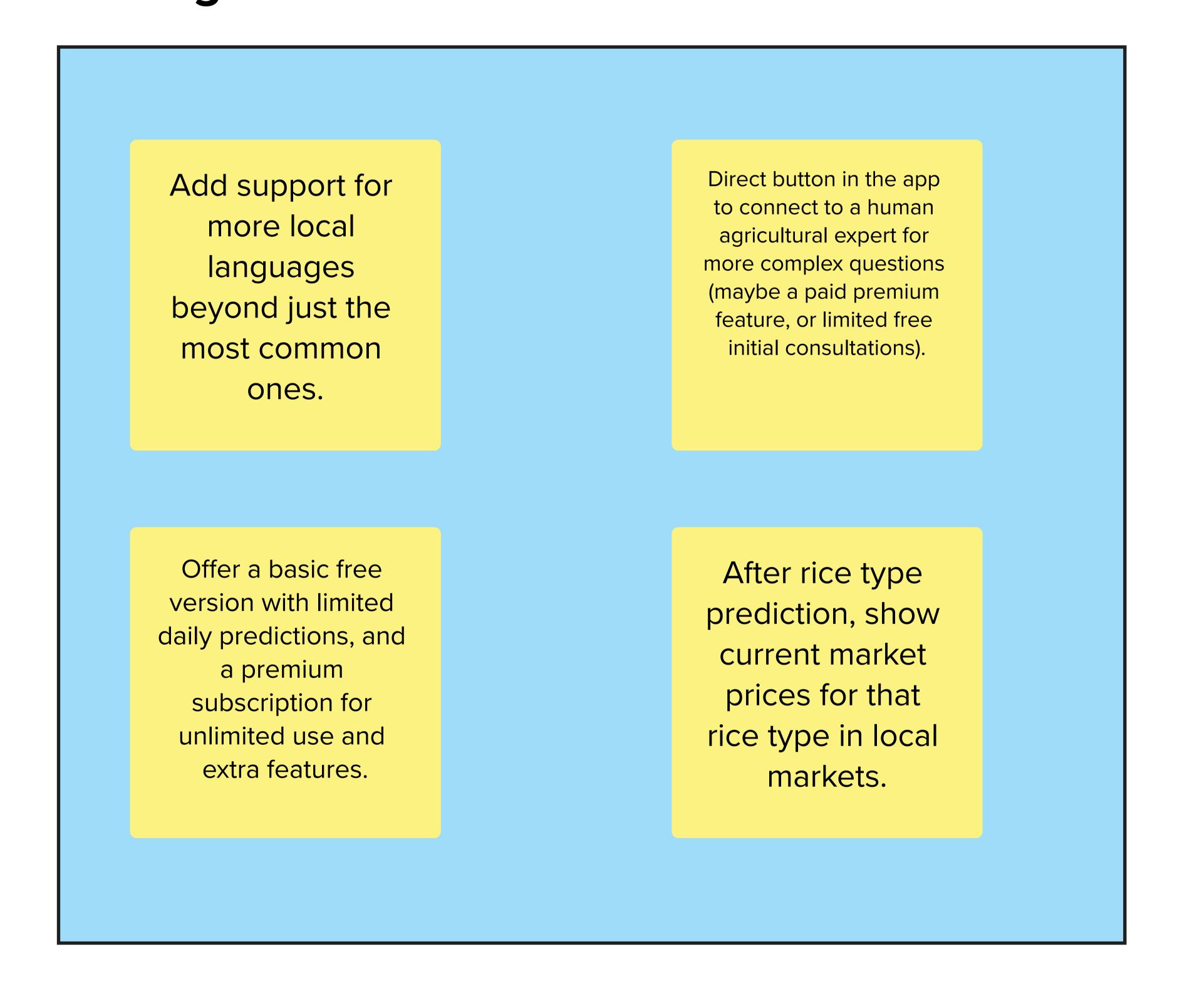
# Simplifying User Experience & Providing Guidance

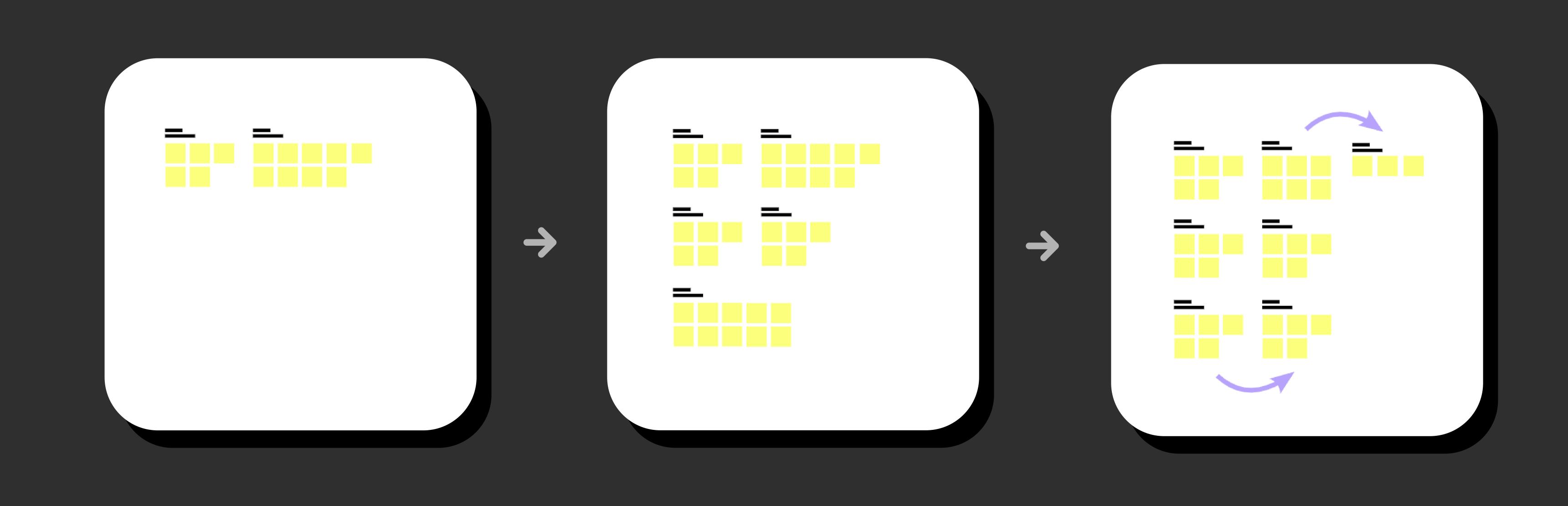


# Strategic Partnerships & Distribution



# Adding Farmer Value & Practical Features







# Prioritize

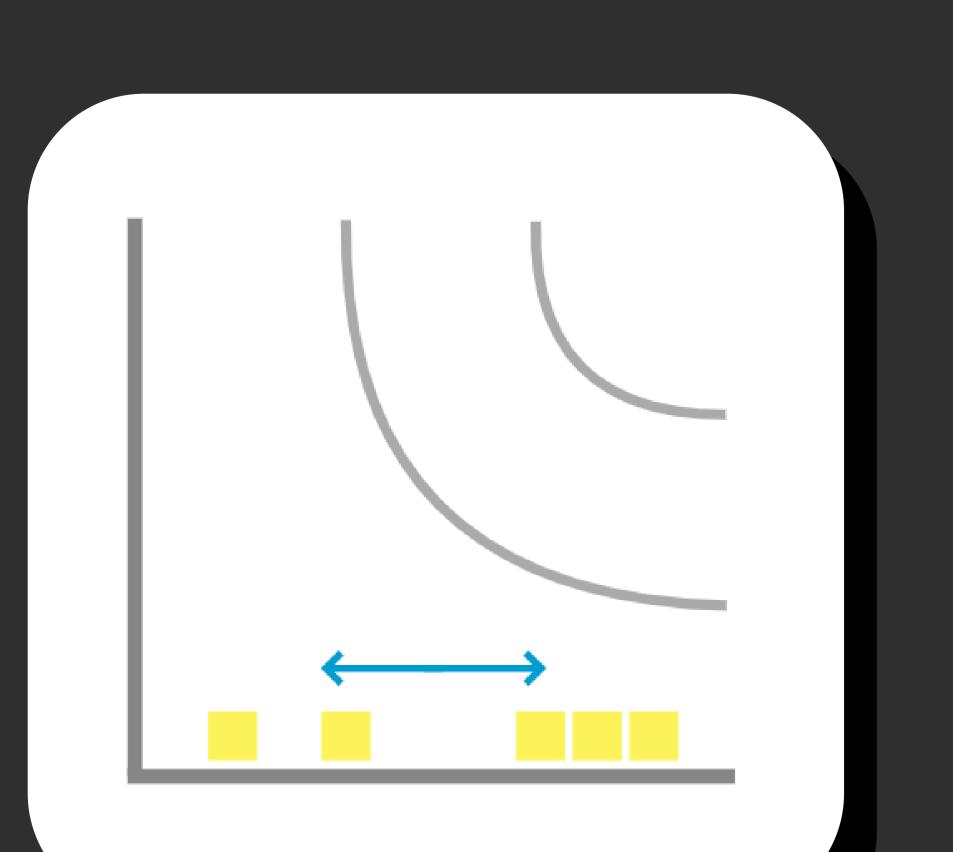
Your team should all be on the same page about what's important moving forward. Place your ideas on this grid to determine which ideas are important and which are feasible.

① 20 minutes

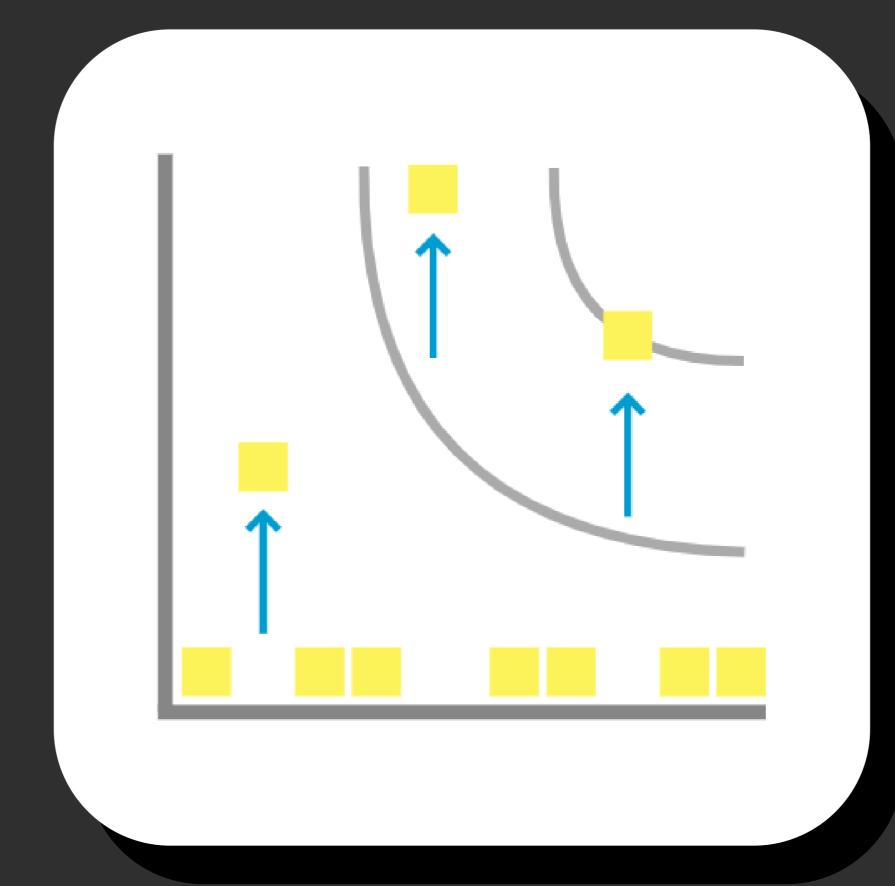
# TIP

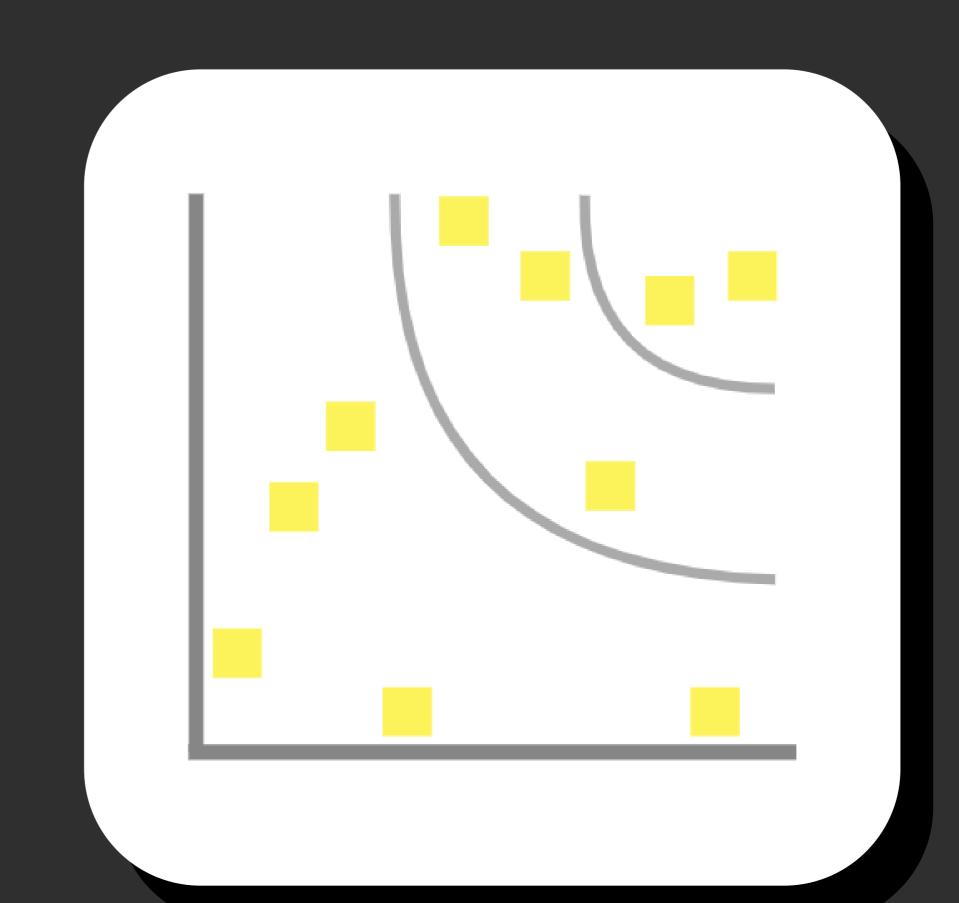
Participants can use their cursors to point at where sticky notes should go on the grid. The facilitator can confirm the spot by using the laser pointer holding the **H key** on the keyboard.











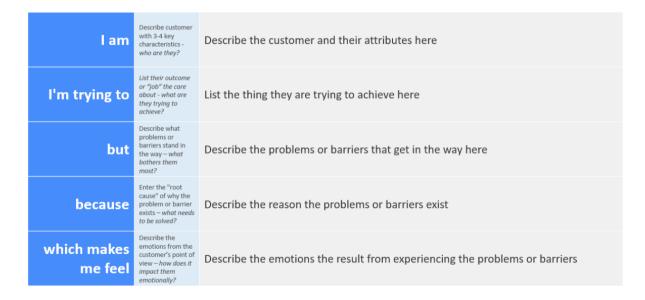
## Ideation Phase Define the Problem Statements

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#### **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.

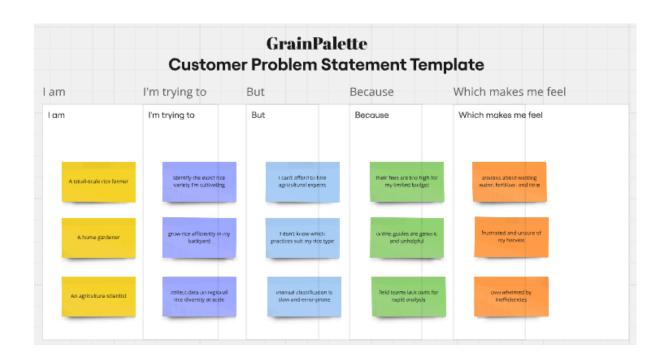
A well-articulated customer problem statement allows you and your team to find the ideal solution for the challenges your customers face. Throughout the process, you'll also be able to empathize with your customers, which helps you better understand how they perceive your product or service.



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

#### **Example:**





# Ideation Phase Empathize & Discover

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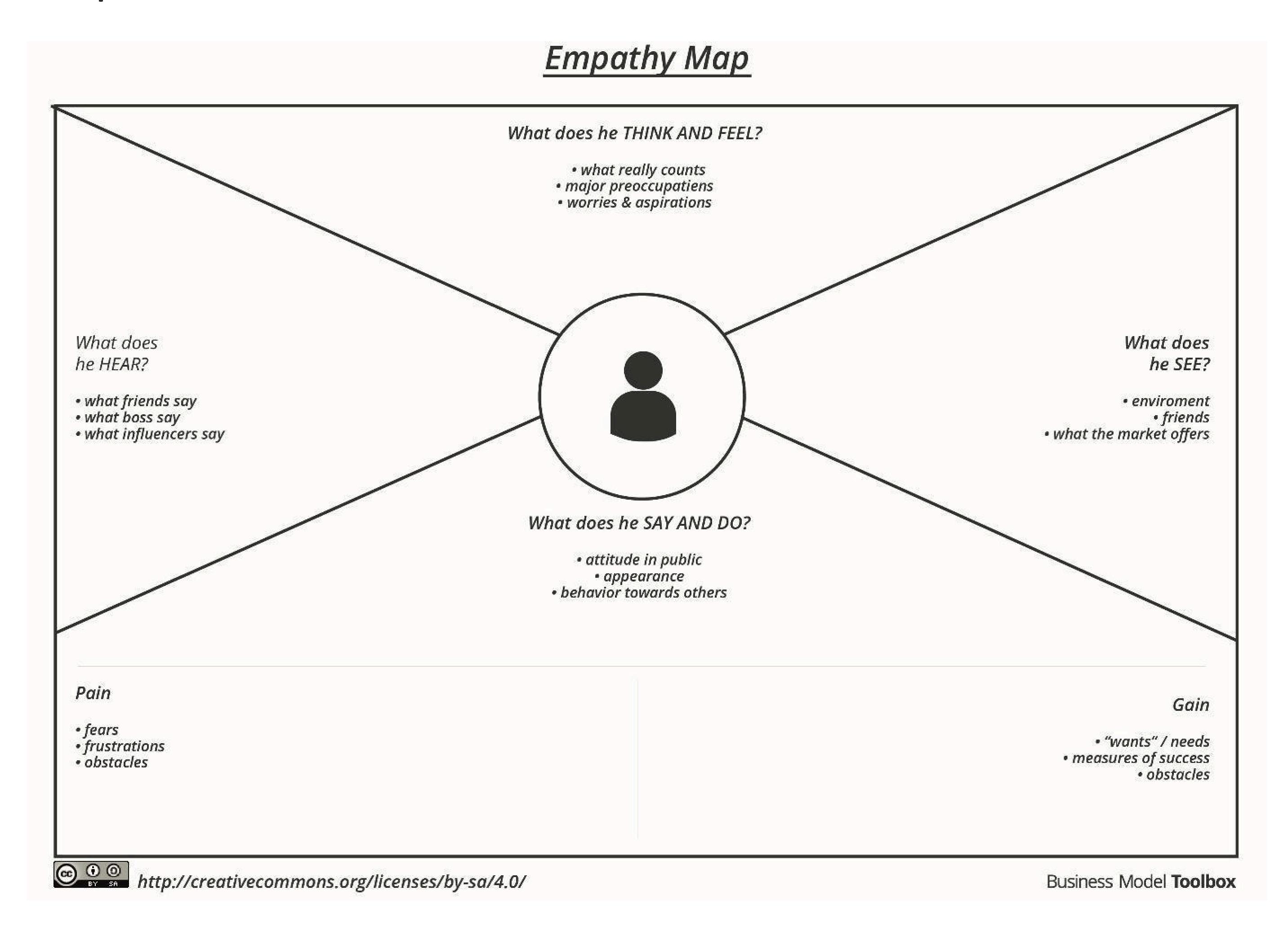
# **Empathy Map Canvas:**

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: <a href="https://www.mural.co/templates/empathy-map-canvas">https://www.mural.co/templates/empathy-map-canvas</a>



# 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.



## WHO are we empathizing with?

W e want to understand farmers needing to identify rice types, and also agriculture scientists and home gardeners.

They need to identify rice types for proper cultivation but lack affordable expert help and quick methods.

Their role is to successfully grow rice or study it, and rice type identification is a key step for them.



## What do they HEAR?

They hear that accurate rice identification is key for good harvests, but expert help is costly.

- Friends share experiences on rice types, farming challenges, and
- sometimes costly expert advice. Colleagues discuss the importance of rice classification, and explore new tech like AI in agriculture.
- They hear about AI in farming, new rice varieties, and the need for modern agriculture solutions.



## What do they need to DO?

They need to move away from slow manual checks and costly expert consultations for rice identification.

They need to accurately and quickly identify rice types to optimize farming and research practices. They need to decide on the correct rice type to determine water, manure, and

cultivation methods. Success is seen in improved yields, efficient research, reduced costs, and easy rice type identification.



# What do they THINK and FEEL?

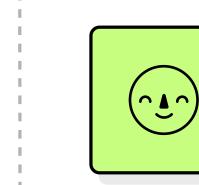
(UAU)

## **PAINS**

They fear crop failure due to incorrect rice type identification, are frustrated by costly expert fees and slow manual

methods, and feel anxious

about yield and income.



## **GAINS**

They want easy, affordable, and accurate rice type identification to improve yields, reduce costs, and achieve better harvests and research outcomes.



# 

## What do they SEE?

They see various rice types, fluctuating prices, expensive expert services, and emerging tech in agriculture. They see different rice paddies/fields, varying rice grain appearances, and

maybe plant diseases or growth issues. They see other farmers using traditional methods, some adopting new

tech, and experts giving costly consultations. They watch agriculture programs, read farming magazines/websites, and maybe research papers on rice and Al.



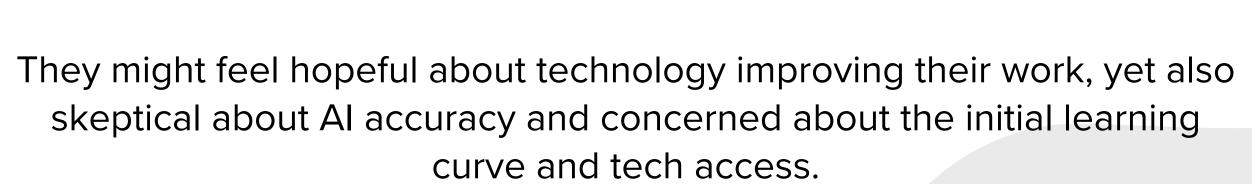
## What do they SAY?

"Identifying rice types is crucial but expensive," "Expert advice is hard to access," "Manual checks are time-consuming." "This GrainPalette app is a game-changer!", "Finally, rice ID is easy and affordable!", "My yields will improve!".











## What do they DO?

Today, they manually inspect rice grains, consult experts, or use traditional, timeconsuming methods for rice identification.

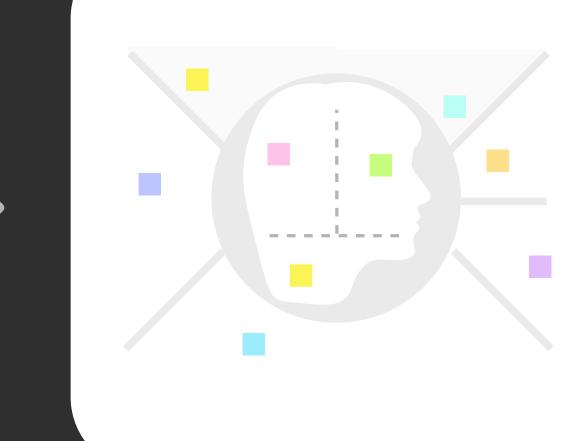
We observe them seeking advice, spending time on manual checks, and

sometimes facing uncertainty about rice types.

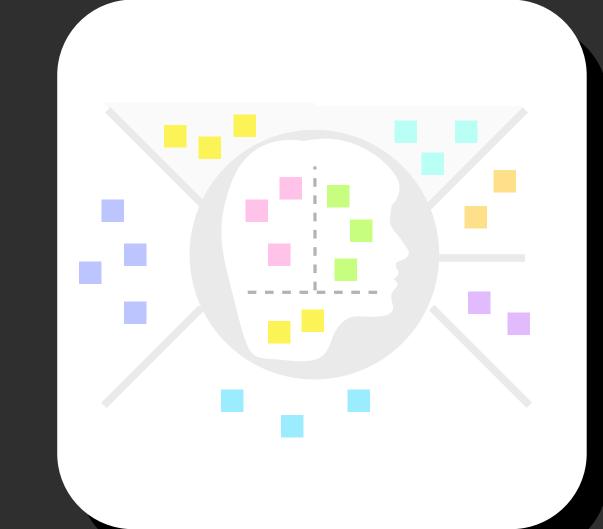
We imagine them quickly uploading rice images to GrainPalette, getting instant rice type predictions, and optimizing their practices.











# Scenario: [Existing experience through a product or service]

# **Entice** How does someone become

aware of this service?

Farmers hear about

GrainPalette through local

agricultural networks or social

media, sparking curiosity

about its cost-saving potential.

Talk to peers at local

farming cooperatives or

watch social media

influencers demo the tool.

"Help me find a cost-

effective way to

identify rice types

without relying on

expensive experts."

**Enter** 

Skepticism arises due to

unfamiliarity with Al tools,

leading to comparisons

with traditional expert

consultations.

Agricultural fairs,

community WhatsApp

groups, or village

meetings.

Help me avoid

wasting time on

unreliable solutions

that don't work for

small-scale farming."

Hearing success

stories from trusted

farmers in their

community motivates

them to try the tool.

What do people experience as they begin the process?

First-time users navigate a

simple interface to upload

images but may feel

overwhelmed if instructions

are unclear or technical.

Seek help from family

members (e.g., tech-savvy

relatives) or customer

support chatbots.

"Help me understand

how to use the tool

quickly so I can start

saving money today."

Users feel accomplished

when the app's intuitive

design lets them upload

their first image without

technical hiccups.

Users waste time

deciphering unclear

tutorials or poorly

Engage

In the core moments in the process, what happens?

Satisfaction when the image

uploads smoothly and results

arrive quickly, providing

immediate actionable insights

(e.g., water requirements).

Collaborate with

neighboring farmers to

capture clear grain images

or troubleshoot errors.

"Help me get accurate

rice type predictions to

make informed

decisions about water

and fertilizer."

Farmers enjoy the thrill of

receiving accurate

predictions within seconds,

and efficient

Repeated rejections of

blurry or poorly lit photos

annoy users, forcing

multiple retries and

wasting time.

naking them feel tech-savvy

Anxiety if the tool flags

poor image quality or

misclassifies rice types,

requiring retries or

manual adjustments.

In-app camera with auto-

focus prompts and

image-quality indicators.

"Help me avoid

mistakes in capturing

or uploading images

that could lead to

wrong results."

Real-time feedback (e.g.,

"Great photo quality!")

during image upload feels

rewarding and educates

users on best practices.

Anger flares when the

tool misidentifies rice

types, leading to

distrust in its

**Exit** 

# What do people typically

Confidence grows after

receiving clear, visual-

based recommendations

that align with their farming

knowledge.

Consult local agriculture

officers to cross-verify Al

recommendations.

"Help me apply the Al

recommendations

correctly to improve

Seeing clear, visual

recommendations (e.g., color-

coded fertilizer ratios) excites

users, as they can immediately

act to improve crop health.

Confusion erupts when

results include terms like

"NPK ratios" without simple

explanations, leaving users

unsure how to act.

my crop yield this

experience as the process finishes?



What happens after the experience is over?

Pride in sharing

success stories with

peers, becoming

advocates for the tool

within their community.

Share success stories

with village leaders or in

farming WhatsApp

groups.

"Help me share my

success with other

farmers to build trust

in this tool."

Farmers feel proud when

peers applaud their

improved yields, turning

them into local advocates

for GrainPalette.

Users feel ignored when

their suggestions (e.g.,

adding new rice types) go

resentment.

unanswered, breeding

**Experience steps** 

What does the person (or people) at the center of this scenario typically experience in each step?

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?

# **Goals & motivations** At each step, what is a person's

primary goal or motivation?

("Help me..." or "Help me avoid...")

**Positive moments** 

**Negative moments** 

or time-consuming?

What steps does a typical person find

frustrating, confusing, angering, costly,

Farmers feel hopeful when What steps does a typical person find learning about GrainPalette's potential to replace costly expert enjoyable, productive, fun, motivating, consultations, sparking delightful, or exciting? excitement about future savings.

Farmers feel frustrated by conflicting reviews or misinformation about Al tools, making it hard to trust GrainPalette's promises.

How? Create short, jargon-

Anger arises when marketing materials use jargon, alienating non-techsavvy users who fear the tool is too complex.

translated guides, delaying their first use. How? Develop voice-

 How? Integrate Al-powered real-time feedback (e.g., "Adjust camera angle") during image capture to reduce retakes.

Add a "Retake" button with auto-captions explaining why a photo

Transforms the tool from a standalone Al into a collaborative platform, addressing user doubts while strengthening communal knowledge-sharing.

 How? Replace technical terms with visuals (e.g., water droplets for irrigation needs)

• How? Launch a farmer-led WhatsApp group moderate by GrainPalette to share updates and address feedback publicly.

Gamify advocacy with referral rewards (e.g., free soil-testing kits for every 5 successful sign-ups).

Disappointment if

feedback feels ignored

(e.g., no updates on

requested features like

Community training

sessions or regional

agriculture

workshops.

"Help me avoid feeling

gnored if I report issues

or suggest

improvements."

Excitement grows when

users see their feedback

(e.g., requests for new rice

varieties) implemented in

app updates.

Embarrassment if advocating

for the tool backfires (e.g.,

neighbors blame them for

crop issues caused by Al

new rice varieties).

Areas of opportunity

How might we make each step better? others suggested?

What ideas do we have? What have Product School Created in partnership with Product School

free video testimonials from respected farmers or local agriculture officers showcasing GrainPalette's

Partner with NGOs to distribute pamphlets in regional dialects, emphasizing cost savings over technical jargon.

guided tutorials for illiterate users and offline PDF guides for low-connectivity areas.

failed (e.g., "Blurry—hold

Farmers receive real-time feedback

(e.g., "Adjust lighting" or "Focus on a

single grain") during image upload,

helping them improve photo quality

and feel supported by the tool's

responsiveness.

Pop-up notifications

advising adjustments

(e.g., "Zoom in for

better accuracy").

"Help me resolve issues

quickly during usage so I

can trust the tool's

results without second-

guessing.'

Farmers feel motivated when the tool not

only identifies the rice type but also

provides tailored farming tips (e.g., "This

variety thrives with 20% less water!"),

turning a simple classification into a

actionable roadmap for better crop

Frustration mounts if

predictions take longer

than advertised, especially

during urgent farming

management.

and link to voice-narrated guides in local languages.

See an example

## Project Design Phase-II Data Flow Diagram & User Stories

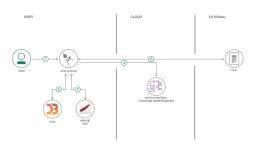
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### **Data Flow Diagrams:**

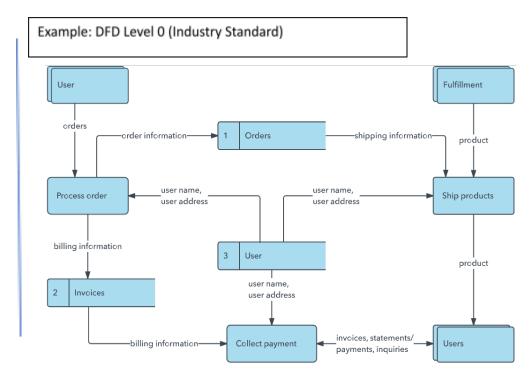
A Data Flow Diagram (DFD) is a traditional visual representation of the information flows within a system. A neat and clear DFD can depict the right amount of the system requirement graphically. It shows how data enters and leaves the system, what changes the information, and where data is stored.

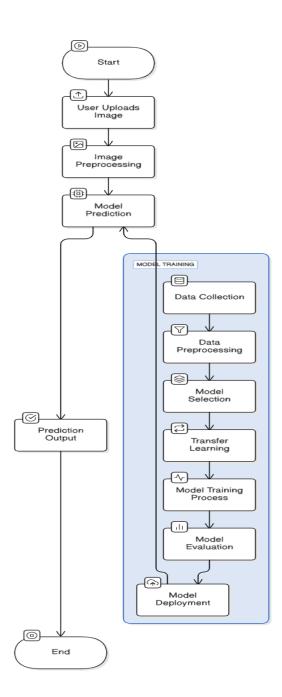
#### **Example:** (Simplified)





- User configures credentials for the Watson Natural Language Understanding service and starts the app.
- 2. User selects data file to process and load.
- 3. Apache Tika extracts text from the data file.
- 4. Extracted text is passed to Watson NLU for enrichment.
- 5. Enriched data is visualized in the UI using the D3.js library.





### **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
Customer (Mobile user)	Registration	USN-1	As a User, I can register using my phone number to avoid email dependency.	Receive OTP for verification; access dashboard after confirmation.	High	Sprint-1
	Image Upload	USN-2	As a User, I can upload a rice grain photo to identify its type.	App accepts JPG/PNG ≤5MB; displays "Upload Successful" message.	High	Sprint-1
	Result & Recommendation s	USN-3	As a User, I want instant rice type predictions with farming tips.	Results load in ≤5 secs; tips include water/fertilizer needs in simple language.	High	Sprint-2
	Feedback	USN-4	As a User, I can report incorrect predictions to improve accuracy.	"Report Error" button appears with results; submission confirmation sent via SMS.	Medium	Sprint-3
Customer (Web User)	Dashboard	USN-5	As a User,, I can view my prediction history on a web dashboard.	Dashboard displays past uploads, dates, and recommendations in a table.	Medium	Sprint-2
	Bulk Upload	USN-6	As a User, I can upload multiple rice images at once for large-scale analysis.	System processes 10+ images in parallel;	Low	Sprint-3
Customer Care Executive	User Support	USN-7	As a support agent, I can access user-reported issues to resolve complaints.	Dashboard shows flagged predictions and user feedback with timestamps.	Medium	Sprint-3

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Administrator	Model Management	USN-8	As an admin, I can update the AI model to include new rice varieties.	New model deploys without downtime; accuracy metrics are logged.	High	Sprint-4
	Analytics	USN-9	As an admin, I can view system usage stats (e.g., daily uploads, common errors).	Dashboard displays graphs for user activity and prediction success rates.	Medium	Sprint-4

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

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## **Functional Requirements:**

Following are the functional requirements of the proposed solution.

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	Registration through Form
		Registration through Gmail
		Registration through LinkedIN
FR-2	User Confirmation	Confirmation via Email
		Confirmation via OTP
FR-3	Image Upload & Processing	Upload rice grain image
		Validate image format/size (e.g., JPG/PNG, ≤5MB)
		Process image using MobileNetv4 AI model
FR-4	Result Display &	Display rice type prediction (top 5 classes)
	Recommendations	Provide cultivation recommendations (water, fertilizer,
		etc.)
		Export results as PDF/SMS
FR-5	Feedback & Accuracy Reporting	Allow users to report misclassifications
		Collect user ratings for predictions

#### **Non-functional Requirements:**

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

FR No.	Non-Functional Requirement	Description
NFR-1	Usability	Intuitive interface for non-tech users (e.g., farmers), with multilingual support (e.g., Hindi, Tamil) and voice-guided tutorials.
NFR-2	Security	Encrypt user data and uploaded images; implement OTP-based authentication to prevent unauthorized access.
NFR-3	Reliability	99% uptime during critical farming seasons (planting/harvesting) with error handling for poor connectivity.
NFR-4	Performance	Predictions delivered within 5 seconds even on low-bandwidth networks (<2 Mbps).
NFR-5	Availability	Offline mode for image uploads; sync results when connectivity resumes.
NFR-6	Scalability	Support 10,000+ concurrent users during peak seasons and expandable to new rice varieties.

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

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#### **Technical Architecture:**

#### **GrainPalette Solution Architecture**

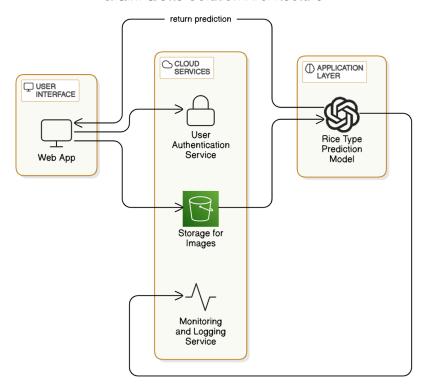


Table-1 : Components & Technologies:

S.No.	Component	Description	Technology/Stack (Example Choices)
1	User Interface (UI)	Client-side user interaction; Image upload & result display.	HTML, CSS, JavaScript, React/Angular/Vue.js
2	Backend API (App Logic)	Application processing logic; Image pre-processing, ML model calls, result handling.	Python (Flask/Django), Node.js, Java Spring Boot
3	AI/ML Model Layer	Rice Type prediction; Trained MobileNetv4 for image classification.	TensorFlow, PyTorch, MobileNetv4, Transfer Learning
4	Database (Optional)	User Data & Prediction History storage; For user accounts & data persistence (optional).	Cloud SQL (GCP, AWS, Azure), MongoDB, Firebase Firestore
5	Storage (Cloud)	File storage for uploaded rice grain images.	AWS S3, Google Cloud Storage, Azure Blob Storage
6	Monitoring & Logging (Cloud)	Error tracking & Performance monitoring; Application health & usage tracking.	Prometheus, Grafana, ELK Stack, Cloud Monitoring/Logging (AWS, GCP, Azure)
7	Cloud Infrastructure (Server)	Application hosting; Platform for deployment & scalability.	Google Cloud Platform (GCP), Amazon Web Services (AWS), Azure, Kubernetes, Docker
8	Interface APIs (External)	Potential future integrations for data enrichment from external sources.	REST APIs, Webhooks

**Table-2: Application Characteristics:** 

S.No.	Characteristics	Description	Technology Justification (Example)
1	Open Source Frameworks	Utilize open-source tools to reduce costs and leverage community support.	Python, TensorFlow/PyTorch, React/Vue.js, Kubernetes, Prometheus, Grafana, ELK Stack
2	Reusability	Design for reusable components to facilitate future enhancements/modules.	Microservices architecture (if applicable), Modular design of API & UI components
3	Security Requirements	Protect user data and ensure secure API access.	HTTPS, OAuth 2.0 (for Authentication), Input validation, Secure cloud service configurations
4	Availability	Ensure high availability of the service for consistent user access.	Cloud-based infrastructure, Load balancing, Redundancy, Container Orchestration (Kubernetes)

### References:

https://c4model.com/

 $\underline{https://developer.ibm.com/patterns/online-order-processing-system-during-pandemic/}$ 

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

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#### **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:



### **Problem-Solution fit canvas 2.0**

Purpose / Vision

1. CUSTOMER SEGMENT(S) Who is your customer? i.e. working parents of 0-5 y.o. kids

2. JOBS-TO-BE-DONE / PROBLEMS

- CS
- 6. CUSTOMER CONSTRAINTS

• Low tech literacy in some regions.

• Unreliable internet in rural areas.

5. AVAILABLE SOLUTIONS

- AVAILABLE SOLD HONS inch solutions are available to the customers when they face the problem need to get the job done? What have they tried in the past? What pros & cons do see solutions have? i.e. pen and paper is an alternative to digital notetaking
- · Limited financial resources for experts. • Expert consultation is costly.
  - · Guesswork leads to poor yields.
  - · Manual guides are time-consuming.

Define CS, fit into CC

· Smallholder rice farmers globally. · Agriculture extension workers.

· Commercial rice farmers.

Accurately identify rice type quickly.

Reduce expert consultation costs.

Optimize yield & resource use.

J&P

TR

9. PROBLEM ROOT CAUSE

What is the back story behind the need to do this job? .e. customers have to do it because of the change in regulations

- · High diversity of rice types.
- · Climate change needs new rice types.
- · Limited access to expert knowledge.

7. BEHAVIOUR

What does your customer do to address the problem and get the job done?
i.e. directly related: find the right solar panel installer, calculate usage and benefits; indirectly associated: customers spend free time on volunteering work (i.e. Greenp

- · Consult local experienced farmers.
- · Use visual guides & manuals.
- Rely on their own experience.

Identify strong TR & EM

3. TRIGGERS

What triggers customers to act? i.e. seeing their neighbour installing solar panels, reading about a more efficient solution in the news.

- Start of planting/new season.
- · Unusual plant growth problems.
- Seek to improve farming practices.

4. EMOTIONS: BEFORE / AFTER

- EM
- · Before: Frustrated and anxious.
- · Before: Burdened by costs.
- · After: Confident and empowered.

10. YOUR SOLUTION

If you are working on an existing business, write down your current solution first, fill in the canvas, and check how much it fits reality. If you are working on a new business proposition, then keep it blank until you fill in the canvas and come up with a solution that fits within customer limitations, solves a problem and matches customer babaducies.

- Al-powered rice type identification.
- · Fast, accurate, and affordable.
- User-friendly mobile/web app.

8. CHANNELS of BEHAVIOUR

СН

Extract online & offline CH of BE

• Online: Social media, agriforums.

SL

8.2 OFFLINE
What kind of actions do customers take offline? Extract offline channels from #7 and use them for customer development.

- Offline: Field demos, workshops.
- Partnerships with extension services.

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## Project Design Phase Proposed Solution Template

Date	28th June 2025
Team ID	LTVIP2025TMID34819
Project Name	GrainPalette A Deep Learning Odyssey In Rice 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)	Farmers and agriculture stakeholders lack affordable and accessible tools for accurate rice type identification, leading to suboptimal farming practices and reduced yields.
2.	Idea / Solution description	GrainPalette is an Al-powered mobile/web application that uses image recognition to rapidly and accurately identify rice types from a grain image uploaded by the user.
3.	Novelty / Uniqueness	Utilizes Transfer Learning (MobileNetv4) for efficient and accurate image classification, providing an Al-powered solution that is more accessible and affordable than expert consultation.
4.	Social Impact / Customer Satisfaction	Empowers farmers with knowledge, leading to improved yields, optimized resource use (water, manure), and reduced reliance on costly experts, ultimately enhancing livelihoods.
5.	Business Model (Revenue Model)	Premium model: Basic service is free (limited uses/features), with potential premium subscription for advanced features, higher usage limits, and/or enterprise solutions.
6.	Scalability of the Solution	Cloud-based AI model and application allow for global scalability, reaching a wide range of users with minimal marginal cost per user, and adaptable to new rice types with data.

## **Project Design Phase Solution Architecture**

Date	28th June 2025
Team ID	LTVIP2025TMID34819
Project Name	GrainPalette A Deep Learning Odyssey In Rice Type Classification Through Transfer Learning
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:**

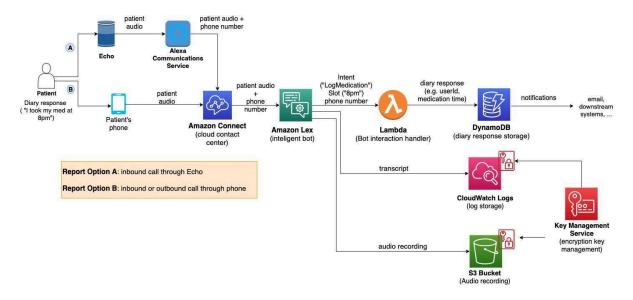
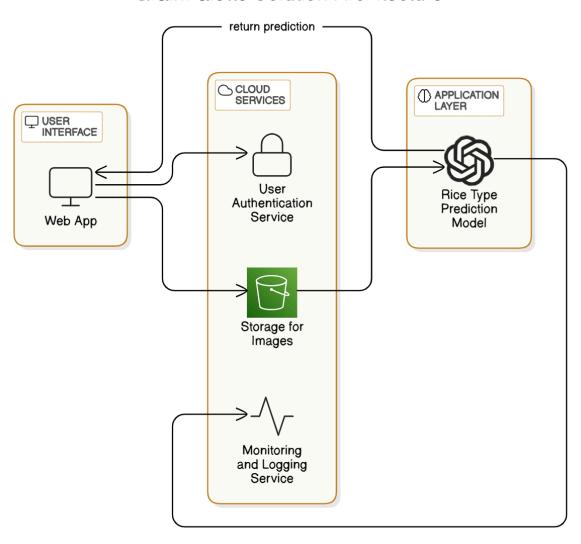


Figure 1: Architecture and data flow of the voice patient diary sample application

#### Reference:

https://aws.amazon.com/blogs/industries/voice-applications-in-clinical-research-powered-by-ai-on-aws-part-1-architecture-and-design-considerations/

## **GrainPalette Solution Architecture**



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

Date	28 <sup>th</sup> June 2025
Team ID	LTVIP2025TMID34819
Project Name	GrainPalette A Deep Learning Odyssey In Rice Type Classification Through Transfer Learning
Maximum Marks	5 Marks

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

Sprint	Functional Requirement (Epic)	User Story Number	User Story/Task (Smaller Stories - Tasks)	Story Points (Estimated)	Priorit y	Team Members	Category (Aligned to Planning Logic)
Sprint 1	Sprint 1: Data Collection & Preprocessing (5 Days)	USN-Data-1	Data Collection: Gather initial rice grain image dataset for training & testing.	2	High	Saket Kumar, Shaik Thasmiya	Data Collection
Sprint 1	Sprint 1: Data Collection & Preprocessing (5 Days)	USN-Data-2	Loading Data: Implement code to load image data efficiently into the development environment.	1	High	Saket Kumar, Shaik Kalesha	Data Collection
Sprint 1	Sprint 1: Data Collection & Preprocessing (5 Days)	USN-Prep-1	Handling Missing Values: Implement data cleaning to handle any missing or corrupted image data.	3	High	Saket Kumar, Shaik Asfiya Anjum, Shaik Kalesha	Data Preprocessing
Sprint 1	Sprint 1: Data Collection & Preprocessing (5 Days)	USN-Prep-2	Handling Categorical Values: Prepare rice type labels for model training	2	High	Saket Kumar, Shaik Thasmiya	Data Preprocessing

			(encoding categorical data).				
Sprint 1	Sprint 1: Data Collection & Preprocessing (5 Days)	USN-Core-1	Basic Image Upload & Display (UI): Implement basic UI for users to upload a rice grain image.	2	High	Shaik Kalesha, Saket Kumar, Shaik Thasmiya	UI - Core Functionality
Sprint 1	Sprint 1: Data Collection & Preprocessing (5 Days)	USN-Core-2	Basic "Submit" Button & Loading Indicator (UI): Add button to trigger processing & basic loading feedback.	1	High	Saket Kumar	UI - Core Functionality
Sprint 2	Sprint 2: Model Building & Deployment (5 Days)	USN-Model- 1	Model Building: Train the MobileNetv4 Transfer Learning model for rice type classification.	5	High	Saket Kumar, Shaik Kalesha, Shaik Asfiya Anjum	Model Building
Sprint 2	Sprint 2: Model Building & Deployment (5 Days)	USN-Model- 2	Testing Model: Evaluate the trained model's performance on a test dataset; refine if needed.	3	High	Saket Kumar, Shaik Thasmiya	Testing Model
Sprint 2	Sprint 2: Model Building & Deployment (5 Days)	USN-Deploy- 1	Working HTML Pages (Basic Result Display): Create basic HTML pages to display rice type prediction results.	3	High	Saket Kumar, Shaik Thasmiya, Shaik Kaleshal	Deployment

Sprint 2	Sprint 2: Model Building & Deployment (5 Days)	USN-Deploy- 2	Flask Deployment (Basic): Deploy a basic Flask application to serve the Al model and UI (locally for testing).	5	High	Saket Kumar, Shaik Thasmiya,	Deployment
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Sprint 2	Sprint 2: Model Building & Deployment (5 Days)	USN-Core-3	Basic Result Display (UI): Implement basic UI to show predicted rice type and confidence level.	2	High	Kunal Goel, Ayush Mishra	UI - Core Functionality
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### **Project Tracker, Velocity & Burndown Chart: (4 Marks)**

Sprint	Total Story Points (Planned)	Duration	Sprint Start Date	Sprint End Date	Story Points Completed (Actual) (as on Planned End Date)	Release Date
Sprint 1	11	6 Days	16 June 2025	22 June 2025	11	28 June 2025
Sprint 2	18	5 Days	23 June 2025	28 June 2025	18	

### Velocity:

Imagine we have a 11-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)

$$AV = \frac{11+18}{2} = \frac{29}{2} = 14.5$$

#### **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

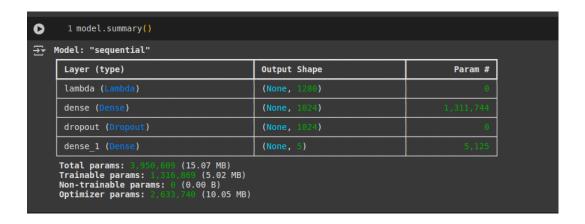
## Project Development Phase Model Performance Test

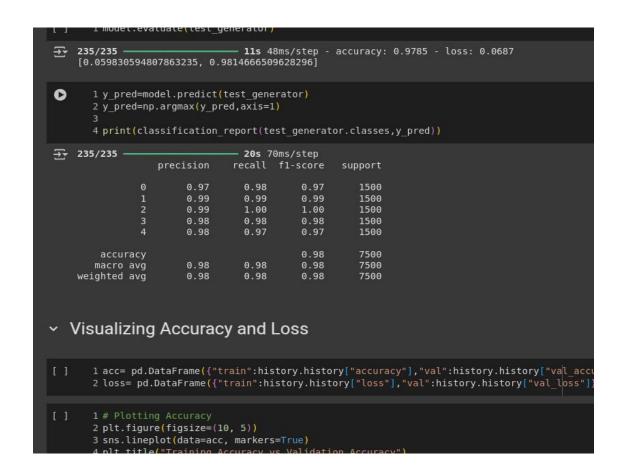
Date	7 March 2025
Team ID	PNT2025TMID00864
Project Name	GrainPalette A Deep Learning Odyssey In Rice Type Classification Through Transfer Learning
Maximum Marks	

#### **Model Performance Testing:**

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

S.No.	Parameter	Values	Screenshot
1.	Model Summary	Sequential Model Architecture: Lambda Layer, Dense Layer, Dropout Layer, Dense Layer.	O 1 model, respectfully  [5] model, respectfully  [author (respectfully)  [aut
2.	Accuracy	Training Accuracy - 97.85%  Validation Accuracy - 98%	2
3.	Fine Tunning Result( if Done)	Validation Accuracy - N/A	N/A







Epochs

