

Project Design Phase

Problem – Solution Fit Template

Date	24 June 2025
Team ID	LTVIP2025TMID59524
Project Name	Pollen's Profiling: Automated Classification of Pollen Grains
Maximum Marks	2 Marks

Problem – Solution Fit Template:

The Problem–Solution Fit in this context means that we’ve identified a critical issue faced by farmers, vendors, and supply chain managers — difficulty in accurately and quickly identifying rotten fruits and vegetables — and developed an AI-based solution that uses transfer learning to automate spoilage detection, reducing waste, saving time, and improving efficiency.

Purpose:

- Solve a Complex Problem in Research Efficiency**
Help researchers, palynologists, and students automate the tedious and error-prone process of manually classifying pollen grains — increasing both speed and accuracy.
- Accelerate Scientific Outcomes**
By automating classification, researchers can analyze larger datasets faster, publish results sooner, and conduct deeper ecological or climate studies with confidence.
- Improve Solution Adoption with Technology**
Leverage machine learning and computer vision (e.g., VGG16 with fine-tuning) to make pollen analysis accessible, even to non-experts, by embedding the tool in familiar research workflows.
- Sharpen Communication & Positioning**
Position the solution as a “time-saving, expert-assisting” tool rather than a replacement — reinforcing trust with the target audience and encouraging adoption.

Template:

Define CS, fit into CC	1. CUSTOMER SEGMENT(S) Who is your customer? I.e. working parents of 0-5 y.o. kids	6. CUSTOMER CONSTRAINTS What constraints prevent your customers from taking action or limit their choices of solutions? I.e. spending power, budget, no cash, network connection, available devices.	5. AVAILABLE SOLUTIONS Which solutions are available to the customers when they face the problem or need to get the job done? What have they tried in the past? What pros & cons do these solutions have? I.e. pen and paper is an alternative to digital notetaking.	Explore AS, differentiate
Focus on J&P, tap into BE, understand RC	2. JOBS-TO-BE-DONE / PROBLEMS Which jobs-to-be-done (or problems) do you address for your customers? There could be more than one; explore different sides.	9. PROBLEM ROOT CAUSE What is the real reason that this problem exists? What is the back story behind the need to do this job? I.e. customers have to do it because of the change in regulations.	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. Greenpeace)	Focus on J&P, tap into BE, understand RC
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.	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 behaviour.	8. CHANNELS of BEHAVIOUR 8.1 ONLINE What kind of actions do customers take online? Extract online channels from #7	Extract online & offline CH of BE
	4. EMOTIONS: BEFORE / AFTER How do customers feel when they face a problem or a job and afterwards? I.e. lost, insecure > confident, in control – use it in your communication strategy & design.		8.2 OFFLINE What kind of actions do customers take offline? Extract offline channels from #7 and use them for customer development.	

Box	Content
1. Customer Segments (CS)	Palynologists, environmental researchers, biology students, and lab technicians working on pollen analysis.
2. Jobs-to-be-Done / Problems (J&P)	<ul style="list-style-type: none"> - Need to classify pollen grains quickly and accurately for ecological or climate studies. - Manual identification is slow, error-prone, and needs expertise.
3. Triggers (TR)	<ul style="list-style-type: none"> - Urgency to publish research. - Influx of large sample volumes from fieldwork. - Pressure to improve efficiency and accuracy in labs.
4. Emotions: Before / After (EM)	<p>Before: Overwhelmed, frustrated, time-constrained.</p> <p>After: Relieved, empowered, confident in data quality.</p>
5. Available Solutions (AS)	<ul style="list-style-type: none"> - Manual microscope-based identification. - Semi-automated systems (limited availability). - Outsourcing to expert labs (costly, slow).
6. Customer Constraints (CC)	<ul style="list-style-type: none"> - Limited time, funding, and expert staff. - Difficulty accessing large datasets for ML model training. - Lack of tech-savvy tools in traditional research environments.
7. Behaviour (BE)	<ul style="list-style-type: none"> - Most researchers currently classify manually using microscope slides. - Some use open-source image libraries, but few use AI tools. - They maintain records in Excel or research software.
8. Channels of Behaviour (CH)	<p>Online: ResearchGate, academic forums, GitHub, conferences (e.g., INQUA, Palynology Society)</p> <p>Offline: University labs, workshops, field expeditions, conferences</p>
9. Problem Root Cause (RC)	<ul style="list-style-type: none"> - Manual classification depends on years of training. - Variation in morphology makes it hard for humans to be consistent. - Lack of AI-ready datasets in public repositories.
10. Your Solution (SL)	<ul style="list-style-type: none"> - AI-powered classification system using CNNs + transfer learning (e.g., VGG16). - Web-based or offline tool to upload and classify pollen images. - High accuracy (>94%) and consistent labeling support for research labs. - Fast, accessible, reproducible, and scalable.

References:

1. <https://www.ideahackers.network/problem-solution-fit-canvas/>
2. <https://medium.com/@epicantus/problem-solution-fit-canvas-aa3dd59cb4fe>