IGNITE EUROGEMS

Empowering Girls, Igniting Futures in STEAM

Topic 2: Design Thinking & Problem Solving
1.1 Introduction to Design Thinking process

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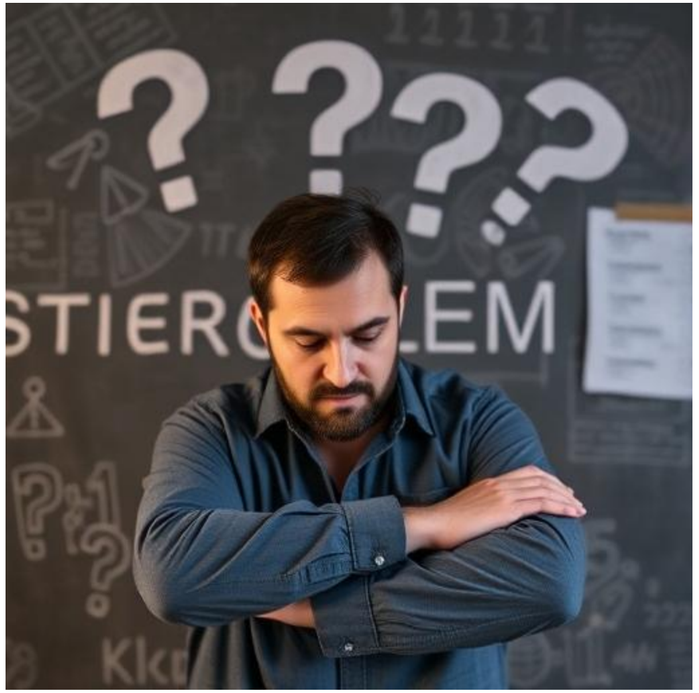
What is a problem?



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Problem Definition

A problem is a situation, issue, or condition that requires a solution or resolution. It arises when there is a gap between the current state and a desired state, or when something is wrong, unclear, or difficult to handle. Problems can be found in various contexts, including personal life, work, science, or society. They often require critical thinking, analysis, and decision-making to resolve.

In summary, a problem typically involves:

A challenge or difficulty: Something that prevents progress or causes discomfort.
A need for a solution: An approach or strategy to overcome or address the issue.
Uncertainty or conflict: A situation where there is a need to make decisions or address conflicting interests, values, or needs.
Problems can range from simple to complex and may require creative thinking or external help to find effective solutions.

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Solutions

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Problem Solving

Solving a problem involves a series of steps that help to understand the issue, identify potential solutions, and implement the most effective one.

1. Define the Problem

-Understand the issue clearly: Take time to analyze what the problem is and why it's occurring. Ask yourself questions like: What exactly is the problem? Why is it a problem? What are the consequences of not solving it?

2. Gather Information

-Collect relevant data: Gather facts, details, or observations that help explain the problem. The more information you have, the better equipped you'll be to understand the situation.

3. Analyze the Problem

-Break it down: Identify the key components of the problem. Is it a larger issue with multiple parts, or is it a single, straightforward problem?

-Look for patterns or causes: Try to identify any underlying causes of the problem. Is it due to a process failure, lack of resources, or communication breakdown?

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4. Generate Possible Solutions

-Brainstorm ideas: Think of several possible ways to address the problem. Avoid dismissing ideas prematurely; even unusual solutions might work.

-Consider pros and cons: Evaluate each solution in terms of feasibility, cost, time, and effectiveness.

5. Select the Best Solution

-Choose the most effective approach: Based on your analysis, select the solution that addresses the root cause and has the best chance of resolving the problem.

-Plan the steps: Develop an action plan for how you will implement the solution. This might include setting timelines, assigning tasks, and considering any resources required.

6. Implement the Solution

-Take action: Begin applying your chosen solution. Be systematic and organized to ensure that each step is completed as planned.

-Monitor progress: Keep track of how things are going and make adjustments if needed.

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7. Evaluate the Results

-Assess the outcome: After implementing the solution, check if the problem has been resolved or if further actions are necessary.

-Learn from the process: Reflect on what worked well and what could have been improved. This helps in handling future problems more effectively.

8. Make Adjustments (if necessary)

-Modify the approach: If the solution didn't fully solve the problem, go back and revisit your analysis, look for new solutions, and try again.

-Be flexible: Sometimes, solving a problem requires adapting to new information or changes in the situation.

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What is design thinking?

In order to find solutions more effectively, the "Design Thinking" Process can be applied.

Design thinking is an iterative, human-centered approach to problem-solving.

It focuses on understanding user needs and challenges, creative exploration of solutions, and continuous improvement of ideas to achieve effective and innovative results.

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What is Design thinking?

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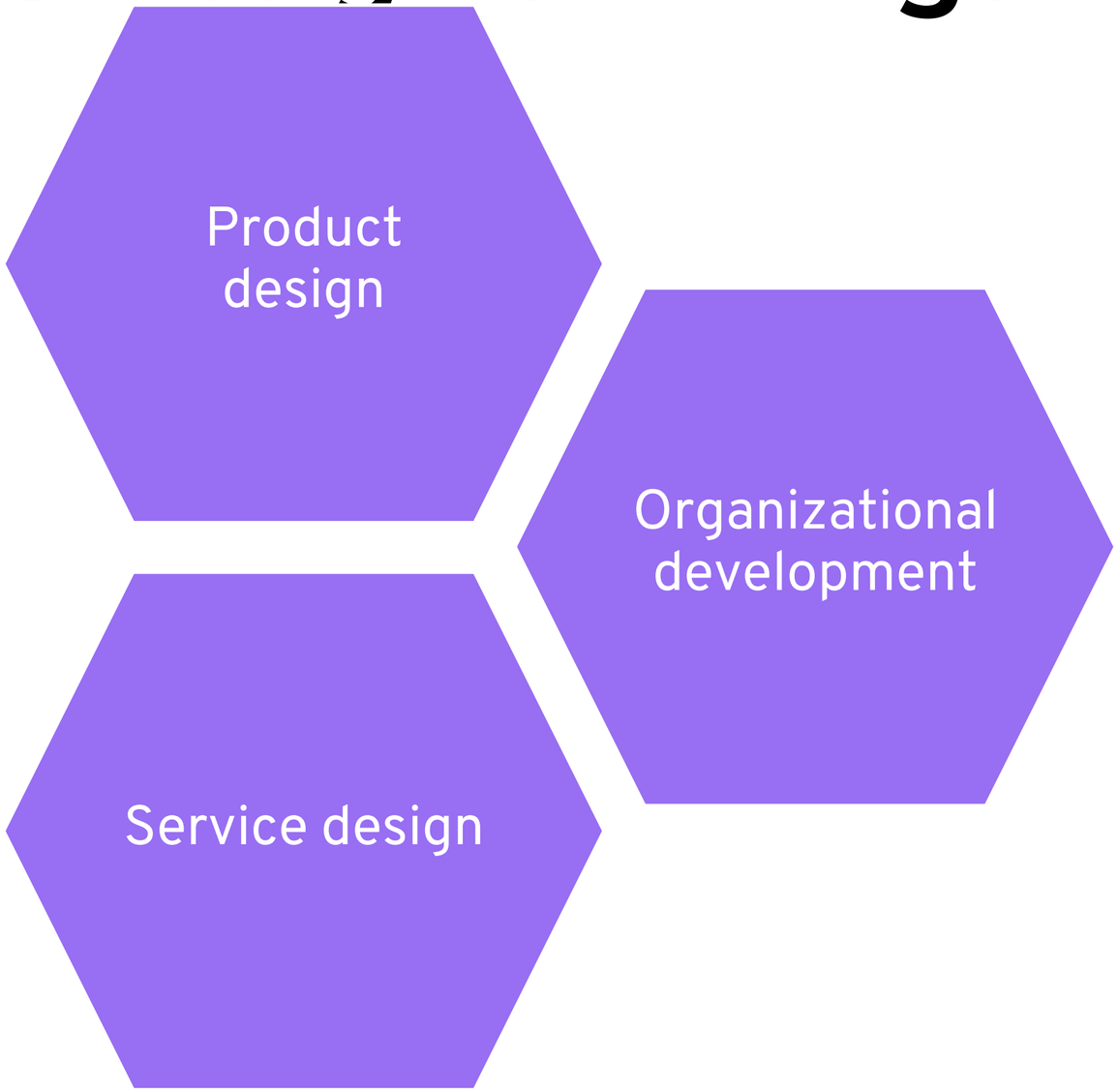

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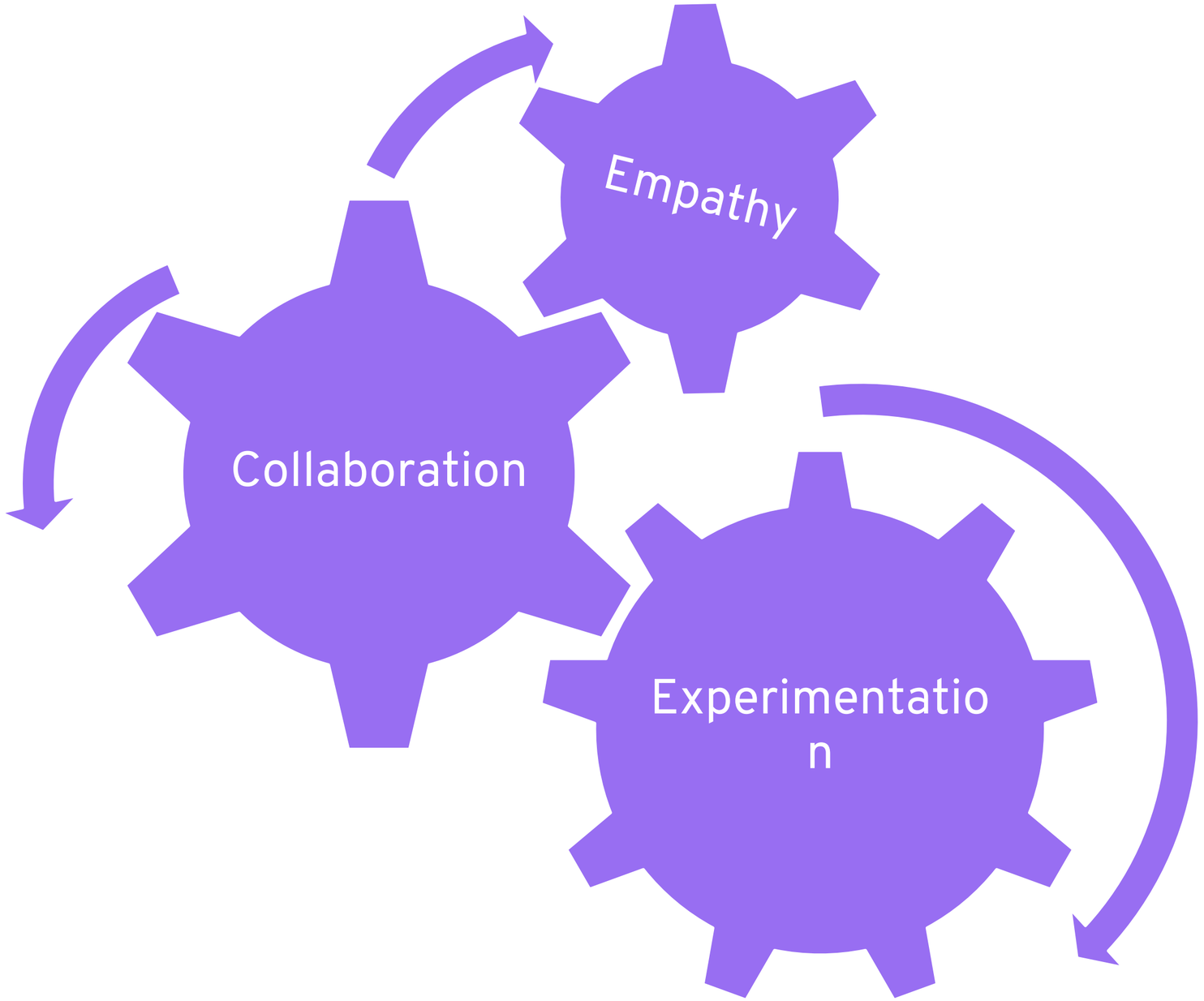

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- Design Thinking is characterized by an emphasis on collaboration, creativity, and a focus on the user.
- It promotes a flexible and iterative approach, rather than a strictly linear process.
- The end goal is to develop innovative and practical solutions, which align deeply with the needs and desires of users.

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Why Design thinking in STEAM?

Problem-Solving Skills

Innovation

Collaboration

Real-World Relevance

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The Design Thinking Process

Empathize

1

Gain a deep understanding of the user's needs and perspectives.

2

Define

Clearly articulate the problem that needs to be addressed.

Ideate

3

Generate a wide range of creative solutions to the problem.

4

Prototype

Create tangible prototypes to test and refine ideas.

Test

5

Gather feedback on prototypes to identify areas for improvement.

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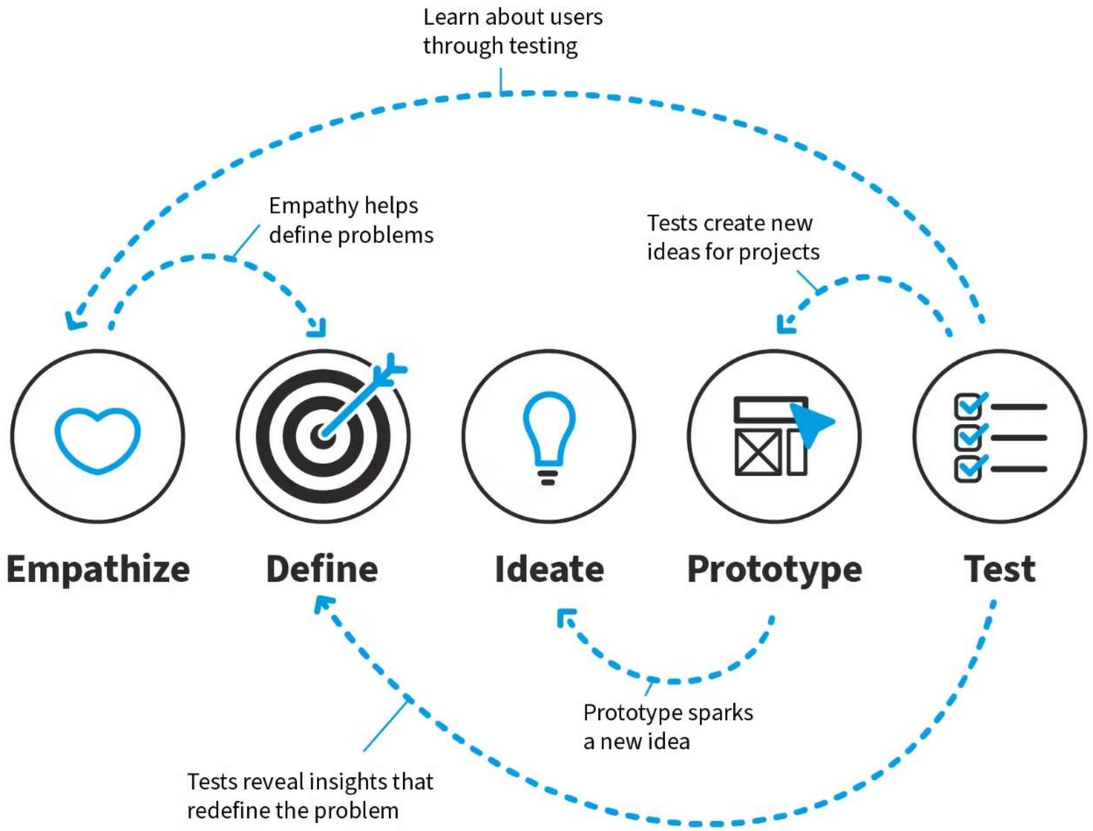
Design Thinking: a Non-Linear Process



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Topic 2: Design Thinking & Problem Solving

1.2 Empathize: Identifying and understanding problems

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Empathize

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Empathize: Understanding User Needs

1

Observe

Watch users in their natural environment to understand their behaviors, interactions, and pain points.

2

Engage

Conduct interviews, focus groups, and surveys to gain insights into users' thoughts, feelings, and motivations.

3

Immerse

Actively experience the user's journey to develop a deeper empathetic understanding.

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The Design Challenge

You will work as a “design” team to redesign an experience regarding:

1. Education and Learning Experiences
2. Public Spaces and Facilities
3. Health and Well-being
4. Environmental Impact and Sustainability

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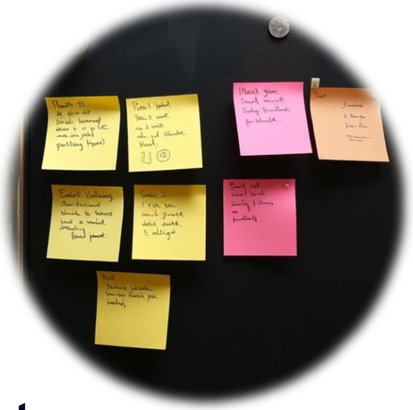
The Design Challenge



What you have to do:

1. Find your team.
2. Write on post it notes an experience where you face a problem (try to keep it local).
3. Give your notes to the team next to you.
4. Discuss with your team and find the most interesting note.
5. Call the person who wrote this note for interview.

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User Interview

Good questions are:

1 **Open**

When? Where? How?
Avoid Yes/No questions.

2 **Simple**

Don’t ask more than one question at the same time

3 **Objective**

Don’t include or induce the answer with your question

4 **About past experiences**

Don’t ask hypothetical questions.
Don’t ask about the future.

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During the Interview

1 **Observe**

Watch users in their natural environment to understand their behaviors, interactions, and pain points.

2 **Engage**

Conduct interviews, focus groups, and surveys to gain insights into users' thoughts, feelings, and motivations.

3 **Immerse**

Actively experience the user's journey to develop a deeper empathetic understanding.

Keep Notes

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Topic 2: Design Thinking & Problem Solving
1.3 Brainstorming and idea generation

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Define the problem

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Define: Framing the problem

1

Synthesize Findings

Analyze the data collected from empathy research.

2

Formulate a Problem Statement

Define a clear and concise problem statement that captures the essence of the challenge.

3

User Persona

Create a fictional representation of the user to guide design decisions.

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The Point of View (POV)

= User + Need + Insight

Persona = states specifically who is it about

Need = use a verb not a noun to express it

Insight = observation and interpretation

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What you have to do:

- From your interview notes extract

  that one **key problem** or **insight**

  that is worth addressing for your user.
- Create a user persona.

Persona: Name and characteristic
+ Need (could be fictional)
+ Insight (context of deeper need / emotional or social)
+ (optional a barrier or friction)

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Persona

1

Demographic & Bio

Age, gender, location

2

Goals & Objectives

What does the user want to achieve?

3

Challenges & Pain Points

What obstacles are they facing?
What frustrations do they encounter that the product or service could help resolve?

4

Behavioral Traits

What are their habits or preferences?
E.g. How do they interact with technology (e.g., preferred devices, online behaviors)?

5

Motivations & Needs

What drives their decisions?
What motivates them to take action?

6

Scenario - Context of Use

The environment or situations in which the user will engage with the product or service.

Avoid biases & stereotypes

Stay context-specific

Use real data

Focus on present

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Ideate the problem

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Ideate:
Generating Creative Solutions

Brainstorming

Encourage a free flow of ideas without judgment to uncover innovative and unexpected solutions.

Mind Mapping

Connect ideas visually to explore relationships and possibilities.

Sketching

Visualize ideas through quick sketches.

Rapid Prototyping

Build rough prototypes to test and refine ideas.

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Ideate: What to do

- Create many many ideas
  - Fun and quantity before quality
    - Listen to all ideas and get inspired
      - Build on the ideas of others

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Generating Ideas Using Trigger Questions

Look at what is the most challenging thing for your user.

Write 1-2 **How Might We** questions.

Focus on verbs, keep it short.

DO NOT suggest a solution.

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Let us see an example

Smith family is ordering regularly from a local pizzeria.

Food is great but the delivery is usually running late.

This is causing delay to the family schedule.

How might we better meet the needs of the user?

What are the unmet needs of our target audience?

What would delight the user in this experience?

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Topic 2: Design Thinking & Problem Solving
1.4 Prototyping and testing solutions

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Prototype

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Prototype: Bringing Ideas to Life

1

Build

Create low-fidelity prototypes to quickly test and refine ideas.

2

Evaluate

Gather feedback from users to identify strengths, weaknesses, and areas for improvement.

3

Iterate

Continuously refine the prototype based on user feedback and insights.

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Why we Prototype

- To experience abstract ideas.
- To have the same understanding inside the team.
- To test the idea with potential users and learn more.

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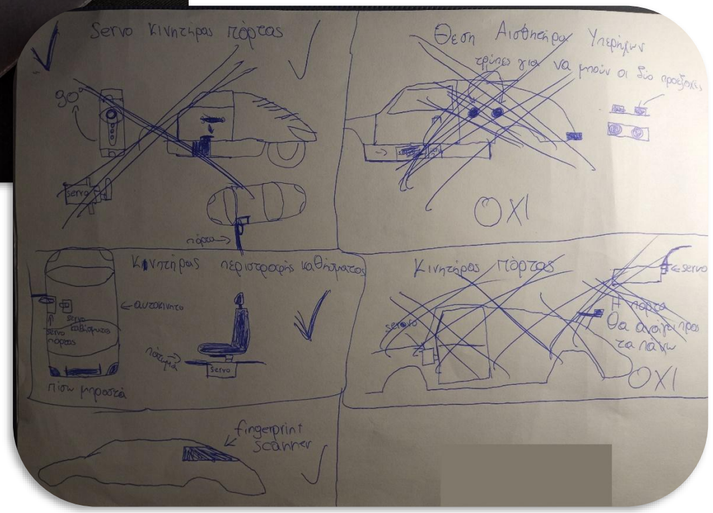
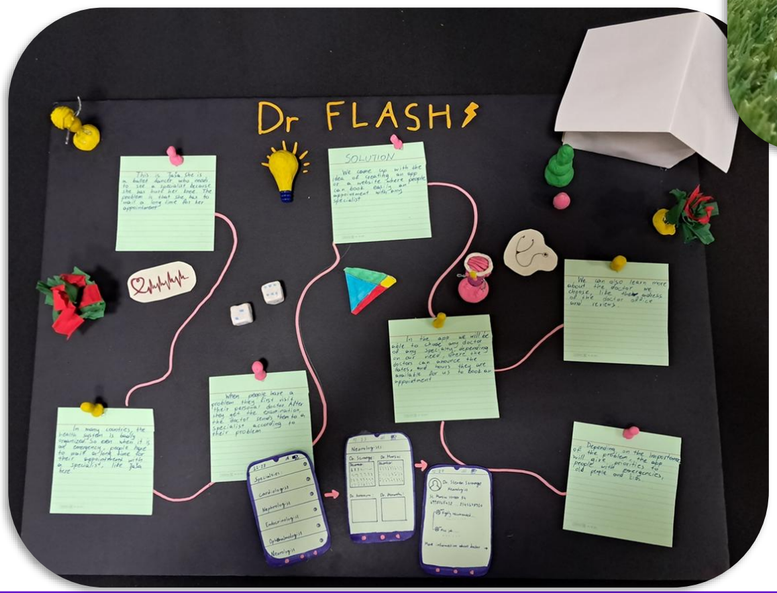
Types of Prototypes





Low-Fidelity Prototypes	**Paper prototypes, sketches, storyboards**
Mid-Fidelity Prototypes	**Wireframes, mockups, interactive prototypes**
High-Fidelity Prototypes	**Working models, functional prototypes, 3D printed models**

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Build your Prototype

- Decide the start and the end of the journey.
- Make it interactive.
- Split tasks and work separately.
- Draw rather than write.

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Test: Iterating and Refining

Gather Feedback	Observe users interacting with the prototype and collect their reactions, thoughts, and pain points.
Analyze Insights	Synthesize the user feedback to identify opportunities for improvement and refinement.
Iterate	Incorporate the user insights to refine the prototype and further develop the solution.

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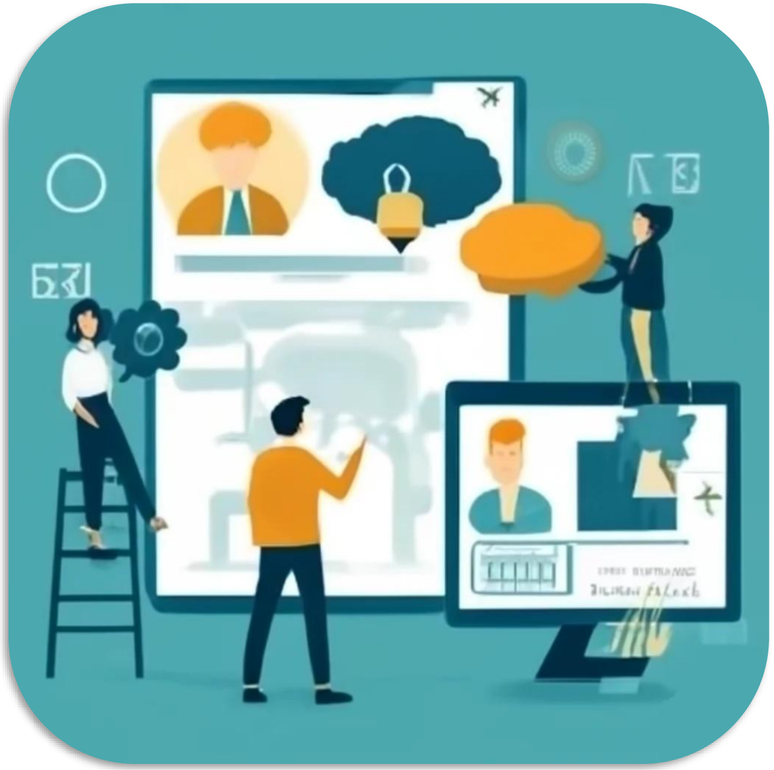
What is a good test?

Validation ≠ success metric of testing!!

The only valuable metric of a test
is the number of new insights you get.



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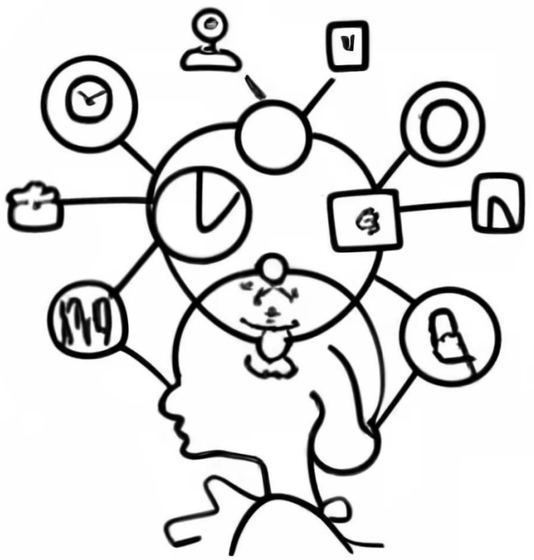
What you have to do:

Ask 3 users to use your prototype

Test, ask for feedback, take notes

- "I like..." (Positive aspects of prototype)
- "I wish..." (Suggestions for improvement)
- "What if..." (Creative ideas for future variations



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Reflections

- What worked well?
- What didn't work or needs improvement?
- Any surprising or new Insights from the tester

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Thank You

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