Module II

Design Thinking Approach

Contents

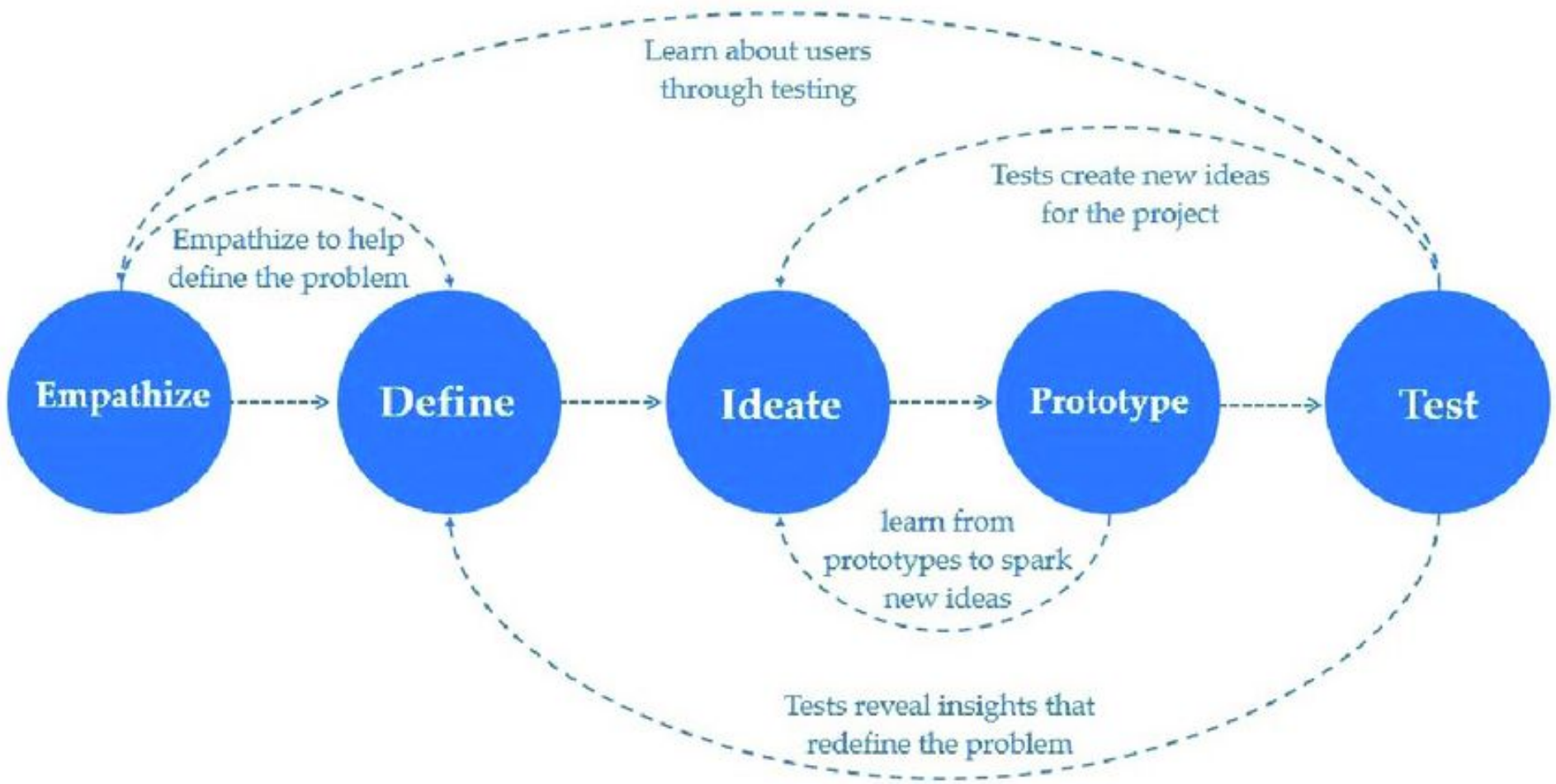
- Design Thinking Approach:-Introduction to Design Thinking, Iterative Design thinking Process Stages: Empathize, Define, Ideate, Prototype and Test.
- Design Thinking as Divergent-Convergent Questioning.
- Design Thinking in a Team Environment.

Design Thinking Process

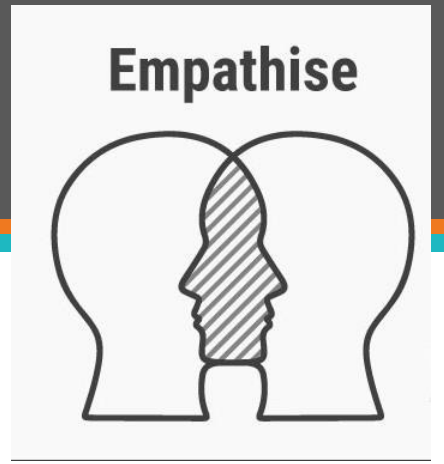
- Design Thinking is a design methodology that provides a solution-based approach to solving problems.
- Design thinking is a non-linear, iterative process that teams use to understand users, challenge assumptions, redefine problems and create innovative solutions to prototype and test.
- Involving **five** phases:
  - Empathize, Define, Ideate, Prototype and Test
- It is most useful to tackle problems that are ill-defined or unknown.

Design Thinking Process

- The five stages of design thinking



Design Thinking Process

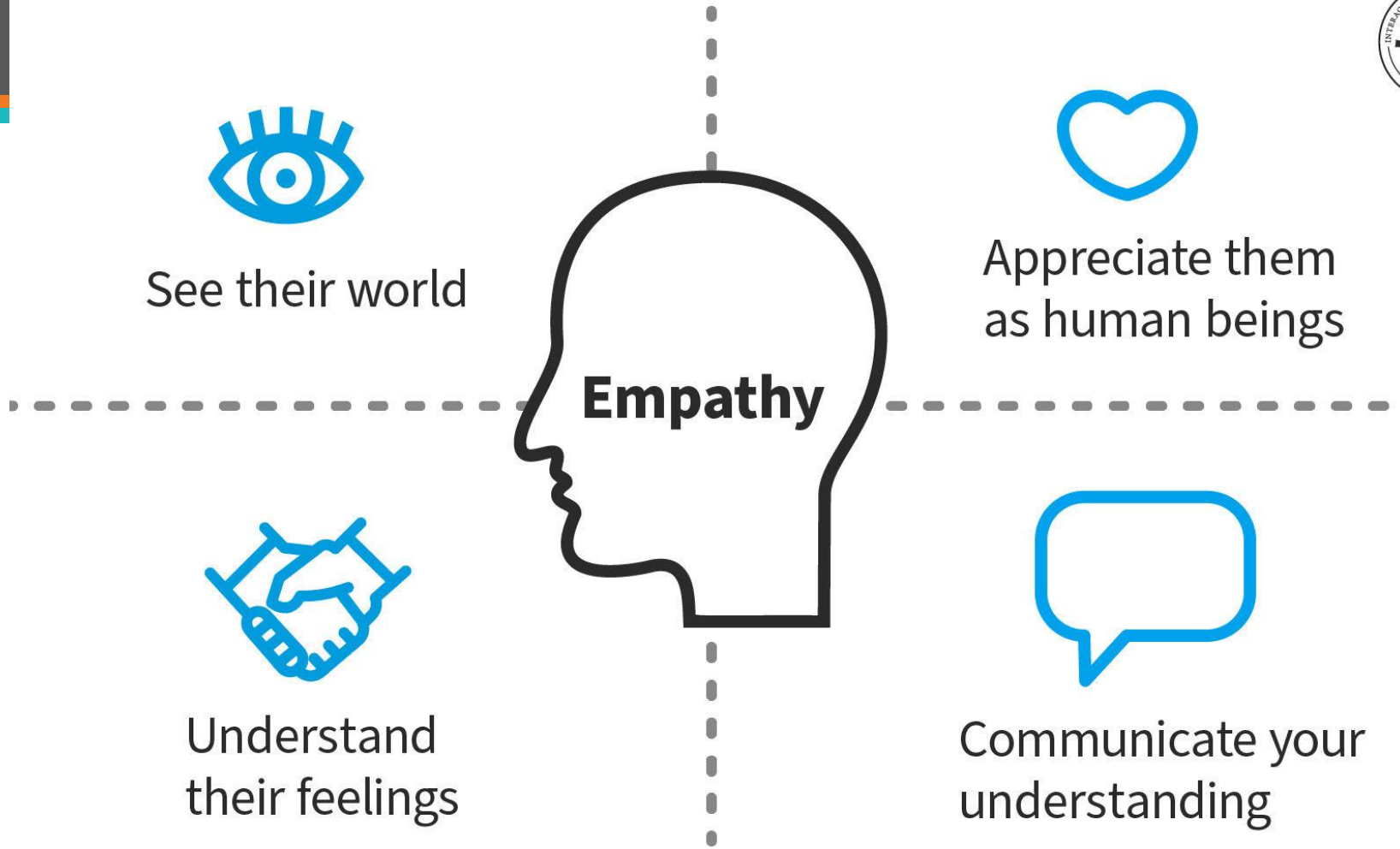


1. EMPATHIZE - **Research your users' needs**

- First stage of the design thinking process.
- You should gain an empathetic understanding of the problem you're trying to solve, typically through user research.
- Empathy is crucial to a human-centered design process such as design thinking because it allows you to set aside your own assumptions about the world and gain real insight into users and their needs.

Design Thinking Process

- Depending on time constraints, a substantial amount of information is gathered at this stage to use during the next stage and to develop the best possible understanding of the users, their needs, and the problems that underlie the development of that particular product.
- You must understand the users' dimensions of use (e.g., tasks) and their feelings (e.g., motivations) before you can work towards delighting them through your design.


See their world
Empathy
Appreciate them as human beings
Understand their feelings
Communicate your understanding

Design Thinking Process

a) ***Observe***

- How users interact with their environment.
- Capture quotes, behaviours and other notes that reflect their experience.
- Notice what they think, feel, need

b) ***Engage***

- Have an engaging conversation with another human being.
- When we have a deep conversation, we typically get a richer set of insights.
- Learn how to ask the right questions.

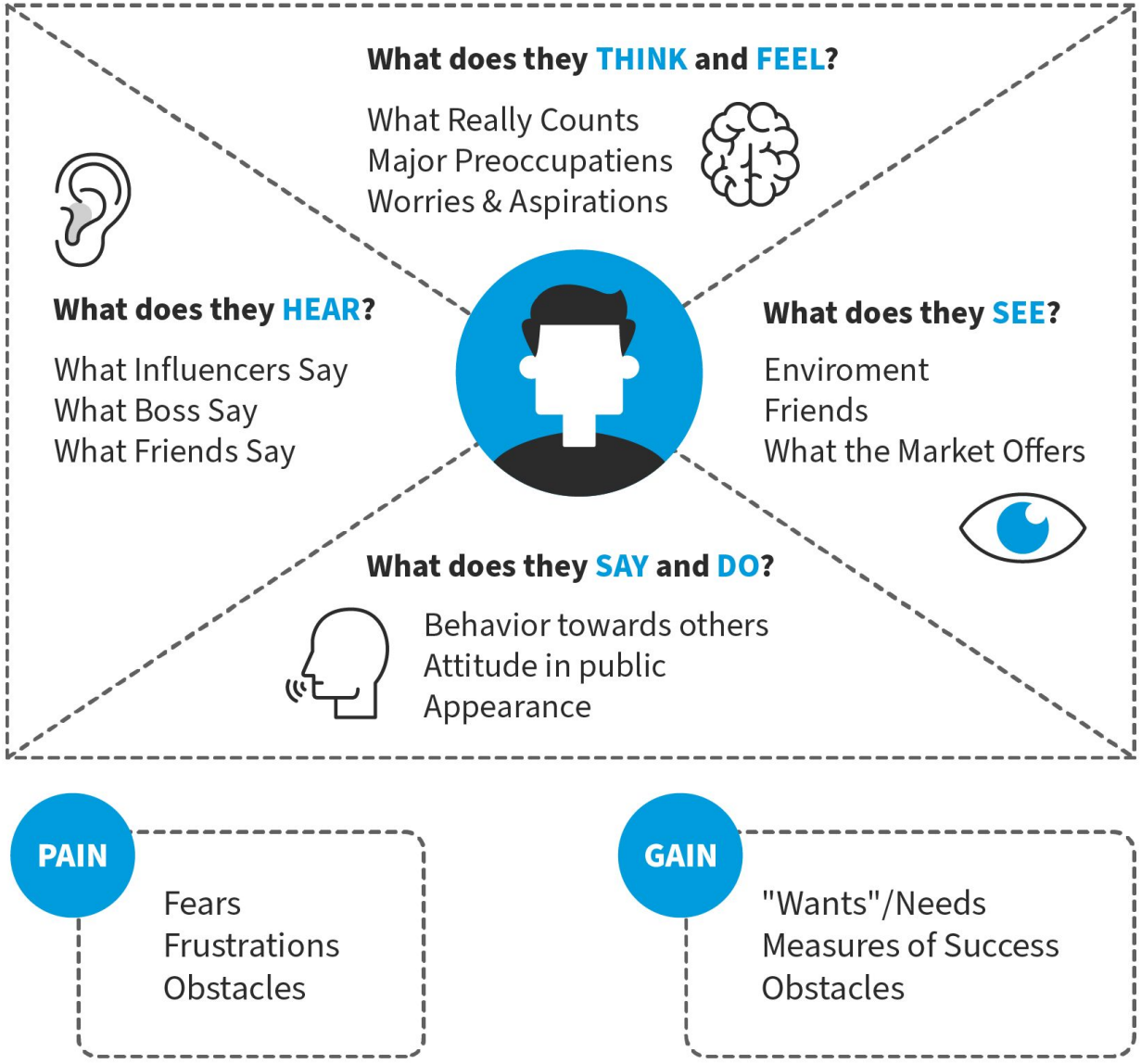
c) ***Listen***

- Actively listen to user.
- It gives us the opportunity to further explore and understand somebody even more.

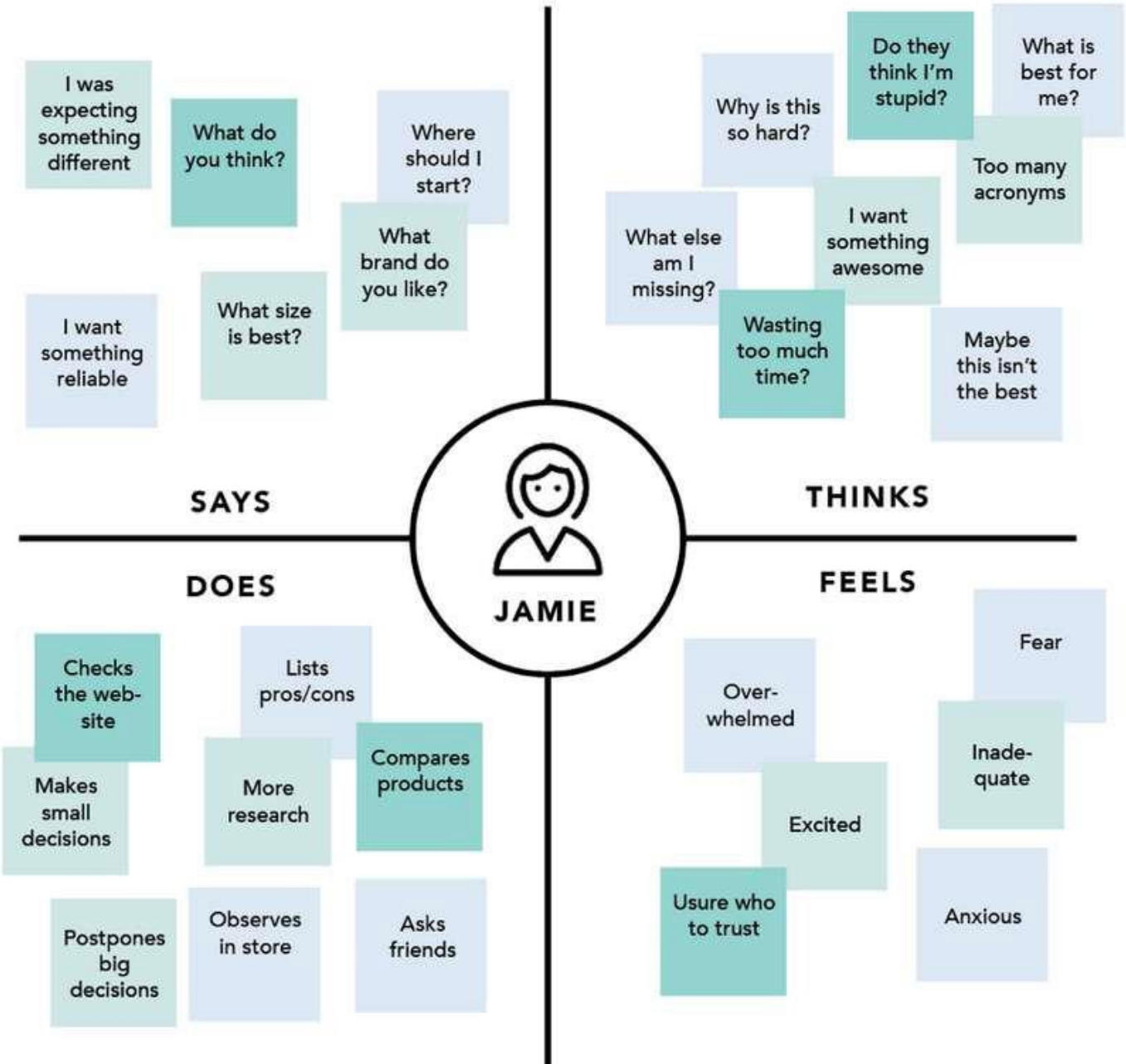
How to Empathize to Get the Right Insights

- Observing real users.
  - "What?" – You detail your observations.
  - "How?" – You analyze how users do things (e.g., with difficulty).
  - "Why?" – You make educated guesses about the users' emotions and motivations.
- Conducting photo- and/or video-based studies in users' natural environments or sessions with the design team or consultants.
- Personal photo/video journals.
- Interviewing users
- Engaging with extreme users
- Analogous empathy
- Sharing inspiring stories
- Bodystorming
- Empathy maps

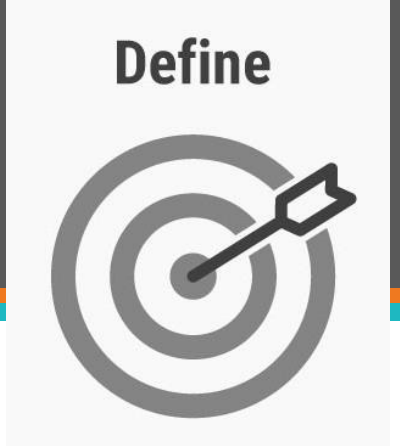
Empathy Mapping


What does they THINK and FEEL?
What Really Counts
Major Preoccupatiens
Worries & Aspirations
What does they HEAR?
What Influencers Say
What Boss Say
What Friends Say
What does they SEE?
Enviroment
Friends
What the Market Offers
What does they SAY and DO?
Behavior towards others
Attitude in public
Appearance
PAIN
Fears
Frustrations
Obstacles
GAIN
"Wants"/Needs
Measures of Success
Obstacles

EMPATHY MAP *Example (Buying a TV)*



Design Thinking Process



2. DEFINE - **State your users' needs and problems**

- During the define stage, you put together the information you have created and gathered during the Empathize stage.
- Then analyze your observations and synthesize them to define the core problems you and your team have identified up to this point.
- These definitions are called problem statements.
  - Problem statements are concise descriptions of design problems.
  - Design teams use them to define the current and ideal states, to freely find user-centered solutions.

Design Thinking Process

- Synthesize your observations about your users from the Empathize stage
- Definition of a meaningful and actionable problem statement, which the design thinker will focus on solving

- A great definition of your problem statement => kick start the ideation process (third stage) in the right direction.

Design Thinking Process

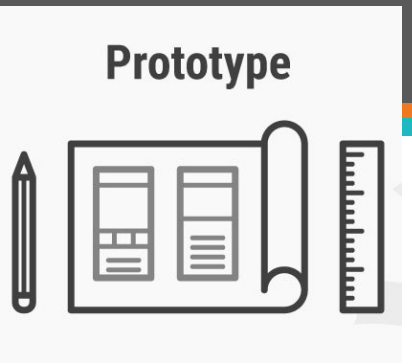
3. IDEATE - **Challenge assumptions and create ideas**

- You are now ready to generate ideas.
- The solid background of knowledge from the first two phases means you can start to "*think outside the box*", look for alternative ways to view the problem and identify innovative solutions to the problem statement you've created.
- It is important to get as many ideas or problem solutions as possible at the beginning of the Ideation phase.

Design Thinking Process

- Brainstorming is particularly useful here.
  - Brainstorming is a method design teams use to generate ideas to solve clearly defined design problems.

Design Thinking Process



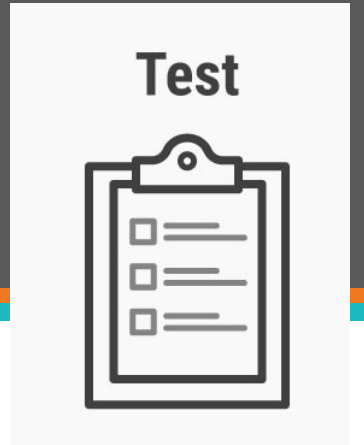
4. PROTOTYPE **- Start to create solutions**

- This is an experimental phase.
- The aim is to identify the best possible solution for each problem found.
- Prototypes may be shared and tested within the team itself, in other departments, or on a small group of people outside the design team.
- Team should produce some inexpensive, scaled-down versions of the product to investigate the ideas you've generated.

Design Thinking Process

- The solutions are implemented within the prototypes, and, one by one, they are investigated and either accepted, improved and re-examined, or rejected on the basis of the users' experiences.
- By the end of this stage, the design team will have a better idea of the constraints inherent to the product and the problems that are present, and have a clearer view of how real users would behave, think, and feel when interacting with the end product.
- This could involve paper prototyping, simulations, 3D models, animations etc..

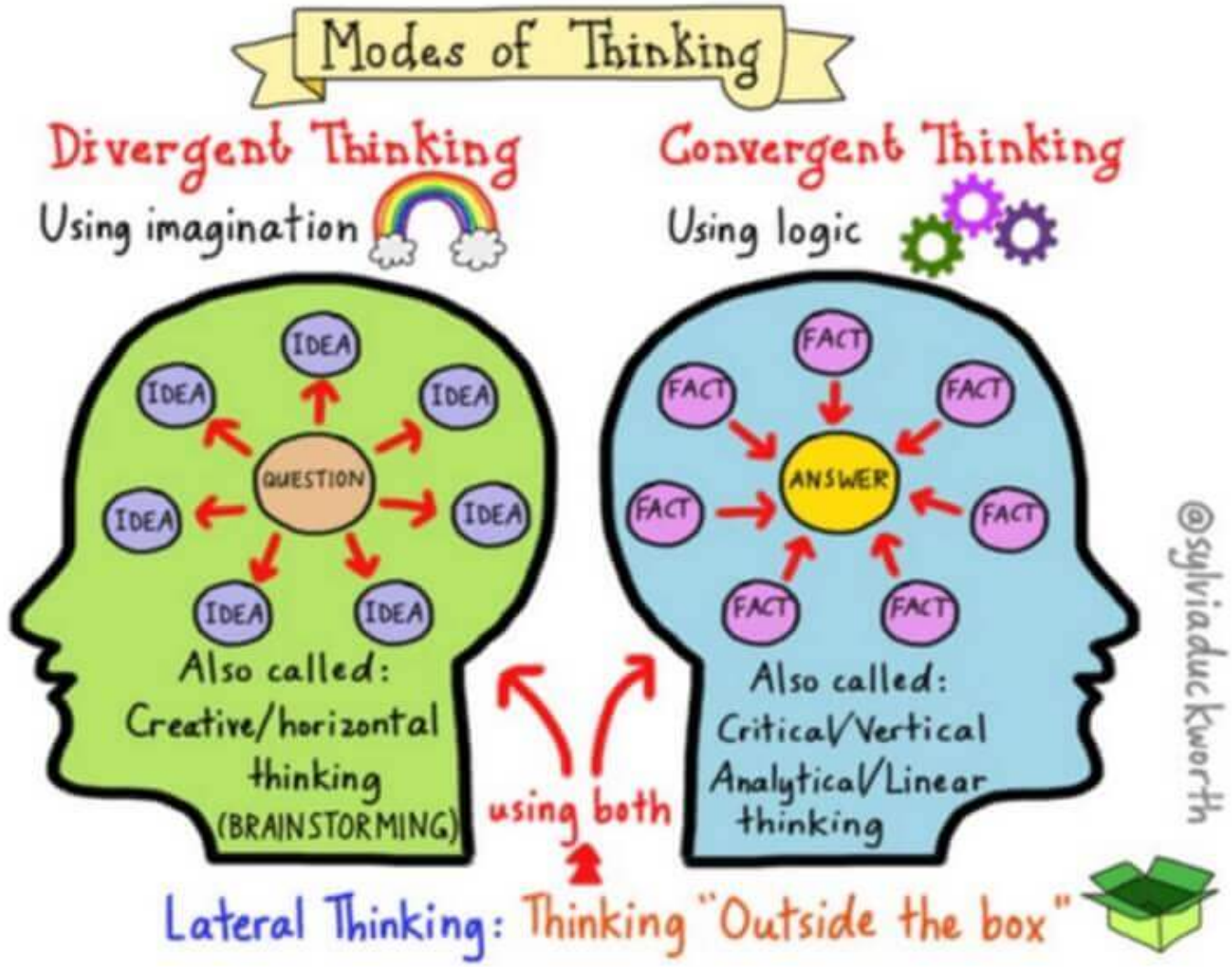
Design Thinking Process



5. TEST - **Try your solutions out**

- This is the final stage of the 5 stage-model,.
- Evaluators rigorously test the prototypes.
- This is an iterative process: Teams often use the results to redefine one or more further problems.
- Can return to previous stages to make further iterations, alterations and refinements – to find or rule out alternative solutions.
- Even during this phase, alterations and refinements are made in order to rule out problem solutions and derive as deep an understanding of the product and its users as possible.

Design Thinking as Divergent-Convergent Questioning

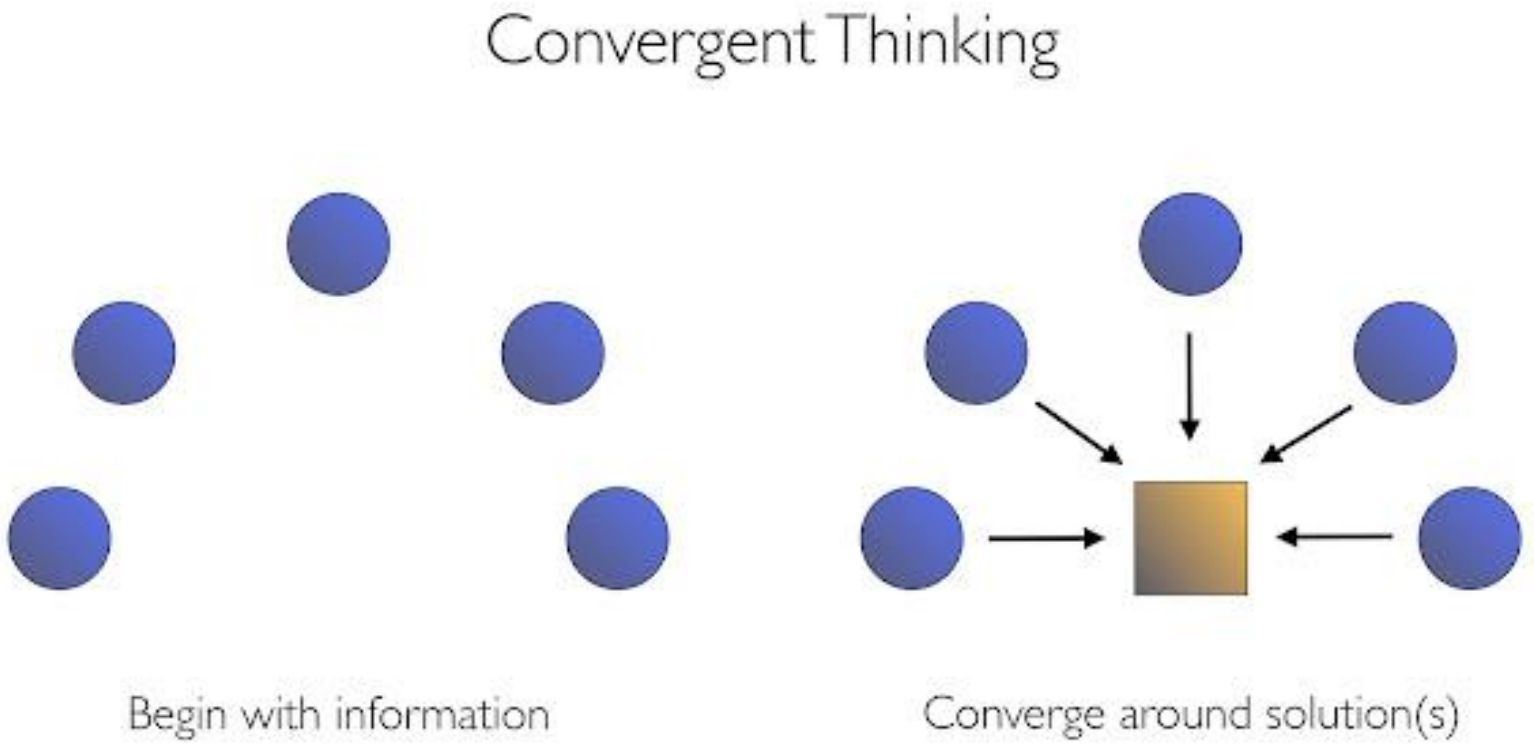


Design Thinking as Divergent-Convergent Questioning

- **Convergent Thinking** (Using logic)

  - Also called: Critical Thinking, Vertical Thinking, Analytical Thinking, Linear Thinking
  - Convergent thinking is the type of thinking that focuses on coming up with the single, well-established answer to a problem.
  - Convergent thinking is used as a tool in creative problem-solving.
  - When an individual is using critical thinking to solve a problem they consciously use standards or probabilities to make judgments

Design Thinking as Divergent-Convergent Questioning



Design Thinking as Divergent-Convergent Questioning

- ***Characteristics***
  - ***Fast*** - As compared to divergent thinking, convergent thinking focuses more on speed as it aims to verify the most direct and efficient answer in a shorter period of time.
  - ***Precise*** - An accurate answer is derived after the process. This means that a certain concept may either be right or wrong.
  - ***Logical*** - A linear method is used and rational steps are taken to figure out the correct solution.

Design Thinking as Divergent-Convergent Questioning

- **Divergent Thinking** (Using imagination)
  - Also called: Creative Thinking or Horizontal Thinking
  - Divergent thinking is a thought process or method used to generate creative ideas by exploring many possible solutions.
  - divergent thinking typically occurs in a spontaneous, free-flowing, ‘non-linear’ manner, such that many ideas are generated in an emergent cognitive fashion.
  - Many possible solutions are explored in a short amount of time, and unexpected connections are drawn.

Design Thinking as Divergent-Convergent Questioning

- After the process of divergent thinking has been completed, ideas and information are organized and structured using convergent thinking.

Design Thinking as Divergent-Convergent Questioning

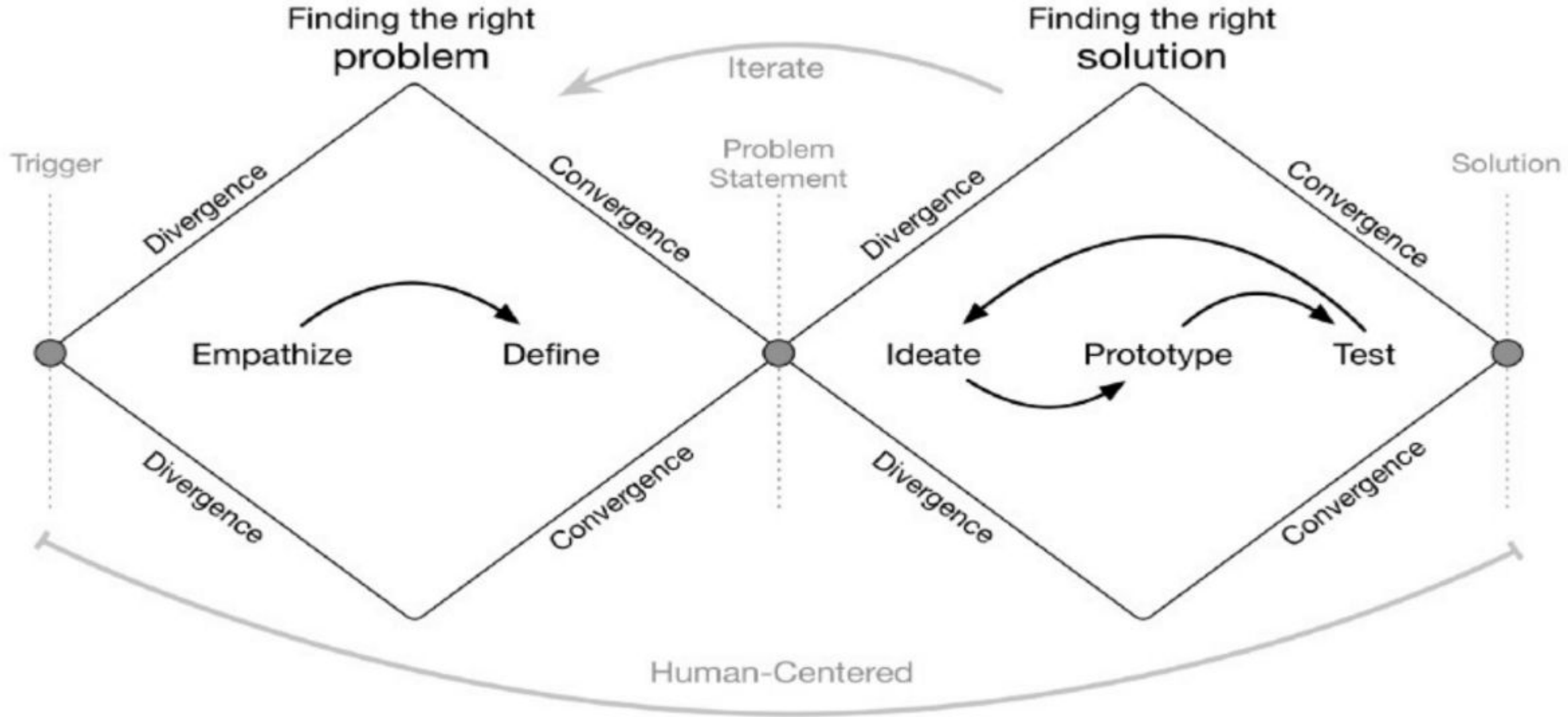
- ***Characteristics***
  - *Instinctual* - Ideas are generated in a highly spontaneous manner.
  - *Free-flowing* - Although an answer has been found, the possibility of finding other answers is still considered.
  - *Complex* - Concepts are multilayered and involve numerous standpoints.

Design Thinking as Divergent-Convergent Questioning

Lateral Thinking

- Using both Convergent and Divergent Thinking.
- Also called: ‘Thinking Outside the Box’

Design Thinking as Divergent-Convergent Questioning



Sample Questions

- Construct a number of possible designs and then refine them to narrow down to the best design for a drug trolley used in hospitals. Show how the ***divergent-convergent thinking*** helps in the process. Provide your rationale for each step by using hand sketches only.

Sample Answer

Objective: To design a drug trolley that can be used in hospitals.

Intended users: Hospital staff like nurses.

Scope / Domain: Hospitals

Expected functionalities:

[1] It should have wheels as we need to move it from one room to another.
[2] It should have racks to keep the medicines.
[3] It should be light weight with sleek design so that we can move it easily.

Sample Answer

Exciting functionalities:

[1] The wheel should have a lock such that it can be prevented from moving when not in use.
[2] It should have racks with closing doors or lids.
[3] It should have separate rack for keeping drugs for each room patients.
[4] It should have a facility to dispose medicinal waste like used cotton, syringe etc.
[5] It should have an open table on the top to keep case diary/charts of patients.

Sample Answer

Possible Designs using Divergent thinking process

Model 1:

Pros:

- Simple and Light weight
- Easier to keep medicines and boundaries are provided in all 3 sides which prevents from medicines falling down while moving.

Cons:

- Difficult to sort out medicines for each room.
- No doors for racks and no open table.
- Wheels have no locks

Sample Answer

Model 2:

Pros:

- Simple and Light weight
- Easier to keep medicines

Cons:

- Difficult to sort out medicines for each room.
- No doors for racks and no open table.
- Wheels have no locks
- As there are no boundaries, there is a high chance of falling down the medicines while moving.

Sample Answer

Model 3:

Pros:

- Simple and Light weight
- Easier to keep medicines as boundaries and lids are there for each rack.

Cons:

- Difficult to sort out medicines for each room.
- Wheels have no locks

Sample Answer

Model 4:

Pros:

- Simple and Light weight
- Easier to keep medicines as drawers are used.
- An open table is there on the top to keep case diary/charts of patients.
- Wheels have locks

Cons:

- Difficult to sort out medicines for each room.
- No option for disposing clinical wastes.

Sample Answer

Model 5:

Pros:

- Simple and Light weight
- Easier to keep medicines as drawers are used.
- An open table is there on the top to keep case diary/charts of patients.
- Have both open and closed racks to keep drugs accordingly.

Cons:

- Difficult to sort out medicines for each room.
- No option for disposing clinical wastes.
- No lock for wheels

Sample Answer

Model 6:

Pros:

- Simple and Light weight
- Easier to keep medicines and sort out medicines for each patient as different partitions are provided for each room.
- Have both open and closed racks to keep drugs accordingly.

Cons:

- No open table is there on the top to keep case diary/charts of patients
- No option for disposing clinical wastes.
- No lock for wheels

Sample Answer

Model 7:

Pros:

- Simple and Light weight
- Easier to keep medicines and sort out medicines for each patient as different partitions are provided for each room.
- Have both open and closed racks to keep drugs accordingly.
- Have facility to dispose clinical wastes.
- Have open table to keep patient charts / records.
- Have locks for wheels.

Sample Answer

Choosing the best design

Model 7 can be chosen as the best design as it incorporates all the expected functionalities as well as exciting functionalities of a drug trolley.

Sample Answer

- Possible design using ***divergent thinking***
- In divergent thinking we are exploring new ideas to improve the design of a drug trolly,

Idea1) instead trays we can use drawers to keep the medicine safe

Idea2) Additional racks can be added in the sides of the trolly for more compartments

Idea3) Add an extra section for hand sanitiser

Idea4) waste bins can be placed for both medical and normal waste

Idea5) can add breaks at the wheels to keep it in same position

Sample Answer

- Possible design using ***convergent thinking***

Fact1) it must have to carry all the place with item/medicine

Fact2) medicine carry racks must be there

Fact3) It must be light weight and easy to carry

Fact4) it must have a handle to pull

Design Thinking in a Team Environment

- In order to get best and creative solutions, design thinking process is generally performed as a team activity.
- Every member may raise their own ideas and solutions.
- The team will analyze the pros and cons of each solution or design and then finalize the best suitable solution.
- But during design thinking as a team activity, conflicts between team members may arise. So It is very important to resolve these conflicts.

Design Thinking in a Team Environment

CHARACTERISTICS OF AN EFFECTIVE TEAM

- Team goals are as important as individual goals.
- The team understands the goals and is committed to achieving them.
- Trust replaces fear, and people feel comfortable taking risks.
- Respect, collaboration, and open-mindedness are prevalent.
- Team members communicate readily; diversity of opinions is encouraged.
- Decisions are made by consensus and have the acceptance and support of the members of the team.

Design Thinking in a Team Environment

STEPS IN RESOLVING CONFLICTS

1. Prepare the resolution
2. Understand the situation
3. Reach agreement

Design Thinking in a Team Environment

Step 1: Prepare for resolution

- **Acknowledge the conflict** – The conflict has to be acknowledged before it can be managed and resolved. The tendency is for people to ignore the first signs of conflict, perhaps as it seems trivial, or is difficult to differentiate from the normal, healthy debate that teams can thrive on. If you are concerned about the conflict in your team, discuss it with other members. Once the team recognizes the issue, it can start the process of resolution.
- **Discuss the impact** – As a team, discuss the impact the conflict is having on team dynamics and performance.
- **Agree to a cooperative process** – Everyone involved must agree to cooperate in to resolve the conflict. This means putting the team first, and may involve setting aside your opinion or ideas for the time being. If someone wants to win more than he or she wants to resolve the conflict, you may find yourself at a stalemate.
- **Agree to communicate** – The most important thing throughout the resolution process is for everyone to keep communications open.

Step 2: Understand the situation

- **Clarify positions** – Whatever the conflict or disagreement, it's important to clarify people's positions. Whether there are obvious factions within the team who support a particular option, approach or idea, or each team member holds their own unique view, each position needs to be clearly identified and articulated by those involved.
- **List facts, assumptions and beliefs underlying each position** – What does each group or person believe? What do they value? What information are they using as a basis for these beliefs? What decision-making criteria and processes have they employed?
- **Analyze in smaller groups** – Break the team into smaller groups, separating people who are in alliance. In these smaller groups, analyze and dissect each position, and the associated facts, assumptions and beliefs.
- **Convene back as a team** – After the group dialogue, each side is likely to be much closer to reaching agreement. The process of uncovering facts and assumptions allows people to step away from their emotional attachments and see the issue more objectively. When you separate alliances, the fire of conflict can burn out quickly, and it is much easier to see the issue and facts laid bare.

Design Thinking in a Team Environment

Step 3: Reach agreement

- Now that all parties understand the others' positions, the team must decide what decision or course of action to take. With the facts and assumptions considered, it's easier to see the best of action and reach agreement.

Design Thinking in a Team Environment

PREVENTING CONFLICTS

- Dealing with conflict immediately – avoid the temptation to ignore it.
- Being open – if people have issues, they need to be expressed immediately.
- Practicing clear communication – articulate thoughts and ideas clearly.
- Practicing active listening – paraphrasing, clarifying, questioning.
- Practicing identifying assumptions – asking yourself "why" on a regular basis.
- Not letting conflict get personal – stick to facts and issues, not personalities.
- Focusing on actionable solutions – don't belabor what can't be changed.
- Encouraging different points of view – insist on honest dialogue and expressing feelings.
- Not looking for blame – encourage ownership of the problem and solution.
- Demonstrating respect – if the situation escalates, take a break and wait for emotions to subside.

- Illustrate the design thinking process through designing a walking stick for elderly people

- Prepare a questionnaire to collect customer requirements for the Design of Coconut Scraper.

Construct two possible designs of a dining table set that occupies minimum space when not in use and then refine them to narrow down to the best design. Show how the divergent-convergent thinking helps in the process. Provide your rationale for each step by using hand sketches only.

- Design a juice machine that run with both man power and electricity. Use the concept of design thinking as divergent-convergent questioning.

- Teachers facing health issue through chalk powder inhalation while they rubbing board with conventional dust removers. Develop a specially designed duster that can solve this issue. Use the concept of design thinking as divergent-convergent questioning.

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What is design thinking process | 15 design thinking examples (apexgloballearning.com)

- DS :Classroom code

ahzx37w

- Case study: Solving the problems of dining room | by Sagar Baishya | Bootcamp (uxdesign.cc)

- Designing and Engineering BE102 Model Question Paper | KTU Students - Engineering Notes-Syllabus-Textbooks-Questions