EST 200 : DESIGN AND ENGINEERING MODULE 2

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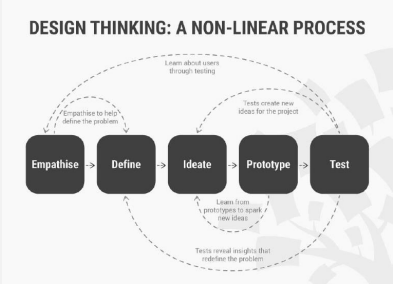
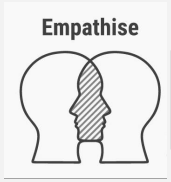
DESIGN THINKING PROCESS

- 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.

THE FIVE STAGES OF DESIGN THINKING

Note: These stages are not always sequential, and teams often run them in parallel, out of order and repeat them in an iterative fashion.





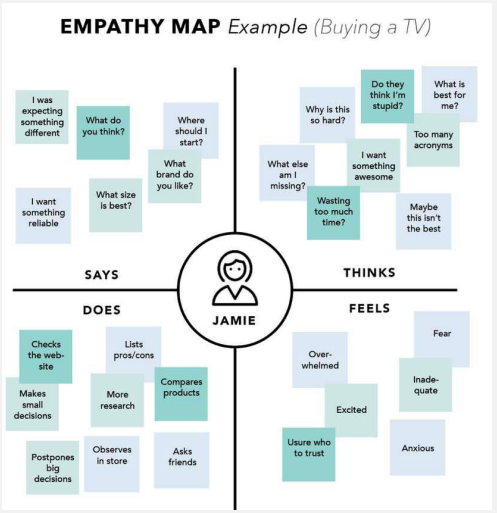
1. **EMPATHIZE -** RESEARCH YOUR USERS' NEEDS

- 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.
- 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.

Empathise

1. **EMPATHIZE -** RESEARCH YOUR USERS' NEEDS

- 3 steps
  - Observe
    - How users interact with their environment.
    - Capture quotes, behaviors and other notes that reflect their experience.
    - Notice what they think, feel, need
  - Engage
    - Interviews scheduled or ad-hoc
    - Learn how to ask the right questions
  - Immerse
    - Find ways "to get into the user's shoes"
    - Best way to understand the users' needs



Define

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.

Define

2. **DEFINE -** STATE YOUR USERS' NEEDS AND PROBLEMS

- 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.
- unpack your empathy findings into needs and insights and scope a meaningful challenge
- Define your Point of View – meaningful and actionable problem statement
  - Preserves emotion and the individual you're designing for.
  - Includes strong language.
  - Uses sensical wording.
  - Includes a strong insight.
  - Generates lots of possibilities

DEFINE TOOLS

- **Point of View**
  - You articulate a POV by combining these three elements – user, need, and insight.
  - Insert your information about your user, the needs and your insights in the following sentence:
  - [User . . . (descriptive)] needs [need . . . (verb)] because [insight. . . (compelling)]
- **How might we?**
  - Short questions that launch brainstorms
  - Seeds for ideation
  - Come out form the point of view statement

DEFINE TOOLS

- **Why - How Ladder**
  - Used to find user needs and ways to possibly solve them
    - Step 1: Identify a few meaningful user needs and write them at the bottom of a piece of paper.
    - Step 2: Ladder up from that need, asking "why?"
      - For example, why would a user "need to see a link between a product and the process that creates it?" because the user, "needs confidence that it won't harm their health by understanding its origin."
    - Step 3: Ask why again, and continue to ladder from that same need.
      - At a certain point, you'll reach a very common, abstract need such as, "the need to be healthy." This is the top of the ladder.
    - Step 4: Climb back down the ladder asking "how?"
      - This will give you ideas for how to address the needs

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.
- Brainstorming is particularly useful here.
  - Brainstorming is a method design teams use to generate ideas to solve clearly defined design problems.
- You should pick some other Ideation techniques by the end of the Ideation phase to help you investigate and test your ideas so you can find the best way to either solve a problem or provide the elements required to circumvent it.

HOW TO IDEATE

- Ideate = transition from identifying problems to exploring solutions
- Ideation is leveraged to:
  - Harness the collective perspectives and strengths of your team.
  - Step beyond obvious solutions and drive innovation.
  - Uncover unexpected areas of exploration.
  - Create fluency (volume) and flexibility (variety) in your innovation options.
- Fluctuate between focus and flare

IDEATE - BRAINWRITE

- The participants write down their ideas on paper
- They pass on their own piece of paper to another participant
- The other participant elaborates on the first person's ideas and so forth.
- Another few minutes later, the individual participants will again pass their papers on to someone else and so the process continues.
- The process takes 15 minutes
- Ideas are discussed afterwards

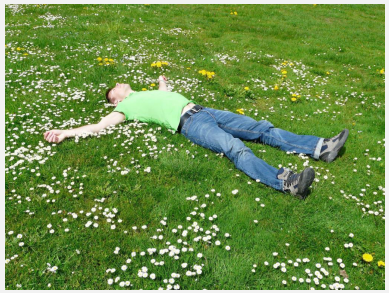
IDEATE – CHALLENGE ASSUMPTIONS

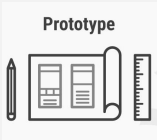
- Identify the assumptions you have about the product you're building (especially if you're stuck)
- Challenge these assumptions
  - Are they fixed because they are crucial aspects or because we have been accustomed to them?
  - Very important step if the empathy stage wasn't well done and there were many things assumed about the users and their context

IDEATE - MINDMAP

- Process through which the participants build a web of relationships
- Participants write a problem statement
- They write solutions
- Link statements and solutions between them

IDEATE – CREATIVE PAUSE





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 (or specific features found within the product) to investigate the ideas you've generated.
- 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.

LOW FIDELITY PROTOTYPING

- Use basic models or examples
- Just some features
- Methods
  - Storyboarding.
  - Sketching
  - Card sorting.

LOW FIDELITY PROTOTYPING

PROS

- Quick and inexpensive.
- Possible to make instant changes and test new iterations.
- Disposable/throw-away.
- Enables the designer to gain an overall view of the product using minimal time and effort,
- No advanced technical skills required
- Encourages and fosters design thinking.

CONS

- Lack of realism. basic and sometimes sketchy nature =>the applicability of results may lack validity.
- Depending on your product, the production of low-fi prototypes may not be appropriate for your intended users.
- Such prototypes often remove control from the user, as they generally have to interact in basic ways or simply inform an evaluator, demonstrate or write a blow-by-blow account of how they would use the finished product.

HIGH FIDELITY PROTOTYPING

- Look and operate closer to the finished product
- For example, a 3D plastic model with movable parts (allowing users to manipulate and interact with a device in the same manner as the final design) is high-fi in comparison to, say, a wooden block.
- Likewise, an early version of a software system developed using a design program such as Sketch or Adobe Illustrator is high-fi in comparison to a paper prototype.

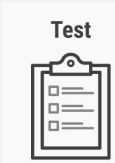
HIGH FIDELITY PROTOTYPING

PROS

- Engaging: the stakeholders can instantly see their vision realized and will be able to judge how well it meets their expectations, wants and needs.
- User testing involving high-fi prototypes will allow the evaluators to gather information with a high level of validity and applicability. The closer the prototype is to the finished product, the more confidence the design team will have in how people will respond to, interact with and perceive the design.

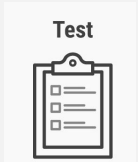
CONS

- They generally take much longer to produce than low-fi prototypes.
- When testing prototypes, test users are more inclined to focus and comment on superficial characteristics, as opposed to the content
- After devoting hours and hours of time producing an accurate model of how a product will appear and behave, designers are often loathed to make changes.
- Software prototypes may give test users a false impression of how good the finished article may be.
- Making changes to prototypes can take a long time



5. **TEST** - TRY YOUR SOLUTIONS OUT

- This is the final stage of the 5 stage-model, but in an iterative process, the results generated during the testing phase are often used to redefine one or more problems and inform the understanding of the users, the conditions of use, how people think, behave, and feel, and to empathise.
- Evaluators rigorously test the prototypes
- Although this is the final phase, design thinking is iterative: 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.



5. **TEST** - TRY YOUR SOLUTIONS OUT

- Chance to gather feedback, refine solutions, and continue to learn about your users.
- The test mode is an iterative mode in which you place low-resolution prototypes in the appropriate context of your user's life.
- Prototype as if you know you're right, but test as if you know you're wrong

TESTING WITH USERS

- Allows you to learn about the solution you created but also about the users (builds empathy)
- Let your user experience the prototype.
  - Show don't tell. Put your prototype in the user's hands (or your user in the prototype) and give only the basic context they need to understand what to do.
- Have them talk through their experience.
  - Use prompts. "Tell me what you're thinking as you do this."
- Actively observe.
  - Don't immediately "correct" your user.
  - Watch how they use (and misuse) your prototype.
- Follow up with questions.
  - This is often the most valuable part.

TEST – FEEDBACK CAPTURE MATRIX

- Real-time capture of feedback on presentations and prototypes
- Arranges thoughts and ideas into four categories for easy assessment
- Fill in the matrix as you give or receive feedback.
  - 1st quadrant: Constructive criticism
  - 2nd quadrant: Place things one likes or finds notable
  - 3rd quadrant: Questions raised
  - 4th quadrant: new ideas spurred

DESIGN THINKING

- Overall, you should understand that these stages are different modes which contribute to the entire design project, rather than sequential steps.
- Your goal throughout is to gain the deepest understanding of the users and what their ideal solution/product would be.

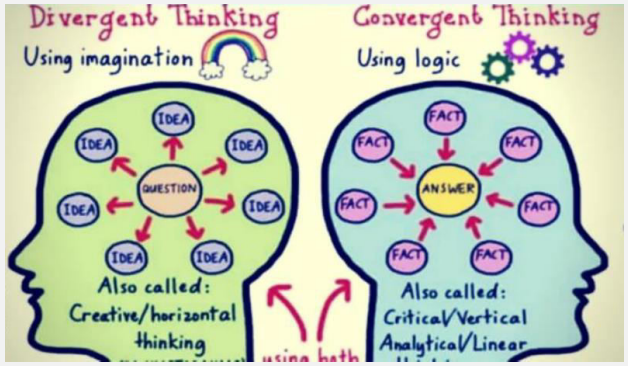
DIVERGENT THINKING

- It is a thought process or method used to generate creative ideas by exploring many possible solutions.
- It typically occurs in a spontaneous, free-flowing, "non-linear" manner, such that many ideas are generated in an emergent cognitive fashion.
- Divergent thinking uses the imagination to open the mind to new possibilities and solutions, and ultimately become more innovative.

CONVERGENT THINKING

- It is the opposite of divergent thinking.
- It generally means the ability to give the "correct" answer to standard questions that do not require significant creativity, for instance in most tasks in school and on standardized multiple-choice tests for intelligence.
- Convergent thinking moves from broad thoughts to concrete understanding, where the thoughts from divergent thinking can be narrowed down to the most promising ideas and solutions.

DIVERGENT THINKING VS CONVERGENT THINKING



DESIGN THINKING IN A TEAM ENVIRONMENT

- Members of a Design Thinking team need to be open minded, curious, collaborative and allow their assumptions to be challenged, ready for change, and be adaptable.
- Cross-disciplinary teams will provide you with the best results.
- Teams may consist of people unfamiliar with each other, with external members brought on board either as specialists or facilitators depending on the availability of skills.
- To make a Design Thinking project successful, we need T-shaped people.
- T-shaped people have a depth of knowledge and experience in their own fields but they can also reach out and connect with others horizontally and create meaningful collaborations.
- All team members should be encouraged to respect each other's inputs, in order to discover deeper and to build upon each other's findings.

SOME OF THE AIMS OF DESIGN THINKING'S APPROACH ARE TO CREATE:

- Greater inclusiveness (quality of covering or dealing with a range of subjects/areas)
- Better team cohesion (fact of forming a united whole)
- Higher levels of collaboration and interaction -increased creative confidence

- Everyone thinks, feels, and experiences things differently. Differences are what we need.

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CASE STUDIES

1. **Design Thinking Case Study: Innovation at Apple**
   - https://www.designorate.com/design-thinking-case-study-innovation-at-apple/
2. **How We Design on the UberEATS Team**
   - https://medium.com/uber-design/how-we-design-on-the-ubereats-team-ff7c41fffb76
3. **IBM: Design Thinking Adaptation and Adoption at Scale**
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