CHAPTER 3

3.1 INTRODUCTION

1. **Proof of concept:** while coming up with new ideas, we conceptualize these ideas in terms of what the proposed product will do.
2. It helps us with initial part of Define from DDDD and helps designer gain clarity.
3. We do this to
   a. find out the practicality, feasibility and how realistic the idea is.
   b. Enable designers to begin articulating basic building blocks of the product.
4. Idea: voice assisted mobile robot in restaurants. Why? It could chit chat with customers. Make customized recommendations. No. These do not address an actual problem but mention just the **putative (supposed)** benefits of design. An actual problem would be "It is difficult to recruit good staff who provide the level of customer service to which we have become accustomed.
5. Asking questions, reconsidering one's assumptions, and articulating one's concerns and standpoints are central aspects of the early ideation process.
6. Express ideas as a set of concepts = turn wishful thinking into concrete working models.

3.2 CONCEPTUALIZING DESIGN

1. When starting designing, we need to be clear about underlying assumptions and claims.
   a. Assumptions: taking something for granted that requires further investigation.
   b. Claims: stating something to be true when it is still open to question.
2. Writing down above two and defending them highlights what is vague and weird so we can reformulate our design if it is poor.
3. In many projects, we observe human activities that are problematic and try to find a way to perform them with a different set of functions.
4. Explaining people's assumptions and claims about why they think something might be a good idea (or not) enables the design team as a whole to view multiple perspectives on the problem space and, in so doing, reveals conflicting and problematic ones.
5. Questions: Any problems with design or UX? If yes, what? Why? Any evidence to prove these problems? How to overcome these problems.
6. The above part should be done in the beginning of design process.
7. Design teams also need to work out how best to conceptualize the design space. This involves articulating the proposed solution as a conceptual model with respect to the UX.
8. Benefits of conceptualising a design
   a. **Orientation**: Enabling the design team to ask specific kinds of questions about how the conceptual model will be understood by the targeted users.
   b. **Open-Mindedness:** Allowing the team to explore a range of different ideas to address the problems identified.
   c. **Common Ground:** Allowing the design team to establish a set of common terms that all can understand and agree upon, reducing the chance of misunderstandings and confusion arising later.
9. Once formulated, conceptual model (as text/diagrams in their **lingua franca (language they communicate in)**) can act as a blueprint to the design and can help communicate the idea to business, finance and other units.

3.3 CONCEPTUAL MODELS

1. A model is a simplified description of a system or process that helps describe how it works.
2. **Jeff Johnson** and **Austin Henderson** define a conceptual model as "a high-level description of how a system is organized and operates.
3. It allows designers to straighten out their thinking before they start laying out their widgets.
4. conceptual model provides a working strategy and a framework of general concepts and their interrelations. Core components include:
   a. **Metaphors and analogies:** make people understand what our design is and how to use it. Example: Bookmarking feature is our design
   b. **Concepts:** to which people are exposed through the product, different features, attributes of design and what operations it can do, etc.
      Example: We can save, revisit or organize the websites
   c. **Relationships**: between those concepts as in how to go from one function of design to another or what set contains the feature I am looking for or how are features interconnected. Example: if one folder of bookmark contains another or how to revisit after bookmarking.
   d. **Mappings:** between the concepts and the user experience the product is designed to invoke. Example: one can revisit a page through looking at a list of visited sites, most-frequently visited, or saved websites.
5. How the various metaphors, concepts, and their relationships are organized determines the UX. Explaining these:
   a. design team can debate the merits of providing different methods and how they support the main concepts.
   b. They can also begin discussing whether a new overall metaphor may be preferable
   c. this can lead the design team to articulate the kinds of relationships between them, such as containership
6. Sometimes due to so many upgrades and iterations, conceptual model becomes very complex. The best conceptual models are often those that appear obvious and simple; that is, the operations they support are intuitive to use. This is because people like to use what they are already comfortable with and may reject new ideas.
7. **Design concepts:** Set of ideas for a design involving scenarios, text, mood-boards, etc.
8. Most interface applications are actually based on well-established conceptual models.
9. It is rare for completely new conceptual models to emerge that transform the way daily and work activities are carried out at an interface. Those who fall into this category are the desktop, the digital spreadsheet and the WWW.
10. All three examples' conceptual models were based on familiar activities so people had no problem adopting them into their lifestyle.

3.4 INTERFACE METAPHORS

1. Metaphors are central component of conceptual models.
2. They provide a structure to relate new design with already familiar design but they also have their own behaviors and properties.
3. an interface metaphor is one that is **instantiated (represented)** in some way as part of the user interface.
4. Examples- Search Engine was coined as a tool to retrieve date and files. The metaphor invites comparisons between a mechanical engine and the everyday action of looking in different places to find something. But Search engine has more features like prioritizing and it works differently hence metaphor is connecting but still has its own properties.
5. Another example is when we put things in cart while online shopping like the real thing.

6. However, they can also contravene people's expectations about how things should be. Like recycle bin on computer stays on desktop while in real life dustbin stays hidden in a corner.
7. An interface metaphor that has become popular in the last few years is the card and most social media apps and many websites use this to present data in packets instead of at once.
8. Many times, interface rapidly becomes integrated in daily life, like these days people use technical mobile and computer terms so easily which was not the case decades ago.
9. **Albrecht Schmidt** suggests a pair of glasses as a good metaphor for thinking about future technologies, helping us think more about how to amplify human cognition. He contrasts this "amplify" metaphor with the "tool" metaphor of a pair of binoculars that is used for a specific task—where someone consciously has to hold them up against their eyes while adjusting the lens to bring what they are looking at into focus.
10. People use metaphors so easily as they are ingrained in human language. They help in
    a. conceptualizing what we are doing (ex- surfing the web)
    b. As a conceptual model instantiated at the interface level (ex- card metaphor)
    c. visualizing an operation (ex- icon of shopping cart where we place things to buy)

3.5 INTERACTION TYPES

1. This is another way of conceptualizing design by observing how user interacts with the design.
2. Deciding upon which of the interaction types to use, and why, can help designers formulate a conceptual model before committing to a particular interface in which to implement them, such as speech-based, gesture-based, etc.
3. There are five interaction types and they are **not mutually exclusive:**
    a. **Instructing:** Where users issue instructions to a system by typing in commands, selecting options, speaking commands, gesturing, or pressing buttons.
        i. Very common conceptual model used in a lot of devices
        ii. Main benefit is, it is quick and efficient
        iii. Good for repetitive kinds of actions performed on multiple objects.
    b. **Conversing:** Where users have a dialog with a system. Users can speak via an interface or type in questions to which the system replies via text or speech output.
        i. Underlying model of having a conversation with another human
        ii. Differs from instructing as it has two way communication and design acts like a partner rather than a machine taking orders.
        iii. most commonly used for applications where the user needs to find out specific kinds of information or wants to discuss issues.
        iv. Allows user to interact in a way familiar to them so they are comfortable.
        v. Misunderstandings arise when design does not know what to do with input.
    c. **Manipulating:** Involves dragging, selecting, opening, closing and zooming actions on virtual objects. Exploit's users' knowledge of how they move in the real world
        i. Can involve actions using physical controllers (for example, Nintendo Wii) or air gestures (such as, Microsoft Kinect) to control an on-screen avatar.
        ii. **Direct manipulation:** proposes that design at interface level should be so the way it is interacted is analogous to how physical objects are interacted in real world. It has three core principles.
            1. Continuous representation of objects and actions of interest.
            2. Physical actions and button pressing instead of issuing commands with complex syntax.
            3. Rapid reversible actions with immediate feedback on object of interest.

        iii. Object on which action is performed is immediately visible and so is all the feedback. Like dragging a word file from one folder to recycle bin.

        iv. **Advantages of DM:**
1. Helping beginners learn basic functionality rapidly
2. Enabling experienced users to work rapidly on a wide range of tasks
3. Allowing infrequent users to remember how to carry out operations over time
4. Preventing the need for error messages, except rarely
5. Showing users immediately how their actions are furthering their goals
6. Reducing users' experiences of anxiety
7. Helping users gain confidence and mastery and feel in control

        v. **Disadvantages of DM:**
1. Some people take the metaphor of direct manipulation too literally
2. Not all tasks can be described by objects, and not all actions can be done directly
3. Some tasks are better achieved through delegating. Ex- I spelled Sarthak as Srathak in 100-page file. I can't go around manually correcting every spelling. So instructing is better here.
4. Can become screen space 'gobblers'
5. Moving a cursor using a mouse or touchpad can be slower than pressing function keys to do the same actions.

d. **Exploring:** Where users move through a virtual environment like 3D space, AR and VR or physical spaces that use sensor-based technologies include smart rooms and ambient environments, also enabling people to capitalize on familiarity.
    i. Main advantage is user can go to places they can't in real life like inside a cockroach or space and discover and learn more intuitively.
    ii. These VR environments can be embedded with sensors so if anyone does a certain thing it triggers something to happen and make experience interactive.

e. **Responding:** Where the system takes the initiative to alert user to something that it "thinks" is of interest and the user chooses whether to respond. An example is when Netflix asks us if we are still watching.
    i. System initiates this alerting user of something by:
        1. By detecting some trigger that is activated by use
        2. By analysing user's repeated patterns
    ii. Sometimes it can get tiresome and frustrating for user to get these alerts so real challenge for system is to find out if it will be helpful or irritate the user.
    iii. If it gets it wrong, does it apologize or allows user to correct its advice?

4. Choosing an interaction type depends on some things
a. **Direct manipulation** is good for 'doing' types of tasks, for example, designing, drawing, flying, driving, or sizing windows
b. **Issuing instructions** is good for **repetitive** tasks, for example, spell-checking and file management
c. **Having a conversation** is good for certain services, for instance, finding information or requesting music
d. **Hybrid conceptual models** are good for **supporting multiple ways** of carrying out the same actions

5. There is a difference between Interaction type and interaction style
a. **Interaction type:** A description of what the user is doing when interacting with a system, for example, instructing, talking, browsing, or responding
b. **Interface style:** The kind of interface used to support the interaction, for instance, command, menu-based, gesture, or voice.

3.6 PARADIGMS, VISIONS, THEORIES, MODELS, AND FRAMEWORKS

Conceptual knowledge that is used to inform design and guide research are divided into five parts which are not mutually exclusive but rather they overlap in their way of conceptualizing the problem and design space. They vary in terms of their scale and specificity to a particular problem space:

a. **Paradigms:** refers to a general approach that has been adopted by a community of researchers and designers for carrying out their work in terms of shared assumptions, concepts, values, and practices. Some paradigms we adopted are:
   i. **Ubiquitous computing:** concept where computing is made to appear when needed by user and move to periphery when task is done.
   ii. Pervasive computing:
   iii. **Wearable computing:** Like smart glasses and smart watches
   iv. **Internet of Things (IoT):** connecting all devices like fans, lights, doors via internet and making them connected to each other.

b. **Visions:** future scenario that frames research and development in interaction design— often depicted in the form of a film or a narrative.
   i. Provide concrete scenarios of how society can use the next generation of imagined technologies
   ii. Also raise ethical questions such as, privacy and trust.
   iii. Some questions raised by technology visions are
      1. How to enable people to access and interact with information in their everyday lives?
      2. How to design user experiences where there is no obvious user control?
      3. How and in what form to provide contextually relevant information to people?
      4. How to ensure that information passed around interconnected devices and objects is secure?

c. **Theories:** well-substantiated explanation of some aspect of a phenomenon
   i. Can help identify factors relevant to the design and evaluation of interactive products such as cognitive, social, and affective.
   ii. Can be used to predict what users will do with different interfaces.
   iii. theories tend to be comprehensive, explaining human-computer interactions.

d. **Models:** simplification of some aspect of human-computer interaction intended to make it easier for designers to predict and evaluate alternative designs.
   i. it depicts how the core features and processes underlying a phenomenon are structured and related to one another.
   ii. models are an abstraction that simplify some aspect of human-computer interaction.
   iii. Abstracted from a theory coming from a contributing discipline, for example:
      1. Don Norman's model of the Seven Stages of Action
      2. Marc Hassanal's model of the UX

e. **Frameworks:** set of interrelated concepts and/or a set of specific questions that are intended to inform a particular domain area (for example, collaborative learning), or an analytic method (for instance, ethnographic studies).
   i. In contrast to a model, a framework offers advice to designers as to what to design or look for
   ii. provide a set of core concepts, questions, or principles in the forms of steps, questions, concepts, challenges, principles, tactics, and dimensions to consider when designing for a user experience or analysing data from a user study.

iii. been based on theories of human behaviour in past, now being based on user studies and experience from actual design
iv. Focus on how to design particular kinds of interfaces to evoke certain responses.
v. A classic HCI framework is Don Norman's (1988) framework of the relationship between the design of a conceptual model and a user's understanding of it. It consists:
1. **The Designer's Model:** The model the designer has of how the system should work
2. **System Image:** How the system actually works, which is portrayed to the user through the interface, manuals, help facilities, and so on
3. **The User's Model:** How the user understands how the system works

4. This above framework makes explicit the relationship between how a system should function, how it is presented to users, and how it is understood by them
5. In an ideal world, users should be able to carry out activities in the way intended by the designer by interacting with the system image that makes it obvious what to do.
6. If the system image does not make the designer's model clear to the users, it is likely that they will end up with an incorrect understanding of the system, which in turn will increase the likelihood of their using the system ineffectively and making errors.
7. By drawing attention to this potential discrepancy, designers can be made aware of the importance of trying to bridge the gap more effectively

3.7 WHO IS IN CONTROL?

Who should be in control of the interface? The user or the system? While users are primarily in control for instructing direct manipulation interfaces, they are less so in responding type interfaces.

- User-controlled interaction is based on the premise that people enjoy mastery and being in control. It assumes that people like to know
- In contrast, autonomous and context-aware control assumes that having the environment monitor, recognize, and detect deviations in a person's behaviour can enable timely, helpful, and even critical information to be provided when considered appropriate.