COLLEGE OF
COMPUTER STUDIES

QUEZON CITY
UNIVERSITY


# WEEK 4-5
# User-Centered Design

HCI101 - INTRODUCTION TO HUMAN COMPUTER INTERACTION

v2020

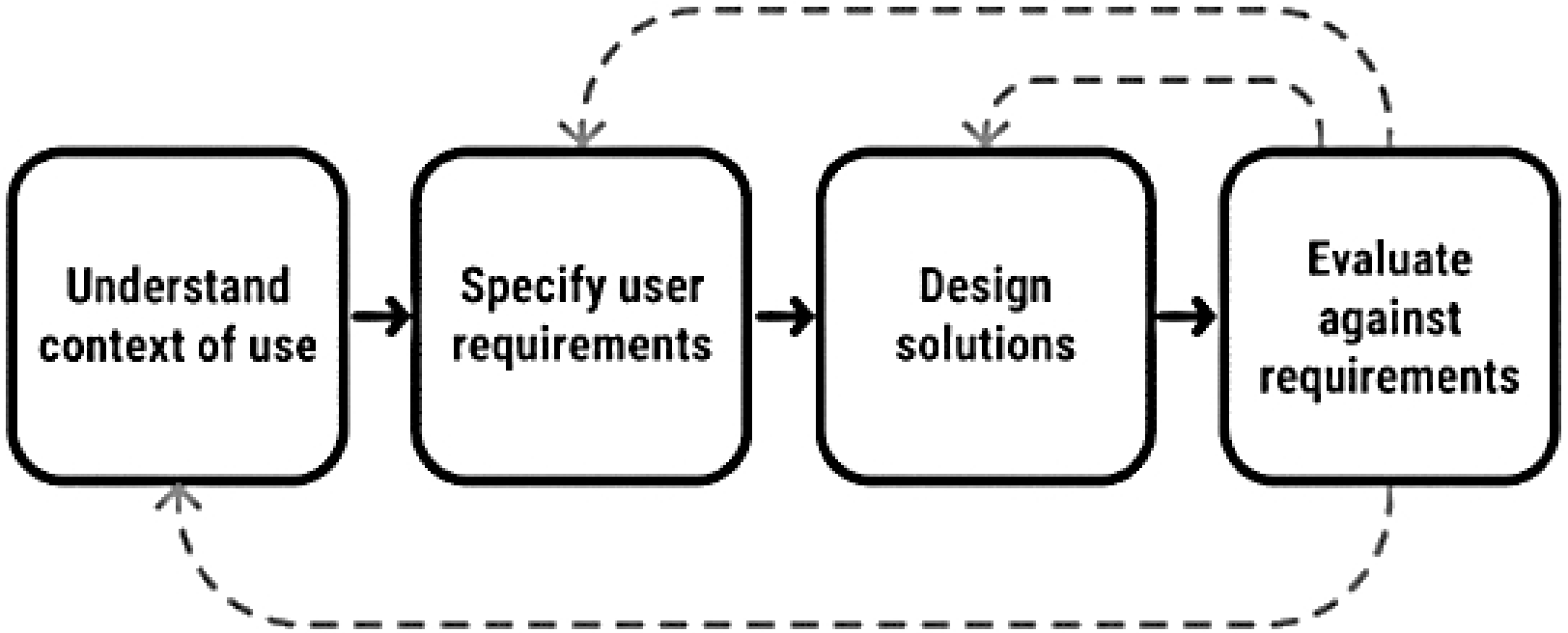
# Learning Outcomes

- Explain the scope of User-Centered Design
- Enumerate and Understand the Conceptual and Mental Models and Metaphors used in design for User's Capabilities.

# What is User-Centered Design?

- **User-centered design** (UCD) is a collection of processes which focus on putting users at the center of product design and development. You develop your digital product taking into account your user's requirements, objectives and feedback.

- *User-centered design (UCD) is an iterative design process in which designers and other stakeholders focus on the users and their needs in each phase of the design process.*
- *UCD calls for involving users throughout the design process via a variety of research and design techniques so as to create highly usable and accessible products for them.*


Understand context of use
Specify user requirements
Design solutions
Evaluate against requirements

# The Essential Elements of User-Centered Design

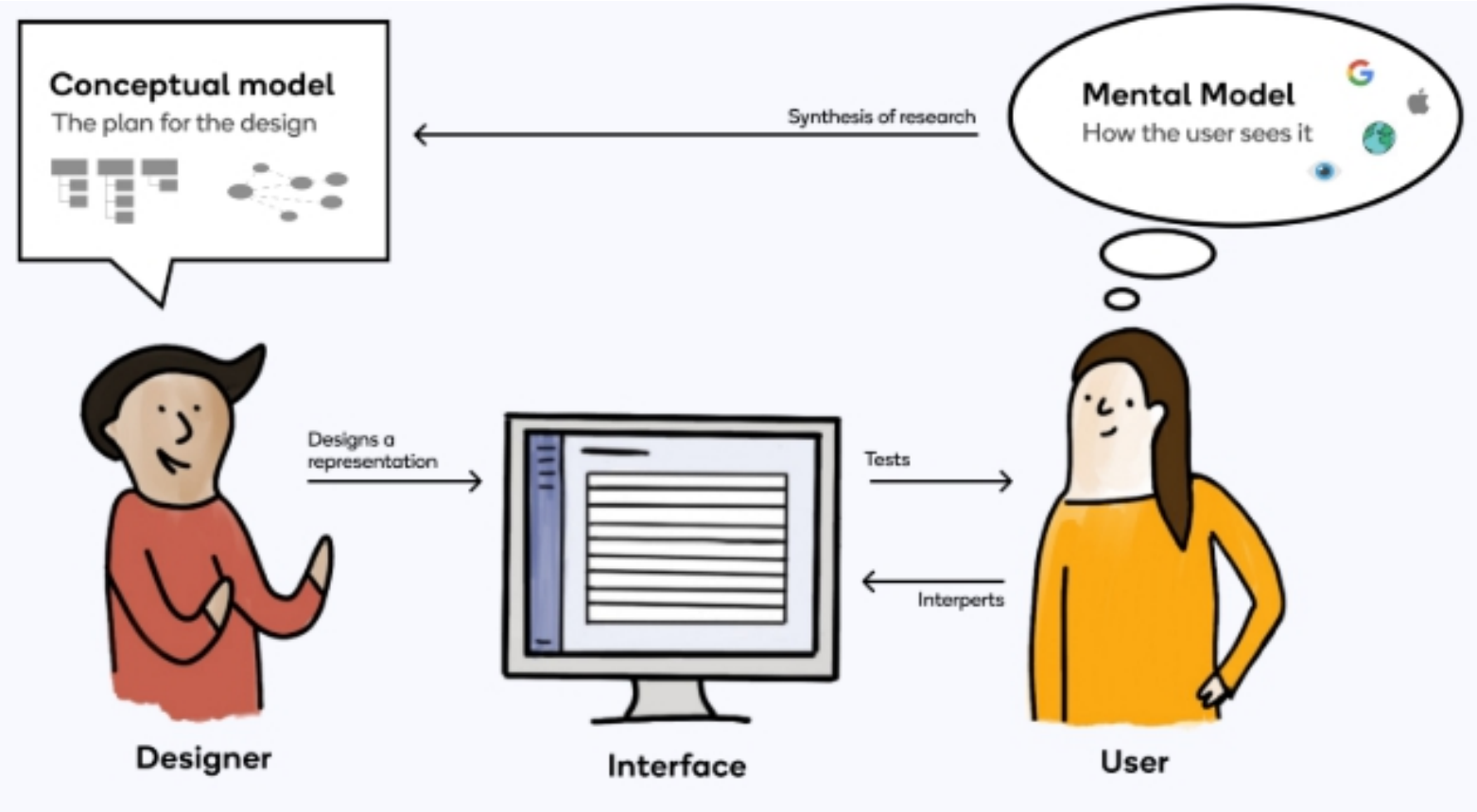
- **Visibility**: Users should be able to see from the beginning what they can do with the product, what is it about, how they can use it.

- ***Accessibility*:** Users should be able to find information easily and quickly. They should be offered various ways to find information for example call to action buttons, search option, menu, etc.

- **Legibility:** Text should be easy to read. As simple as that.

- **Language:** Short sentences are preferred here. The easier the phrase and the words, the better.

# Mental and Conceptual Models



- Design is a quest to find the best possible match between the user's mental model that they have in their mind, and the conceptual model that you're presenting to them with your product.
- These two models run through all resolutions of design — everything from developing a product system to crafting a single button. Understanding how they work together will help you design products that users can easily understand.

# What is a mental model?

- A ‘mental model’ refers to a **user’s underlying expectations about how something should work.**
- It’s formed based on what they already do, prior experiences with similar products, or by assumptions they’ve made based on how it appears (also known as perceived affordances).

# For example:

- **Booking a flight** — You have a basic expectation of what steps you will take, and the information you'll need along the way.
- **A chat app** — You expect that messages will go back and fourth in real time, and that you can also send attachments like photos and GIFS. You expect to be notified as soon as someone has replied to you.
- **Driving a car** — You have expectations of what the main things you can interact with are, what the car is capable of doing, and how to appropriately drive it in your country.

- It’s important to remember that a person’s **mental model is constantly evolving and subject to change.** It’s influenced by new experiences with your product, other technologies, and day to day life.

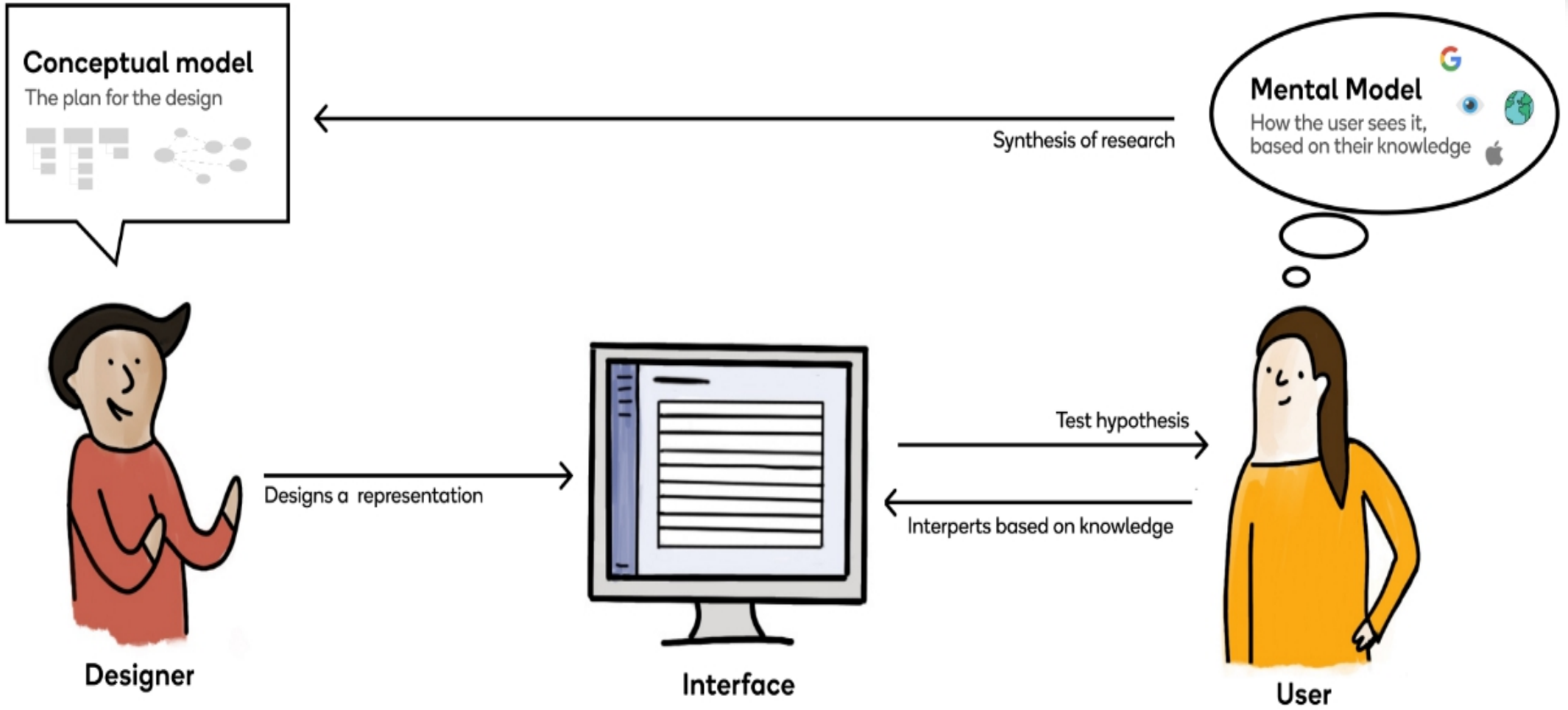
# What is a conceptual model?

- **A conceptual model is created by the designer as a high-level plan for how the product will work and fit together.**
- It's made up of different elements that shape the organization of the system, and is ultimately represented in the interface that the customer interacts with.

# Elements that contribute to the conceptual model of your product include:

- **Information architecture** — How are the different areas being grouped and structured? Where are your customers expecting to find the answers to their mental model within your product? Does that match their expectations?
- **Terminology** — Is the user familiar with the words being used? Are they broad terms that infer what you can do in each part of the product? How closely do they match the terms the customers use every day?

- **Content strategy** — What are the guiding concepts or rules for the types of content appearing on each page?
- **Channel strategy** — Are you creating consistent, continuous, or complementary experiences?
- **Interaction models** — Are you using well known patterns? Introducing something new? How are people interacting with the system?


Conceptual model
The plan for the design
Synthesis of research
Mental Model
How the user sees it,
based on their knowledge
Designer
Designs a representation
Interface
Test hypothesis
Interperts based on knowledge
User

# Next Week

# What is a Metaphor?

- As Merriam-Webster notes, a *metaphor* is a rhetorical device "in which a word or phrase literally denoting one kind of object or idea is used in place of another to suggest a likeness or analogy between them."

Because metaphor suggests a likeness between objects and ideas, it is a powerful way to articulate the new or the conceptual. Metaphor helps us explain something new and unfamiliar in terms of the familiar. Metaphor also enables us to describe the conceptual in terms of the tangible.

# The principle of Metaphor

- The principle of Metaphor states that an interface should implemented behavior from system that the users are familiars with. It increases the understandability of even most complex application by introducing the element of being familiar with the environment user has been working as for this entire for have.
- Furthermore, metaphor can be further extended to provide functionality that is not only acceptable but also usable in the whole interface. This property of extendibility, differentiate between a strong metaphors from a weak one.

# 7 Deep Metaphors

An effective marketing strategy, the Zaltmans argue, should consider how to tap into these seven *deep metaphors:*

- ***balance***—which focuses on justice, equilibrium, and the interplay of elements
- ***transformation***—including changes in substance and circumstances
- ***journey***—involving the meeting of past, present, and future

- ***container***—encompassing inclusion, exclusion, states of being, and other boundaries
- ***connection***—which focuses on the need to relate to oneself and others
- ***resource***—involving acquisitions and their consequences
- ***control***—the sense of mastery, vulnerability, and well-being

- A few examples, The promotion and content—instructions, button labels, images, and the like—of self-service applications could draw on the *control* metaphor. Social networking products naturally tap into *connection*. Product positioning and interactive marketing efforts can evoke metaphors in many different ways. For instance, with one image, Hearing Planet relates its products, hearing aids, to the metaphor of *connection.* When older adults lose their hearing, they also lose their ability to participate in conversations and, consequently, the ability to connect with friends and family. A hearing aid restores that ability.

- Another example is the way Apple depicts MobileMe. The line “keep everything in sync” coupled with the cloud—holding representations of different core applications such as email and calendar—suggests *container*. On a shallow level, this helps make the abstract concept of a Web-based service concrete. On a deeper level, MobileMe is attempting to tap into customers’ need to have constant access to their tools—to remain in a state of perpetual access.

# The End.

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# WEEK 6-7
# The User Interface

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# USER INTERFACE

- The user interface (UI) of a computer program is the part that handles the output to the display and the input from the person using the program. Designing user interfaces for interactive systems is a task that
- The user interface has been recognized as one of the most important elements of a software project. It had been estimated that 48% of work on a project goes into the design and implementation of the user interface  depends, among other things, on the designer's creativity.

# Efficiency of a User Interface

- There are two types of efficiency at play in a user interface. The first is the ease with which it allows a user to perform a task, as perceived by the user. Time plays only a minor role. This type of efficiency can be enhanced by providing sensible defaults, choices adapted to the user's expectations and shortcuts.
- Efficiency in a more technical sense is the time required to perform a certain action: how fast can a menu be drawn, how fast a typed sentence can be parsed.

- Clearly, efficiency is something to strive for. But there is the strange effect that computers can sometimes be too fast. At least that is sometimes claimed with the following example: slow compilers force programmers to think more about their code, resulting in fewer editcompile cycles than programmers who rely on the compiler to find errors, eventually leading to faster development.

# Types of User Interface

- Paradigms, metaphors, mental models and personas are driving forces behind the user interface and design employed in a particular system. There are three commonly recognised user interfaces in use today.
- Graphical User Interface, which is possibly the most familiar to most users; the Voice User Interface, one that is rapidly being deployed in many aspects of business; and the Multi-Modal Interface, a relatively new area of research that combines several methods of user input into a system.

# Graphical User Interface

- Graphical user interfaces make computing easier by separating the logical threads of computing from the presentation of those threads to the user, through visual content on the display device. This is commonly done through a window system that is controlled by an operating system's window manager.
- The WIMP (Windows, Icons, Menus, and Pointers) interface is the most common implementation of graphical user interfaces today.

# Voice User Interface

- Voice User Interfaces (VUIs) use speech technology to provide people with access to information and to allow them to perform transactions.
- VUI development was driven by customer dissatisfaction with touchtone telephony interactions, the need for cheaper and more effective systems to meet customer needs, and the advancement of speech technology to the stage where it was robust and reliable enough to deliver effective interaction.

- A Voice User Interface is what a person interacts with when using a spoken language application. Auditory interfaces interact with the user purely through sound. Speech is input by the user, and speech or nonverbal audio is output by the system
- auditory interfaces provide opportunity to use non-verbal audio such as background music and earcons to create an auditory environment for the user, and thus creating a unique —sound and feel‖ for a business or application

- Aside from speech recognition systems, other speech technologies include Text-to-Speech Synthesis and Speaker Verification. Speaker Verification involves collecting a small amount of a person's voice to create a voice template, which is used to enrol a person into a system and then compare future conversation. The system can be used, for example, to replace personal identification numbers .

- Text-to-Speech technology, on the other hand, synthesises text into speech. The technology has improved significantly in recent times, and although it does not yet duplicate the quality of recorded human speech, it is still a good option for creating messages from text that cannot be predicted, such as translating web pages for blind users

- VUIs are comprised of three main elements

- Prompts, also known as system messages, are the recorded or synthesized speech played to the user during the interaction.

- Grammars are the possible responses users can make in relation to each prompt. The system cannot understand anything outside of this range of possibilities.

- Dialog logic determines the actions the system can take in user's response to a prompt.

# Multi-modal User Interface

- Multi-modal interfaces attempt to address the problems associated with purely auditory and purely visual interfaces by providing a more immersive environment for human-computer interaction. A multimodal interactive system is one that relies on the use of multiple human communication channels to manipulate the computer. These communication channels translate to a computer's input and output devices.

- The value of an interface that can interpret a user's emotions has applications in fields ranging from business management, safety, and productivity, to entertainment and education. For example, if a program could recognise that the user was getting frustrated, it could modify its behaviour to compensate

- When evaluating the text-and-GUI-based Mentor System application used by students from Curtin University to assist with their assignments, Marriott [2003] found that personality conflict occurred between the system and some users. For example, one user became intensely annoyed at the beeping sound the program made, while another user found the program to be discourteous. Marriott suggests that incorporating a dynamically adjusting module into the user interface could eliminate or reduce some of these problems

# Other User Interface

- Many other paradigms for human-computer interaction exist. Perhaps one of the best known paradigms is the World Wide Web. The web itself did not provide any technological breakthroughs, because all the required functionality, such as transmission protocols, hypertext and distributed file systems, already existed. The breakthrough came with the advent of the browser and HTML, which enabled easy access to information on the internet, first through academia and then through business and leisure circles

# Next week

# User Interface Principles

- User Interface Principles comprises mainly of User Familiarity, Consistency, Minimal Surprise, Recoverability, User Guidance and User Diversity help guide the design of user interfaces. When making user interface design decisions, the human factors are the critical factor for the design principles.

- The following principles are fundamental to the design and implementation of effective interfaces, whether for traditional GUI environment for the web [

# The principle of User Profiling

- One of the main objectives of User Profiling is to create the user interfaces so as to make the work of the user easier. The interface is the key in providing the user with the ease of making use of even the most complex applications in an efficient and simplified manner. User models works on the theory of creating profile of all the possible users. As a result, a detailed description of the user's specification such as user's goal, user's skill, user's experience and user's needs, etc. can be formulated in an organized manner

# The principle of Exposure

- The principle of Exposure says that the user should be aware of all the functions & functionality that is available to him via the interface. The interface is to provide an environment that should be able to concentrate and the sensory details of the environment rather than the perfection of abstraction. The interface should be designed in such a way that it is Sensible to the general population, rather than being only Intuitive.

# The principle of Coherence

- There's been some argument over whether interfaces should strive to be Intuitive, or whether an Intuitive interface is even possible. However, it is certainly arguable that an interface should be coherent in other words logical, consistent and easily followed.
- Internal Consistency means that the program's behaviors make sense with respect to other parts of the program.
- External Consistency means that the program is consistent with the environment in which it runs

# The principle of State Visualization

- Each change in the behavior of the program should be accompanied by a corresponding change in the appearance of the interface. One of the big criticisms of modes in interfaces is when a program that many of the class is bad example programs have modes that are visually indistinguishable from one another.

# The principle of Shortcut

- The principle of Shortcut says that in order to achieve a task or to get a work done, the accessing methods should not only be abstract but concrete too. Once a user has become experienced with an application, she/he will start to build a mental model of that application. She/he will be able to predict with high accuracy what the results of any particular user gesture will be in any given context

# The principle of Focus

- The principle of Focus states that some aspects of the User Interface enjoy more attention of the user than others. The user finds same attributes and aspects of the user interface more attractive as compared to others. The human mind is a highly non-linear and has a perfect coordination with the eyes. Thus our eyes are more observant towards animated areas rather than the static are in an application.

# The principle of Help

- There are five basic types of Help: Goal-Oriented, Descriptive, Procedural, Interpretive and Navigational [47]. A help browser or tool tips can be useful in responding to questions related to procedural help, but these can sometimes be more efficiently addresses using cue card', interactive guides, or wizards which guide the user through the process step –by-step.

# The principle of Safety

- The principle of Safety states that the interface should develop confidence amongst the user by providing them a feeling of safety. The User Interface should ensure that the novice user should not feel him at risk while accessing the program: i.e. he should not feel unsafe while navigating, accessing or a doing a task. A certain level of comfort should be provided to the user, in almost all the situation.

# The Principle of Context

- The principle of Context states that the user's activity should be limited to a well defined context unless significant reason is there to support his freedom to access more.
- Each user action takes place within a given context the current document, the current selection, the current dialog box.

# The principle of User Testing

- The principle of User Testing states that the inevitable defects in the design of the user interface should be spotted. Generally, it is the fundamental defects in a user interface that the designer of the interface can spot. There are however various kinds of defects that are not easy to spot. The testing of user interface is actually the process of testing of the interface using actual end users.

# Human Factors Based User Interface Design

- Before designers start designing of user interface they need information about the target users. These factors can be very important in other development activities, primarily in analysis and design, as many early design decisions are based on these specifications. Considering human factors early in the development process goes a long way toward improving quality of the system.

- Specifying details about users and contexts is important as designers should become familiar with users' psychological characteristics(for example ,cognitive abilities, motivation), level of experience, domain and task characteristics, cultural background, as well as their physical attributes (for example, age, vision and hearing)

# The End.