UNIT 2
User Interface Design Process

UI Design Process - Know your User or Client

Unit Outcomes

- List the different development steps in the Interface design process
- Discuss the importance of Human Characteristics in the Interface design process
- Outline the different human considerations in the user interface design and business systems
- List and explain the possible problems in the requirement gathering prior to an interface design in a given domain

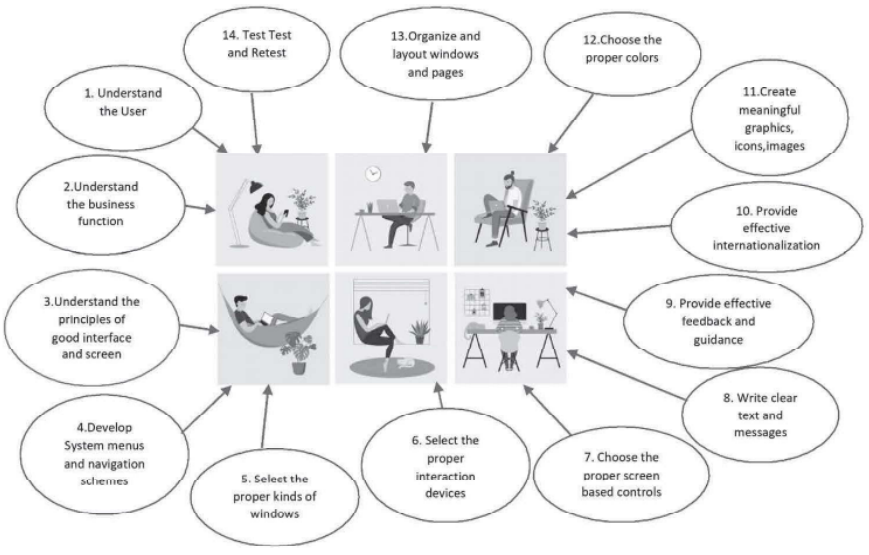
Introduction to Design Process

Introduction

- A computer system is built to serve the user and the user interacts with the computer through an interface to use these services
- To provide these services in an efficient way, the interface and the screen design process must always begin with the proper understanding of the system user

Introduction

- The interface designers should have proper understanding of the following to have a usable system :
  - Issues faced by the users while interacting with the system
  - Human characteristics
  - User's knowledge, skills and experience
  - User's requirements
  - User's psychological and physical characteristics



Introduction

- As a first step in the design process, the designer has to understand the following:
  - How a human interacts with computers
  - The importance of human characteristics in Design
  - Human Considerations in the design of Business Systems
  - Human interaction speed

Introduction

- As a second step, the designer need to understand the following:
  - Business Definition and Requirements Analysis
  - Determine the Basic Business Functions
  - Understand the value of Standards and Guidelines
  - System Training and Documentation Needs

Human Interaction with Computers

Important factors

In order to have a proper understanding of how users interact with computers, the designers need to consider the following factors:

- The Human Action Cycle
- Trouble using the computer by the users
- Responses to Poor Design
- The tasks performed by the users

Human Action Cycle

- Norman, a researcher, presented a psychological model in 1988 to describe how people interact with computer systems
- The model says that any action performed by a user can be cognitive or physical in nature
- Also, whenever an action is performed, the user has a goal and a specific objective in mind

Human Action Cycle

The action is performed in three stages:

- Goal formation: A goal is formed first and then cognitive activity and an objective is thought about and defined
- Execution of activities to achieve the goal: An execution plan is devised and implemented in three stages:
  - First two stages are cognitive in nature
  - Third stage is physical

Human Action Cycle

- Stage 1: The general methods to achieve the desired goals are decided upon.

  In the case of typing a letter, a computer's word processing function is required.
- Stage 2: The action sequence is planned.

  Typing a letter requires opening the word processor, retrieving a blank document, and typing the letter.

Human Action Cycle

- Stage 3: The actions are performed.

  The available computer controls, such as the keyboard and mouse, are used to perform the planned tasks.
- Evaluation of the results of the action: Evaluating the results of an action is a cognitive phase that is done in following stages:
  - The resulting output is perceived and understood: The results would be, the appearance of the letters and symbols on the screen.

Human Action Cycle

- Interpretation of the outcome is based upon expectations:
  - The letter is checked for proper format, completeness, and accuracy
  - It is also compared with the set goals and is checked if the letter has been printed correctly
  - If the goals are not achieved, the actions will be performed again or the goals can be modified

Why People have trouble with Computers

Why People have trouble with Computers

- Programmers, Systems analysts, and System designers are responsible for the design of business computer systems
- In recent years, graphic artists have been added to the interface design team to cater to the development of Web technology
- The graphic artists have extensive technical knowledge but little training in usability
- Hence, the issues related to user's capabilities depends on designer's intuition and his specialized knowledge

Why People have trouble with Computers

A system is difficult to use due to the following reasons:

- Too much flexibility:
  - A poorly understood system is always built with more functions than required
  - It results in higher interface complexity
  - A more complex system required more learning and it results in less efficient human performance

Why People have trouble with Computers

- Non-obvious design:
  - Unique and new designs cannot be implemented in a conventional way
  - It requires special skills
  - The outcome of these implementations will not be visible immediately
  - The results cannot always be related to the actions that accomplish them

Why People have trouble with Computers

- Fine distinctions:
  - Sometimes different actions may accomplish the same thing or different things may result from the same action
  - These distinctions are minute and difficult to keep track of
- Use of Jargon:
  - Learning to use a system often requires learning a new language

Why People have trouble with Computers

- Disparity in problem-solving strategies:
  - Most people do not read and follow instructions before taking an action
  - They follow trial and error method to solve the problem
  - This leads to many repeated attempts of actions

Why People have trouble with Computers

- Design inconsistency:
  - Many design inconsistencies may result in the user requiring to memorize ways to perform the actions when using different designs or systems
  - Same action may have different names such as “save” and “keep,” or “write” and “list”
  - Same information may be ordered differently on the screen

Responses to Poor design

Responses to Poor design

- In a computer-based system, the magnitude of errors is almost 46 percent for commands, tasks, or transactions
- Errors are symptoms of problems and they may lead to two types of user responses:
  - Psychological
  - Physical

Psychological User Response

The psychological responses diminish user effectiveness because there are severe blocks to concentration. Following are psychological user responses to poor interface design:

- Confusion:
  - Detailing of a content overwhelms the perceived structure
  - Meaningful patterns are difficult to ascertain
  - The conceptual model or underlying framework cannot be understood or established

Psychological User Response

- Annoyance:

Users get annoyed due to the following reasons:

- Inconsistencies in design
- Slow computer reaction times
- Difficulties in quickly finding information
- Outdated information
- Visual screen distractions and obstructions that prevent a task from being completed

Psychological User Response

- **Frustration:**
  - **Users get frustrated when they are not able to easily convey information to the computer**
  - **When they are unable to finish a task or an unexpected response cannot be undone**
  - **Also, if a system is not flexible then the user gets frustrated**

Psychological User Response

- **Panic or Stress:**
  - **A complex system is very taxing on a person's perceptual and cognitive abilities which results in panic and stress**
  - **Also, long delays occurring when a user is operating under a deadline or dealing with an angry customer can lead to panic and stress**

Psychological User Response

- **Boredom:**
  - As opposed to a complex system resulting in stress, an oversimplistic way of doing jobs or tasks can result in boredom in users
  - Person's perceptual and cognitive abilities are underused
  - Slow response times or long download times can create boredom

Physical User Response

Physical User Response

People expect that the benefits of the actions are more than the cost or the effort to do it. But when the reverse happens, the following physical reactions are seen in the users.

- Abandonment of the system:
  - The users can reject a system and rely upon other sources of information
  - In the earlier days, the managerial and professional personnel in business systems followed this method

Physical User Response

- Partial use of the system:
  - Most of the time, only a portion of the system's capabilities are used
  - Only those operations that are easiest to perform or that provide the most benefits are used and many system aspects go unused

Physical User Response

- Indirect use of the system:
  - The manager or other higher authority places an intermediary between the user and the computer
- Modification of the task:
  - When a problem is unstructured and the tools are not very flexible, the task is changed to match the capabilities of the system

Physical User Response

- Compensatory activity:
  - In a system with inadequate features, additional actions are performed
  - For example: Clerical personnel can format information manually to match the structure required by the computer

Physical User Response

- Misuse of the System:
  - Sometimes, the system integrity may get lost when rules are broken to cope with operational difficulties
- Direct Programming:
  - When the users have specific needs, they reprogram the system. This is usually done by a sophisticated user

People and their tasks

People and their tasks

All computer users show the following features:

- They may not read the documentation
- They do not understand how much a computer can help to solve their problems
- They may not know much about the information available to solve their problems

People and their tasks

- As the system designer are often isolated psychologically and physically from the users' situations, they may not understand the user's technical skills

- Unlike these users, the system designers are capable enough to solve most of the system problems
- System designers assume that anyone is capable to use the system they created

People and their tasks

- The users do not care about how technically sophisticated the system is
- Their main aim is to complete the task or get satisfied
- Today's users have a level of expectations w.r.t design of the system

Human Characteristics in design - Perception

Perception

Perception:

- **Perception is the understanding of the elements and objects of our environment**
- **The understanding happens through the physical sensation of our various senses like sight, sound, smell**
- **The main goal of interface design is to utilize our perceptual capabilities so that a screen can be structured in the most meaningful way**

Perception Characteristics

- **Proximity:**
  - **Objects that are spaced nearby are perceived by our eyes as belonging together**
- **Similarity:**
  - **Objects that have the same color, size, shape, brightness, or orientation are perceived by our eyes as belonging together**

Perception Characteristics

- Matching patterns:
  - Objects of the same shape but different sizes are responded similarly
- Succinctness:
  - Perfection and simplicity are easier to remember, so people tend to see an object as having some perfect or simple shape

Perception Characteristics

- Closure:
  - Our perception is synthetic; it establishes meaningful wholes
  - If something does not close itself, such as a circle, square, triangle, or word, we see it as closed anyway.
- Unity:
  - Objects that form closed shapes are perceived as a group

Perception Characteristics

- Continuity:
  - Shortened lines may be automatically extended
- Balance:
  - People desire stabilization or equilibrium in their viewing environment so vertical, horizontal, and right-angled objects are visually satisfying

Perception Characteristics

- Expectancies:
  - What we expect influences our perception
  - So, we tend to perceive what we want and not what is there
  - For Example: when we are proofreading a document, a mis-spelled word is missed as we do not see how a word is spelled, but how we expect to see it spelled

Perception Characteristics

- Context:
  - Perception is also influenced by context, environment, and surroundings
  - For Example: Based on the angle of adjacent lines or on the cues given by others about the size of the lines, two drawn lines of the same length may seem to be of the same length or different lengths

Perception Characteristics

- Signal versus noise:
  - There is a type of perception called figure-ground perception. Here, the object of interest is the figure or signal, and its background is known as the ground
  - Signals, or figures, are more quickly perceived and understood if they are easily distinguishable from noise, or background, in our sensory environment

Human Characteristics - Memory

Memory

- The difference in the ability to recognize or recall words is an important consideration significant for interface design
- Human beings can recall words between 2,000 and 3,000 and can recognize around 100,000 numbers
- Memory mainly consists of 2 components: long-term memory, short-term memory
- During searching tasks, long-term memory can help recognize objects

Memory

- The power of recognition is more than our power of recall
- A system can be made more usable if memory loads are reduced
- It also reduces the need for mental integration, aid recall, and expand working memory

Ways to reduce Memory load

- Information should be presented in an organized, structured, familiar, and meaningful way
- Control over the pace of information presentation should be given to the user
- As people can remember a few items for only 3 or 4 seconds, all the required information for task performance can be placed in close physical proximity

Ways to reduce Memory load

- Important items can be recalled faster by placing them at the beginning or end of the listing
- Information that needs comparison can be placed close by
- If screen reading speed is required, users should not be given other tasks which require using working memory
- To make remembering easy, important items can be made unique or distinctive in some manner

Human Characteristics – Sensory Storage

Sensory Storage

- Information collected from our senses is stored in a buffer known as Sensory storage
- This storage process happens unconsciously and the information is being constantly replaced by newly gathered stimuli
- So, the sensory storage acts as a radar, which scans the environment for things that are important to pass on to higher memory

Sensory Storage

- Sometimes this process is overwhelmed by surrounding noise
- In the presence of such noise, the detection of objects becomes difficult
- Interface should be designed with less noise and all elements presented should serve a definite purpose

Visual Acuity, Foveal and Peripheral Vision

Visual Acuity

- Visual Acuity is a phenomenon by which our eye can resolve details in an object
- An object becomes more distinct when our eyes are fixed on it and become less distinct when we turn our eyes away
- This phenomenon is used by interface designers when screen groupings are considered

Visual Acuity

- For modern personal computer displays, the recommended viewing distance has been increased to about 24 inches
- This increased distance along with variations in font sizes has made the calculation of the exact “chunk” size and a viewable number of characters difficult to calculate
- Most of the time, small visual chunks will exist on screens and these chunks should be considered in the design

Foveal and Peripheral Vision

- Foveal and Peripheral Vision help the interface designers to design screens, to aid visual search and also to help in improving the attention of the user
- Foveal vision is used to focus directly on an object, whereas peripheral vision helps us to sense the area surrounding it
- Limitations in the visual acuity make this surrounding area unclear

Foveal and Peripheral Vision

- Foveal and peripheral vision maintain a cooperative and competitive relationship
- Cooperatively, peripheral vision aids a visual search, but can also be distracting
- Also, it provides hints to where the eye should go next in the visual search of a screen

Foveal and Peripheral Vision

- Competitively, peripheral vision can compete with a foveal vision for attention
- For Example: Information about the periphery is passed on to our information-processing system along with foveal information. This can be termed visual noise.

Information Processing and Mental models

Information Processing

- Important information collected by our senses must be processed in a meaningful way
- The information is processed on two levels and these two levels function simultaneously

Higher level:

- It is identified with our consciousness and working memory
- It is limited, slow, and sequential

Information Processing

- Used for reading and understanding
- Perform reasoning and problem-solving

Lower level:

- It processes familiar information along with the higher level
- Its capacity is unknown
- Happens without conscious effort
- Perceives the physical form of the information

Information Processing

- When a new system or screen is presented to a user, all the components such as its title, the controls, and other information it contains are looked at consciously
- Here a higher level of information processing happens
- As familiarity grows, only a glance is needed to identify the screen components

Information Processing

- The shape and structure can help the user identify the correct screen needed in that context
- Now the lower level of information processing happens

Mental Models

- People develop mental models of things and also of other people with whom they interact, based on, their previous life experience and their culture
- These models are gradually developed and they enable a person to do actions or predict them as required
- In the similar way, a person who has used the computer system has formed a mental model

Mental Models

- Users have expectations and preconceptions based on their previous usage
- If the new system conforms to the mental models a person has developed, the model gets reinforced and the system's use feels more comfortable
- If not, interference occurs and learning the new system becomes difficult

Mental Models

- Hence, a user's mental models should be identified and understood while designing the interface

Movement Control

- Based on what we see and perceive, an action is taken or response is made
- In computer systems, this response is a movement such as pressing keyboard keys, moving the screen pointer by pushing a mouse or rotating a trackball, or clicking a mouse button
- Fitts' law states that "the time to acquire a target is a function of the distance to and size of the target"

Movement Control

The implications in screen design are as follows:

- Provide large objects for important functions
- Take advantage of the pinning actions of the sides, top, bottom, and corners of the screen

Learning

- People learn new things by coding the long-term memory information which is present in the short-term memory
- If the learning time is reduced, the performance increases
- People are very sensitive to even minor changes in the user interface, and this makes transferring them from one system to another difficult

Learning

Learning benefits the users in the following ways:

- Prediction of the location of the common screen or page elements before they are displayed
- Movement of the mouse pointer to the area of an expected target before the target appears on the screen by experienced users

Skill

- Skills in human beings help them to perform an action in the correct time sequence with the required precision
- Human effort can be saved when our actions and work pace result in optimum efficiency
- This is achieved by learning to use shortcuts, working at a higher speed, and having easier access to information or data
- The design of a system and its screen should allow the development of increasingly skillful performance

Individual Differences

- Human beings differ in their characteristics such as looks, feelings, motor abilities, intellectual abilities, learning abilities and speed, and so on
- These individual differences complicate the design of user interfaces
- The interfaces must be designed to suit the widely varying characteristics to satisfactorily and comfortably learn the task or job, or use the Website

Human Considerations in design of Business System

Introduction

- In addition to the human characteristics considered for interface design, a set of user/task characteristics need to be considered in the design
- These are summarized under four categories as follows:
  - Knowledge/Experience of the User
  - JOB/TASK/NEED of the User
  - Psychological Characteristics
  - Physical Characteristics

Knowledge or Experience of the User

- Knowledge about the usage of Computer
- Experience of interacting with a system
- Experience of using similar applications
- Experience or knowledge about the task
- Experience of some other systems used to do the same task
- Education level of the user
- Typing Skill of the user
- Native Language or Culture of the user

Job, Task and Need of User

- Based on the place where the interface is used and its need, the design issues are as follows:
  - Type of the System used: Mandatory or discretionary use of the system
  - Frequency of use: Continual, frequent, occasional, or once-in-a-lifetime
  - Task or Need Importance: High, moderate, or low importance

Job, Task and Need of User

- Task Structure: Repetitiveness or predictability of tasks being automated
- Job Category: Executive, manager, professional, secretary, clerk
- Lifestyle For Web e-commerce systems: Hobbies, recreational pursuits, and economic status

Psychological Characteristics

Characteristics	Possible values
Attitude	• Positive, neutral, or negative feeling toward job or system
Motivation	• Low, moderate, or high due to interest or fear
Patience	• Patience or impatience expected in accomplishing a goal
Expectations	• Kind and reasonableness
Stress	• Level High, some, or no stress generally resulting from task performance
Cognitive Style	• Verbal or spatial, analytic, or intuitive, concrete or abstract

Physical Characteristics

Characteristics	Possible values
Age	• Young, middle-aged, or elderly
Gender	• Male or Female
Handedness	• Left, right, or ambidextrous
Disabilities	• Blind, defective vision, deafness, motor handicap

Human Interaction Speed

Introduction

- Human Interaction Speed is generally measured in terms of words per minute
- Interaction speed in terms of following communication methods need to be considered:
  - Reading: The speeds can differ during prose text, proofreading on paper or monitor
  - Listening: listening to audio books, video narrations

Introduction

- Speaking to a computer: Speech recognition
- Keying: Speed is different for a fast and average typist
- Hand printing: Speeds differ for memorized text and copying

UNIT 2
User Interface Design Process

Understand the Business Function

Introduction to Business Functions

Steps in the Business Functions

In general, Business Functions consist of following steps:

- The business definition is created and requirement analysis is done
- Basic business functions are determined
- The activities are described through task analysis
- A conceptual model of the system is developed
- Design standards are established
- Design goals for system usability established
- Training and documentation needs are defined

Business Definition and Requirement Analysis

- In this phase, the need for the system is established
- Later, based on the input from users, and marketing, the product is described
- There are four sub-phases in the implementation of this phase:
  - Information Collection Techniques
  - Defining the Domain
  - Considering the Environment
  - Possible Problems in Requirements Collection

Information Collection Techniques

- There are two main techniques for collecting the information: Direct and Indirect methods
- Direct method: Here requirements are collected through face-to-face meetings with users
- Indirect method: This method makes use of an intermediary, someone or something, between the users and the developers

Requirement Analysis

- The developer should have knowledge of the policies and work culture of the organization being studied
- The developer should understand the current system or process before the new system replaces it

Information Collection Techniques - Direct Methods

Direct Methods

- There are eight direct methods proposed to collect information from the potential users

Individual Fact-to-Face interview: Here a questionnaire can be prepared for the user which can get information about the following:

- Activities performed to complete a task and methods used to perform those activities
- Any interactions exist with other people or systems

Direct Methods

Telephone Interview or Survey:

- **This method is not very useful, but a planned and well-structured interview that is informed well in advance can get enough information from the user**
- **These interviews are less expensive**

Direct Methods

Traditional Focus Group:

- **A small group of users (8 to 12) and a moderator together discuss the requirements**
- **The questions from the moderator help him to get information on users' experiences, attitudes, beliefs, and desires, and to obtain their reactions to ideas or prototypes**
- **A video recording of the discussion can provide insights into the user needs for all developers**

Direct Methods

The focus group should do the following:

- Objectives of the session should be established
- Typical users or potential users should be selected as participants
- A skilled moderator should be chosen to facilitate discussion on the relevant topics
- Take good notes and clarify issues using the session recording

Direct Methods

Facilitated Team Workshop:

- This provides a less formal discussion
- They can also provide useful information in less time

Requirements Prototyping:

- A demonstration model, or very early prototype, is presented to users for their comments concerning functionality and to clarify requirements

Direct Methods

Observational Field Study:

- The designers visit the sites of work and observe the activities of the client users
- They study the environment of the office or home for some time
- It can be time-consuming and expensive
- Sometimes this observation can disturb the user and change his performance and behavior

Direct Methods

- Video recording of the observation sessions provide a permanent record and permit a later detailed task analysis

User-Interface Prototyping:

- A demonstration model, or early prototype, is presented to users to uncover user interface issues and problems

Direct Methods

Usability Laboratory Testing:

- **Verbal description about the nature of the work is given by the users to the designers**
- **But these are not always clear, so the designers test their product by in a laboratory by carefully observing its usage and understanding how they use it**
- **They test the results. If there are any errors, they are corrected**

Information Collection Techniques - Indirect Methods

Indirect Methods

These methods have some advantages but can create three main problems:

- Messages may be filtered or distorted either intentionally or unintentionally
- The intermediate person may pass an incomplete or incorrect message due to a lack of understanding of the user's needs
- There could be a political reason for the user and developer not getting directly connected

Indirect Methods

There are twelve indirect methods proposed to collect information from the potential users:

MIS Intermediary:

- The mediating person may be from the Management Information Services department
- He defines the user goals and requirements to the designer
- The disadvantage here is that the mediating person may not have the in-depth knowledge of all the user requirements

Indirect Methods

Paper Survey or Questionnaire:

- **A questionnaire or survey is given to the user in the form of short answer or multiple-choice questions**
- **The questions will be framed by experienced designers**
- **The questions may help in finding the user's attitudes, feelings, or expressions but the actual tasks and behaviors cannot be understood**

Indirect Methods

Electronic Survey or Questionnaire:

- **A questionnaire or survey is given to a set of users via e-mail or the Web**
- **This survey is less expensive and faster that the paper survey**

Indirect Methods

Electronic Focus Group:

- The collection of information and advantages are similar to the traditional focus group but the information is obtained electronically by e-mail or a Web site
- The participation from all the people in the group is even
- More information can be collected in a shorter time
- The disadvantage is that the depth and richness of face-to-face discussions does not exist

Indirect Methods

Marketing and Sales:

- The needs of the users are collected by the company representatives who visit the sites regularly so is inexpensive
- But the business representatives may not have the knowledge of the nature of customers, the business, and the requirements
- The representatives may filter needed information or add some unimportant information

Indirect Methods

Support Line:

- The information collection is only when there are problems, so the sources are customer care team, help-desk and so on

User groups:

- The information in the form of Improvements suggested by customer groups is taken periodically the software usage is evaluated

Indirect Methods

E-Mail, Bulletin Boards, or Guest Book:

- The information collection is in the form of problems, questions, and suggestions by users posted to a bulletin board, a guest book, or through e-mail are collected and evaluated
- The focus is only on problems
- This information depends on the recommendations generated by the users who are most of the time unhappy
- This method is inexpensive

Indirect Methods

Competitor Analysis:

- **Reviews of competitor's products, or Web sites, can also be used to gather ideas**
- **The designers can perform this evaluation or, even better, users can be asked to perform the evaluation**

Indirect Methods

Trade Show:

- **Expert customers attending a trade show will be exposed to a prototype, so they can provide a superficial view of the important features**

Other Media Analysis:

- **The information on the media in the form of print or broadcast or other process in which it is presented may be used to collect ideas and design requirements**

Indirect Methods

System Testing:

- **The system test results which give the new requirements can be gathered, evaluated, and implemented if needed**

Defining the Domain

The domain knowledge about the system to be developed can be collected from domain experts or partially by reviewing documentation from the old manual process or the current computer system

Considering the Environment

- The environment where the system is going to be used is considered before the system design
- Physical environment considers issues like lighting, temperature, and other issues
- Safety environment considers health issues and hazards
- Social environment considers issues related to user's interaction with each other

Considering the Environment

- Organizational environment is the integration all the people in the network and the technology

Possible Problems in requirements collection

The requirement collection may be hindered due to the following reasons:

- The number of users and customers involved may be less
- Less Management and coordination during requirement collection
- Participants may not communicate properly
- Difficulties may be faced during the collection of relevant information
- People with relevant information may not be available due to heavy workload

Understanding User's Work

Determining the Basic Business Functions

- The Basic Business Functions are determined in order to understand and describe the functionality of the product
- These functions are determined by performing the following tasks:
  - Understanding the User's work
  - Developing conceptual models

Understanding Users' Work

In this phase of the interface design, the aims and goals of the people using the system are described in order to provide the necessary functionality.

Task Analysis:

- Helps in meeting the goals of the users
- Makes the designer understand the functionality of the computer
- Describe the user activities and the ways of performing them

Understanding Users' Work

- Uses the mental model of the user
- Provides information concerning workflows such as,
  - The interrelationships between people, objects, and actions
  - The user's conceptual frameworks

Understanding Users' Work

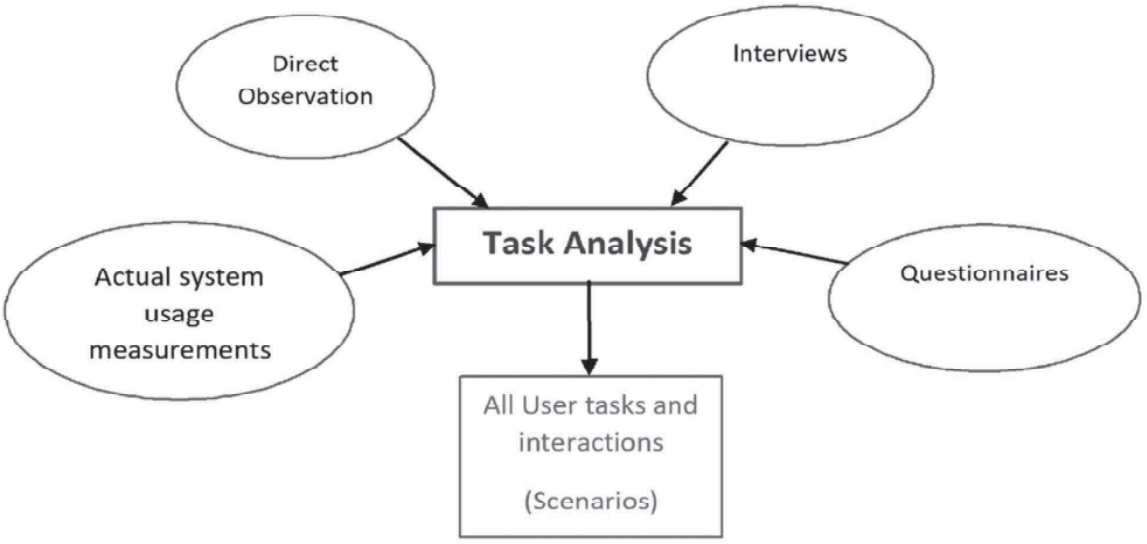
Mental Models: Enable a person to understand, explain and do things. These are a representation of a person's understanding of,

- Their own self
- Other people
- The environment
- Things with which they interact

Understanding Users' Work

Performing a Task Analysis:

- It is performed by breaking down the user's activities to the individual task level
- Goal is to find out why and how user's do the jobs manually which are to be automated
- Knowing why establishes work goals
- Knowing How provides the details of actions to be performed



Developing Conceptual Model

Developing Conceptual Models

- A conceptual model is a framework which shows the system's functions
- This model is the output of the task analysis stage
- This model describes the following:
  - How the interface will present objects
  - Relationship between objects
  - Properties of objects
  - Actions that will be performed

Developing Conceptual Models

- The model is based on the user's existing mental model
- The conceptual model when presented to a user, a new useful system mental model is created
- The system mental model is based upon the system's behavior, which include factors like system inputs, actions, outputs (including screens and messages), and its feedback

Developing Conceptual Models

Guidelines for Designing Conceptual Models: The model should reflect the user's mental model.

- Draw physical analogies or present metaphors
- Comply with expectancies, habits, routines, and stereotypes
- Provide proper and correct feedback
- Avoid anything unnecessary or irrelevant
- Provide documentation and a help system that will reinforce the conceptual model

User's New Mental Model

User's New Mental Model

- When a new system is implemented and presented to a user, the person interacts with the new system and its interface
- Also, the user tries to understand the system based upon the existing mental model
- If the designer has correctly reflected the user's mental model in design, the user's mental model is reinforced

User's New Mental Model

- With the continuous system interaction, the user's concept of system mental model will get influenced and the mental model may be modified
- Refinement of this mental model, is aided by well-defined distinctions between objects and by being consistent across all aspects of the interface

User's New Mental Model

- Documentation and training will be provided when a gap exists between the conceptual model and the mental model the user would bring to the new system

Design Standards or Style Guides

Design Standards or Style Guides

- In interface design, design standards describe the appearance and behavior of the interface
- They provide guidance on the proper use of system components
- They also define the interface principles, rules, guidelines, and conventions that must be followed in detailed design
- Design standards or guidelines help in achieving design consistency

Users Benefits-Design Standards/Style Guides

- Allow faster performance
- Reduce errors
- Reduce training time
- Foster better system utilization
- Improve satisfaction
- Improve system acceptance
- Reduce development and support costs

Developers Benefits - Design Standards/Style Guides

- Increase visibility of the human-computer interface
- Simplify design
- Provide more programming and design aids, reducing programming time
- Reduce redundant effort
- Reduce training time