

## Unit 1

### What is a User Interface (UI)?

The UI is the point of interaction between a user and a computer system. It's everything you see and interact with on the screen, including:

- Visual elements: buttons, menus, icons, text, graphics
- Input methods: keyboard, mouse, touch screen
- Output methods: displays, speakers

In essence, the UI acts as a bridge, translating the computer's internal workings into something users can understand and manipulate.

### Importance of Good UI Design

Good UI design is crucial for a positive user experience. Here's why:

- Usability: A well-designed UI is intuitive and easy to learn. Users can quickly understand how to achieve their goals without getting frustrated.
- Efficiency: A good UI allows users to complete tasks quickly and with minimal effort. This saves time and increases productivity.
- User Satisfaction: A user-friendly interface is enjoyable to interact with. It leaves users feeling satisfied and more likely to return to the system.
- Increased Adoption: A clear and intuitive UI encourages people to adopt and use a new system.
- Reduced Support Costs: Easy-to-use interfaces require less technical support, saving companies money.
- Brand Image: A well-designed UI reflects positively on a brand, making it appear professional and trustworthy

### Benefits of Good UI Design

Investing in good UI design leads to several benefits for both users and developers:

- Increased User Engagement: Users are more likely to stick with a system that is easy and enjoyable to use.
- Reduced Errors: A clear UI minimises user mistakes, leading to more accurate data entry and task completion.
- Improved Accessibility: Good UI design considers users with disabilities, making the system usable for everyone.
- Lower Development Costs: A well-designed UI can be easier and faster to develop, reducing overall project costs.
- Competitive Advantage: A user-friendly interface can give a product a significant edge over competitors.

## GUI

GUI- stands for graphical user interface - is an interface through which humans interact with electronic devices through use of icons menus and other visual indicators

### Popularity of GUI

- Revolutionised Design: Graphics transformed user interfaces from text-based interfaces to visually rich experiences.

- From Flat to 3D: Text-based interfaces were limited, while GUIs offered a more dynamic and three-dimensional feel.
- Pointing Devices: The keyboard took a backseat to pointing devices like the mouse for selecting objects and actions.
- Faster & More Responsive: Increased computer power led to quicker and more dynamic interactions between user and system.
- The Desktop Metaphor: The **WIMP interface (Windows, Icons, Menus, Pointer)** mimicked a physical desktop for a familiar experience.
- Efficient Information Processing: Graphics leveraged human visual processing for faster information transfer and understanding.
- Reduced Cognitive Load: GUIs minimised the need for mental recording and reorganisation of information, easing user burden.
- Data Visualization: Graphics enabled better representation of data like trends and relationships, simplifying information comprehension.
- Engaging & Customizable: GUIs offered a more visually appealing and customizable experience compared to text-based interfaces.

## Direct Manipulation

- Screen is seen as an extension of the real world
- All the actions possible are already known to the user
  - Cut, copy, paste, move, delete, undo, save, etc
- User is already aware of the objects and actions on the screen
- Cursor action is performed in a natural and obvious way
- Continuous information on screen of all objects present
  - Labelled buttons replacing complex syntaxes.
- Rapid and Increasing actions with rapid feedback (aka immediate visual feedback)

## Characteristics of GUI

- Sophisticated Visual representation
  - Visual aspect of interface
  - Lines, drawings, icons
  - Fonts of diff. sizes, styles
  - Diff. colours, animations, videos etc
  - Screen based controls (text box, list box, scroll bar etc)
  - Icons (Prog/files)
  - Mouse pointer & cursor
- Pick and Click interaction
  - Elements on graph screen upon which action is to be performed
  - Motor activity->Pick
  - Mouse and buttons
  - The text then specifies an action to be performed with the mouse:
    - Move Pointer (Pick)
    - Rapid selection and feedback
    - Action signalled (click)
- Restricted set of Interface options
  - What you see is what you get

- Nothing less, Nothing more
- Limited choices available on screen
- Visualisations
  - Cognitive process that allows users to understand the information which is difficult to perceive
  - Best method is to gain insights from data
  - Gives more insights , increases efficiency , faster and more accurate data
- Object orientation
  - Objects can be seen on screen.
  - Manipulated as a single unit.
  - Can have sub objects.
  - Operations can be applied to objects.
  - eg. range of cells in spreadsheet, words in a paragraph, paragraph of text in a document
  - Container collection of one or more objects.
  - Persistence (maintaining state of object (eg. window size, scroll position and so on.)
- Use of recognition memory
  - Constant visibility
  - Out of sight out of mind

### The web user interface

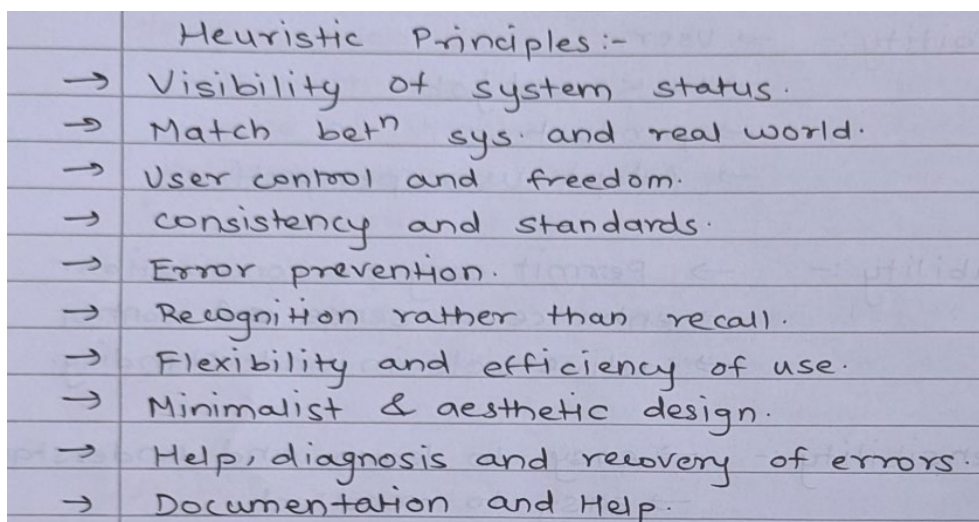
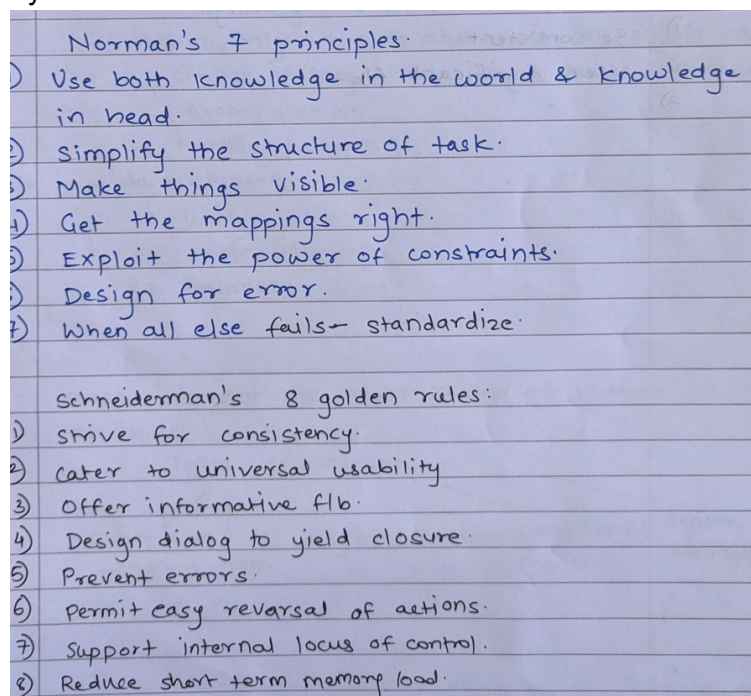
- deals with navigation and info presentation.
- balance of structures, menus, Content and graphics.
- well structured hierarchy of menus and pages in a natural way.
- ease of use.
- HTML had limited obj. and interaction styles.
- Arch and task flows can't be standardised

	# Difference between GUI and web page design.	
	Web	GUI
Designer	anyone.	Professionals.
Nature	as per <sup>Content</sup> navigation	as per functionality/app <sup>n</sup>
Technology	Low risk / user testing	Moderate risk, S/W testing
Disciplines	Info. arch, human, graphics, Marketing	Inf. Tech, Appl <sup>s</sup> specialist
Usability	depends on designer profile.	Depends on dev-proces

### Principles of design

- Aesthetically Pleasing
  - Meaningful contrast between screen elements
  - Create groupings
  - Alignment of elements and groups
  - 3d representation
  - Simple and effective use of colours and graphics.
- Clarity

- Visually, Conceptually and Linguistically clear
- Clear visuals
- Word and Text and functions
- Compatibility
  - With users
  - Task and job
  - Product
  - Adopt users Perspective
- Configurability
  - Increase customization
  - Sense of control
  - Active role understanding
- Comprehensibility
  - Easy to learn and understand
  - Easy to recollect



## **Design Process**

### **Human interaction with computers**

- Users experience and knowledge will influence iterations and considerations
- Considerations
  - Users wants and needs
  - Ability / possible physical limitations
  - Users perceptions

### **Human characteristics**

1. Perception
  - Users awareness and understanding of elements and awareness
  - Proximity - Spacial awareness
  - Similarity - eyes and brain see similar stuff if they have same shape colour etc
  - Matching patterns
    - Closure
    - Unity
    - Balance
    - Continuity
2. Memory
  - Memory is not the most stable element
  - Types of memory
  - Sensory Memory
    - Allows you to remember sensory information after the simulation has occurred
    - Is there for a short time
    - Iconic - Visual
    - Echoic - Audio
    - Haptic - touch
  - Short term
    - Allows one to remember specific topics for a brief duration
    - Known as primary active memory
    - Needs to be rehearsed to retain memory
  - Working memory
    - Involves the active and small amount of information that a person recalls and allows us to do cognitive tasks
    - Is a part of short term memory
  - Long term memory
    - Any memory which can be recalled after 30 seconds
    - Explicit - conscious retention
      - Semantic
      - Episodic
    - Implicit - unconscious retention

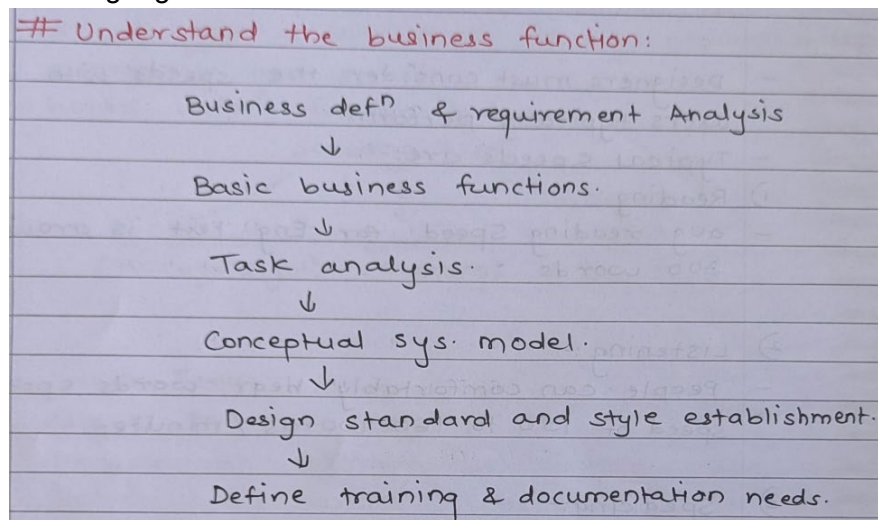
### **Human speeds**

Need to know at what speeds human can do tasks to help make design decisions

- Reading in english - 250 - 300 words a min
- Speaking - dictating to computers 105 words a min
- Listening - 150 - 160 words a minute
- Typing - on an average is 35 words per min

## Gaining a understanding of users

1. Visit user locations to know work environment.
2. Talk with users about difficulties, wishes etc. Establish direct comm. (contextual enquiring).
3. Observe users performing their task.
4. Videotape users working on a task.
5. Learn about work organisation.
6. Have users think aloud.
7. Try the job yourself.
8. Prepare surveys and questionnaires.
9. Establish target goals.



## Unit 2

### Design goals

### Screen planning and purpose

#### Purpose

- Reflect capabilities, need and tasks of users
- Achieve Business objective

#### Need of screen User:-

- orderly, clean, clutterfree appearance.
- obvious indications of what is shown & what is to be done
- simple language.
- simple entry & exit options.
- indication for permanent actions

### Organising Screen Elements

#### Consistency

- Provide an obvious staring point like upper left corner
- Information should be visible
- Maintain real world consistency ,internal consistency
- Follow same conventions and rules across all related interfaces

- Divide info into logical and sensible units
- Organise depending on interrelationships
- Ordering schemes
  - Conventional
  - Sequence of use
  - Frequency of use
  - General to specific
  - Importance

## Screen Navigation and flow

### Consider human eye perception is :

- From dark to light
- Big to Little
- Unusual shape to usual
- Saturated to unsaturated

### Things to keep in mind

- Use of natural movement sequence
- Minimise pointer eye movement distance
- Locate more frequently used elements on top left
- Maintain Top to Bottom or left to right flow
- Locate command buttons at the end of the screen

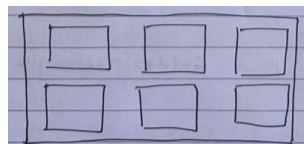
### Navigation on screen to

- Alignment of elements
- Grouping of elements
- Using line border

## Visually Pleasing Composition

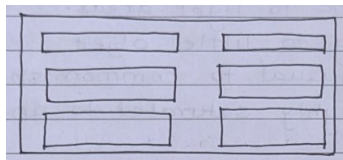
### 1. Regularity

- Create regularity by maintaining same sizes fonts across pages
- Establish standard and consistent horizontal and vertical spaces



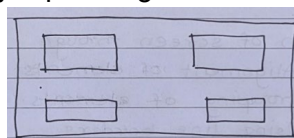
### 2. Balance

- Maintain balance by keeping equal amount of elements on both left and right and top and bottom parts of the screen



### 3. Symmetry

- Create Symmetry by replicating elements on left and right of the screen



### 4. Sequentiality



- a. From brighter to less bright elements
  - b. Bigger to smaller elements
  - c. Graphics before texts
  - d. Color before black and white
  - e. Saturated colors before unsaturated
5. Unity and Proportion
  - a. Show unity by using same text, font, size, shape, color etc
  - b. Proportions - Square = 1:1 golden rectangle = 1:1.6
6. Simplicity
  - a. Optimise no of items on screen
  - b. Use standard grids
7. Groupings
  - a. Meaningfully divide elements in groups
  - b. Use line borders between groups
  - c. White space as distinction between groups
  - d. meaningful title for each group

### Amount of information

- Present proper amount of information on a screen
- Too little - insufficient
- Too much - confusing
- Restrict window density level to 30 percent
- Use decisions on one screen

# Focus and Emphasis:-

- Visually emphasize most prominent ele.
- central idea.
- White spaces.
- higher brightness.
- larger font.
- Underlining
- Blinking
- Boxes/ frames.
- Contrasting colors.
- larger size.
- positioning
- Isolation

# Presenting Info<sup>n</sup>:

- noticeable and distinguishable info<sup>n</sup>.
- attractive, identifiable info<sup>n</sup>.
- Use of diff. screen elements.
- Visually distinct.
- Consistent.

# Info<sup>n</sup> retrieval on web.

- comb<sup>n</sup> of HCI and IR.
- exploratory search (querying & browsing)
- engaging
- support info<sup>n</sup> life cycle.
- flexible arch.



## # statistical graphics:-

- S.G. is a picture of mathematical knowledge in graphs.
- These are used for info. storage and stat. data analysis.

### - Types:-

#### 1) Bar Graph:-

- representation of info<sup>n</sup> on horizontal and vertical bars.
- represents total quantity of obs. and knowledge.
- plottes on x-y axis.
- help in matching multiple set of info<sup>n</sup>.
- used in quantitative data representat<sup>n</sup>.

#### 2) Pie Chart:-

- Circular charts that are divided into classes by radial lines.
- every sector is a ~~part~~ as an entire.

#### 3) Histograms:-

- displays the discovered frequencies of info<sup>n</sup>. bin.
- Hist. can show binned response knowledge.
- Ht. of bars represent the ratio of obs. of info<sup>n</sup>.

#### 4) Scatter plots:

- 2-3 dim. plot that shows common variation of 2 or 3 variables.
- co-ord. correspond to info. values for a single obs.

#### 5) Line graphs:-

- used to represent cont. data.
- generally used in weather forecasts.
- used to depict quantitative data.

## # Uses of stat. graphs:-

- Improved understanding
- detect patterns of correlations.
- can be made a part of presentations.

## # Limitations:-

- Oversimplifying data may <sup>be</sup> misleading ~~the~~ insight
- Bargraphs fail to show main assumptions.

#	Technical considerations in graphic design:
-	Physical chara. of the device and internal s/w affects the screen interface design.
	Graph Compatibility must be ensured with foll. components:-
1)	System Power
2)	Screen Size
3)	Screen Resolution
4)	Display colours
5)	Other display feature
6)	Development & Implementation of tools
7)	Platform style

## Windows

Main four types

- Primary window
  - A window in which users main interaction with data or document takes place
  - An application can have any amounts of primary windows that can be opened ,closed, minimised , reshape independently
- Secondary window
  - It's a supportive window alongside the primary window
  - Users can view and provide additional actions or information about the primary window
- Utility Window
  - Its content affect an active primary window
  - It cannot be closed like other windows they remain open even when primary window is minimised or closed
  - Eg - tools - palette
- Plain Window
  - A window with no title or window controls

## Navigation schemes

Navigation pane

- Key part of a structured docs
- Primarily used for navigation
- Visual alignment

Scroll pane

- Specialised container offering uses with vertical and horizontal scroll bars
- Help user control which part of the window is visible
- Scroll pane can be set to visible or invisible
- Scroll bars are set to a element like text area which is placed inside a scroll pane

Scroll bar

- User to control a part of document or list
- Appear along the left bottom and right side of the screen
- Scroll box represents the proportion of window that is currently visible

## Tabbed panes

- Help user switch between different content panes that share the same space (eg google chrome tabs)
- Can be chosen by selecting corresponding tabs
- Rules
  - Use headline Capitalisation
  - Provide short forms (mnemonics)
  - Never nest
  - Divide content in several dialog boxes components

## Split panes

- Allows to resize windows inside a pane
- Include zoom buttons inside this

## Desktop pane

- Pane placed inside a window

## Selection of windows

- Area of screen visible to user
- Can be removed or rendered independently
- Window can be small or large

	selection Parameters :-
1) Window Chara:-	
-	must be identifiable.
-	must have height / width.
-	visible.
-	located on screen in permissible area.
-	arranged in tiles / cascade / overlap in rel <sup>n</sup> to other windows.
-	able to manipulate on screen.

## Screen based controls

↓	↓	↓	↓	↓
Operable Controls (Buttons)	Text Entry/ Read only Controls (Text box)	Selection Controls (Radio Button checkbox)	Comb <sup>n</sup> Entry/ Sel <sup>n</sup> Controls. (Spin-box)	Presentation Controls. static text field. (Read only).
→ sq. or rect. shape	→ rect. shape	→ circle / $\diamond$ / $\Delta$		→ clarify a screen
→ labeled.	→ captioned.	→ choice descript <sup>n</sup>		
→ to start action.				
→ to change prop.	Single line → flexible → less space consumption	Multiple line		

## Device based controls

### # Device Based Controls:-

- 1) Trackball
- 2) Joystick
- 3) Graphic Tablet
- 4) Touch screen
- 5) Pen
- 6) Voice
- 7) Mouse
- 8) Keyboard

### Unit 3