

**1. What are three levels processing and seven stages of Action ? How they are interrelated to each other?**

**Three Level of processing.**

**1] Visceral level.**

- The most immediate level of processing.
- Here the human reacts to audio, visual and other aspects of a product before experiencing it.
- The look and feel of the product dominate the user in this level.
- Visceral design often corresponds to creating an aesthetically pleasing appearance.

**2] Behavioral level.**

- The middle level of processing.
- The emotional brain takes control of the decision making.
- We react to the products at a deeper level than that of visceral.
- This level manages simple, everyday actions. here functionality of the product takes prime importance.
- In behavioral design, semantics and usability practices are primarily addressed.

**3] Reflective level.**

- The last level of processing.
- A careful analysis and reflection of all the incidents or experiences is made. The meaning of an experience is stored in our brain.
- Reflective design can tell us about customers inclination towards various ranges of products.

**Seven stages of actions**

1. Goal : The reflective level has analyzed situation and realizes from past experiences.
2. Plan : In this reflective layer gathers from past experiences.
3. Specify : In this behavioral layer has its likes and dislikes. it takes responsibility of choosing perfect option.
4. Perform : The visceral layer looks for physical activities like choosing specific things.
5. Perceive : In this the visceral layer takes care of various audio and visual aspects.
6. Reflect : In this behavioral level reacts to their perceptions with an emotion, we reflect ourselves with particular aspect emotionally.
7. Compare : In this, the reflective level gives a meet to the entire experience, by comparing it with the goals.

**2. Explain fundamental principles of interaction.**

**Affordance:**

- Affordance are the physical clues that lead the user to understand the functionality of the object.
- Example: Shape of the lid of the container and the container itself

**Signifiers:**

- Physical form of showing the functionality
- Example: A sound, printed word or an image
- Handle of door with PUSH written on it

**Perceived Affordance:**

- Perceived affordance is what the user understands by looking at the object. It may be different than what the designer intended to be
- Example: Up and down arrows on lift panel.

Mapping:

- Mapping is the relationship between two objects.
- Get the mappings right.
- Map actions to appropriate consequences.
- Acknowledge every user's action.
- Examples: when you move mouse to the right, cursor also moves to the right.

Feedback:

- A correct mapping of an action to the consequence creates good feedback.
- For every action its consequences should be predictable.
- Create good feedback.

### 3. Seven Stages of Action

- Forming the goal
- Forming the intention (plan)
- Specifying an action (specify)
- Execute the action (Perform)
- Perceive the state of the world (perceive)
- Interpreting the state of the world (reflect)
- Evaluating the outcome(compare)
- **Example:**
- I want to kill my bore dome (goal)
- Movie good idea (plan)
- Check for nearest cinema and show time(specify)
- Purchase a ticket(perform)
- You watch the audio-visual effects of the movie(perceive)
- You interpret the effects to your understanding(reflect)
- After the movie you say " it was good time pass" (Compare)

### 4. Gulf of execution gulf of evaluation

- There is always a gap between what we do and what we wanted to do.
- Norman called this as gulf of execution and Gulf of Evaluation.
- **Gulf of execution:**
- The distance between the options available and the user's goal is the gulf execution.
- Guideline: You need to find if the system provides actions that corresponds to the user's intention.
- **Gulf of Evaluation:**
- The amount of effort a person has to put to interpret the option available on the interface and determine if they will match his intention.

### 5. Gestalt Theory

- Gestalt is a psychology term which means "unified whole".
- It refers to theories of visual perception developed by German psychologists in the 1920s.
- These theories attempt to describe how people tend to organize visual elements into groups
- or unified wholes when certain principles are applied. These principles are:
  - **Similarity**
  - **Continuation**
  - **Closure**
  - **Proximity**

- **Figure and ground**

- **Similarity** occurs when object look similar to one another
- People often perceive them as group or pattern



- **Unity** occurs because the triangular shapes at the bottom of the eagle **look similar**

- **Continuation** occurs when the eye is compelled to move through one object and continue to another object



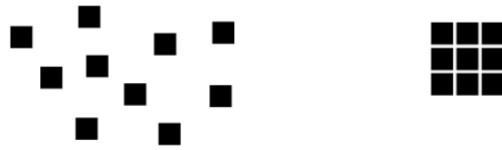
- Continuation occurs here because the smooth flowing crossbar of the “H” leads the eye directly to the maple leaf

- **Closure** occurs when an object is incomplete
- If enough of the shape is indicated, people perceive the whole by filling in the missing information



- Closure occurs here although the panda above is not complete, enough is present for the eye to complete the shape

- **Proximity** occurs when elements are placed close together.



- The squares on the left are placed **without proximity**. They are perceived as separate shapes.
- When the squares are given **close proximity**, unity occurs, they are now perceived as one group.

#### □ **Figure**

- That what is the important subject
- Foreground

#### □ **Ground**

- That what is the environment of the subject
- Background

#### □ The eye actively separate **Figure from Ground**

- Selecting what is important

- This image uses complex figure/ground relationships which change upon perceiving leaves, water and tree trunk.



## 6. Explain common interaction style

### Common interaction styles

- command line interface
- menus
- natural language
- question/answer and query dialogue
- form-fills and spreadsheets
- WIMP
- point and click
- three-dimensional interfaces

## 7. What is HMI?

- Human Computer interaction is the study, planning and design of how people and machine work together so that a person's needs are satisfied in the most effective way
- Human machine Interaction is a field of research that demands equal knowledge of human psychology and technology.

- Norman can be considered the father of the field, as he was the first person to find this relation between humans and interface design.

## 8. What is User Interface?

- Interaction between users and computers (or machine) occurs at the user interface which includes both software and hardware.
- User interface design is a subset of a field of study called “human computer interaction (HCI).
- Interface design is involved in a wide range of projects from computer systems, to cars, to commercial planes; all of these projects involve much of the same basic human interactions yet also require some unique skills and knowledge.

## 9. Human Centred Design

- HCD is to consider all aspects of the target users: likes, dislikes, behaviour, experience, skill sets etc.
- Every user has some kind of experience of real world. The internal representation of something is called user’s mental model.
- Conceptual model must confront to the user’s mental model.
- If end product does not map to the user’s mental model, then product will fail
- Four Aspects of HCD
  - o Feedback: Every action must be acknowledged.
  - o Constraint: Prevents the user from making mistakes. E.g., Date picker to enter date.
  - o Affordance: Convey the rules by leaving visual clues.
  - o Power of observation: Learn from the struggle of others. Observe people.

## 10. AR vs VR

Augmented Reality	Virtual Reality
System augments the real world sense	Totally immersive environment
User maintains a sense of presence in real world	Visual senses are totally under control of the system
Users are able to distinguish between the real world and augmented contents	Users cannot tell the difference between the real and virtual world
Users remain in the real world	Users are transported into a new world.

## 11. What is Goal Directed Design?

- Goal directed design mainly focuses on the design issues related to the specific task that need to be carried out as per user’s requirements.
- Need to answer the following Questions
  - o Who are the users of the system?

- What are the user's task and goals?
- User's expectation levels?
- What functions users need from the interface?
- How does user think the system should work?
- Any extreme environment?
- Is the user multi-tasking?

## **12. Phases of Goal Directed Design**

- **Research**
  - Field survey by contextual Inquiries
  - Interviews of stake holder
  - Outcome:
  - Report on:
    - Who are potential users?
    - What are their expectations?
    - What are other competitive products in the market?
- **Modeling**
  - The outcome of research phase is synthesized into domain and user models.
  - Domain model includes information flow and work flow.
  - User model includes: detailed persona, composite user types that represent distinct behavior , attitude etc.
  - Goals and motivation identified in research phase
- **Requirement Definition**
  - Requirement gathering is done in this phase.
  - Focus is on most important tasks performed by the user.
- **Framework**
  - Focus is on the actual design of the system
  - Here the interaction team prepares the interaction framework; which includes color scheme , visual style etc.
- **Refinement**
  - It has focuses on design details and implementation.
  - This phase may use storyboards.
  - The shortcomings of previous phase are overcome in this phase.
- **Support**
  - The system is sent to the user acceptance.
  - This phase will fulfill the futuristic requirements of the user.
  - Even after user acceptance there may be change after the development (i.e. when user actually uses the system).
  - Continuous refinement and additional development must be done if needed.

### 13. Qualitative vs Quantitative

Quantitative	Qualitative
Quantitative Research is used to quantify the problem by way of generating numerical data or data that can be transformed into usable statistics. It is used to quantify attitudes, opinions, behaviors, and other defined variables	Qualitative Research is primarily exploratory research. It is used to gain an understanding of underlying reasons, opinions, and motivations.
Helps to forecast the use and usability of the interface	It helps to identify any existing same or similar products are available.
Quantitative data collection methods are much more structured than Qualitative data collection methods. Quantitative data collection methods include various forms of surveys – <a href="#">online surveys</a> , <a href="#">paper surveys</a> , <a href="#">mobile surveys</a> and <a href="#">kiosk surveys</a> , face-to-face interviews, telephone interviews.	Qualitative data collection methods vary using unstructured or semi-structured techniques. Some common methods include focus groups (group discussions), individual interviews, and participation/observations. The sample size is typically small, and respondents are selected to fulfil a given quota
It uses non-statistical data analysis	Statistical data is usually in the form of tabulations (tabs). Findings are conclusive and usually descriptive in nature

### 14. What is storyboard?

- User stories are great at capturing product functionality. But they are less suited to describe complex user interactions. This is where scenarios and storyboards come into play: Both are great tools to describe the interaction steps.

### 15. What is persona?

- A user persona is a fictional representation of your ideal customer. A persona is generally based on user research and incorporates the needs, goals, and observed behavior patterns of your target audience.

### 16. Direct and indirect method of information collection technique

- **Direct Methods**
  - Individual face-to-face interview
  - Telephone interview or survey
  - Traditional focus group
  - Facilitated team workshop
  - Observational field study
  - Requirements prototyping
  - User-Interface prototyping
  - Usability laboratory testing
  - Card sorting for Web sites
- **Indirect Methods**
  - MIS intermediary
  - Paper survey or questionnaire
  - Electronic survey or questionnaire
  - Electronic focus group
  - Marketing and sales
  - Support line

- E-Mail or bulletin board
- User group
- Competitor analyses
- Trade show
- Other media analysis
- System testing

## 17. Nielsen's Ten Heuristic Principles

- **Visibility of system status**
  - Users need to be kept informed by the system about what is going on, through appropriate feedback within reasonable time.
- **Match between system and the real world**
  - The system should speak the users' language, with words, phrases and concepts familiar to the user, rather than system-oriented terms. Follow real world conventions, making information appear in a natural and logical order.
- **User control and freedom**
  - Users often choose system functions which they did not want. (Mouse click due to haste). This calls for Support undo and redo. A user needs to have to go through tracing too many steps back to regain control.
- **Consistency and standards**
  - Using different words to mean the same action or using different symbols on different pages can be confusing to the user. Users should not have to wonder whether different words, situations, or actions mean the same thing. They should not be in doubt as to what to do next.
- **Error prevention**
  - By research it is possible to pinpoint the typical errors that users normally tend to commit. Prevention of error is best approach. However, recovery from error prone actions through a well-designed error message should be adopted.
- **Recognition rather than recall**
  - Loading the STM- short term memory of the user beyond a limit has negative consequences. Given a navigation path, a user need not have to remember or recall all the instructions. Users are better at recognising things they have previously experienced. Prompts, visibility, sequential direction, pop-ups etc should come to the aid of the user. Help needs to be easily retrievable
- **Flexibility and efficiency of use**
  - The system can cater to both inexperienced and experienced users. As the user becomes proficient - shortcuts can be encouraged. Thereby increasing the efficiency. Allowing the rearranging of the screen elements by the user can also be adopted
- **Aesthetic and minimalist design**
  - Relevancy, simplicity, minimum number of labels, un cluttered graphics result in efficient communication dialogue between the user and the interface. All unnecessary superfluous elements need to be dropped.
- **Help users recognize, diagnose, and recover from errors**
  - Preventing a user who is about to make a error would be a good approach. Gentle wording of error messages, constructive suggestions, re-educating the user- all



can contribute to a happy self-confident user who is not afraid of being caught unawares or penalized.

- **Provision of Help and documentation**
  - Even though it is better if the system can be used without documentation, it may be necessary to provide help and documentation. Help queries need to be answered promptly without the user having to go through an elaborate eliminating list.

#### **18. Eight Golden Rules of User Interface Design stated by Ben Schneiderman.**

- **Strive for Consistency**
  - Users need to be able to do the same thing the same way that they have been doing - every time.
  - Interfaces need to exhibit 'consistent' quality across screens/ applications both visually as well as behaviourally
- **Cater to Universal Usability**
  - Universal design strives to cater to as wide a range of human users of different characteristics (age, culture, educational level, disability) with a single design.
  - Interfaces need to cater to all levels & classification of users: novice to experts.
- **Offer Informative feedback**
  - Interfaces need to not just to be communicative but also need to inform the user in terms of learning & feedback which tells them that they are proceeding in the right direction.
- **Design Dialogs to yield closure**
  - In an interaction - dialogue needs to have a closure which is recognized by the user as end of an action.
  - Sequence of actions need to proceed in a dialogue by engaging the user in a step-by-step manner.
- **Prevent Errors**
  - Interfaces need to minimize errors. Human Computer dialogue can be designed to minimize and prevent errors made by users.
  - There could be many reasons for user's errors but the user himself or herself is not one of them. Users can make errors while interacting with computers as well as while inputting / interpreting information.
- **Permit easy reversal of actions**
  - Interactions need to build in retracing backwards /reverse actions, if need be, so as give relief from anxiety to the user. The system should encourage exploration without techno fear. One way to do this is to provide a re traceable path backwards of all actions and permit their nullification.
- **Support internal locus of control**
  - Allow user to always feel 'in control' of the system and of the situation.
  - Make the user aware that he/she is in control. User should believe that they are controlling the system and not the other way around. This is achieved by more opportunities for 'interactions'
- **Reduce short term memory load**
  - Allow user to always feel 'in control' of the system and of the situation. Make the user aware that he/she is in control. User should believe that they are controlling the system and not the other way around. This is achieved by more opportunities for 'interactions'

## 19. Donald seven principles for the evaluation of the interaction.

- **Principles underlying the seven-stage model**
- Use both knowledge in world & knowledge in the head
- Simplify task structures.
- Make things visible
- Get the mapping right (User mental model = Conceptual model = Designed model)
- Convert constraints into advantages (Physical constraints, Cultural constraints, Technological constraints)
- Design for Error
- When all else fails – Standardize.

## 20. Principles of User Interface Design

- The Principles of Design can be thought of as what we do with the elements of design to express and communicate a predetermined message of Usability, Reliability, & Functionality in a harmonious fashion.
- **Aesthetically pleasing**
  - o Appeals to our eyes – color, shape, size, images.
- **Clarity**
  - o Not confusing
  - o Interface should be visually, conceptually and linguistically clear
  - o Avoid computer Jargons
- **Compatibility**
  - o User
  - o Task
  - o Product
- **Comprehensibility**
  - o Easy to understand ( what to look at?)
  - o what ,when how where to do
- **Configurability**
  - o Easy to personalize
  - o Desktop view/ mobile view
- **Consistency**
  - o System should look, act and operate the same throughout
- **Control**
  - o Every action has a consequence
  - o Nothing happens without a user action.
- **Directness**
  - o Provide direct ways to accomplish tasks
- **Efficiency**
  - o Reduced hand/ eye movements
  - o Navigation paths should be short
- **Familiarity**
  - o Logos, color scheme, punch lines, music, mascots
- **Flexibility**
  - o Customizable
- **Forgiveness**
  - o Do not tax the user for his mistakes
  - o Exception handlers

- Auto-save
- **Predictability**
- **Recovery**
  - Remember last activity of user
  - User should be able to retract action using *undo*
- **Responsiveness**
  - Every user action has to be responded appropriately and immediately.
- **Simplicity**
  - Don't confuse the user
- **Transparency**
  - User need not understand the working of the system to use it.

## 21. Features of Graphical Interface

- **Sophisticated visual presentation**
  - Objective is to reflect real world of the user realistically, meaningfully, simple and clear
- **Pick-and-Click interaction**
  - (Using mouse and keyboard)
- **Restricted set of interface options**
- **Visualization**
  - Effective visualization can facilitate mental insights and increased productivity
- **Object orientation**
- **Use of Recognition memory**
- **Concurrent performance of functions.**

## 22. Graphical systems advantages and disadvantages

- **ADVANTAGES**
- **Symbols recognized faster than text**
- **Faster Learning**
  - Graphical, Pictorial representation can be easily learned
- **Faster use and problem solving**
  - E.g.: Installation of software
- **Easier remembering**
- **More Natural**
  - Graphical representation is more natural
- **Exploits visual/spatial cues**
  - Visually thinking is believed to be better than logical thinking
- **Fosters more concrete thinking**
  - No need mentally decomposes tasks.
  - Abstract thinking is minimized
- **Easily reversible actions**
- **Fewer errors.**
- **Less anxiety concerning use.**
- **Immediate feedback**
- **Predictable system responses**
- **More attractive.**
- **May consume less space**
  - More information can be packed in less space through icons

- **DISADVANTAGES**
- **Greater design complexity.**
- **Learning still necessary.**
  - Icons may not be known to the first-time users
  - Significance of each icon has to be remembered
  - How to use pointing device needs to be learned
- **Lack of experimentally-derived design guidelines.**
- **Inconsistencies in technique and terminology.**
- **Not always familiar.**
  - Symbolic representations may not be familiar as words or numbers
  - Nontechnical people may prefer text-based system over graphics
- **Human comprehension limitations.**
  - E.g.: Touch screens, double clicking a mouse, drag and drop
- **Few tested icons exist.**
  - Poor and improper icon design will lead to confusion
- **Inefficient for touch typists.**
- **Not always the preferred and fastest style of interaction.**
- **Increased chances of clutter and confusion.**
- **Hardware limitations**
  - Require adequate power, speed, screen resolution and graphic capability

### 23. Principles of Design

- The Principles of Design can be thought of as what we do with the elements of design to express and communicate a predetermined message of Usability, Reliability, & Functionality in a harmonious fashion.
- **Balance**
  - Visual balance. Are the various elements visually balanced in terms of their Size, shape, weight, and placement? Can the rhythmic order be visually discernible?
- **Unity**
  - Unity is an overall “sameness” throughout a screen. How harmoniously all the elements blend together.
- **Proportion**
  - Size relationships found within an object or design. Also, a comparison in terms of ratio of size, shape, etc with neighbouring elements.
- **Harmony**
- **Direction**
- **Rhythm**
  - Rhythm is created when one or more elements of design are used repeatedly to create a feeling of organized movement / direction
- **Symmetry**
- **Pattern**
- **Emphasis**
  - This is the part of the design that catches the viewer’s attention. Usually, the Designer will make one area stand out by using the elements of design in a contrasting way. There will be a play with different sizes, colours, textures, shapes etc.
- **Contrast**
  - Differences and Diversities. Highlighting similarities

- **Movement**

- Movement is the path the viewers eye takes through the artwork, often to focal areas. Animation is often used

## 24. GUI Vs. Web page design

Features	GUI	Web
<b>Devices</b>	User hardware variations limited. User hardware characteristics well defined. Screens appear exactly as specified.	User hardware variations enormous. Screen appearance influenced by hardware being used.
<b>User Focus</b>	Data and applications	Information and navigation
<b>Data/Information</b>	Typically created and used by known and trusted sources. Properties generally known Typically placed into system by users or known people and organizations Typically organized in a meaningful fashion A notion of private and shared data exists	Full of unknown content Source not always trusted Often not placed onto the Web by users or known people and organizations Highly variable organization Privacy often suspect
<b>User Tasks</b>	Install, configure, personalize, start, use, and upgrade programs. Open, use, and close data files. Fairly long times spent within an application. Familiarity with applications often achieved.	Link to a site, browse or read pages, register for services, participate in transactions, fill out forms, download and Movement between pages and sites very rapid. save things. Familiarity with many sites not established.
<b>Response Time</b>	Nearly instantaneous	Quite variable, depending on transmission speeds, page content, and so on. Long times can upset the user.
<b>Interaction</b>	Interactions such as clicking menu choices, pressing buttons, selecting list choices, and cut/copy/paste occur within context of active program.	Basic interaction is a single click. This can cause extreme changes in context, which may not be noticed.
<b>Presentation Elements</b>	Windows, menus, controls, data, toolbars, messages, and so on. Many transient, dynamically appearing and disappearing. Presented as specified by designer. Generally standardized by toolkits and style guides.	Two components, browser and page. Within page, any combination of text, images, audio, video, and animation. May not be presented as specified by the designer— dependent on browser, monitor, and user specifications. Little standardization.
<b>Context</b>	Restricted navigation paths. Multiple viewable windows.	Single-page entities. Unlimited navigation paths.

<b>Navigation</b>	Through menus, lists, trees, dialogs, and wizards.	Through links, bookmarks, and typed URLs.
<b>Visual Style</b>	Typically prescribed and constrained by toolkit. Visual creativity allowed but difficult. Little significant personalization.	Fosters a more artistic, individual, and unrestricted presentation style. Complicated by differing browser and display capabilities, and bandwidth limitations. Limited personalization available.
<b>Task Efficiency</b>	Targeted to a specific audience with specific tasks.	Often intended for anyone and everyone.
<b>Consistency</b>	Major objective exists within and across applications. Aided by platform toolkit and design guidelines. Universal consistency in GUI products generally created through toolkits and design guidelines.	Sites tend to establish their own identity. Frequently standards set within a site. Frequent ignoring of GUI guidelines for identical components, especially controls.

## 25. Printed Pages vs Web Pages

- |  |  |
|--|--|
| <ul style="list-style-type: none"> <li>● <b>Page Size- Fixed</b></li> <li>● <b>Page Rendering-</b><br/>Entire content is available for reading immediately upon appearance</li> <li>● <b>Page Layout-</b><br/>Precise and fixed</li> <li>● <b>Look-</b> give integrated and complete look</li> </ul> | <ul style="list-style-type: none"> <li>● <b>Page Size- Variable</b></li> <li>● <b>Page Rendering-</b><br/>Presented in pieces</li> <li>● <b>Page Layout-</b><br/>layout depends on screen sizes</li> <li>● <b>Look-</b> Presented in pieces</li> </ul> |
|--|--|

## 26. Apply a visual emphasis technique to highlight the most important or prominent parts of a screen.

- **Brightness:**
  - A brighter element has a good attention-getting quality and no disturbing features. It may be used to indicate items in error, and increased brightness is the best vehicle for calling attention to data on inquiry screens.
  - Do not use more than two brightness levels on a screen.
  - If brightness has a fault, it is that displays with improperly set manual screen contrast controls can diminish its effectiveness, even causing it to disappear.
- **Fonts:**
  - Differences in fonts have a moderate attention-getting capability. Their varying sizes and shapes can be used to differentiate screen components.

- Larger, bolder letters can be used to designate higher-level screen pieces, such as different levels of headings, if the headings are used to search for something. Do not use larger fonts, however, for entry/modification (conversational) and display/read-only
- screens, because this will place too much emphasis in the headings themselves. If you are using multiple fonts, never use more than two styles or weights, and three sizes, on a screen.
- **Underlining:**
  - Underlining is a moderate attention-getting mechanism but it can reduce legibility, so it should be used conservatively and carefully.
  - In graphical systems it is commonly used to designate keyboard equivalents or mnemonics. In Web pages it is used to designate navigation links.
- **Blinking:**
  - Blinking has a very high attention-getting capability, but it reduces text readability and is disturbing to most people. It often causes visual fatigue if used excessively. Therefore, it should be reserved for urgent situations and times when a quick response is necessary. A user should be able to turn off the blinking once his or her attention has been captured. The recommended blink rate is 2–5 Hz, with a minimum “on” time of 50 percent. An alternative to consider is creating an “on” cycle considerably longer than the “off,” a wink rather than a blink.
- **Line rulings and surrounding boxes or frames:**
  - Use lines to emphasize and guide the user’s eye through the screen.
  - Use horizontal rulings as a substitute for spaces when breaking a screen into pieces.
  - Use vertical rulings to convey to the screen viewer that a screen should be scanned from top to bottom.
  - Use rules to surround radio buttons and check box controls, and other groupings of controls or important single controls.
  - Use no more than three-line thicknesses or two-line styles on a screen.
- **Colors:**
  - Use color to emphasize and assist in the identification of screen components.
  - Some colors appear brighter than others.
  - Display no more than four colors at one time on a screen essentially alphanumeric in nature, six on a statistical graphics screen.
- **Other emphasis techniques:**
  - Other emphasis techniques include:
  - Displaying the element in a larger size,
  - Placing an element in a position where the eye first meets the screen,
  - Isolating the element from the remainder of the screen,
  - Presenting the element in a distinctive or unusual shape, and
  - Using white space to emphasize blocks of text.
  - One’s eyes will also be drawn to the start of any text following white space.
- **De-emphasize less important elements:**
  - To designate an element as not applicable or not active, dim it or grey it out.
- **Avoid too much emphasis:**

- Emphasis will lose its attracting value if too many different items on a screen are emphasized.
- A few hands raised for attention are much easier to deal with than many hands raised.
- Focus problems will also be created if too many emphasizing techniques are used within a screen.
- The user's attention will be drawn to the differences in techniques, and his or her information processing system will try to understand why the differences exist, instead focusing on the information itself.
- Minimization of clutter also assists a user in focusing on the most crucial part of a screen.
- In using emphasis, conservatism and simplicity is the key.
- **Web page emphasis:**
  - The dynamic nature of the Web and its available screen design tools raise some other emphasis considerations.
  - New or changed Web page content should be emphasized to immediately call the user's attention to it when the page is presented.
  - Inappropriate page backgrounds may degrade an emphasis technique's usability.
  - Background graphics, pictures, patterns, or textures may reduce the technique's attention-getting quality, as well as reduce text legibility.
- **Reverse polarity:**
  - Reverse polarity meant displaying dark text on a light background, or reversing the standard light text on a dark background.
  - For elements of screens—pieces of data, messages, and so on—reverse polarity has a very high attention-getting quality.
  - It can be effectively used for items selected, items in error, information being acted upon, or information of current relevance.

**27. With respect to screen explain the following screen planning and purpose ordering of screen data & content screen navigation and flow.**

- **SCREEN PLANNING AND PURPOSE**
  - **Each screen element**
    - Every control
    - All text
    - Screen organization
    - All emphasis
    - Each color
    - Every graphic
    - All screen animation
    - All forms offered back
  - **Must**
    - Have meaning to screen users
    - Serve a purpose in performing task organizing screen elements
  - **Consistency**
    - Provide real world consistency
    - Provide internal consistency
  - **Visual identity or theme**
    - Component



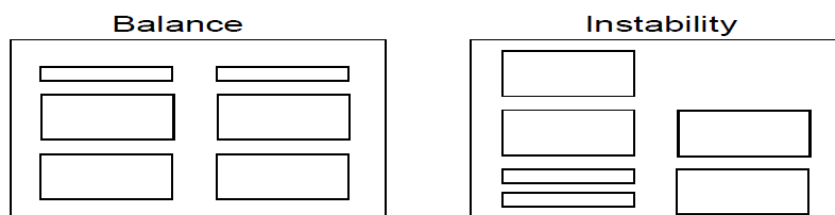
- Organization
- Presentation
- Usage
- Locations
- Follow the same conventions
- Deviate only when there is clear benefit to user
- **ORDERING OF SCREEN DATA & CONTENT**
  - Divide information into units that are logical, meaningful and sensible.
  - Organize by interrelationships between data or information.
  - Provide an ordering of screen units of elements depending on priority.
  - Possible ordering schemes include
    - Conventional
    - Sequence of use
    - Frequency of use
    - Function
    - Importance
    - General to specific.
    - Form groups that cover all possibilities.
    - Ensure that information is visible.
    - Ensure that only information relative to task is presented on screen.
    - Organizational scheme is to minimize number of information variables.
    - Upper left starting point
    - Provide an obvious starting point in the screen's upper left Corner.
- **SCREEN NAVIGATION AND FLOW**
  - Provide an ordering of screen information and elements that:
    - is rhythmic guiding a person's eye through display
    - Encourages natural movement sequences.
    - Minimizes pointer and eye movement distances.
  - Locate the most important and most frequently used elements or controls at top left.
  - Maintain top to bottom, left to right flow.
  - Assist in navigation through a screen by
  - Aligning elements
    - Grouping elements
    - Use of line borders
  - Through focus and emphasis, sequentially, direct attention to items that are
    - Critical
    - Important
    - Secondary
    - Peripheral
  - Tab through window in logical order of displayed information.
  - Locate command button at the end of the tabbing order sequence,
  - When groups of related information must be broken and displayed on separate screens, provide breaks at logical or natural points in the information flow.
  - In establishing eye movement through a screen, also consider that the eye trends to move sequentially, for example–
    - From dark areas to light areas
    - From big objects to little objects

- From unusual shapes to common shapes.
- From highly saturated colors to unsaturated colors.
- These techniques can be initially used to focus a person's attention.
- Maintain top to bottom, left to right through the screen. This top to bottom orientation is Recommended for information entry for the following reasons–
  - Eye movements between items will be shorter.
  - Control movements between items will be shorter.
  - Groupings are more obvious perceptually.
  - When one's eyes moves away from the screen and then back, it returns to about same place it left, even if it is seeking next item in sequence.
- Most product style guides recommend a left to right orientation.
- Our earliest display screens reflected this left to right entry orientation.
- Top to bottom orientation is also recommended for presenting displays of read only information that must be scanned

## 28. Visually pleasing composition

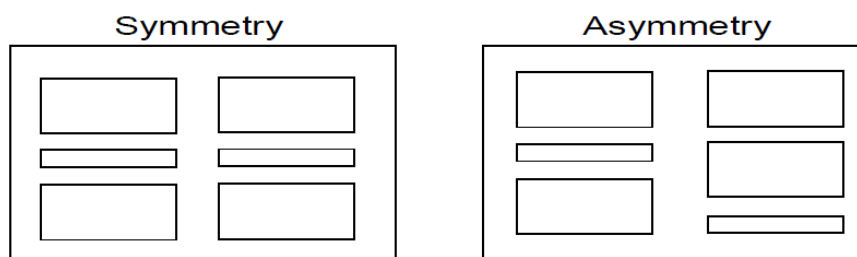
- Provide visually pleasing composition with the following qualities:
- **Balance**

**Balance:** Create screen balance by providing an equal weight of screen elements, left and right, top and bottom.



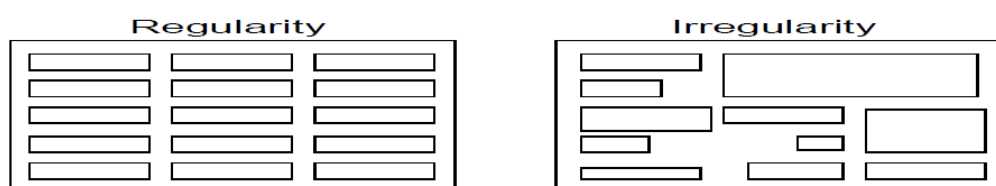
- **Symmetry**

**Symmetry:** Create symmetry by replicating elements left and right of the screen centerline.



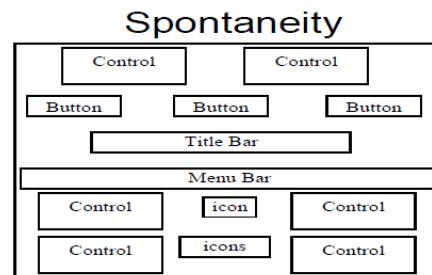
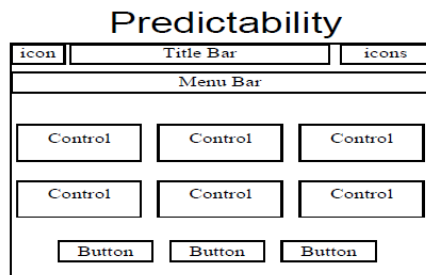
- **Regularity**

**Regularity:** Create regularity by using consistently spaced column and row starting points for widgets. Also use elements similar in size shape, color and spacing.



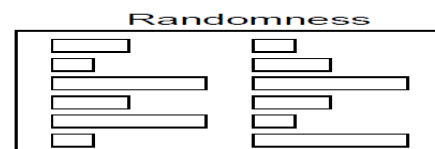
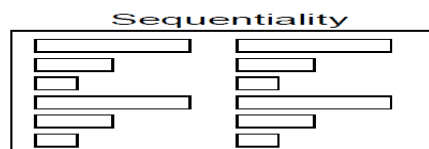
## - Predictability

**Predictability:** Create predictability by being consistent and following conventional orders or arrangements.



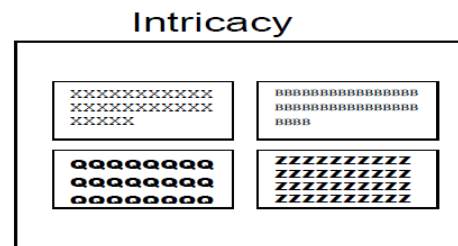
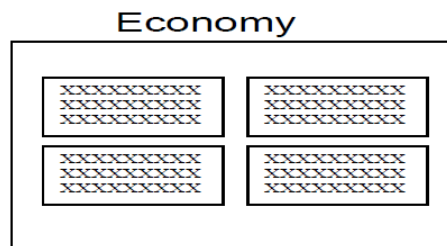
## - Sequentially

**Sequentiality:** Provide sequentiality by arranging elements to guide the eye through the screen in an obvious, logical, rhythmic, and efficient manner.



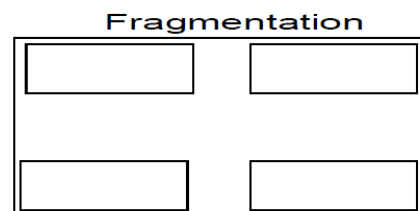
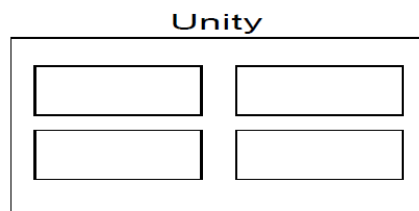
## - Economy

**Economy:** Provide economy by using as few styles, display techniques, and colors as possible.



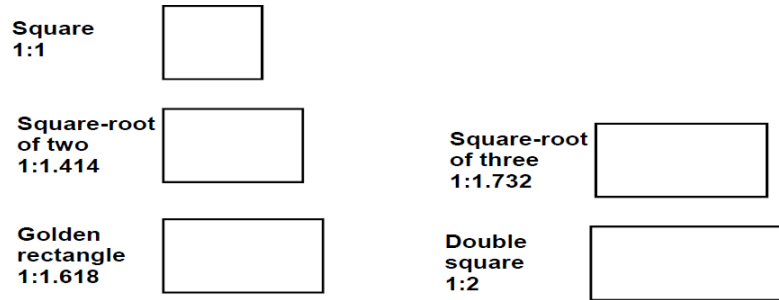
## - Unity

**Unity:** Create unity by using similar sizes, shapes, or colors for related information. Also by leaving less space between elements of a screen than the space left in the margins.



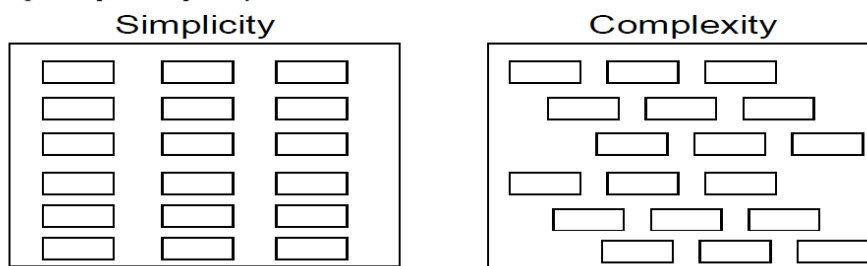
## - Proportion

**Proportion:** Create windows and groupings of data or text with aesthetically pleasing proportions.



## - Simplicity

**Simplicity:** Optimize the number of elements on a screen, within the limits of clarity. Minimize the alignment points, especially horizontal and vertical.



## - Groupings

**Groupings:** GROUPING USING BORDERS

- Provide functional groupings
- Create spatial groupings
- Provide meaningful titles for each grouping
- Incorporate line borders
- Do not exceed three-line thickness
- Create lines consistent in height and length
- For adjacent groupings with borders wherever possible
- Use rules and borders sparingly

## 29. A well-designed screen

- Reflects the capabilities, needs, and tasks of its users.
- Is developed within the physical constraints imposed by the hardware on which it is displayed.
- Effectively utilizes the capabilities of its controlling software.
- Achieves the business objectives of the system for which it is designed.
- To make an interface easy and pleasant to use, then, the goal in design is to:
- Reduce visual work.
- Reduce intellectual work.
- Reduce memory work.
- Reduce motor work.
- Minimize or eliminate any burdens or instructions imposed by technology.

## 30. Screen Meaning and Purpose

- **Each screen element . . .**
  - Every control

- All text
- The screen organization
- All emphasis
- Each color
- Every graphic
- All screen animation
- Each message
- All forms of feedback
- **Must . . .**
  - Have meaning to screen users.
  - Serve a purpose in performing tasks.
- **Organizing Screen Elements Clearly and Meaningfully**
  - **Visual clarity**
    - A clear and clean organization
  - **Clarity**
    - consistency in design,
    - a visually pleasing composition
    - a logical and sequential ordering
    - the presentation of the proper amount of information
  - **Groupings**
    - alignment of screen items
    - Avoid: visual clutter created by
    - indistinct elements,
    - random placement
    - confusing patterns.
  - **Consistency**
    - Provide real-world consistency. Reflect a person's experiences, expectations, work conventions, and cultural conventions.
    - Provide internal consistency. Observe the same conventions and rules for all aspects of an interface screen, and all application or Web site screens, including:
      - Operational and navigational procedures.
      - Visual identity or theme.
      - Component.
        - Organization.
        - Presentation.
        - Usage.
        - Locations.
    - Follow the same conventions and rules across all related interfaces.
    - Deviate only when there is a clear benefit for the user.

### 31. Ordering of Screen Data and Content

- Divide information into units that are logical, meaningful, and sensible.
- Organize by the degree interrelationship between data or information.
- Provide an ordering of screen units of information and elements that is prioritized according to the user's expectations and needs.
- Possible ordering schemes include:

- Conventional.
- Sequence of use.
- Frequency of use.
- Function.
- Importance.
- General to specific.
- Form groups that cover all possibilities.
- Ensure that information that must be compared is visible at the same time.
- Ensure that only information relative to the users' tasks or needs is presented on the screen.

### 32. Types of Statistical Graphics

- **Curve and Line Graphs**
- **Surface Charts**
- **Scatterplots**
- **Bar Graphs**
- **Segmented or Stacked Bars**
- **Pie Charts**

**Table 3.2** Tasks and Best Types of Graphs

	PROPORTION			
	WITH SCALE	WITHOUT SCALE	COMPARISON	CHANGE
Best	Line Graphs	Segmented Bars	Bar Graphs	Line Graphs
	Bar Graphs	Pie Charts	Segmented Bars	Bar Graphs
	Segmented Bars			
	Pie Charts			
Poorest	–	Bar Graphs	Pie Charts	Segmented Bars
	Line Graphs	Pie Charts		

Source: Spence (1992) and Simkin and Hastie (1987).

### 33. Mobile ecosystem

- Mobile is an entirely unique ecosystem and, like the Internet, it is made up of many different parts that must all work seamlessly together. With mobile technology, the parts are different, and because you can use mobile devices to access the Internet, that means that not only do you need to understand the facets of the Internet, but you also need to understand the mobile ecosystem.
- **Operators**
  - The base layer in the mobile ecosystem is the operator. Operators go by many names, depending on what part of the world you happen to be in or who you are talking to.
- **Networks**
  - Operators operate wireless networks. Remember that cellular technology is just a radio that receives a signal from an antenna. The type of radio and antenna determines the capability of the network and the services you can enable on it.
- **Aggregators**

- Third Party company that bridges the gap between the content owners, the users and the operators.
- **Devices**
  - Phones, the mobile industry calls handsets or terminals.
- **Platform**
  - A mobile platform's primary duty is to provide access to the devices. To run software and services on each of these devices, you need a platform, or a core programming language in which all of your software is written
  - Categories: Open Source, Licensed, Proprietary
- **Operating System**
  - OS have core services or toolkits that enable apps to talk to each other and share data or services.
- **Application Framework**
  - Application frameworks often run-on top of operating systems, sharing core services such as communications, messaging, graphics, location, security, authentication, and many others.
- **Application**
  - In the realm of technology, this usually Definition: refers to a computer program that runs on a website (Google Apps), a small computing device (iPad App) or a cell phone (Android App).
- **Services**
  - Services are "everything the user is trying to do
  - Example services may include:
    - the Internet
    - sending a text message
    - being able to get a location

### 34. Types of Mobile Applications

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### 35. Mobile Information Architecture

- **What Is Information Architecture?**
  - The structural design of shared information environments
  - The combination of organizations, labelling, search, and navigation systems within websites and intranets.
  - The art and science of shaping information products and experiences to support usability and find ability.
  - An emerging discipline and community of practice focused on bringing principles of design and architecture to the digital landscape.
- **Information architecture**
  - The organization of data within an informational space. In other words, how the user will get to information or perform tasks within a website or application.
- **Interaction design**
  - The design of how the user can participate with the information present, either in a direct or indirect way, meaning how the user will interact with the website of application to create a more meaningful experience and accomplish her goals.
- **Information design**

- The visual layout of information or how the user will assess meaning and direction given the information presented to him.
- **Navigation design**
  - The words used to describe information spaces; the labels or triggers used to tell the users what something is and to establish the expectation of what they will find.
- **Interface design**
  - The design of the visual paradigms used to create action or understanding.
  - The role of information architecture is played by a variety of people, from product managers to designers and even developers.
- **Visual characteristics of what users expect**
  - **Keeping It Simple**
    - When thinking about your mobile information architecture, you want to keep it as simple as possible.
  - **Support your defined goals**
    - If something doesn't support the defined goals, lose it. Go back to your user goals and needs, and identify the tasks that map to them. Find those needs and fill them.
  - **Clear, simple labels**
    - Good trigger labels, the words we use to describe each link or action, are crucial in Mobile

## 36. Mobile 2.0

- **The Convergence of the Web and Mobile**
- **The Mobile Web Browser**
- **JavaScript**
- **Mobile User Experience**
  - **The Web as a platform** for the mobile context, this means write once, deploy everywhere, moving away from the costly native applications deployed over multiple frameworks and networks.
  - **Harnessing collective intelligence** this isn't something the mobile community has done much of, but projects like WURFL—an open-source repository of device profiles provided by the community—is exactly what mobile needs more of.
  - **Data is the next Intel inside Mobile** takes this principle several steps further. It can include the data we seek, the data we create, and the data about or around our physical locations.
  - **End of the software release cycle** long development and testing cycles heavily weigh on mobile projects, decreasing all hopes of profitability. Shorter agile cycles are needed to make mobile development work as a business. Releasing for one device, iterating, improving, and then releasing for another is a great way to ensure profitability in mobile.
  - **Lightweight programming models** Because mobile technology is practically built on enterprise Java, the notion of using lightweight models is often viewed with some scepticism. But decreasing the programming overhead required means more innovation occurs faster.
  - **Software above the level of a single device** This effectively means that software isn't just about computers anymore. We need to approach new software as



though the user will demand it work in multiple contexts, from mobile phones to portable gaming consoles and eBook readers.

- **Rich user experiences** a great and rich user experience helps people spend less time with the software and more time living their lives. Mobile design is about enabling users to live their lives better.

### 37. Types of Mobile Applications

- The mobile medium type is the type of application framework or mobile technology that presents content or information to the user. It is a technical approach regarding which type of medium to use; this decision is determined by the impact it will have on the user experience.
- **SMS**
  - The most basic mobile application you can create is an SMS application.
- **Mobile websites**
  - Mobile website is a website designed specifically for mobile devices, not to be confused with viewing a site made for desktop browsers on a mobile browser
- **Mobile Web Widgets**
  - A mobile web widget is a standalone chunk of HTML-based code that is executed by the end user in a particular way. Mobile web widgets are small web applications that can't run by themselves; they need to be executed on top of something else.
- **Mobile Web Applications**
  - Mobile web applications are mobile applications that do not need to be installed or compiled on the target device. Using XHTML, CSS, and JavaScript, they are able to provide an application like experience to the end user while running in any mobile web browser.
- **Games**
  - The most popular of all media available to mobile devices. Technically games are really just native applications that use the similar platform SDKs to create immersive experiences

### 38. Mobile Design

- When building mobile experiences, it is impossible to create a great experience without three ingredients: context, information architecture, and visual design.
- The visual design of your experience is the direct representation of everything underneath; it is the first impression the user will have.
- A great design gives the user high expectations of your site or application; a poor design leads to lower expectations.
- Users' expectations translate to value and trust.

### 39. Types of Windows

- **Primary Window**
  - It is the 1st one that appears on screen when an activity or action is started.
  - Required for every function or application possessing a menu bar and some basic action controls.
  - Should represent an independent function/application.
  - Also referred as Application Window/Main window.

## - **Secondary Window**

- Auxiliary Windows – dependent or independent.
- Independent window can be opened without primary window unlike dependent.  
E.g.- User clicks on properties command of a menu.
- Appears whenever requested on the top of an active window.
- Can be scrolled or shifted.
- Two types- modal and modeless.
  - **Modal**
    - Mostly the secondary windows are modal.
    - Prohibit interactions with other windows.
    - Does not disappear till necessary action is carried out.
    - Appears whenever user requests for critical actions.
  - **Modeless**
    - Permits interaction with another window.
    - Other tasks can be performed with dialog box open.
    - Users can switch between windows.
    - Hence used for tasks that require repeated interaction.
  - **Cascading:**
    - Keeps original window open and displays dependent window offset to the top right or just below.
    - Provides advanced options at lower level.
  - **Unfolding:**
    - Also called as expanding windows.
    - Provides advanced options at same level.
    - Best for fixed options or controls rarely accessed by the interface.
  - **Dialog Boxes**
    - Used to display short messages, errors etc.
    - Appears when system requires additional input, on some command button being pressed or due to menu item being chosen.
  - **Property Sheets**
    - Way to present an object's complete set of properties in a secondary window.
    - It's a modeless secondary window
  - **Property Inspector**
    - Display only most common or frequently accessed properties in a property inspector.
  - **Palette Window**
    - Modeless secondary windows, that present a set of controls.
  - **Message Boxes**
    - Used for displaying a message about a particular situation or condition
    - Typically, message boxes contain only command buttons with appropriate choices offered to the user.
  - **Pop-up Windows**

- Pop-up windows can be used to display additional information when an abbreviated form of the information is the main presentation technique

-

#### **40. Window Representation Style**

##### **- Tiled Window**

Use tiled windows for:

- Single-task activities
- Data that needs to be seen simultaneously
- Tasks requiring little window manipulation
- Novice or inexperienced users

##### **- Overlapping Window**

Use overlapping windows for:

- Switching between tasks
- Tasks necessitating a greater amount of window manipulation
- Expert or experienced users
- Unpredictable display contents

##### **- Cascading Window**

- A special type of overlapping window has the windows automatically arranged in a regular progression.
- No window is ever completely hidden.
- Bringing any window to the front is easier.
- It provides simplicity in visual presentation and cleanness.

#### **41. Window Components**

- **Frame**
- **Title Bar Text**
- **Title Bar Icon and Button**
- **Window Sizing Buttons**
- **What's This ? Button**
- **Menu Bar**
- **Status Bar**
- **Scroll Bar**
- **Split Box**
- **Toolbar**
- **Command Area**
- **Size Grip**
- **Work Area**

#### **42. Apply the following with example in feedback and guidance. (a)Response time. (b)Dealing with time delays. (c)Blinking for Attention. (d) Use of Sound**

## 1. RESPONSE TIME

- The optimum response time is dependent upon the task
- Satisfaction with response time is a function of expectations.
- Dissatisfaction with response time is a function of one's uncertainty about delay.
- People will change work habits to conform to response time.
- Constant delays are preferable to variable delays
- More experienced people prefer shorter response times.

## 1. RESPONSE TIME

- Very fast or slow response times can lead to symptoms of stress.
- Web response time.
  - High (Good): Up to 5 seconds.
  - Average: From 6 to 10 seconds.
  - Low (Poor): Over 10 seconds.

## 2. DEALING WITH TIME DELAYS

- Button click acknowledgement:
  - Acknowledge all button clicks by visual or aural feedback within one-tenth of a second.
- Waits up to 10 seconds:
  - If an operation takes 10 seconds or less to complete, present a “busy” signal until the operation is complete.
    - Display, for example, an animated hourglass pointer.
- Waits of 10 seconds to 1 minute:
  - If an operation takes longer than 10 seconds to complete, display:
    - A rolling barber's pole or other large animated object.
    - Additionally, a progress indicator, percent complete message, or elapsed time message.

## 2. DEALING WITH TIME DELAYS

- Waits over 1 minute:
  - Present an estimate of the length of the wait.
  - Display a progress indicator, percent complete message, or elapsed time message.
  - When a long operation is completed, present an acknowledgment that it is completed.
    - A significantly changed screen appearance.
    - An auditory tone.
- Long, invisible operations:
  - When an operation not visible to the user is completed, present an acknowledgment that it is completed.
    - A message.
    - An auditory tone.
- Progress indicator:
  - A long rectangular bar that is initially empty but filled as the operation proceeds.
    - Dynamically fill the bar.
    - Fill it with a color or shade of gray.

## 3. BLINKING FOR ATTENTION

- Attract attention by flashing an indicator when an application is inactive but must display a message to the user.
  - – If a window, flash the title bar.
  - – If minimized, flash its icon.
- To provide an additional message indication, also provide an auditory signal (one or two beeps).
  - – Very useful if:
    - The window or icon is hidden.
    - The user's attention is frequently directed away from the screen.
- Display the message:
  - – When the application is activated.
  - – When requested by the user.

## 4. USE OF SOUND

- Always use in conjunction with a visual indication.
- Use no more than six different tones.
  - – Ensure that people can discriminate among them.
- Do not use:
  - – Jingles or tunes.
  - – Loud signals.
- Use tones consistently.
  - – Provide unique but similar tones for similar situations.
- Provide signal frequencies between 500 and 1,000 Hz.
- Allow the user to adjust the volume or turn the sound off altogether.
- Test the sounds with users over extended trial periods.
- Use sounds sparingly because they:
  - – Are annoying to many people, including other users and nonusers in the vicinity.
  - – Can easily be overused, increasing the possibility that they will be ignored.