Software Engineering

Unit 3: User Interface Design (UI)

INTRODUCTION

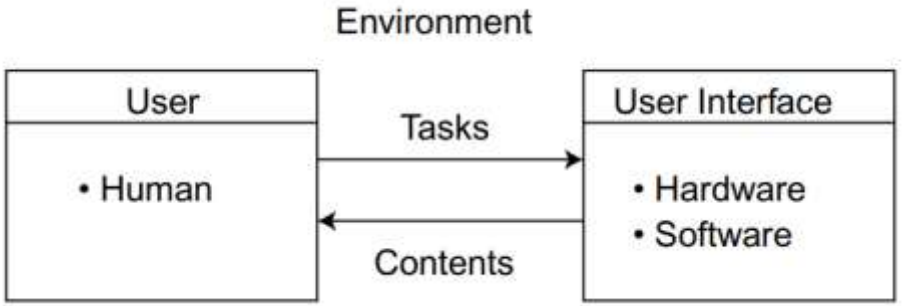
- First impression is the best impression and hence first look into the user interface (UI) should impress the end users.
- User interface plays a crucial role in the success of software projects.
- User interface is not only the reflection of the functionalities of the system, but also the reflection of the culture of the end users.
- For example, white color is the symbol of purity in Western cultures, whereas the same color is the symbol of bad luck in India, Japan and China.
- If the portal/website is intended (planned, હેતુ) for particular demographics (area/region, વસ્તી વિષયક) then we need to choose the colors appreciated by that area/region.
- Each color has its own meaning and this also needs to be considered while choosing the color.
- Below mentioned are few colors and their common meanings.
  - Black: mystery, secrecy.
  - Blue: coolness, peace.
  - Brown: strength, stability.
  - Gray: maturity, reliability.
  - Green: life, naturalness, health.
  - Orange: warmth, courage.
  - Red: danger, energy, power, aggression.
  - White: purity, freshness, peace.
  - Yellow: happiness, brightness, joy.

CONCEPTS OF USER INTERFACE

- A user interface has 3 basic components namely:
  1). End users (People, Man)
  2). User interface
  3). System (Machine)
- UI helps the people/man (users) to interact with a machine (system).
- User interface includes its own software and hardware components which helps the users to interact with the system.
- User interface makes human machine interaction possible.
- For Example, while driving a car the driver (user) uses the accelerator, break, clutch and gearing system to interact with the engine of the car (machine). They all are acting as UI input.
- Speedometer, fuel level meters helps the driver to understand the engine. They act as UI output.
- **The goal of the UI is to effectively control the machine (system) at the user's end and pass the feedback from the machine (system) back to the user in efficient manner which helps the user to make decisions.**
- This means the user needs to provide ***minimal input to achieve the desired output*** and stopping machine to provide undesired output.

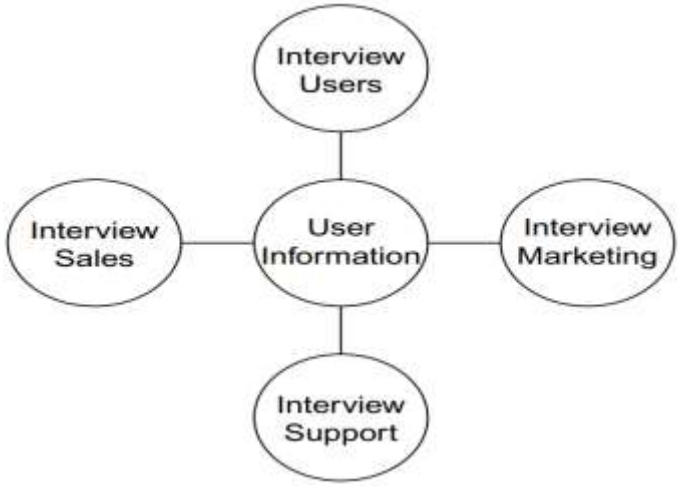
ELEMENTS OF THE USER INTERFACE

- User interface has four elements:
  1. Users
  2. Tasks
  3. Contents
  4. Environment
- ***Users*** interact with the system through the user interface.
- ***Tasks*** are the activities performed by the users to interact with the system.
- ***Contents*** are the output of the system that is displayed to the users through the user interface.
- ***The environment*** in which these tasks are executed are also part of the user interface.
- Based on the four elements the analysis is also classified into four:
  1. User analysis
  2. Tasks analysis
  3. Contents analysis
  4. Environment analysis



1. User analysis

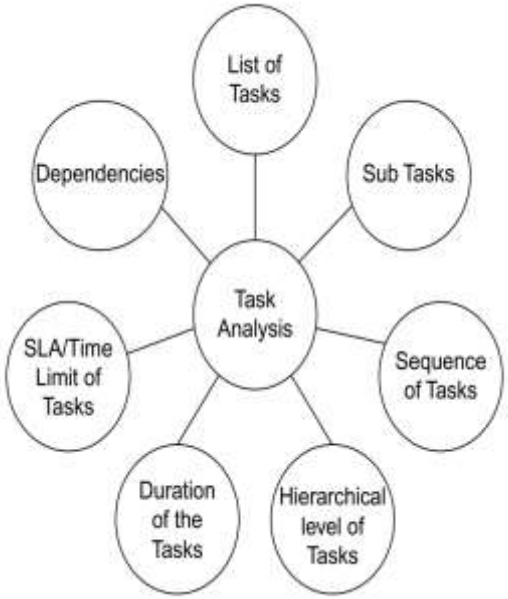
- User analysis helps to ***understand the end users*** as well as ***how the end users use the system*** which will help them to design the UI in a better way.
- Information about the end users can be obtained directly from the end users in the form of interview and also getting input from others who are interacting with the end users like sales, marketing and support people.
- Basic set of questions is prepared that can be used to gather the basic information from all the above set of people.
- User Analysis Questions: Following questions are sample user analysis questions which help to understand the end users.



1. What level of formal education does the user have?
2. Age of the user
3. Home country of the user
4. Gender of the end user
5. Primary spoken language of the user
6. Office hours of the user
7. Is the system integral part of the user's work?
8. Can the user learn the system by looking into user manu
9. Is the user trained to use the system?
10. Do the user knows the technology behind the system or want to know the technology?
11. Is the user subject matter expert of the system?
12. What are the consequences if the user makes a mistake in the system?

2. Tasks analysis

- Task analysis helps to ***understand the tasks done by the end users*** under a specific circumstance.
- It helps to understand the ***sub tasks done by the end users, its sequence levels, hierarchical levels*** and ***problems faced by the end users*** while executing the tasks.
- As an output of tasks analysis ***use case diagram*** is drawn which helps to understand how the end users performs the tasks along with the ***workflow of the interaction***.
- It helps to understand the overall flow of the users as well as the tasks performed by the users.
- Task Analysis Questions: Following questions are sample task analysis questions which help to understand the tasks performed by the end users.



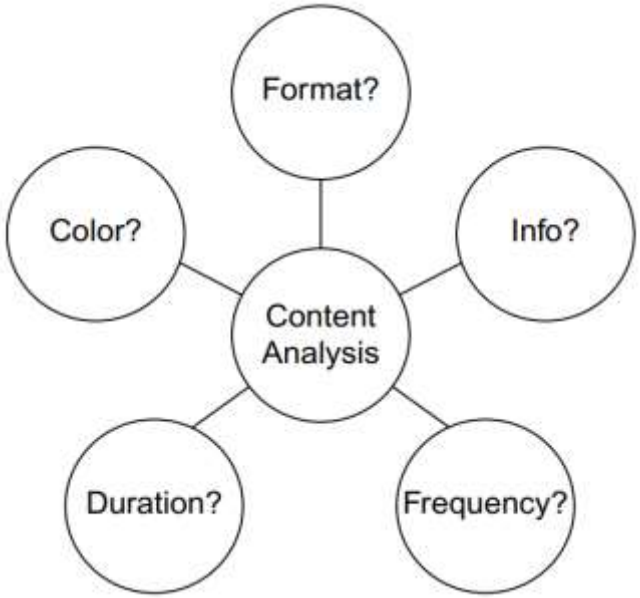
1. List of tasks performed by the particular end user.
2. What are the sub tasks of the tasks describe above?
3. What are the sequencing levels of the sub tasks defined above?
4. What are the hierarchical levels of the sub tasks?
5. How work flow moves from one user to the other?
6. Who is the next user acting on the task(s) performed by this user?
7. What is the duration of the tasks performed?
8. Is the task performed manual or automated?
9. Is there any email communication to other users about the tasks?
10. Is there any service level agreement set for the tasks with the customer?
11. Is there any time limit for the tasks to be performed?
12. Do tasks depend on the external parties (inside and outside the organization)?

3. Contents analysis

- Content analysis is an important element of the overall user interface as it directly satisfies the end users.
- Content analysis helps the end users to understand the machine language.
- Content may be in the form of single word, graphical representation or in the form of sound files.
- For example, reverse guider fitted into the car gives a deep beep sound if there is any object nearby the car prompting the driver to apply the break.
- In few cars the reverse guider system also has visual display in the front that can be used by the driver of the car.
- Content analysis helps to understand the content requirement of the users.
- Display content may be acquired from already stored database of the system as well as data transmitted from external system to the application.
- For example, radio system being used in a car.
- The format of the content is the main component of the study along with the data/information to be displayed.

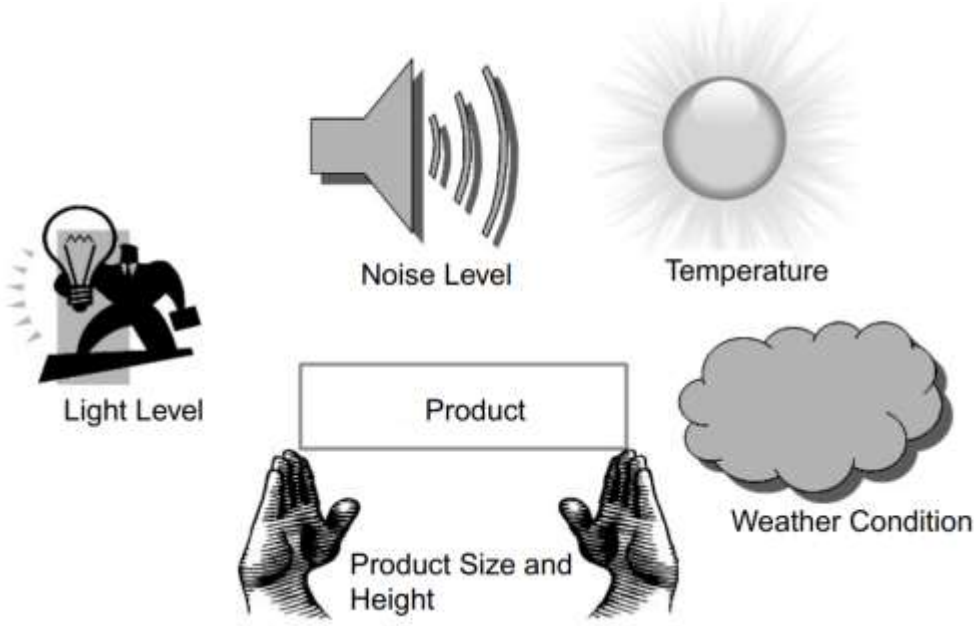
3. Contents analysis…

- Content Analysis Questions: Following questions are sample content analysis questions which help to understand the contents.
  1. What information is required by the end user?
  2. What is the form of contents (graphical, tables, text)?
  3. What is the frequency of updating the content? Is it LIVE update?
  4. How long the content needs to be displayed? Is it permanent display?
  5. Can the user customize the place holder of the information (Content)?
  6. How to use the color to enhance the understanding (RED/GREEN, etc.)?
  7. Can the user navigate through the information?



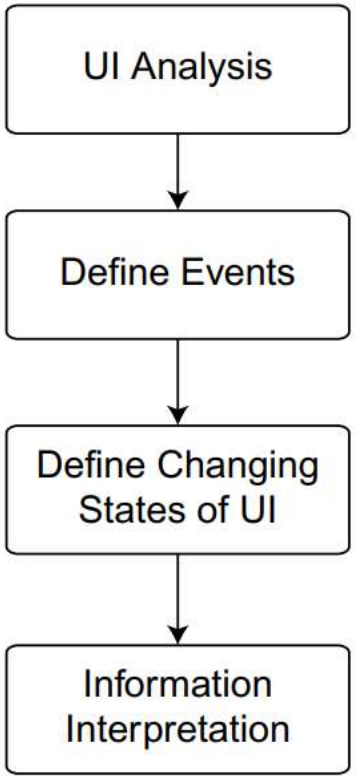
4. Environment analysis

- Work environment analysis plays a crucial role as the designed product is fitting into the environment.
- For example, the intensity level of the head light in a car will always be higher than the intensity of the light used inside the car.
- Both are bulbs but the light intensity levels varies and it depends on the environment in which it operates.
- Same logic is applicable to the software products.
- For example, surrounding noise level plays a crucial role while designing an audio/video system.
- Environmental Factors to be Analyzed:
  1. Surrounding temperature
  2. Surrounding noise level
  3. Surrounding light level
  4. Time restrictions if any
  5. Weather condition
  6. Space (place size) limitation
  7. Product size, height
  8. Input device to be used
  9. Size of the input device
  10. Output device to be used
  11. Size of the output device
  12. Alternatives input and output device

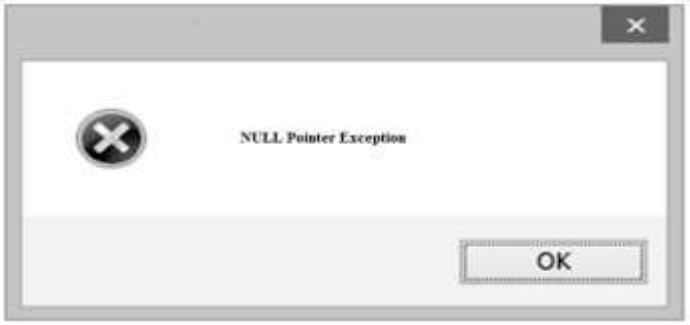


Designing the User Interface

- User interface design (UID) is an iterative process.
- Three golden rule of the user interface (three golden rules of Mandel) to be kept in mind while designing the UI .
- Interface designer creates the layout of the screen (screen layout) after identifying all the objects and its actions. Screen layout design generally involves the following steps:



Common User Interface Design Issues



Common User Interface Design Issues

1. Improper error messages to the users
2. No proper menu labeling
3. Improper help facilities to the users
4. Response time of the system

- **1. Improper error messages to the users**
- User interface should convert the system errors, which are technical in nature, into a user specific error message which is understandable by the users in their business language.
- Basically, the technical message needs to be converted into a business message which is plain so that it is easy for the business users to interpret and act accordingly.
- Following are the characteristics of the error messages:

  1. It is easily understandable and non-judgmental
  2. The message should not blame the end users under any circumstance
  3. The message should also use visual cue so that the end users understand it easily
  4. The message should indicate the reason for the error (e.g., input file format is not correct, etc.). 5. The message should indicate the advice to overcome the current situation (e.g., Input file format is not correct. Please correct the format and try this option again).
  6. Even successful transaction to be shown to the customer in the form of message (e.g., Application successfully submitted. Please check the email for the next step)

Common User Interface Design Issues…

- **2. No proper menu labeling**
- Menu labeling is to be designed in such a way so that it is easy and consistent across all the screens.
- It should also display consistently across all the environments.
- Menu labeling should address the following:
  1. All menu labels are self explanatory
  2. Short cut options available for menu actions (example, [CTRL] O, etc.)
  3. Can menus be customized by the users?
  4. Sub menus are consistent with the main menu

- **3. Improper help facilities to the users**
- Help manuals should describe all the scenarios of the system and it should be written in easy language so that any new users can understand and use the system.
- **4. Response time of the system**
- Response time of the system is very important and it needs to be taken care even while designing the user interface.

USER INTERFACE EVALUATION (USER INTERFACE DESIGN EVALUATION)

- While evaluating the UI, the evaluator needs to act as an end user experiencing the system thereby come out with the difficulties the evaluator is facing which in turn lead to the improvement action plan.
- Factors to be considered while evaluating/reviewing the user interface

  1. Time spent by the users to perform tasks
  2. Response time of the system (each screen and actions)
  3. Amount of learning the users should undergo
  4. Memory load on the users
  5. How easy the help and error messages are
  6. The complexity of the user interface look and feel (how easily the users are able to understand what needs to perform)
  7. Check UI rules being followed in the design

GOLDEN RULES OF USER INTERFACE DESIGN

- Three famous golden rules OF User Interface Design (UID) are:

  1). Place users in control

  2). Reduce users' memory load

  3). Make the Interface consistent

1). Place users in control:

- It includes providing customizable screen based on the user profile, proper help, proper navigation of the system, different options to the customers for interacting with the system, interactive display system, etc.
- By providing the control to the users the users feel as if he owns the system and will start liking it.
- Display descriptive messages and text (helpful).
- Allow users to use either the keyboard or mouse (flexible).
- Make the UI transparent (facilitative).
  - Example: given highlighted message "New" against all the new options added facilitating the end users to know the new futures added recently.
- Provide immediate and reversible actions and feedback (forgiving).
- Provide meaningful paths and exits (navigable).
  - Example: option to exit (log out) from any page
- Use modes cautiously.
  - Example, "Session time out" mode needs to be used cautiously depending on the situation.

    User mode also includes "You have logged in as Administrators," "You have logged in as Users,"

GOLDEN RULES OF USER INTERFACE DESIGN…

2). Reduce Users' Memory Load

- Provide visual cues (inform). Visual cues are given on informing the purpose of the link thereby clarifying clear purpose of the links.
- Relieve short-term memory.
- Example: In Indian Railway ticket booking website while booking the return tickets, the system will remember the names used in the previous transaction and it will display the same names for return ticket booking, which helps the users to book the return ticket for all the members.
- Provide interface shortcuts.
- Provide visual clarity (organize). Share this on Facebook, LinkedIn, Twitter with logo.
- Promote an object-action syntax. "BUY NOW" option is an object – action syntax and users will click it only when he decided to buy the course under discussion.
- Provide defaults, undo and redo. User can also redo and undo until selecting the final value.

GOLDEN RULES OF USER INTERFACE DESIGN…

3). Make the Interface Consistent

- Provide ***aesthetic appeal and integrity*** (attitude).
- Aesthetic feel ***means initial feeling*** by looking into something; it actually deals with nature of ***beauty and taste.*** Color plays a crucial role here.
- Website Designers need to choose the ***color and pictures likeable*** by the audience.
- This is the reason most of the company has ***region specific websites***.
- ***Culture*** also plays a crucial role in this factor.
- Encourage exploration (predictable). ***"START LOGGING"*** button encourage the users to explore further.
- The ***action of the button is clearly predictable***.
- Example: In ***ecommerce website*** after adding products to the baskets, the site will display the ***number of items*** in the basket, ***value of items*** in the basket and as well as allow the user to ***continue the shopping*** or another option to ***check out*** the basket items taking them to payment gateway.
- Consistency is maintained in terms of back ground color, and fonts.
- The error message display and pop up message display are maintained same across the products.