CONTENTS

INTERFACE DESIGN ANALYSIS

It helps with the study of how humans interact and relate to the technology.

Interface design focuses on the following:

INTERNAL INTERFACE

Deals with software components.
Example: Connection to the LAN of the router.

EXTERNAL INTERFACE

Deals with software and other non-human producers and consumers.
Example: Connection to the WAN of the router.

USER INTERFACE

Deals with interaction between computer and human.
Example: Remote Control.

USER INTERFACE DESIGN PROCESS:

INTERFACE ANALYSIS AND MODELING

- Gather requirements.

INTERFACE DESIGN.

- Objects and Actions.

INTERFACE CONSTRUCTION.

- User interface development tools may be used.

INTERFACE VALIDATION.

- Correctness of System.

USER INTERFACE ANALYSIS AND DESIGN

When a user interface is analyzed and designed four different models come into play.

1. User profile Model.
2. Design Model.
3. Implementation Model.
4. User's Mental Model.

USER PROFILE MODEL

Establish a profile of the end-user of the system: Age, Race, Gender, Background, Goal, etc.

Consider Syntactic and Semantic knowledge of user.

Categorize Users as:

1. Novice
2. Intermittent
3. Frequent

DESIGN MODEL

Incorporates data, architectural, interface, and procedural representations of the software.

Normally it is not as important as other parts of the design model.

But in many cases, it is as important as the other parts.

USER'S MENTAL MODEL

Consists of the image of the system that users carry in their heads.

Accuracy of the description depends upon the user's profile and overall familiarity with the software in the application domain.

Discussions with people who work with the users and/or users themselves:

What would the user want the system to do?

How would the system fit in with the normal work?

What interface looks best for the user?

IMPLEMENTATION MODEL

Consists of the look and feel of the interface combined with all supporting information.

Strives to agree with the user's mental model users then feel comfortable with the software and use it effectively

ELEMENTS OF THE USER INTERFACE

There are 4 elements of user interface:

1. Users - Who will interact through interface.
2. Tasks - That users must perform to do their work.
3. Content - Presented as a part of interface.
4. Work Environment - In which the tasks will be conducted.

USER ANALYSIS

- How these people use the system
- **Information can be obtained from**
  - User interviews with the end users
  - Sales input from the sales people who interact with customers and users on a regular basis
  - Marketing input based on a market analysis to understand how different population segments might use the software
  - Support input from the support staff who are aware of what works and what doesn't, what users like and dislike, what features generate questions, and what features are easy to use

TASK ANALYSIS AND MODELING:

- **Task analysis strives to know and understand**
  - The work the user performs in specific circumstances
  - The tasks and subtasks that will be performed as the user does the work
  - The specific problem domain objects that the user manipulates as work is performed
  - The sequence of work tasks (i.e., the workflow)
  - The hierarchy of tasks

CONTENT ANALYSIS

Content can be displayed in various ways:

Character-based reports, Graphical Displays, Multimedia information etc.

Content Maybe:

- Generated by components in other parts of the application
- Acquired from data stored in a database that is accessible from the application
- Transmitted from systems external to the application in question

WORK ENVIRONMENT ANALYSIS

- **Software products need to be designed to fit into the work environment, otherwise they may be difficult or frustrating to use**
- **Factors to consider include**
  - Type of lighting
  - Display size and height
  - Keyboard size, height and ease of use
  - Mouse type and ease of use
  - Surrounding noise
  - Space limitations for computer and/or user
  - Weather or other atmospheric conditions
  - Temperature or pressure restrictions
  - Time restrictions (when, how fast, and for how long)

Introduction

- User interface design is an iterative process, where each iteration elaborate and refines the information developed in the preceding step
- General steps for user interface design
  1) Using information developed during user interface analysis, define user interface objects and actions (operations)
  2) Define events (user actions) that will cause the state of the user interface to change; model this behavior
  3) Depict each interface state as it will actually look to the end user
  4) Indicate how the user interprets the state of the system from information provided through the interface
- During all of these steps, the designer must
  - Always follow the three golden rules of user interfaces
  - Model how the interface will be implemented
  - Consider the computing environment (e.g., display technology, operating system, development tools) that will be used

Design Issues to Consider

- Four common design issues usually surface in any user interface
  - System response time (both length and variability)
  - User help facilities
    - When is it available, how is it accessed, how is it represented to the user, how is it structured, what happens when help is exited
  - Error information handling
    - How meaningful to the user, how descriptive of the problem
  - Menu and command labeling
    - Consistent, easy to learn, accessibility, internationalization
- Many software engineers do not address these issues until late in the design or construction process
  - This results in unnecessary iteration, project delays, and customer frustration

Guidelines for Error Messages

- The message should describe the problem in plain language that a typical user can understand
- The message should provide constructive advice for recovering from the error
- The message should indicate any negative consequences of the error (e.g., potentially corrupted data files) so that the user can check to ensure that they have not occurred (or correct them if they have)
- The message should be accompanied by an audible or visual cue such as a beep, momentary flashing, or a special error color
- The message should be non-judgmental
  - The message should never place blame on the user

Design and Prototype Evaluation

Before prototyping occurs, a number of evaluation criteria can be applied during design reviews to the design model itself

- The amount of learning required by the users
  - Derived from the length and complexity of the written specification and its interfaces
- The interaction time and overall efficiency
  - Derived from the number of user tasks specified and the average number of actions per task
- The memory load on users
  - Derived from the number of actions, tasks, and system states
- The complexity of the interface and the degree to which it will be accepted by the user
  - Derived from the interface style, help facilities, and error handling procedures

- Prototype evaluation can range from an informal test drive to a formally designed study using statistical methods and questionnaires
- The prototype evaluation cycle consists of prototype creation followed by user evaluation and back to prototype modification until all user issues are resolved
- The prototype is evaluated for
  - Satisfaction of user requirements
  - Conformance to the three golden rules of user interface design
  - Reconciliation of the four models of a user interface