User Interface Design

Why User Interface

- Any system/product – human interaction
- If a product is to be successful, it must exhibit good usability
- usability - a qualitative measure of the ease and efficiency with which a human can interact with system
- Initially people are required to conform to technology but now technology conforms to people

- If software is difficult to use,
- if it forces you into mistakes,
- or if it frustrates your efforts to accomplish your goals,

- you won't like it, regardless of the computational power it exhibits,
- the content it delivers,
- or the functionality it offers

What is UI

- UI design creates an effective communication medium between a human and a computer

- A set of golden rules
- A set of interaction mechanisms

Interface Design

Easy to learn?

Easy to use?

Easy to understand?

Interface Design

Typical Design Errors

**lack of consistency
too much memorization
no guidance / help
no context sensitivity
poor response
Arcane/unfriendly**

THE GOLDEN RULES

- **Place the user in control.**

- **Reduce the user's memory load.**

- **Make the interface consistent.**

Place the User in Control

- Most interface constraints and restrictions that are imposed by a designer are intended to simplify the mode of interaction. But for whom? In many cases, the designer might introduce constraints and limitations to simplify the implementation of the interface. The result may be an interface that is easy to build, but frustrating to use.

- **Define interaction modes in a way that does not force a user into unnecessary or undesired actions.**

- **Provide for flexible interaction**

- **Allow user interaction to be interruptible and undoable**

- **Streamline interaction as skill levels advance and allow the interaction to be customized.**
- **Hide technical internals from the casual user**
- **Design for direct interaction with objects that appear on the screen.**

Reduce the User's Memory Load

- The more a user has to remember, the more error-prone the interaction with the system will be.
- It is for this reason that a well-designed user interface does not tax the user's memory

- Reduce demand on short-term memory
- Establish meaningful defaults
- Define shortcuts that are intuitive.
- The visual layout of the interface should be based on a real world metaphor
- Disclose information in a progressive fashion.

Make the Interface Consistent

- The interface should present and acquire information in a consistent fashion.
- This implies that
- (1) all visual information is organized according to a design standard that is maintained throughout all screen displays,
- (2) input mechanisms are constrained to a limited set that are used consistently throughout the application.
- (3) mechanisms for navigating from task to task are consistently defined and implemented

- **Allow the user to put the current task into a meaningful context.**
- **Maintain consistency across a family of applications**
- **If past interactive models have created user expectations, do not make changes unless there is a compelling reason to do so**

User Interface Design Models

- User model — establishes the profile of all end users of the system
- To build an effective user interface, "all design should begin with an understanding of the intended users
  - Novices
  - Knowledgeable, intermittent users
  - Knowledgeable, frequent users

- **Design model** — a design realization of the user model
- **Mental model (system perception)** — the user's mental image of what the interface is
  - E.g working with any word processor software
- **Implementation model** — the interface "look and feel" coupled with supporting information that describe interface syntax and semantics
- Mental model and Implementation model are same
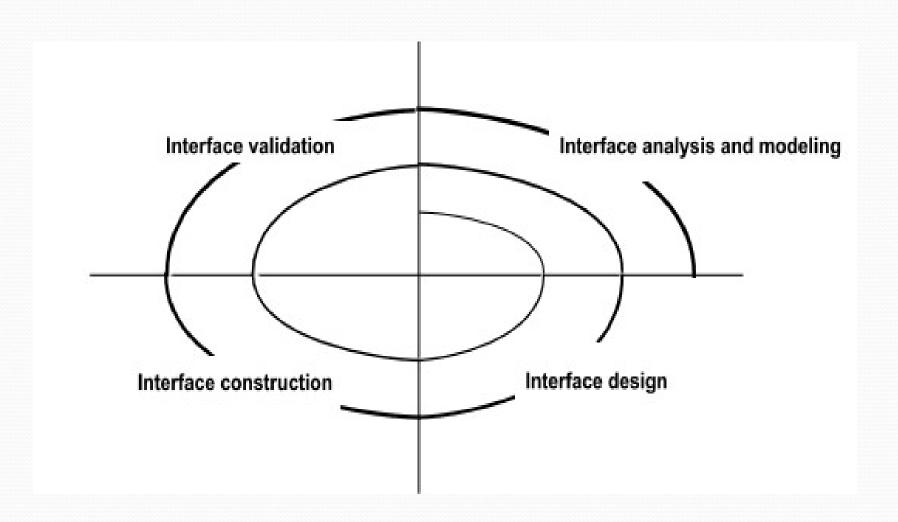 - User feel comfortable in using that system

Interface Design Process

- Interface analysis and modeling
  - profile of the users who will interact, skill level, business understanding (Slide No 21 & 22)
  - *task analysis* is conducted, tasks that the user performs to accomplish the goals (Slide No 23 & 24)
  - Analysis of display content (Slide No 25)

- Interface Design
  - define a set of interface objects and actions
  - enable a user to perform all defined tasks
- Interface Construction
  - creation of a prototype that enables usage scenarios
  - Iterative process

- Interface Validation
  - the ability of the interface to implement every user task correctly
  - the degree to which the interface is easy to use and easy to learn
  - the users' acceptance of the interface

Interface validation

Interface analysis and modeling

Interface construction

Interface design

- Are users trained professionals, technician, clerical, or manufacturing workers?
- What level of formal education does the average user have?
- Are the users capable of learning from written materials or have they expressed a desire for classroom training?
- Are users expert typists or keyboard phobic?
- What is the age range of the user community?
- Will the users be represented predominately by one gender?
- How are users compensated for the work they perform?

- Do users work normal office hours or do they work until the job is done?
- Is the software to be an integral part of the work users do or will it be used only occasionally?
- What is the primary spoken language among users?
- What are the consequences if a user makes a mistake using the system?
- Are users experts in the subject matter that is addressed by the system?
- Do users want to know about the technology the sits behind the interface?

- Answers the following questions …
  - What work will the user perform in specific circumstances?
  - What tasks and subtasks will be performed as the user does the work?
  - What specific problem domain objects will the user manipulate as work is performed?
  - What is the sequence of work tasks—the workflow?
  - What is the hierarchy of tasks?

- Use-cases define basic interaction
- Task elaboration refines interactive tasks
- Object elaboration identifies interface objects (classes)
- Workflow analysis defines how a work process is completed when several people (and roles) are involved

- Are different types of data assigned to consistent geographic locations on the screen (e.g., photos always appear in the upper right hand corner)?
- Can the user customize the screen location for content?
- Is proper on-screen identification assigned to all content?
- If a large report is to be presented, how should it be partitioned for ease of understanding?
- Will mechanisms be available for moving directly to summary information for large collections of data.
- Will graphical output be scaled to fit within the bounds of the display device that is used?
- How will color to be used to enhance understanding?
- How will error messages and warning be presented to the user?

Interface Design Steps

- Using information developed during interface analysis, define interface objects and actions (operations).
- Define events (user actions) that will cause the state of the user interface to change. Model this behavior.
- Depict each interface state as it will actually look to the end-user.
- Indicate how the user interprets the state of the system from information provided through the interface.

Design Issues

- Response time
- Help facilities
- Error handling
- Menu and command labeling
- Application accessibility
- Internationalization