

User Interface Design

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Overview

- ◆ So far we have designed the “internals” of a software program/system.
- ◆ Most contemporary software systems are operated through a user interface, typically a graphical user interface.
- ◆ We need *user interface design principles* and *usability principles*
- ◆ Interface design should be *user-centred*.

The User Interface



- ◆ Users often judge software by its interface rather than its functionality.
- ◆ Poor user interface design is the reason why so many software systems are never used.
- ◆ A poorly designed interface can cause a user to make catastrophic errors.
- ◆ Human Computer Interaction (HCI) draws on psychology, ergonomics and computer science.

UI Design Principles

- ◆ Familiarity
- ◆ Consistency
- ◆ Clarity
- ◆ Minimal surprise
- ◆ Recoverability
- ◆ User guidance
- ◆ User diversity

User familiarity

- ◆ Interface is based on user-oriented terms and concepts rather than computer concepts.
- ◆ Use of the users' experience and everyday environment.
- ◆ Use of Metaphor

Metaphors

- ◆ Terms used figuratively to describe something but not applied literally
- ◆ Two metaphors for human–computer interaction:
 - the dialogue metaphor
 - the direct manipulation metaphor

The Dialogue Metaphor

- ◆ Communication between the human and the computer is a kind of dialogue
- ◆ There is no real conversation, but messages are passed from the human to the computer, the computer responds in some way, and that prompts the human to respond, and so on

The Direct Manipulation Metaphor

- ◆ The interface gives the impression that you are manipulating physical objects on the screen through the use of the mouse:
 - you drag and drop an icon
 - you shrink or expand a window
 - you push a button
 - you pull down a menu

Consistency

- ◆ Interface should be consistent
 - Comparable operations activated the same way
 - Components laid out in a predictable manner (Internal)
 - Standard conventions are used (External)

Clarity

- ◆ Easy to use
 - Readable
 - Proper associations
 - Use of standard Controls and Commands

Minimal surprise

- ◆ Users never surprised by system behaviour.
- ◆ User controls!

Recoverability

- ◆ Provide resilience to user errors and allow user to recover from errors.
- ◆ Might include an undo facility, confirmation of destructive actions, 'soft' deletes, etc.

User guidance

- ◆ Immediate and meaningful feedback for errors.
- ◆ Implementation of context sensitive user help facilities such as help systems, on-line manuals, etc.

User diversity

- ◆ Provide different interaction facilities for different types of user.
E.g. some users have impaired vision and so larger text should be available.

User Interface Evaluation

- ◆ Evaluation of a user interface design should be carried out to assess its suitability.
- ◆ Full scale evaluation is very expensive and impractical for most systems.
- ◆ An interface should be evaluated against a usability specification.

Usability Attributes

Attribute	Description
Learnable level	How long does it take a user to become productive?
Speed of Operation	How fast is the system response to a users request/activity?
Robustness	How tolerant to user errors?
Recoverability	How good is recovery from user errors?
Adaptability	How closely is the system tied to a single model of work?

Event-driven Interfaces

- ◆ Graphical User Interfaces (GUIs) are event-driven
- ◆ The window manager responds to events and changes the state of objects in the windowing system
- ◆ In a complex interface like a word-processor, the user can choose from many actions; the system has to respond correctly whichever is chosen and maintain correct state information

Event-driven Interfaces

- ◆ Sometimes modal dialogues are used—the user can interact with only the dialogue box until they close the dialogue window
- ◆ Sometimes the user can be constrained by disabling and enabling elements of the interface to limit their choice of action

GUI Design Characteristics

Characteristic	Description
Windows	Multiple windows allow different information to be viewed simultaneously.
Icons	Represent different types of information. Some represent files; others represent processes.
Menus	Commands are selected from a menu rather than typed in as a command.
Pointing	Pointing device, like a mouse, used for selecting choices from a menu or indicating items of interest on a window.
Graphics	Graphical elements can be mixed with text on the same window.

GUI Advantages



- ◆ Easy to learn and use.
 - Users without experience learn to use system quickly.
- ◆ User may switch quickly from one task to another and interact with several different applications.
- ◆ Fast, full-screen interaction is possible with immediate access to anywhere on the screen.
- ◆ Reality can be better modelled.

Recommended Readings

- ◆ Joel Spolsky, User Interface Design for Programmers
- ◆ Ian Sommerville, Software Engineering
- ◆ Preece et al., Interaction Design, 2002