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Introduction to Software Engineering

8. viii. User Interface Design

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The UI design process

- UI design is an iterative process involving close liaisons between users and
- designers.
- The 3 core activities in this process are:
- User analysis. Understand what the users will do with the system; System prototyping. Develop a series of prototypes for experiment; Interface evaluation. Experiment with these prototypes with users.

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The design process

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Interface Design Models

Four different models occur in HCI design:

1.

- The design model expresses the software design.

2.

- The user model describes the profile of the end users. (i.e., novices vs. experts, cultural background, etc.)

3.

- The user’s model is the end users’ perception of the system.

4.

- The system image is the external manifestation of the system (look and feel + documentation etc.)

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- User Interface Design Principles
- Principle
- Description
- User familiarity
- Use terms and concepts familiar to the user.
- Consistency
- Comparable operations should be activated in the same way. Commands and menus should have the same format, etc.
- Minimal surprise
- If a command operates in a known way, the user should be able to predict the operation of comparable commands.
- Feedback
- Provide the user with visual and auditory feedback, maintaining two-way communication.

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- GUI Characteristics
- Characteristic
- Description
- Windows
- Multiple windows allow different information to be displayed simultaneously on the user’s screen.
- Icons
- Usually icons represent files (including folders and applications), but they may also stand for processes (e.g., printer drivers).
- Menus
- Menus bundle and organize commands (eliminating the need for a command language).
- Pointing
- A pointing device such as a mouse is used for command choices from a menu or indicating items of interest in a window.
- Graphics
- Graphical elements can be commands on the same display.

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GUIs

Advantages

- They are easy to learn and use.
  - Users without experience can learn to use the system quickly.
- The user may switch attention between tasks and applications. Fast, full-screen interaction is possible with immediate access to the entire screen

Problems

- A GUI is not automatically a good interface
  - Many software systems are never used due to poor UI design - A poorly designed UI can cause a user to make catastrophic errors

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Direct Manipulation

Advantages

- Users feel in control and are less likely to be intimidated by the system User learning time is relatively short Users get immediate feedback on their actions mistakes can be quickly detected and corrected

Problems

- Finding the right user metaphor may be difficult It can be hard to navigate efficiently in a large information space. It can be complex to program and demanding to execute

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Menu Systems

- Advantages
- Users don’t need to remember
- command names
- Typing effort is minimal User errors are trapped by the
- interface
- Context-dependent help can be
- provided (based on the current menu selection) Problems
- Actions involving logical conjunction (and) or disjunction (or) are
- awkward to represent
- If there are many choices, some menu structuring facility must be
- used
- Experienced users find menus slower than command language

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Menu Structuring

Scrolling menus

- The menu can be scrolled to reveal additional choices Not practical if there is a very large number of choices

Hierarchical menus

- Selecting a menu item causes the menu to be replaced by a sub-menu

Walking menus

- A menu selection causes another menu to be revealed

Associated control panels

- When a menu item is selected, a control panel pops-up with further options