

User Interface Design

Sommerville, Chapter 16;
Pressman, Chapter 12

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Overview

- UI design – The Golden Rules
- UI prototyping
- UI evaluation

The User Interface

- User interfaces should be designed to match skills, experience and expectations of its anticipated users
- System users often judge system by its interface rather than its functionality
- Poor user interface design is reason why so many software systems are never used
- Poorly designed interface can cause user to make catastrophic errors

Human Factors in Interface Design

- Limited short-term memory
 - People can instantaneously remember max 7 items of information
 - If you present more than this, they are more liable to **make mistakes**
- People make **mistakes**
 - When people make mistakes and systems go wrong, inappropriate alarms and messages can increase **stress** and hence the likelihood of **more mistakes**
- People are **different**
 - People have a wide range of physical capabilities
 - Designers should not just design for their own capabilities
- People have **different interaction preferences**
 - Some like pictures, some like text, some...

Pressman's Golden Rules

- Place user in control
- Reduce user's memory load
- Make interface consistent

Place User in Control

*No need to learn these items by heart,
but be able to cite examples*

- 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

- **Place user in control**
- Reduce user's memory load
- Make interface consistent

Reduce User's Memory Load

- Reduce demand on short-term memory
 - Quick check: Golden rules?
- Establish **meaningful defaults**
- Define shortcuts that are **intuitive**
- Base visual layout on a **real world metaphor**
 - Ex: in office environments,
 talk about: documents of various types (letter, spreadsheet, ...), folders, ...
 instead of: *files with extensions (.doc, .xls, ...), directories, ...*
- Disclose information in a **progressive** fashion

Make Interface Consistent

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

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Anti-Examples

- ssh vs scp port
- Win registry:

My Computer\HKEY_CURRENT_USER\Software\Microsoft\Windows\CurrentVersion\Policies\Explorer

...which rules are violated?

...want to add another rule: make interface safe (particularly for casual users)

User Analysis

- If you **don't understand** what the users **want to do** with a system, you have **no realistic prospect** of designing an effective interface.
- User analyses have to be described in terms that users and other designers can understand.
- Scenarios where you describe **typical episodes of use** are one way of describing these analyses.
 - Use cases!

Ex: User Interaction Scenario

[Pressman]

Jane is a student of Religious Studies and is working on an essay on Indian architecture and how it has been influenced by religious practices. To help her understand this, she would like to access some pictures of details on notable buildings but can't find anything in her local library.

She approaches the subject librarian to discuss her needs and he suggests some search terms that might be used. He also suggests some libraries in New Delhi and London that might have this material so they log on to the library catalogues and do some searching using these terms. They find some source material and place a request for photocopies of the pictures with architectural detail to be posted directly to Jane.

Requirements from Scenario

- Users may not be aware of appropriate search terms,
→ need a way of **helping them choose terms**
- Users have to be able to **select collections** to search
- Users need to be able to carry out **searches**
and **request copies** of relevant material

Analysis Techniques

- **Task analysis**
 - Model steps involved in completing a task
- **Interviewing and questionnaires**
 - Ask users about work they do
 - Use open-ended questions
 - Group interviews / focus groups → discuss with each other what they do
- **Ethnography**
 - Observes user at work, questions them
 - Valuable to find intuitively done steps
+ to understand role of social & organisational influences

Ex: Ethnographic Records

[Pressman]

Air traffic control involves a number of control 'suites' where the suites controlling adjacent sectors of airspace are physically located next to each other. Flights in a sector are represented by paper strips that are fitted into wooden racks in an order that reflects their position in the sector. If there are not enough slots in the rack (i.e. when the airspace is very busy), controllers spread the strips out on the desk in front of the rack.

When we were observing controllers, we noticed that controllers regularly glanced at the strip racks in the adjacent sector. We pointed this out to them and asked them why they did this. They replied that, if the adjacent controller has strips on their desk, then this meant that they would have a lot of flights entering their sector. They therefore tried to increase the speed of aircraft in the sector to 'clear space' for the incoming aircraft.

Insights from Ethnography

- Controllers had to see **all flights in a sector**. Therefore, scrolling displays where flights disappeared off the top or bottom of the display should be avoided.
- The interface had to have some way of telling controllers how many flights were in **adjacent sectors** so that they could plan their workload.

UI Prototyping

- Aim: allow users to gain direct experience with interface
- Without such direct experience, it is impossible to judge usability of an interface
- Prototyping may be two-stage process:
 - Early in the process, paper prototypes may be used;
 - design is then refined through increasingly sophisticated computer prototypes

Prototyping Techniques

■ Paper prototyping

- sketches of the interface + a storyboard to present a series of interactions
- effective way of getting user reactions to a design proposal

■ Script-driven prototyping

- set of scripts + screens using a tool such as Macromedia Director.
- When user interacts, screen changes to next display

■ Visual programming

- language designed for rapid development, eg, Visual Basic (Pressman Chapter 17)

■ Internet-based prototyping

- web browser + associated scripts

UI Evaluation

- Some evaluation of a user interface design should be carried out to assess suitability
- Full scale evaluation very expensive & impractical for most systems
- Ideally, an interface should be evaluated against a **usability specification**
 - rarely done, though

UI Wrap-Up

- UI design process involves
 - user analysis
 - system prototyping
 - prototype evaluation
- Create metaphors, use them consistently
- UI critical for acceptance or failure of the whole project
 - Prototyping + high customer interaction advisable