Lecture outline

Usability Analysis
Cognitive Walkthrough
Heuristic Evaluation
Design Guidelines
Design Principles
Visual Presentation

Analysing Performance

- **GOMS** analysis methods
  - Goals, Operators, Methods, Selection rules
  - including KLM, Keystroke-Level Modelling
- **Cognitive walkthrough**
- **Heuristic evaluation** aka usability inspection

Cognitive Walkthrough

Particularly appropriate for analysing walk-up-and-use interfaces for **ease of learning** by **first-time** users.
- Also appropriate for analysing **changes to a system**.
- Similar in spirit to **code walkthrough**.

Evaluators **step through** the sequence of interface actions required to complete some task.
- **At each step**, determine why it is or isn’t appropriate for a new user.
Cognitive Walkthrough

Based on a user model of exploratory learning:

1. The user starts with a rough plan of what is to be achieved—a task to be performed.
2. The user explores the system, via the user interface, looking for actions that might contribute to performing the task.
3. The user selects the action whose description or appearance most closely matches the goal.
4. The user interprets the system’s response and assesses whether progress has been made towards completing the task.

Exposes design flaws that may interfere with exploratory learning.

Cognitive Walkthrough Requirements

To do a cognitive walkthrough, as an evaluator you need:

- sufficiently detailed description of the prototype,
- description of the task the user is to perform,
- list of actions needed to perform the task with the prototype,
- indication of the user’s experience and knowledge,

Cognitive Walkthrough Questions

As you step through, ask:

1. Will the correct action be made sufficiently evident to the users?
2. Will the users connect the correct action’s description with what they are trying to do?
3. Will the users interpret the system’s response to the chosen action correctly? That is, will the users know if they have made a right or a wrong choice?
4. Will the user’s mental model be affected? Will new concepts be added, or existing concepts lost?

Heuristic Evaluation

Heuristic evaluation is also called usability inspection

- more appropriate for designs where method of operation is less predictable
- typically done by small team of evaluators
Heuristic Evaluation

General-purpose guidelines for the application of usability heuristics:

- simple and natural dialogue
- speak the user’s language
- minimize memory load
- be consistent
- provide feedback
- provide clearly marked exits
- provide shortcuts
- provide good error messages
- prevent errors
- ...

Heuristic Evaluation, Comments

Heuristic evaluation is rather loose and flexible

- low cost, compared with other methods
- little or no advance planning required

It can be used early in development process

- problem oriented
- design inertia
- more varied outcome, less repeatable

Guidelines

Guidelines capture knowledge about how to design interactive systems.

Can look at:

- What they are
- What kinds there are
- What they’re used for
- Examples

Guidelines Sampler

- Strive for consistency. (Shneiderman, 1992)
- In menu-based interaction, where users make frequent selection and the set of options does not change over time, user letter identifiers paired to each option. (Perlman, 1984)
- Consider voice synthesis as an output device when the user’s eyes are busy, when mobility is required, or when the user has no access to a workstation or screen. (Mayhew, 1992)
When using a video link to support collaboration of individuals, adjust camera fields of view wide enough to show other people at the connected locations, not just the heads and shoulders of the principal users. (Dourish et al., 1994)

When closing a document, the user must be able to choose whether to save any changes made to the document since the last time it was opened. (Apple, 1987)

A standard window has a close box. When the user clicks the close box, the window goes away. (Apple, 1987)

Kinds of Guidelines

- General principles
- Global rules
- Design guidelines for components
- House style, vendor specific
- International or national design standards

What Guidelines Can Be Used For

- Raising awareness of concepts
- Assisting in design choices
- Offering strategies for solving design problems
- Supporting evaluation
  (e.g. heuristic evaluation)

Problems in Applying Guidelines

- Which ones to use?
- How to apply them?
- What if guidelines conflict?
  - Use a logical order (if one exists) to help guide users through the process
  - Put most important or most frequently used functions at the top of the menu
General Design Principles

- Design with a view to supporting the user’s task or process
- Know your user
- Strive for consistency
- Enable frequent users to use shortcuts
- Offer informative feedback
- Design dialogues to yield closure
- Offer simple error handling
- Permit easy reversal of actions
- Support internal locus of control
- Reduce short-term memory load

Conceptual Design Heuristics

- Take into account the mental models that users will bring with them to the new system (Mayhew, 1992)
  - Alternatively: Investigate whether people have and use mental models of various kinds (Carroll & Olson, 1988)
- Promote the development of both novice and expert mental models (Mayhew, 1992)

Example Guidelines for Menu-Based Interaction (Shneiderman, 1992)

- Use task semantics to organize menus (single, linear sequence, tree structure, acyclic and cyclic networks)
- Prefer broad and shallow to narrow and deep
- Show position by graphics, numbers or titles
- Use item names as titles for trees
- Use meaningful groupings for items
- Use meaningful sequencing of items
Example Guidelines for Menu-Based Interaction

- Make items brief, begin with keyword
- Use consistent grammar, layout, terminology
- Allow typeahead, jumphaead, or other shortcuts
- Allow jumps to previous and main menus
- Consider online help, novel selection mechanisms, response time, display rate, and screen size

Example Guidelines for Voice-Based Interaction

- In a prompting message, present the goal first and the action afterwards
- In a message of predictable form whose purpose is to provide variable information, place this information at or near the start of the message
- Provide a means of skipping the remainder of partially heard messages
- Provide a means of repeating messages
- Use an output rate of approximately 180 words per minute

Guidelines for Visual Presentation

- Locate the command line near the bottom of the screen unless it is clear that the user’s gaze will be elsewhere
- When your application organizes data logically into pages, provide page-oriented scroll bars. (Sun, 1991)
- Present only what is necessary for the activity’s performance
- Assist associations between items by placing them within 5 degrees visual angle of each other

Guidelines for Visual Presentation

- Present lists in vertical columns rather than in running horizontal text
- For item differentiation, use a maximum of five colors (plus or minus two) to match the user’s short-term memory capacity
- For item ordering, follow the spectral order: red, orange, yellow, green, blue, violet
- (Use red and green within the eye’s central focusing area, and avoid relying on them in the periphery.)—suspect!
Guidelines for Visual Presentation

- Avoid use of extreme changes in hue in adjacent high-saturation colors
- Use familiar color codings, e.g., red for stop or danger, green for go
- Use additional coding methods, for example, shape, size or texture, to cater for users with color-deficient vision
- Use color in such a way that you can be sure that the effects will be achieved despite normal differences in color rendering by displays and printers

Summary

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