

User Interface Evaluation

Cognitive Walkthrough

Lecture #16

Agenda

- Evaluation through Expert Analysis
 - Cognitive walkthrough
 - Heuristic evaluation
 - Model-based evaluation
 - Cognitive dimension of notations

Evaluation through Expert Analysis

- Usability experts **inspect** the interface
- Objective
 - To identify any areas that are likely to cause difficulties
- Application stage
 - Any stage in the development process: Design, Code, Test and Development
- Advantages
 - Relatively cheap and fast
 - Do not require the involvement of users
- Disadvantages
 - Not assess actual use of the system, assess only whether or not a system upholds accepted usability principles
 - Often abused by developers that consider themselves to be experts

Expert Analysis Approaches

- Four important approaches are known
 - Cognitive walkthrough
 - Proposed by Polson et al. [1994]
 - Heuristic evaluation
 - Proposed by Nielsen et al. [1994]
 - Model-based approaches
 - Proposed by Card, Moran and Nielsen [1980]
 - Cognitive dimension of notation
 - Proposed by Thomas Green [1996]



Cognitive Walkthrough

- Walkthrough is a term refers to the **detailed review of a sequence of actions**
- Walkthrough done by **a group of experts** (preferably, excluding the members who actually design/implement)

Example: Code walkthrough in Software Engineering

- To review a segment of program code by the expert other than programmer
- Sequence of actions
 - Selecting a set of program codes
 - Check certain characteristics, such as, coding style, spelling variables conventions, function declarations, system-wide invariants etc.

Cognitive Walkthrough

- Like cognitive walkthrough (CW) in Software Engineering, we follow CW in HCI
- CW involves one or a group of evaluators inspecting a user interface by going through a set of tasks and evaluate its **understandability** and **easy of learning**
- Assess the usability of a system in situations where the **user is not an expert**, and may be attempting a task that s/he has never done before

Cognitive Walkthrough

- Polson et al. introduced the concept of cognitive walkthrough [1994]

Reference

- The cognitive walkthrough method: A practitioner's guide by C. Wharton, J. Riemann, C. Lewis and P. Polson in **Usability Inspection Methods** edited by J. Nielsen and R. Mack, John Wiley, New York, 1994
- Polson's CW is based on the concept of **Exploratory Learning**

Exploratory Learning

- Exploratory learning (EL) is **learning through exploration**
- Many users prefer to learn how to use system by explorations its functionality **hands on** and not after sufficient training or examination of user's manual
- Users carrying out tasks through EL involves **four** basic tasks
 1. User sets a **goal** to be accomplished with the system
e.g. *Spelling check*
 2. User searches the interface for currently available **actions**
e.g. Presence of menu items, buttons, availability of command-line inputs
 3. User **selects** the action that seems likely to make progress toward the goal
 4. The user **performs** the selected action and **evaluates** the system's feedback for evidence that progress is being made toward the current goal

CW: Evaluation Procedure

- To do the CW, we need the following things
 - A **specification** or **prototype** of the system
 - It does not have to be complete, but it should be fairly detailed
 - A general description of the **type of users** who are expected to use the system and the relevant knowledge that these users would be expected to have
 - A description of one or more **representative tasks** to be used in the evaluation
 - For each of the tasks, a list of the **correct actions** that should be performed in order to complete the task

CW: Evaluation Procedure

- The evaluators move through each of the tasks, considering the user interface at each step
- At each step, they examine the interface and critique the system and tell scenario

CW: What to Evaluation?

- Three things are to be evaluated
 - Problems forming correct goals
 - Problems identifying the actions
 - Problems performing the actions

Problems Forming Correct Goals?

– Failure to add goals

- If the new design contains new goals, is there a clear indication to the user that these should be added?

Example: The user needs to add “load Hindi dictionary” to check a document. An interface may not contain prompt or other information in the interface indicating that this step is required to check a document in Hindi

– Failure to drop goals

- If the design contains goal that must be dropped, is there a clear indication to the user that these should be dropped?

Example: While editing a file the older version is being saved as backup automatically. If the interface gives no indication of this activity, the user won't drop the goal of manually creating backup

Problems Forming Correct Goals?

– Addition of spurious goals

- Does the system suggest any extra or incorrect goals?

Example: The user tries to save a modified file and the system presents a dialogue box asking ‘**Save as ..**’. The user may add the goal of entering a file name, even though the next correct action is to click ‘**Ok**’, which saves the file under its current name

– No-progress impasse

- Does the system’s response indicate that progress has been made toward some higher goal?

Example: No significant response (while opening a large file from hard disk) or inappropriate response (Load the file and fix the cursor at the end of the file showing a blank screen giving a feedback that no file or improper file is opened)

Problems Identifying the Actions

– Correct action doesn't match goals

- Is there a problem matching a current goal to the correct action?

Example: A user with his mobile cell has the goal “Send reply to a received message appended with the message”. The action is to select reply message “Send” is a poor match to the user's goal

– Incorrect actions match goals

- Are the incorrect actions available that match a user's goal?

Example: A user working with MS Word wants to “Change the width of column of a table”. To perform this goal user has to place the pointer in any cell in the column and stretch a boundary of the cell accordingly

Problems Performing the Actions

– Physical disabilities

- Are there any difficulties in performing an action, such as pressing multiple keys simultaneously or finding a hidden control?

Example: The subscript command in MS Word is “Ctrl + =“. On a keyboard with a single control key on the far left side, a user with small hands may have difficulty touch typing “Ctrl + =“

– Time-outs

- If the system has time-outs, how users might have difficulties deciding on the action and performing it before a time-out?

Example: User response time can vary greatly, and it is required to consider whether time-outs is useful or there is an obvious way to recover from a time-out if one does occur

CW: Who Are the Evaluators?

- The evaluators may include
 - Human factors engineer
 - Software developer
 - People from marketing
 - People for documentation
- etc.



Recommended Materials

- See the course web page

<http://www.iitkgp.ac.in/course/it60110/>

(For the presentation slides of the current lecture and other materials)

- Book

Human-Computer Interaction by Alan Dix et al.
Pearson-Education,

Chapter 9

