Homework Set 2

A brief discussion
Homework Set 2

A brief discussion
Problem 4

Hick’s Law or Fitt’s Law?
\[ MT = a + b \cdot ID \]

\[ ID = \log_2 \left( \frac{A}{W} + 1 \right) \]
\[ MT = a + b \cdot ID \]

\[ ID = \log_2\left(\frac{A}{W} + 1\right) \]

\[ a = 548 \]
\[ b = 420 \]

| Dyn 1 | Dyn 2 | Dyn 3 | Dyn 4 | Static 1 | Static 2 | Static 3 | Static 4 | Static 5 | Static 6 | Static 7 | Static 8 |
\[ MT = a + b \cdot ID \]
\[ ID = \log_2 \left( \frac{A}{W} + 1 \right) \]

- \( W \)
- Dyn 1
- Dyn 2
- Dyn 3
- Dyn 4
- Static 1
- Static 2
- Static 3
- Static 4
- Static 5
- Static 6
- Static 7
- Static 8

\[ a = 548 \]
\[ b = 420 \]
\[ MT = a + b \cdot ID \]
\[ ID = \log_2 \left( \frac{A}{W} + 1 \right) \]

\[ a = 548 \]
\[ b = 420 \]

\[ .5(548 + 420 \cdot \log_2 \left( \frac{A_1}{W} + 1 \right)) + .5(548 + 420 \cdot \log_2 \left( \frac{A_2}{W} + 1 \right)) \]

\[ n \cdot \log(m) \neq \log(n \cdot m) = \log(m^n) \]
Cognitive Walkthrough and Heuristic Evaluation

Tuesday
low-fi prototyping

(or - how to get paid for playing with construction paper and crayons)
Messages

• Low fidelity prototypes allow rapid exploration with minimal investment

• Get your design down quickly, evaluate it, and iterate based on lessons learned

• Improves creativity and resulting design
In Context of TCUID

**Goals**
- Identify: Usability goals
- Users & tasks
- Content

**Methods**
- Contextual inquiry
- Task analysis
- Interviews
- Surveys
- Observations
- Sketching & brainstorming
- Heuristic evaluation
- Cognitive walkthrough
- GOMS
- Action analysis

**Artifacts**
- User descriptions
- Task descriptions
- Affinity diagrams
- Design brief
- Task scenarios
- Paper prototypes
- Functional prototype
- Functional interface & system

**Analysis**
- Explore design space

**Early Design**
- Refine selected design

**Late Design**
- Implement and integrate

**Implementation**
- Empirical study
- UI guidelines
- Functional test

**Deployment**
- Gather requirements for next release
- Field study
- Critical incident walkthroughs
- Interviews and surveys
- Usability report
Prototyping in HCI

• **Build a scaled model of an interactive system**
  – externalize your design thinking
  – enables communication

• **Evaluate the model against some criteria**
  – measure how “good” the model is
  – compare against other models
  – learn how to improve it

• **Iterate as necessary**
  – integrate lessons, increase fidelity and detail
  – iterate rapidly at first, then slow as design solidifies
Prototype and Evaluation Stages

Early design
- Rough out on paper
- Cognitive walkthrough
- Formative evaluation
- Action analysis
- Heuristic evaluation
- Functional prototype
- Empirical studies

Late design
- Low-fidelity (paper-based)
- Medium-fidelity
- High-fidelity (computer-based)
Iterative Design

- Build, evaluate, iterate, ...
  - iterate rapidly at first, slow as design solidifies
- Increase fidelity and add detail
  - change from paper to computer medium
- Evaluate different aspects of the design at different stages of the design process
  - early: metaphor, structure, usefulness
  - late: performance, learnability, satisfaction
Prototyping Tools

- Use tools to construct models
  - paper, informal tools, development tools
- In choosing a tool, consider:
  - requirements of the project
  - expertise of design team
  - access to relevant libraries
  - balance investment with effectiveness
Low-fidelity Prototype

- Rough cut of your interface design created with paper, post-it notes, overlays, correction tape, etc.
- Sketch storyboards to show overall design concept and interface structure
- Use post-its and overlays to simulate critical interactions
- Build the prototype to support your tasks
Low-fidelity Tools

Dialogs

Menus

Main screen
Example
Benefits of Low-fidelity

- Quick and cheap to build prototype
- Communicates design concept and structure, can demonstrate interactions
- Facilitates brainstorming and invites discussion
- Enables early evaluation
- Maximizes number of design refinements before you commit to code
- Enables rapid and extensive exploration of the design space
Materials

- Paper: heavy paper for base interface screens
- Overlays: show changes in content
- Post-it notes: show changes in content
- Adhesives: glue sticks, correction tape
- Colored markers and pencils: enable highlighting, drawing in color
- Scissors: cut content to size
- Library: Pre-fabricate menus, buttons, tabbed panes, dialogs, etc.
Build the Prototype

- Sketch interface screens on heavy paper
  - called *storyboards*
- Build interactions using “library”
  - menus, dialogs, tabbed panes, buttons, etc.
- Assemble components to enable users to perform each task from your analysis
- Do not debate the design too much, get your ideas down and ready for evaluation
  - quality will improve with iteration
Evaluate Low-Fi Prototype

- Identify “big” problems
- Perform rapid iteration
- May catch problems that empirical tests could miss (e.g., consistency issues)
- Evaluations are only effective if your team
  - has the right skill set
  - wants to improve the design, not defend it
Evaluation Techniques

- Formative evaluations
- Wizard of Oz studies
- GOMS and action analysis
- Cognitive walkthroughs
- Heuristic evaluations
Evaluating the Techniques

- Does the technique identify usability issues that users will encounter in practice?
- Can the technique help you identify design solutions? Does implementing these solutions actually fix the usability issue?
- When can you use the technique?
- What are the costs of learning and applying the technique? What types of usability issues does it discover?
Formative Evaluation

• Evaluate how well users can perform tasks with your low-fidelity prototype
  – have a user perform a task with prototype
  – manipulate prototype to make it interactive
  – identify trouble points and solutions
  – revise prototype and perform again
What You Need

- User and task descriptions
- Low-fidelity prototype with enough “functionality” for several tasks
- An evaluation team that consists of a
  - “computer”
  - facilitator
  - note taker
What To Do

• Ask the user to perform a task
• Manipulate prototype to reflect actions
• Ask the user to think aloud
• Identify trouble points with the interface
• Write down each usability issue
Formative Evaluation

Observer

Computer

“Computer” with components laid out in order, for quick access

Facilitator

Facilitator, guiding user through tasks, prompting for user’s thoughts

User

User, with lo-fi prototype in use

Camera pointed at interface
After the Evaluation

• Reflect on the results
  – write each usability issue on a post-it note
  – identify severity and frequency
  – use affinity diagram techniques

• Explore larger design changes to address multiple usability issues
  – small variations may not be enough, this is the best time for “big” changes

• Change your prototype and re-evaluate