Lecture 6: Usability Evaluation

February 10
Project Ideas
Website for Older Adult Team

• Prof. Bo Xie
• Information School
• New technologies for older adults

• **Needs:** Managing computer training classes for seniors given in local public libraries
Website for Sharing Voice/Accent Videos

- Prof. Leigh Wilson Smiley
- Department of Theater
- Voice, Acting, Speech, Dialect

**Needs:** Share and lookup video examples of voices and accents.
Usability Evaluation
Goals of evaluation

• Compare design candidates
• Identify usability problems
• Make recommendations to improve usability
• Provide evidence of usability attributes
When?

• Formative evaluation (while designs are still changing substantially)
• Summative evaluation (near the end of the design process, provide evidence of usability)
Who should do evaluation?

- Programmers?
- Users?
- HCI Experts?
Evaluation by users

• Focus group
• Survey
• Field test
• Controlled experiments

(We will cover these topics in later lectures)
Evaluation by experts

- Cognitive walkthrough
- Heuristic evaluation
- Action analysis
- Guideline review
- Metaphors of human thinking
Evaluation by experts

- **Good:** Cheaper and quicker to do
- **Good:** Can be done early in the design process
- **Bad:** Experts may not have an adequate understanding of the task domain or user communities
- **Bad:** Experts may have different and sometimes conflicting opinions
Evaluation by experts

• Cognitive walkthrough
• Heuristic evaluation
• Action analysis
• Guideline review
• Metaphors of human thinking
Cognitive Walkthrough
Cognitive Walkthrough (CW)

• Focus on users’ cognitive functions
• Focus on tasks

• When?
  – Before the interface is implemented
  – After the interface is implemented
Requirements for CW

• Interface description
• User description (experience, skill)
• Task description (needs)
• A sequence of user actions for the task
What to ask about each action?

• Will users know to perform the action?
• Will users see the control?
• Will users understand the control?
• Will users see the feedback?

• Easy? Hard? Impossible?
Example: Elevator

• Interface description
  – *A closet with pictures of buttons*

• User description (experience, skill)
  – *Someone never used an elevator before*

• Task description (needs)
  – *Go to a particular floor*

• A sequence of user actions for the task
  – *Call for an elevator, wait, get in, select a floor*
Example: Elevator

- Will users know to perform the action?
  - Call for an elevator to come
- Will users see the control?
  - Up button
- Will users understand the control?
  - The button needs to be pressed
- Will users see the feedback?
  - The button is lit

- Easy? Hard? Impossible?
Example: Elevator

• Will users know to perform the action?
  – Select a floor

• Will users see the control?

• Will users understand the control?

• Will users see the feedback?

• Easy? Hard? Impossible?
Example: Booking a flight

• **Interface description**
  – *Design Sketches*

Candidate 1

Candidate 2
Example: Booking a flight

• User description (experience, skill level)
  – The user has booked hotels online but never booked flights online before

• Task description (needs)
  – The user wants to find the earliest one-way NWA flight tomorrow from DCA to JFK.
Example: Booking a flight

• Sequence of actions

1. Find a list of possible flights
   • DCA and JFK as departure and arrival cities
   • One-way
   • Tomorrow

2. Rank the flights by departure time

3. Keep only flights operated by NWA
1. Find all possible flights

**Know** the action?

**See** the control?

**Understand** the control?

**See** the feedback?
1. Find all possible flights

**Know** the action?

**See** the control?

**Understand** the control?

**See** the feedback?
Example: Booking a flight

- Interface description
  - Expedia.com
1. Find all possible flights

Know the action?
See the control?
Understand the control?
See the feedback?
2. Rank by departure time

Washington, DC (DCA) to New York, NY (JFK)

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<th>Delta</th>
<th>US Airways</th>
<th>Northwest</th>
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1 stop

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Prices are per person for roundtrip travel; they are e-ticket prices and include all flight taxes and fees. Prices do not include baggage fees or other fees charged directly by the airline.

1 Choose a one way flight or view top 30 picks

Sort by: Price | Duration | Departure time | Arrival time

$149.99 + $10.71 taxes & fees = $160.70

6:15 am Depart Washington (DCA) Arrive New York (JFK) 7:35 am
Mon 25-Jan Duration: 1hr 20mn
Delta 6728 Nonstop flight

Preview seat availability

Book this flight online now without booking fees! See details

$149.99 + $10.71 taxes & fees = $160.70

10:10 am Depart Washington (DCA) Arrive New York (JFK) 11:31 am
Mon 25-Jan Duration: 1hr 21mn
Delta 6730 Nonstop flight
3. Keep only NWA flights

Washington, DC (DCA) to New York, NY (JFK)

Know the action?

See the control?

Understand the control?

See the feedback?
Heuristic Evaluation
• **Usability attributes:**
  – From users perspective

• **Usability heuristics:**
  – From design’s perspective
Heuristic Evaluation (HE)

- An inspection technique
- Performed by HCI experts
- Cost / Problem ratio is low
Steps of HE

1. Inspect UI thoroughly
2. Compare UI against heuristics
3. List usability problems
4. Explain and justify each problem with heuristics
Indicate severity level

- **Cosmetic**: okay not to fix
- **Minor**: need to fix but low priority
- **Major**: need to fix and high priority
- **Catastrophic**: must fix right away
Tips for successful HE

• Use multiple evaluators
• Alternate with actual user testing
HE Guidelines

• Nielsen’s 10 principles
• Shneiderman’s 8 golden rules
• Tognazzini’s 16 principles
Nielsen’s 10 principles

• Who is Jakob Nielsen?
  – Author of the book “Usability Engineering”
  – Inventor of HE
• Exercise: Identify the usability attributes each design heuristic is aimed to optimize.
Nielsen’s 10 principles

1. Visibility of system status
2. Match between system and the real world
3. User control and freedom
4. Consistency and standards
5. Error prevention
6. Recognition rather than recall
7. Flexibility and efficiency of use
8. Aesthetic and minimalist design
9. Help users recognize, diagnose, and recover from errors
10. Help and documentation
1. Visibility of system status

• Does the system tell the users
  – what operation it is performing?
  – how much longer they need to wait?
  – which mode it is in?
2. Match between system and the real world

• Does the system
  – speak users’ language?
  – follow real world convention?
3. User control and freedom

• Does the system
  – provide clearly marked exists?
  – support undo and redo?
4. Consistency and standards

- Does the system use the same term to refer to the same thing?
- Does the system let users perform the same action by the same UI?
5. Error prevention

• Does the system eliminate or check for error-prone conditions?

• For example, does an email client help users avoid common errors such as
  – typing the wrong address
  – making spelling mistakes
  – missing an attachment
To: cms |

<cmcs434-0101-spr10@coursemail.umd.edu>

Check Spelling ▼

The page at https://mail.google.com says:

Did you mean to attach files?

You wrote "attached file" in your message, but there are no files attached. Send anyway?

[Cancel] [OK]
6. Recognition rather than recall

• Does the system present options for users to recognize the one they want?
7. Flexibility & efficiency of use

• Does the system provide ways for users to access a file or application quickly?
• Does the system provide shortcuts users can learn to do things faster?
8. Aesthetic & minimalist design

• Does the system minimize irrelevant or rarely needed elements?
• Does the system look aesthetically appealing?
9. Help users recognize, diagnose & recover from errors

• Does the system explain well why an error occurs and how to fix it?
Wrong button!
This button doesn't work.

Solution
Try another.

Temporary Error (502)

We're sorry, but your Gmail account is currently experiencing errors. You won't be able to use your account while these errors last, but don't worry, your account data and messages are safe. Our engineers are working to resolve this issue.

Please try accessing your account again in a few minutes.

Try Again  Sign Out
10. Help and documentation

• Does the system help?
• Does the system provide help where and when it is needed?
• Is the system adequately documented?
Pros & Cons of HE

• Pros:
  – Easy and inexpensive
  – Can be performed by experts
  – Does not require users
  – Catch most obvious design flaws

• Cons:
  – Can not see how well the interface will address user goals
Shneiderman’s 8 golden rules

• Who is Ben Shneiderman?
  – Founder of HCIL
  – Author of “Designing the User Interface”
  – Leading expert in Information Visualization
Shneiderman’s 8 golden rules

1. Consistency
2. Shortcuts
3. Feedback
4. Dialog closure
5. Simple error handling
6. Reversible actions
7. Put user in control
8. Reduce short-term memory
1. Consistency
2. Shortcuts
3. Feedback

• Frequent or minor actions $\rightarrow$ modest
• Infrequent or major actions $\rightarrow$ substantial
4. Dialog disclosure

![Image of installation success dialog box]
5. Simple error handling

![Error Handling Dialogue Box]

Are you sure you want to permanently erase the items in the Trash?
You can’t undo this action.

[Cancel] [Empty Trash]
6. Reversible actions
7. Put users in control
8. Reduce short-term memory
Tognazzini’s 16 principles

1. Anticipation
2. Autonomy
3. Color blindness
4. Consistency
5. Defaults
6. Efficiency
7. Explorable interfaces
8. Fitts’s Law
9. Human interface objects
10. Latency reduction
11. Learnability
12. Metaphors
13. Protect users’ work
14. Readability
15. Track state
16. Visible navigation
Activity: Evaluation

1. Cognitive Walkthrough
2. Heuristic Evaluation