Today’s Lecture

- Welcome Back!
- Paper Prototyping
  - User Testing
- Final Exam

Reminders
- Blog Post (Week)
- Project 3

Final Exam

- Take Home or Two Hour Exam
  - Take Home
    - Programming – WPF / Surface
    - Written Answers
    - Much > 2 hours (4+ hours)
  - Normal Final
    - Two Hours
    - Open Book / Open Note
    - Some Programming but much less picky

CIFS: Don’t forget them!

Hall of Fame / Shame?

Why Prototype?

- Get feedback easier, cheaper
- Experiment with alternatives
- Easier to change or throw away

Was your final project alpha prototype worthy?

<table>
<thead>
<tr>
<th>Low fidelity</th>
<th>High fidelity</th>
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Other Prototype Considerations

- Breadth vs. Depth
  - How many features to cover?
  - How well are they implemented?
- Examples
  - Word Processor
    - Leave out printing, spell checking
- Horizontal vs. vertical
  - Horizontal – all breadth, little depth
  - Vertical – One area in depth
  - Horizontal – Usability (most common)
  - Vertical – Risky sub-area
Fidelity – User-interaction

- Look
  - Hand-drawn vs. toolkit widgets
- Feel
  - Mouse / keyboard
  - Point to "click"
  - Write input
    - Tablet / Surface?

Paper Prototype

- Interactive paper mockup
  - Sketches of screen appearances
  - Paper pieces show windows, menus, dialogs
- Interaction is natural
  - Pointing = mouse
  - Writing = keyboard
- Person simulates computer operation
  - Putting down / picking up pieces
  - Writing responses
  - Describing what is going on

Why paper?

- Faster
  - Sketch vs. code
- Easier to change
  - Change between or even during
  - No code investment
- Focuses attention on big picture
  - Don’t waste time on details
  - Suggestions vs. nitpicking
- Non-programmers can help
- Clear model vs. view separation

Tools

- Poster board
- Unlined index cards
- Restickable Glue
- Post-It Notes
- Correction Tape
- Photocopier
- Transparencies
- Pens, markers, scissors, tape

Tips

- Larger than life
- Monochrome
- Tricky visual feedback w/audio
  - Tool tip, drag and drop, progress bar
- Keep pieces organized
  - Envelopes, folders

Examples
Size Matters

Big / Dark Writing

Post Its / Transparencies

Roles

- Computer
  - Design simulator
  - No feedback not from computer

- Facilitator
  - Present interface / tasks
  - Encourage user to think "aloud"
  - Keeps user on task

- Observer
  - Takes notes (lots of them)
  - Does not speak

What do you learn?

- Conceptual model
  - Do the users understand it?
- Functionality
  - Does it do what is needed?
- Navigation / task flow
  - Can users find their way around?
- Terminology
  - Do users understand the labels?
- Screen content
  - What needs to go on the screen?

What you can’t learn

- Look, color, feel
- Feel: Fitt’s Law
- Response time
- Are small changes noticed?
  - Everything is noted in a paper prototype
- Exploration vs. deliberation
  - Thrashing / exploration
  - Users do what you ask, not much tinkering with a paper prototype

Many studies show that low fidelity prototypes illustrate usability as well as high-fidelity prototypes
Wizard of Oz

- Man behind the curtain
  - Simulate technology not available
    - Voice recognition
    - Artificial intelligence
  - Games
    - Dynamic difficulty (human managers)

User Testing - Ethics

- Users are human beings
  - Human beings have been abused in the past
    - Yale electric shock study
    - MIT Fernald School study
    - Tuskegee syphilis study
  - Point
    - Codes of conduct for human interactions
    - Research related studies must be approved
      - ND – Institutional Review Board

User Pressure

- Performance anxiety
- Intelligence test
- Compare self w/others
- Feel stupid in front of observers
- Compete w/others

Respect your users

- Don’t waste time
- Make user comfortable
- Informed consent
- Privacy
- Control to the user

How many users?

- Landauer-Nielsen Model
  - Every tested user finds a fraction $L$ of usability problems ($L \approx 31\%$)
  - If user tests are independent, $n$ users will find a fraction $(1-(1-L)^n)$
- How many
  - 15 users to find 99% of one iteration
  - 5 users to find 85% on three iterations
- Rough rule of thumb
  - 3-5 users per user class

Flaws

- Finding of issues may be much less
  - Spool & Schroeder -> $L \approx 8\%$
- $L$ may vary from problem to problem
  - Interface differences
  - Task complexity
  - Individual differences
- Take home point
  - Difficult to predict how many users to work with
  - More is almost always better 😊
Split into groups

☐ Final project (5 minutes)
  ■ Sketch out with your group members
  ■ Sketch major screens / interfaces

Wednesday: Bring it to class, demo with other people in the class

Questions?

- Weekly Blog
- Project 3
- Alpha Submission