Human-Computer Interaction IS4300

P4 – Design Sketches

Due today

- You will explore possible design options, and sketching what your interface will look like.
- **Interaction Scenarios**
  - Expand each of your activity design scenarios into full interaction scenarios, thinking about what the user perceives and the actions he/she performs at each major step in the scenario, following the methods outlined in Rosson & Carroll Ch 4 & 5.
- **Preliminary interface design**.
  - One or more sketched windows or dialog boxes, along with the menus and controls that the user manipulates. Take a little time to brainstorm a variety of different interface designs, sketching them by hand on paper or a whiteboard. Then choose one that seems the most promising, or a combination of them, to hand in. Hand-drawn sketches are encouraged.

P4 – Design Sketches

Due today

- **Storyboards**. For each of your tasks/scenarios, describe how your preliminary interface would be used to perform the task. Use rough sketches to illustrate how the interface would look at important points in the task.
- **What to Post**. Include the following parts in your report:
  - **Overall design**. Describe your preliminary design by presenting sketches of important windows, dialog boxes, and menu trees, and briefly explaining the function of each item.
  - **Scenario storyboards**. Present each of your scenarios in story form, including sketches to illustrate how your interface would look at important points in the task.

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I6 – Swing Layout Managers

due 1 week

- **You have two choices for requirements**:

1) try to duplicate the functionality of an existing applet; or,

2) create your own (ideally project-related) applet with the following minimum requirements:

  - A JFrame and a modal JDialog.
  - A JTabbedPane and JScrollPane.
  - Nested JPanels including the following layout managers: GridLayout, FlowLayout, BorderLayout
  - Some interaction widgets (JButton, etc.) on every JPanel and tab.
  - Reasonable behavior when the JFrame is resized.

- You may not use GridBagLayout or absolute layout anywhere in the project.

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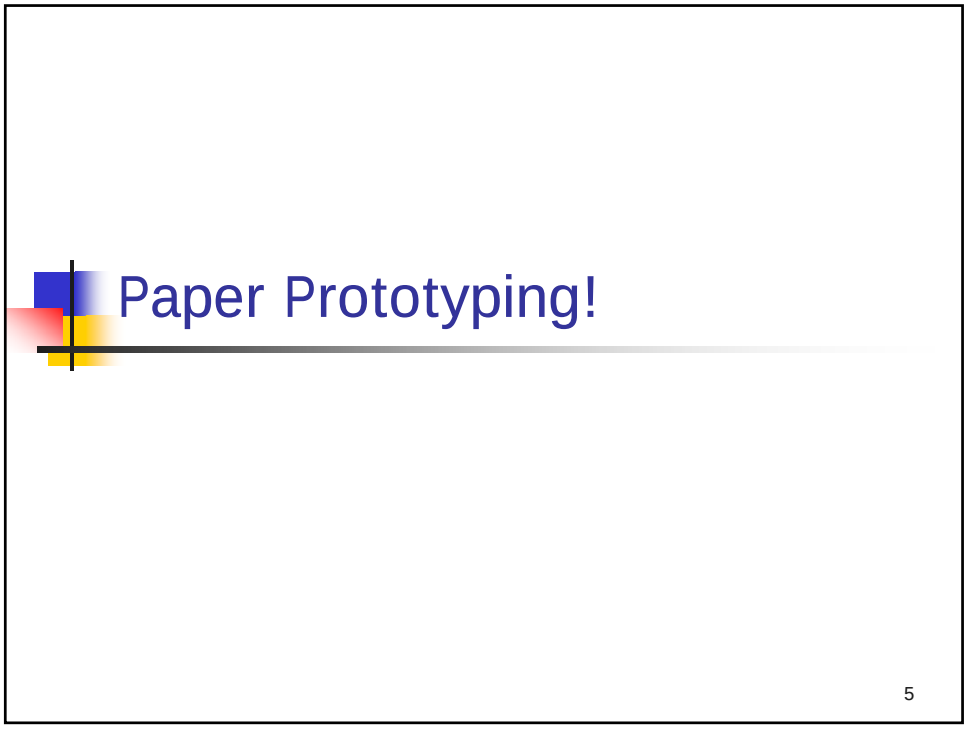
Paper Prototyping!
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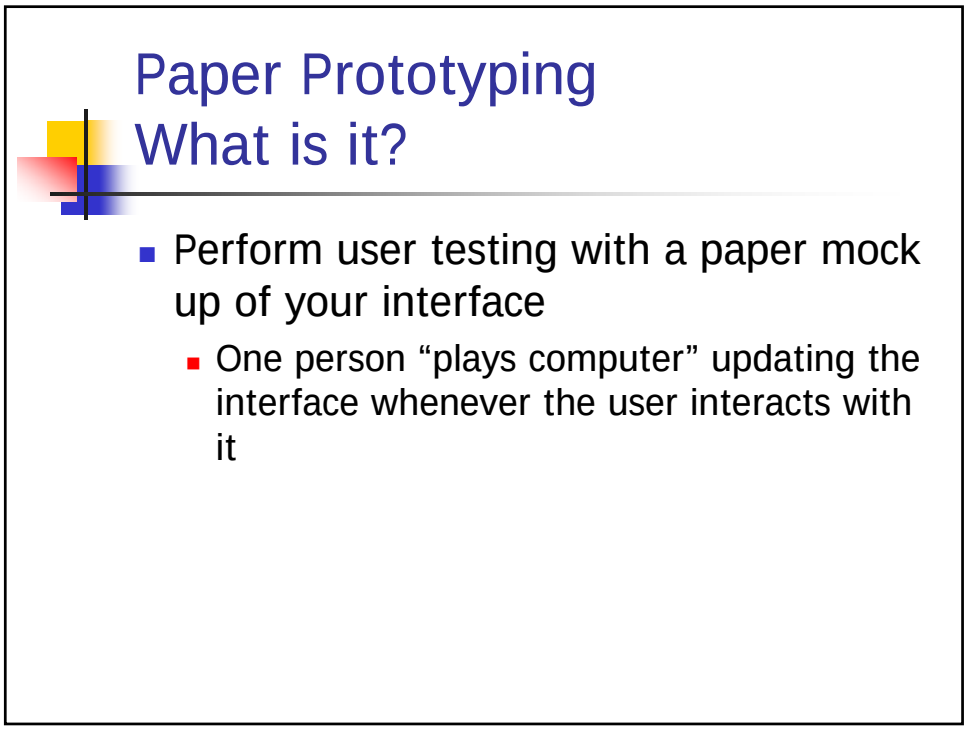
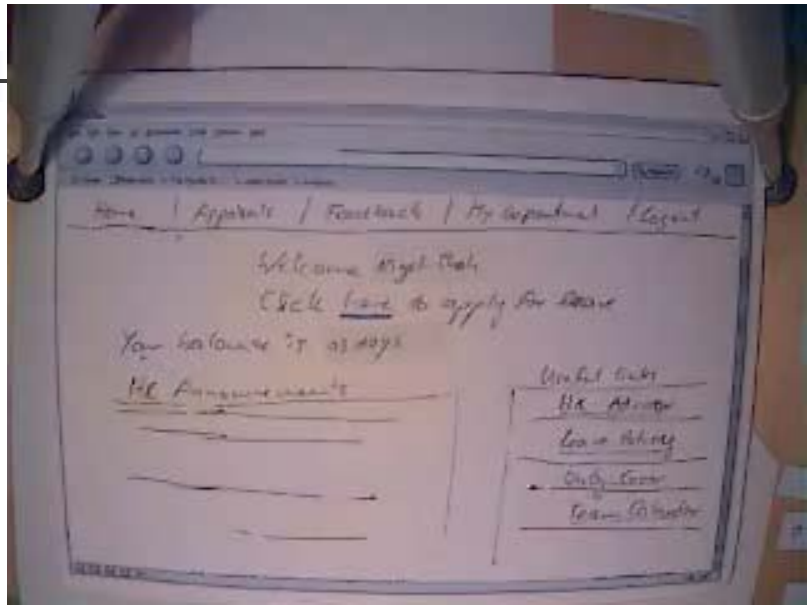

Paper Prototyping
What is it?
Perform user testing with a paper mock up of your interface
One person “plays computer” updating the interface whenever the user interacts with it

Example: leave submission system



Why?

Snyder, “Paper Prototyping”

- Substantive user feedback early in development process
- Promotes rapid iterative development
- Facilitates communication within dev team and between dev team and customers
- Does not require any technical skills, so a multidisciplinary team can work together
- Encourages creativity in the product development process
- Less intimidating than a computer
- Encourages more (creative) feedback
- No nitpicky feedback

Why?

- Prevent inertia that can be caused by building “heavy” prototypes
- Try out goofy ideas without having to worry about how many hours it will take to implement

Paper Prototyping How

- Parts list
  - White poster board
  - Blank 5x8, 4x6 index cards
  - Removable tape
    - For text fields (users write on it)
    - For ‘grayed out’ (disabled) widgets
    - To stick widgets on the background
  - Markers, pens & highlither
  - Scissors
- Optional
  - Transparency & markers
  - Restickable glue
  - Correction fluid/tape (for on-the-fly changes)

Widget-by-widget suggestions

- Radio buttons & check boxes
  - Removable tape for selection
- Tabbed dialog box
  - One index card/tab
- Text field
  - User writes on removable tape
- Drop-down list
  - List on card/paper
  - When item selected, computer writes on tape

Building the Prototype

- Hand sketched, monochrome
- Enlarged UI (e.g. 11x17) easier to work with and will allow almost all testing
- Can use “greeking” for large blocks of irrelevant text
- Can use photos or printouts where especially important (e.g., photo of product on a shopping page)

Demo! Pet-O-Matic

P5a – Paper Prototyping

- **If you are working on a project by yourself, you <u>must</u> team with another student.**
  - **You play computer for your own interface.**
  - **Other student acts as observer.**
- Before the next class, prepare your prototype and test cases, and practice "playing computer".
- Write your 3 test tasks on separate index cards.
- We will practice with all teams in class.

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Conducting Usability Studies
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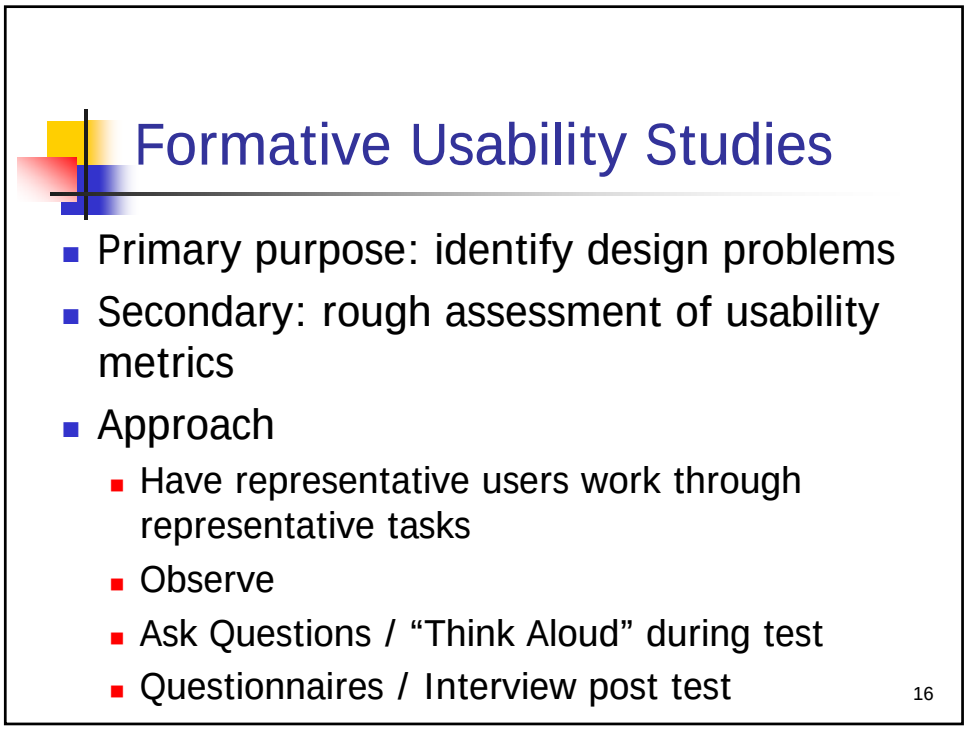
Formative Usability Studies
Primary purpose: identify design problems
Secondary: rough assessment of usability metrics
Approach
Have representative users work through representative tasks
Observe
Ask Questions / “Think Aloud” during test
Questionnaires / Interview post test
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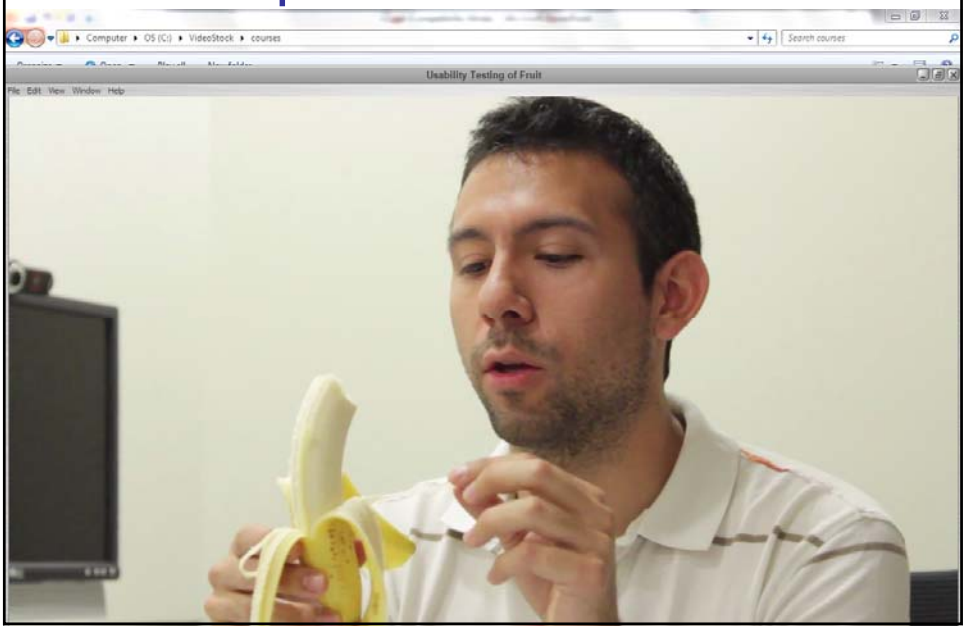
Example



Wrangling Test Users

- How to recruit?
- How much to compensate?
  - Issues?
- What data do you collect?
  - Why?

Always collect basic demographics

- Age
- Gender
- Race (?)
- Educational level
- Computer literacy
- Experience using similar applications
- Etc

Most common measures

- Quantitative
  - Time to complete, number of errors
  - Questionnaires
    - Satisfaction
    - Other scale measures
- Qualitative
  - Post-test semi-structured interview
  - Think aloud comments

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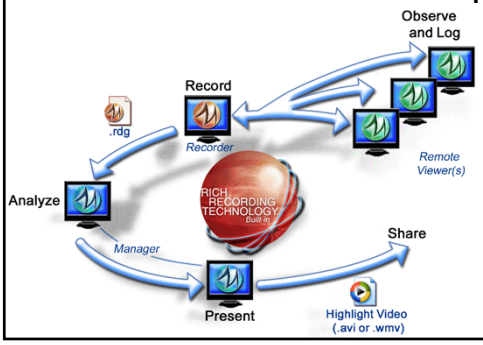
Where Will You Do the Evaluation?

- Field Studies – user's own environment
  - Better "ecological validity"
  - Only practical choice for longitudinal efficacy studies.
- Controlled Studies / Lab Studies – other than user's environment
  - Important if special equipment or tight control required.
  - Less distracting.
- Arranging Usability Evaluation Sessions
  - Call / email day before to confirm
  - Still may get up to 50% no-show rate

Other ways of measuring usability…

- Auto logging data
- Quantitative behavioral measures
  - Number of frowns per task



Other ways of measuring usability...

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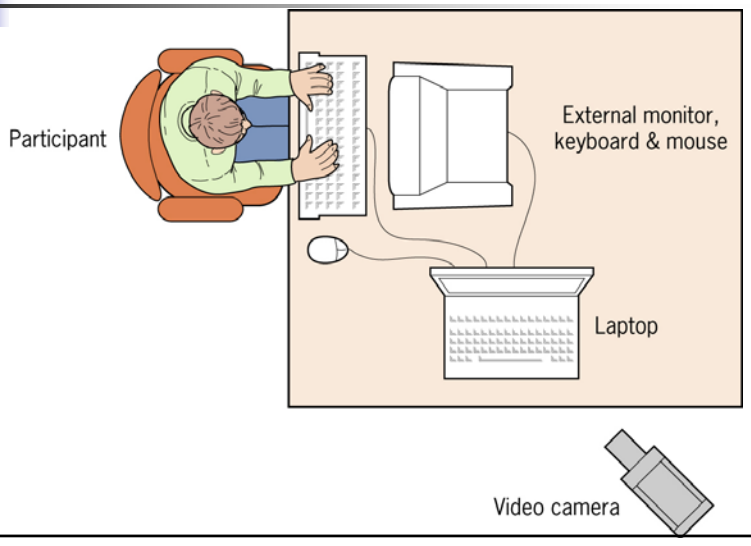
Low cost video mixing



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Low cost video mixing

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Video recording

- Think carefully about why you want to video record.
- Not a substitute for real-time observation.
- Reviewing & coding video takes 2x – 10x real time..
- However, can be used in retrospective review.
- Be sure you get consent.

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Audio Recording

- Important for capturing exact quotes (fodder for qualitative analysis).
  - Post test interview
  - Think aloud
- Be sure you get consent.

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Think-Aloud and Offering Help

- Using Cognitive Walkthrough Questions
  - "Is there anything there that tells you what to do next?"
  - "Is there a choice on the screen that lines up with what you want to do? If so, which one?"
  - "Now that you've tried it, has it done what you wanted it to do?"

Think Aloud interferes with Usability Metrics

- Quantitative usability metrics
  - E.g., time to complete
- Think aloud
  - To get qualitative info on bugs
- Can be overcome with retrospective review methods

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Conducting Post-Session Discussions

- Retrospective protocol
- Post-session interview / debrief

Questionnaires

- Advantages
  - Can't forget to ask a question
  - All participants see the same questions
  - Ability to collect quantitative data
- Disadvantages
  - Difficult to design
  - Must predict topics the users will need
  - Closed questions don't give reasons why the users answered the way that they have.

"Mixed-Method" Studies

- Use scales and questionnaires for things you anticipate wanting to know.
- Follow with semi-structured interview to learn about things you didn't think of.
  - Probe with follow up questions

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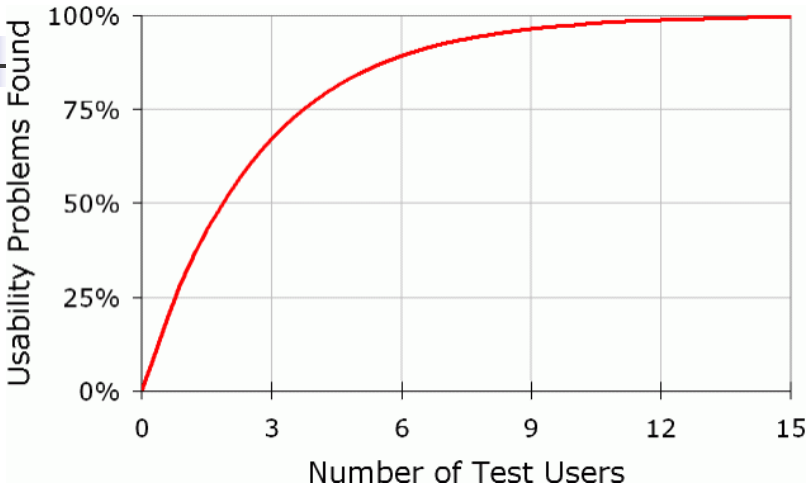
How many participants are needed for usability testing?

- Topic of lively debate in HCI.
- Good historical summary:
http://www.measuringusability.com/blog/five-history.php
- Consensus (?): 3-5 users to get 80% of bugs
  - When used in conjunction with good design practices and heuristic evaluation.

How many participants are needed for usability testing?

- Need $N(1-(1-L)^n)$ test users.
- N is the total number of usability problems in the design
- L is the proportion of usability problems discovered while testing a single user.
  - typical value 31%
- Plotting the curve for L=31% gives the following result:

How many participants are needed?



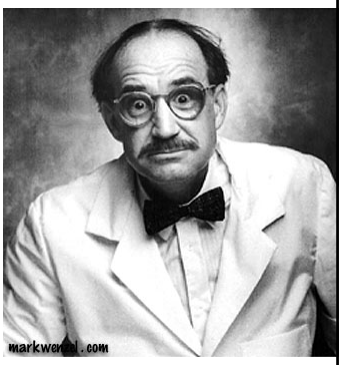
Nielsen, J., & Landauer, T. K. (1993). A mathematical model of the finding of usability problems. In Proceedings of the SIGCHI conference on Human factors in computing systems (pp.206-213). Amsterdam: ACM

How many participants are needed for usability testing?

- Better to do more tests with fewer users given a budgeted total number of test users
  - E.g., 3 iterations with 5, rather than 1 iteration with 15

Plan Everything: Study Protocol

- Describe in step-by-step detail everything that you do when a test user walks in the door.
- Especially important for controlled, quantitative studies
- Helps reduce demand effects
- Helps reduce stupid mistakes



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PDA ECA Modality Study Protocol

[Subject is assigned sequential ID at time appointment is made. Subject is randomized during lab setup just prior to experiment. Configure and check PDAs, make sure they are charged. Write subject ID and study configuration number on all forms]

[Seat subject at desk in observation room. Experimenter stands.]

Thanks for helping out with this experiment. Let me tell you what you're going to be doing in the study. We're building an animated virtual exercise coach to help people get more exercise. This coach works on a PDA so that it is portable. ***[Show PDA]*** Today you will be talking to four different animated coaches, primarily so we can test how well people are able to interact with them. You will not be asked to do any exercise. You will interact with each coach for about five minutes. After each interaction we will ask you to fill out a questionnaire telling us what you thought about it. The entire study should take about 30 minutes and it pays $10.

Are you able to help us out with this?

Now I need you to sign some consent forms. ***[hand subject forms]*** You can go ahead and read the consent forms now. ***[Give subject time to read and sign consent forms.] [Collect consent forms.]***

Preparation

- Documents
  - Study Protocol / User briefing
  - Task descriptions
  - Demographic Questionnaires
  - Screeners
  - Measure Questionnaires
  - Debriefing
  - Payment receipt
- Equipment
  - Computer & Software
  - Video, Audio recorders, batteries, tapes
  - Gaze tracker, logging software, etc.

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The Pilot Test / aka “Walk Through”

- Participants for Your Pilot Test
- Design and Assemble the Test Environment
- Run the Pilot Test

Paper Prototyping: Conducting the test

- Need at least two people
  - Computer – usually sits across from user
  - Facilitator
    - Talks to user, explains purpose of study and interface, hands him/her tasks, constantly encourages user to talk about what he/she is thinking about, asks user for clarification, etc.
- Others: observers
  - When any issue/problem arises writes them down (ideally on separate index cards)

Sample Briefing *from Snyder "Paper Prototyping"*

- Greeting & Introduction
  - "We're working on a product for… The purpose of today's session is for you to help us figure out how to make this interface more user-friendly before we finish developing it. But believe it or not, we aren't going to use a computer. As you'll see, we've actually created paper versions of the screens, and this guy named Stan will be playing the computer."
  - "We'll give you some tasks that we think are representative of what people might do in real life. [example] Your job is to tell us what makes sense, what's confusing, whether it works the way you'd expect it to, etc."
  - "The other members of the team will just be watching and quietly taking notes."

Sample Briefing
from Snyder "Paper Prototyping"

- Greeting & Introduction, cont'd
  - "Keep in mind that we're testing the interface--we're not testing you—so if you run into any problems it's not your fault and it means that there's something we need to change. I'll be sitting next to you, and I can help you if you want."
  - "The prototype still has some rough edges—we're still thinking through how it should work and some parts of it are incomplete. Before we cast it in concrete, we want to get some feedback about how well this design works."
  - "Stan here will be playing the computer. Stan may seem like a pretty smart computer, but he has no speech recognition and no artificial intelligence. Since machines can't talk, he's not allowed to explain anything. If you want to do something, you'll need to interact with the prototype just as you would on a computer. Use your finger to click on buttons. These pieces of tape indicate places where you can type something in, and here's your keyboard (give pen). It's OK to write on this."

Sample Briefing
from Snyder "Paper Prototyping"

- Greeting & Introduction, cont'd
  - "Please tell us what makes sense to you, what's confusing, and any questions that come to mind. Your questions are especially valuable, but I may not answer them right away because our goal is to change the interface so it answers them."
  - "Remember that we're testing the interface—we're not testing you. Are you ready to start?"
  - "OK, here's the first thing we'd like you to do. Take a minute to read this and let me know if it makes sense. If so, then whenever you're ready please show us what you would do first."
- **See "briefing.doc" under next week's readings.**

Facilitator – during test

- Encourage questions but don't answer them
- Use user's vocabulary
- Use open-ended questions
  - "What will that do?"
  - "What are you trying to do right now?"
  - "What are you thinking?"
  - "Tell me more about that."
- Watch for "hmm", "ah", "oh", "oops", furrowed brow, etc. - ask what's going on.
- Make changes during test or between tests if necessary
- Take a break if something goes wrong

Post-test Design Team Debrief

- Spend a few minutes immediately after the test meeting with the testing team, discussing results, clarifying problems, and writing down prioritized problems.
- Correct significant problems that can be fixed before the next test.

Your Projects

- Write user briefing (suggest full protocol)
  - Verbal informed consent
  - Backgrounder on project, process
- Computer practices
- Write user tasks
  - Each on 1 index card
  - Goal to be accomplished (not how to do it)
- Walkthrough the entire process

Research Articles

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CHI 2010: End-User Programming I April 10–15, 2010, Atlanta, GA, USA

FrameWire: A Tool for Automatically Extracting Interaction Logic from Paper Prototyping Tests

Yang Li [1*] Xiang Cao [2] Katherine Everitt [1] Morgan Dixon [1] James A. Landay [1]
[1] DUB Institute, University of Washington, Seattle, WA [2] Microsoft Research Cambridge, UK
{yangli, xiangcao}@acm.org, katherine.everitt@gmail.com, {mdixon, landay}@cs.washington.edu

ABSTRACT
Paper prototyping offers unique affordances for interface design. However, due to its spontaneous nature and the limitations of paper, it is difficult to distill and communicate a paper prototype design and its user test findings to a wide audience. To address these issues, we created FrameWire, a computer vision-based system that automatically extracts interaction flows from the video recording of paper prototype user tests. Based on the extracted logic, FrameWire offers two distinct benefits for designers: a structural view of the video recording that allows a designer or a stakeholder to easily distill and understand the design concept and user interaction behaviors, and automatic generation of interactive HTML -

playing the role of the "computer", presents an interface screen (e.g., drawn on a piece of paper) to a user according to the user's actions. The user interacts with the interface

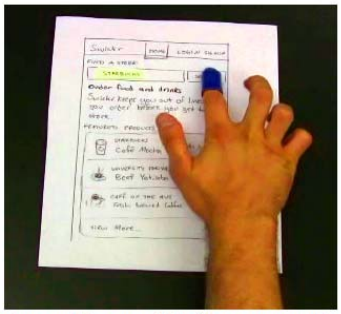

Figure 2. A user clicks on an interface component by tapping

DisplayObjects: Prototyping Functional Physical Interfaces on 3D Styrofoam, Paper or Cardboard Models

Eric Akaoka, Tim Ginn and Roel Vertegaal
Human Media Lab
Queen's University
Kingston, ON K7L 3N6

ABSTRACT
This paper introduces DisplayObjects, a rapid protot workbench that allows functional interfaces to be proj onto real 3D physical prototypes. DisplayObjects u Vicon motion capture system to track the locatic physical models. 3D software renditions of the 3D ph model are then texture-mapped with interactive bel and projected back onto the physical model to allow time interactions with the object. We discuss implementation of the system, as well as a selection o and two-handed interaction techniques for DisplayOb We conclude with a design case that comments on so the early design experiences with the system.

info

Figure 3. Brick model with 5 retroreflective markers

Pers Ubiquit Comput (2008) 12:269–277
DOI 10.1007/s00779-007-0147-2

ORIGINAL ARTICLE

Adapting paper prototyping for designing user interfaces for multiple display environments

Brian P. Bailey · Jacob T. Biehl · Damon J. Cook · Heather E. Metcalf

Received: 13 February 2006 / Accepted: 2

Abstract A multiple display en networks personal and shared devic workspace, and designers are just b with the challenges of developing

Paper Prototyping Practice Session – next class

- Each Project
  - Set up
  - Pick your most representative task
  - I'll recruit someone from another team
  - Go through entire script as if this was a real test user
    - Briefly explain what your system does
    - Read and give Task to test user
- Observers (the rest of you)
  - Note problems with protocol / method
  - Note problems with interface

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P5a – Paper Prototyping

- **If you are working on a project by yourself, you must team with another student.**
  - **You play computer for your own interface.**
  - **Other student acts as observer.**
- Before the next class, prepare your prototype and test cases, and practice "playing computer".
- Write your 3 test tasks on separate index cards.
- We will practice with all teams in class.

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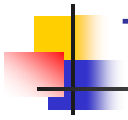

To Do

- Read
  - Universal design (Dix Ch 10)
- Finish by next class
  - Paper prototype
- Finish next Thursday
  - I6 – Swing Layout Managers

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