

Human-Computer Interaction

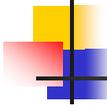
IS4300



16 – Swing Layout Managers

due next class

- **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.



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.

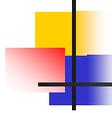
- We will practice with all teams in class.

3



Brief Review: Conducting Usability Studies

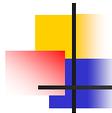
4



Formative Usability Studies

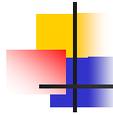
- Primary purpose: identify design problems
- Secondary: rough assessment of usability metrics
- Approach
 - Have representative users work through representative tasks
 - Observe
 - Ask Questions / "Think Aloud" during test
 - Questionnaires / Interview post test

5



Paper Prototyping: Conducting the test

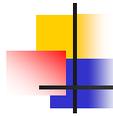
- Need at least two people
 - Computer – usually sits across from user
 - Facilitator
 - Talks to user, explains purpose of study and interface, hands him/her tasks, constantly encourages user to talk about what he/she is thinking about, asks user for clarification, etc.
- Others: observers
 - When any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



Sample Briefing

from Snyder "Paper Prototyping"

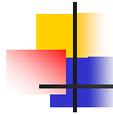
- Greeting & Introduction
 - "We're working on a product for... The purpose of today's session is for you to help us figure out how to make this interface more user-friendly before we finish developing it. But believe it or not, we aren't going to use a computer. As you'll see, we've actually created 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"

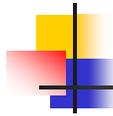
- Greeting & Introduction, cont'd
 - "Keep in mind that we're testing the interface--we're not testing you--so if you run into any problems it's not your fault and it means that there's something we need to change. I'll be sitting next to you, and I can help you if you want."
 - "The prototype still 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

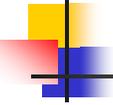
from Snyder "Paper Prototyping"

- 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 this 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



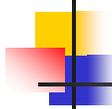
■ Additional questions: Think-Aloud and Offering Help

- 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?”



■ 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



Paper Prototyping Practice Sessions!

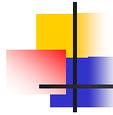
- 4 rounds of 15 minutes
 - Project groups 1-5, 6-10, 11-15, 16-21
 - If you have already arranged to have a facilitator from another project in your group, you need to swap.
 - We will recruit someone from one of the other groups to be a test user.
 - Do your briefing and first task.
 - EVERYONE take notes of problems with the prototype, briefing, task, or protocol.

Project	Members	Topic	Facilitator	
1	Stephanie, Elise	Mood Recommender	NA	1 st Round
2	Michael R.	Task Tracker	Jeff	
3	William, Alex	D&D Character Editor	NA	
4	Daniel P.	NU Registration	Cory	
5	Will, Chris	Cloud Services Market	NA	2 nd Round
6	Joey	MBTA alerts	Stuart	
7	Michael O.	File Backup	Jonathan	
8	Brendan, Daniel J.	Course Scheduler	NA	
9	Sam	BudgeTool	Andrew	3 rd Round
10	Courtney, Dean	Cosplay Helper	NA	
11	Martha	Monster Creator	DJ	
12	Elizabeth, Gregory	Cards Against Humanit	NA	
13	Bobby, Nnamdi	Archive for Desktops	NA	4 th Round
14	Sarah	Everyday Victory Tracks	Craig	
15	Andrew	Treatment Tracker	Sam	
16	Jonathan	Medication Tracker	Michael O.	
17	DJ	Pomodoro	Martha	
18	Jeff	Blackjack	Michael R.	
19	Stuart	Task tracker	Joey	
20	Craig	Roommate Dashboard	Sarah	
21	Cory	Introducer	Daniel P.	

Crash course in human subjects research



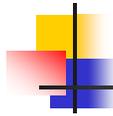
16



Ethical Principles in Human Subjects Research - History

- Nazi Experiments
 - 1939-1945 - Thousands of 'subjects'
- Tuskegee Syphilis Study
 - Study of 600 black males by US Public Health Svc, 1930's – 1972
 - No consent ('special treatment')
 - No treatment – just observation
- US Govt Radiation Experiments
 - 1944-1974 – exposed thousands to radiation
- NY Jewish Chronic Disease Hospital Study
 - 1963 – injected live cancer cells into subjects
 - Improper (oral only) consent, deception
- NY Willowbrook School Study
 - 1963-66 – infected children with hepatitis (“would get it anyway”)

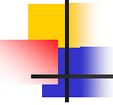
17



Regulatory Milestones

- 1947 - Nuremberg Code
- 1949 - International Code of Medical Ethics of the World Medical Assembly
- 1964 - Helsinki Declaration
- 1966 - U.S. Surgeon General policy statement, establishes IRBs
- 1979 - Belmont Report
- 1991 – US “Common Rule”

18



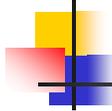
Ethical Principles in Human Subjects Research (Belmont Report)

- Respect for persons (autonomy)
- Beneficience
- Justice



Respect for Persons

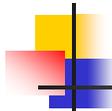
- Individuals should be treated as autonomous agents
- Persons with diminished autonomy may need special protections
- Primary implication: informed consent



Beneficence

- Maximize benefits
- Minimize possible harm

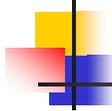
- Primary implication: ensure minimal risk



Justice

- Treat subjects fairly
- Risks vs. benefits must be equitably distributed across population

- Primary implication: don't experiment on one group for results to be primarily applied to another.



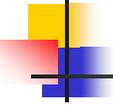
Northeastern University IRB

- Office of Research Regulatory Compliance
www.research.neu.edu/research_integrity/
- Application process takes 1-2 months



IRB application not needed if...

- is a normal part of the students coursework;
- is supervised by a faculty member;
- has as its primary purpose the development of the student's research skills;
- does not present more than minimal risk to participants or to the student investigator;
- does not include any persons as research subjects under the age of 18;
- does not include any persons as research subjects who are classified as part of a vulnerable populations according to Federal regulations (see below);
- is not "genuine research" that is expected to result in publication or some other form of public dissemination;



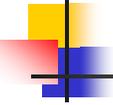
Minimal risk

- means that the probability and magnitude of harm or discomfort anticipated in the research are not greater in and of themselves than those ordinarily encountered in daily life or during the performance of routine physical or psychological examinations or tests of healthy individuals.



But, cannot gather “sensitive” information...

- 1) Relating to sexual attitudes, preferences or practices;
- 2) Relating to use of alcohol, drugs or other addictive products;
- 3) Pertaining to Illegal conduct;
- 4) That if released could reasonable damage an individual's financial standing, employability, or reputation within the community;
- 5) That would normally be recorded in a patient's medical record and the disclosure of which could reasonably lead to social stigmatization or discrimination;
- 6) Pertaining to an individual's psychological well-being or mental health;
- 7) Genetic Information.



And cannot use special subject populations...

- 1) Minors (under eighteen years of age).
- 2) Fetuses or products of labor and delivery;
- 3) Pregnant women (in studies that may influence maternal health);
- 4) Prisoners;
- e) Individuals with a diminished capacity to give informed consent.



You should obtain verbal consent – Example:

"Hi, we're designing a *XYZ*. *Explanation of XYZ*. We are conducting a study to find out what people think about this. We will not record or publish any information with your name. This is for a course we're taking in Human-Computer Interaction from Prof. Bickmore in the College of Computer and Information Science. Your participation is voluntary and you can stop anytime and ask that your data not be used. It should take about 30 minutes and we will compensate you with a can of Red Bull. Can you help us out with this?"



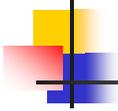
Universal Design

Designing systems so they can be used by anyone in any circumstance.

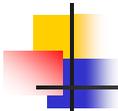


Accessibility

- The Principles of Universal Design
- W3C Web Content Accessibility Guidelines
- Section 508



Universal Design



Universal Design: 7 Principles

1. Equitable use
 - useful to all
2. Flexibility in use
 - range of ability
3. Simple & intuitive to use
 - literacy
4. Perceptible information
 - Regardless of user ability / Multiple modalities of output
5. Tolerance for error
 - E.g., unintended behavior
6. Low physical effort
 - Comfortable; minimize physical fatigue
7. Size & space for approach & use
 - Reached by all, regardless of mobility or physical ability

Multimodal Interfaces

- Why good for accessibility?
- Complementary vs. Redundant info across channels

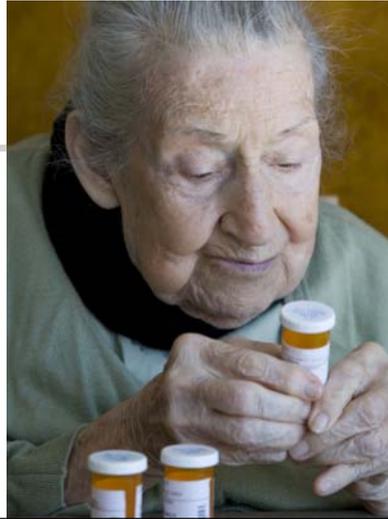


Many kinds of Special populations

- Older adults
 - Enormous variability in physical & cognitive abilities, familiarity with technology
- Children
 - Abilities strongly indexed by age

Health Literacy

A Significant Accessibility Issue in Healthcare.



W3C Web Content Guidelines

- W3C Web Content Accessibility Guidelines
 - 14 general principles of accessible design
 1. *Provide alternatives to auditory and visual content*
 2. *Don't rely on color alone*
 3. *Use markup and style sheets properly*
 4. *Clarify natural language usage*
 5. *Create tables that transform gracefully*
 6. *New technology pages transform gracefully*

Guidelines are Only Half the Story: Accessibility Problems Encountered by Blind Users on the Web

Chris Power, et al

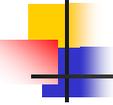
CHI 2012

39

WCAG 1.0 – Web Content Accessibility Guidelines

- 1999 W3C Standard
- Promote web accessibility
- Prepare web content so people with disabilities could use
- The *de facto* standard for web accessibility

40



WCAG 1.0 – Web Content Accessibility Guidelines

- Succeeded in raising awareness
- Actual impact remains very low
 - Numerous studies
 - Heuristic/Expert evaluation
 - Algorithmic checking
 - User testing with disabled users
- General awareness high, specific awareness of guidelines low
- 30% of websites claiming conformance overstated level of conformance
- 22% of site owners surveyed had no knowledge

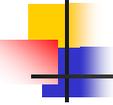
42



WCAG 1.0 – Web Content Accessibility Guidelines

- Usability evaluation of the Guidelines themselves highlighted many problems
 - Users found them confusing, hard to navigate, contradictory or ambiguous
- Evaluations have not demonstrated that a website that is fully conformant was more usable by people with disabilities
 - E.g., on study with disabled users found that only 27% of the usability problems were covered by the guideline

43



WCAG 2.0 – Web Content Accessibility Guidelines

- 2008
- Improved usability of Guidelines themselves
- Most problems remain
 - Web designers still find difficult to use (unable to reach 80% agreement on usability problems by panel of experts)
- Has not improved accessibility overall
 - Study: crawled 30M web pages, under 4% of elements met all standards.
- Power's study: websites that conform to WCAG 2.0 do not have fewer usability problems for disabled users compared to sites that do not conform.

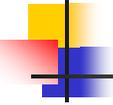
44



Power et al's conclusions

- Many (most?) problems encountered by users are more fundamental design problems that any user would have with the websites.
- Problem-based guidelines are not the solution.
 - Identify common problems and recommend solutions.
- Overall usability testing with disabled users is a better approach.

45



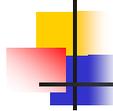
Section 508

- Federal Guidelines
- IT used by federal depts must be accessible
- If you ever had to develop anything for the federal government
 - Including PowerPoint presentations!



Research into Universal Design

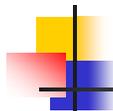
- ACM SIGACCESS - Computers and Accessibility
- Annual ASSETS Conference



Universal Design

- Bottom line:
 - Know your users
 - Design for them
 - Have them evaluate your interface
 - Designing for disadvantaged users usually benefits everyone.

- **Follow good Usability engineering practices!**



To Do

- Read
 - User support (Dix Ch 11).
 - Reporting usability test results. Skim Usability report template (usability.gov).
- Finish by next class
 - I6 – Layout managers.
- Start organizing/conducting usability tests
 - P5 – finish in one week