Semester Project, IRB, & User-Centered Design

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Agenda

- Semester project overview

- IRB and human subjects approval

- User-Centered Design Process

Group Project

- Design and evaluate an interface
  - 0 - Team formation & topic choice
  - 1 - Understand the problem
  - 2 - Design alternatives
  - 3 - Prototype & evaluation plan
  - 4 - Evaluation

- Main 4 parts worth 12% each

Details

- Part 0 - Topic definition – Due Jan 18
  - Identify team & topic, create web notebook
  - Suggestion: Pick a population and pick a technology; check out intersection

- Part 1 - Understanding the problem
  - Describe tasks, users, environment, social context
  - What are implications for design?

Details

- Part 2 - Design alternatives
  - Storyboards, mock-ups for multiple different designs
  - Explore, push boundaries of design space
  - Explain decisions

- Part 3 - System prototype & eval plan
  - More detailed prototype (semi-working ok)
  - Plan for conducting evaluation

Details

- Part 4 - Evaluation
  - Conduct formal evaluation with example users
  - Use appropriate methods
  - Analyze results of evaluation
  - Characterize what's working and what's not

Presentations

- Informal poster session
  - Feedback on ideas
  - After part 2
  - Other students and "expert" gallery
- Formal project presentation
  - Final week of classes
  - 10-15 minute summary

Project Teams

- 4 people
  - You decide
  - Diverse is best!
  - Consider schedules
  - Use the CoWeb:
    - Immediately post ideas for general topics, populations, technologies, etc.
- Cool project & team name
- Help getting members on Tuesday

Past Topics   (Old ones)

- Mobile/handheld (cars, tour guides, etc.)

- Wedding planner

- GIS

- Calendar agent (speech)

- Audio / Web sites

Project Themes: Think…

- …off the desktop!
  - Mobile, handheld, environmental
- …modern desktop
  - multiple displays
- …everyday
  - home, automobiles, parks, children, parent
- …solving a real problem
  - aging, emergency response
- …of someone else
  - Avoid being biased by your intuitions
- Think about people first, then technology

Learn from the Past

- Browse old projects for more ideas...
  - CoWeb

- Talk to former students

- Picking a good topic is a HUGE part of doing a good project

Programming requirements

- Leverage team expertise
  - You need someone...

- Full functionality is NOT intention

- But good evaluation requires authentic experience

What Makes a Good Project

- Access to domain experts & users

- "Real" clients

- Interesting human issues

- Rich domain for design

- Try to avoid a topic in which the user population is 22-year old college students

IRB, Participants, & Ethics

- Institutional Review Board (IRB)
  - http://www.osp.gatech.edu/compliance.htm
- Reviews all research involving human (or animal) participants
- Safeguarding the participants, and thereby the researcher and university
- Not a science review (i.e., not to assess your research ideas); only safety & ethics

Ethics

- Testing can be arduous; privacy is important

- Each participant should consent to be in experiment (informal or formal)
  - Know what experiment involves, what to expect, what the potential risks are

- Must be able to stop without danger or penalty

- All participants to be treated with respect

Ethics Certification

- Ethics is not just common sense

- Training being standardized to ensure even and equal understanding of issues

- Required Online CITI TRAINING:
  - http://www.osp.gatech.edu/compliance/humans/irb_training.doc
  - http://www.citiprogram.org

Protocol Approval

- Obtain IRBWise username & password

- Submit protocol, including description of experiment, participants, consent form, etc

- Modify as necessary to ensure compliance

- Obtain approval
  - Including approved consent form

- Conduct study appropriately

Recruiting Participants

- Various "subject pools"
  - Volunteers
  - Paid participants
  - Students (e.g., psych undergrads) for course credit
  - Friends, acquaintances, family, lab members
  - "Public space" participants - e.g., observing people walking through a museum

- Must fit user population (validity)

- Motivation is a big factor - not only $$ but also explaining the importance of the research

- Note: Ethics, IRB, Consent apply to *all* participants, including friends & "pilot subjects"

Consent

- Why important?
  - People can be sensitive about this process and issues
  - Errors will likely be made, participant may feel inadequate
  - May be mentally or physically strenuous

- What are the potential risks (there are <u>always</u> risks)?
  - Examples?

- "Vulnerable" populations need special care & consideration (& IRB review)
  - Children; disabled; pregnant; students (why?)

IRB Contact Information

- Georgia Tech IRB Contact:
  - Melanie Clark (melanie.clark@osp.gatech.edu)
  - http://www.osp.gatech.edu/compliance/humans/humans.htm

- More details on the Project web page

HW 1

- Acquire IRB training
  - Required Online CITI TRAINING:
    - http://www.osp.gatech.edu/compliance/humans/irb_training.doc
    - **http://www.citiprogram.org**

Administratia

- Web site updates
- Add yourself to co-web

Good Design

"Every designer wants to build a high-quality interactive system that is admired by colleagues, celebrated by users, circulated widely, and imitated frequently." (Shneiderman, 1992, p.7)
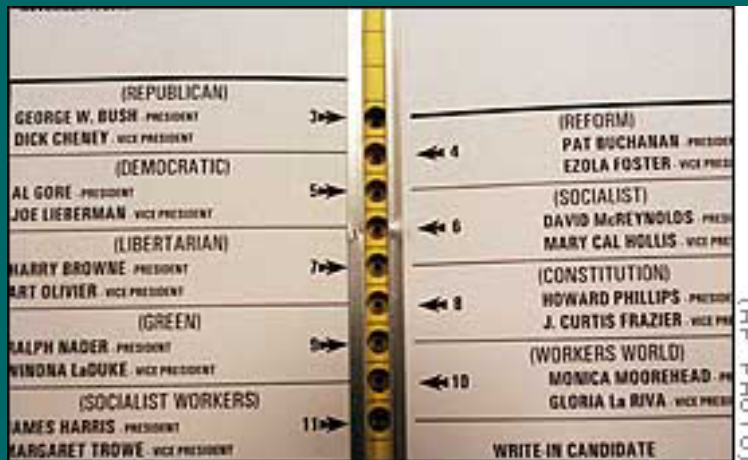
...and anything goes!...

The Good…

The Good...

The Bad...

The Bad…

The Bad…

The Ugly…

The (really) Ugly…

What The...???

But What Makes it Good?!

- Functionality

- Speed & efficiency

- Reliability, security, data integrity

- Standardization, consistency

- **USABILITY !**

Closer to Fine: A Philosophy

...The human user of any system is the focus of the design process. Planning and implementation is done with the user in mind, and the system is made to fit the user, not the other way around....

"Good Design" Means

- Systems are built for humans; must be designed for the user

- Recognize individual differences; appreciate design implications of these human factors

- Recognize the design of things, procedures, etc., influences human behavior and well-being

- Emphasize empirical data & evaluation

- Rely on the scientific method

- Things, procedures, environments, and people do not exist in isolation

Good Design Is Not…

- ☹ **NOT just applying checklists and guidelines**
  - These can help, but UCD is a whole philosophy
- ☹ **NOT using oneself as the model user**
  - Know your real users; recognize variation in humans
- ☹ **NOT just common sense**
  - Knowing how to design a fire alarm so it will be heard over background noise is not something we all know
  - The HF specialist knows where or how to get the information needed to answer design questions

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Design (Sidebar)

- Start reading Don Norman's *DOET*

- We'll return to design as a focus topic in few weeks

User Centered Design

- A way to force yourself to identify and consider the the relevant human factors in your design

- Helps reduce the number of decisions made out of the blue, and helps focus design activities

- Helps document and defend decisions that may be reviewed later

The Tao of UCD

DESIGN

IMPLEMENT

USE & EVALUATE

UCD: 9 Step Overview

1. Define the Context
2. Describe the User
3. Task Analysis
4. Function Allocation
5. Define Usability Criteria
6. Design the UI
7. Build & Test Prototypes
8. *Iterative* Test & Redesign
9. Release, Update, & Maintain

Design Implications

- At each stage, consider how the details of your discovery process affect your design

Fact	Implications
Users 16-80 yrs	Range of text sizes Range of grip strength
Some French speakers	Multilingual interface
Astronaut users	Extensive training available
Military context	Aesthetics less of an issue Ruggedness is critical

1. Define the Context

- Context: the "type" of uses, applications
  - Life critical systems, applications
  - Industrial, commercial, military, scientific, consumer
  - Office, home, entertainment
  - Exploratory, creative, cooperative
- Market
- Customer (not the same as the User)

  ...Design Impacts?...

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2. Describe the User (!!)

- Physical attributes
  (age, gender, size, reach, visual angles, etc…)
- Physical work places
  (table height, sound levels, lighting, software version…)
- Perceptual abilities
  (hearing, vision, heat sensitivity…)
- Cognitive abilities
  (memory span, reading level, musical training, math…)
- Personality and social traits
  (likes, dislikes, preferences, patience…)
- Cultural and international diversity
  (languages, dialog box flow, symbols…)
- Special populations, (dis)abilities

3. Task Analysis

- Talk to and observe **users** (NOT customers) doing what they do

- List each and every TASK

- Break tasks down into STEPS

- ☞ ABSTRACT into standard tasks
  (monitor, diagnose, predict, control, inspect, transmit, receive, decide, calculate, store, choose, operate, etc.)

4. Function Allocation

- Consider the whole system!

- Decide who or what is best suited to perform each task (or each step)
  - e.g., system remembers login id, and reminds the user, but user remembers the password

- Base this on knowledge of system hardware, software, human users' abilities, culture, communications protocols, privacy, etc.

- <u>Allocation constraints</u>: Effectiveness; Cognitive/affective; Cost; Mandatory

  ...Don't forget the design implications!...

5. Define Usability Criteria

– Task X should take less than Z seconds

– New user should be able to edit document within 30 minutes

6. Design the UI

- Summary of the components and their basic design

- Cross-check with any Requirements Documents; Human Factors refs; Hardware specs; Budgets; Laws (ADA); etc.

- Ensure that the system will support the design and comply with constraints

- (Verification and Validation, in the language of software engineering)

HCI Design

- Design is driven by requirements

  What the artifact is for …

  Not *how* it is to be implemented

- Design represents the artifact
  – Storyboards or screen sketches
  – Task flow diagrams - more detailed than in task analysis stage
  – Executable prototypes

- Representations should always <u>simplify</u>

Get Informal Feedback ASAP!

- Present prototype to users

- Do a quick questionnaire

- Watch (quietly) as user struggles with your terrible design

Design fixation

- Keep an open mind

- Don't get wedded to an idea

- Don't let design review become about whose idea wins

- **Honor the truth (your observations). People come first. Not your ego, not your team's ego.**

Iterate on Design

- Redesign system
  - In light of initial user impressions
  - Pay attention to common complaints

- Be prepared to **abandon bad ideas!!**

- It's just an idea, not a measure of your worth!

Iterate on Design

- Let me reiterate...

- Be prepared to...

Abandon bad ideas!!

- It's just an idea, not a measure of your worth!

Once More, with Feeling

Abandon bad ideas!

Formative Evaluation Techniques

- Use while "forming" the design

- Apply design principles - heuristic evaluation
  - Consistency, don't set the user up, etc etc …

- Apply design rules / standards / style guides
  - Java look and feel, Mac look and feel, etc

- Cognitive walkthrough

- Key-stroke level model, NGOMSL analyses

7. Build & Test Prototypes

- "Informed Brainstorming"

- RAPIDLY mock up the user interfaces for testing with real people

- Pen and paper or whiteboard to start

- Iterate, iterate, iterate!!

- Increasingly functional & closer to final reality

- List audio & visual details at same levels of detail in the prototypes
  - (i.e. don't forget either of them)

Prototyping

- Storyboards

- Paper simulations of application

- *Wizard of Oz* experiment

- Prototyping tools

- Cheap!

8. *Iterative* Test & Redesign

- Usability testing
  - Get real (or representative) users to do what they do, using the prototypes
  - Subjective and objective feedback. Sometimes users "want" features that actually yield poor performance
  - Video tape, lots of notes
  - Be rigorous wherever possible (stats, etc.)
  - Feedback into the iterative evaluation & redesign of the system
  - "Discount" usability testing can be very effective, using fewer subjects, more rapid results

8. *Iterative* Test & Redesign

- Repeat cycles of testing and reworking the system, subject to cost/time constraints

- Focus on Functionality First !

- Plan for several versions during development

9. Release, Update & Maintain

- In-the-field feedback, telemetry, user data, logs, surveys, etc.

- Analyze and make iterative redesign/test recommendations

- Updates and maintenance plan as part of the design!
    - (design it so it can be fixed or updated)

UCD: 9 Step Overview

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Design Implications?!!

UCD: Focusing Your Efforts

- There are real-world constraints

- Cutting out steps is not the way to economize!

- Optimize the efficiency of each step

- *Here:* Focus on the context and the user, to get the most value for the time spent

Upcoming

- Project planning and intro.

- Usability Principles

- Human abilities

- Continue reading…
  - DFAB, DOET