CPE/CSC 484: User-Centered Design and Development

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Logistics

- **Assignments**
  - A4 - Data Collection trial runs complete
    - A4 presentation schedule: Team 3 today, rest Thu during the lab time
  - A5 - Usability Evaluation
    - selection of systems to evaluate
- **Guest presentation on Universal Design and ADA compliance on Thu, May 17**
  - Trey Duffy, John Lee, Disability Resource Center
- **HCI Lab Opening Ceremony on Thu, May 31, 9:30 - 11:00 am**
  - poster boards, demos from 484 teams?
- **CEng Project Fair Thu, May 31, 4:00 - 7:00 pm**
  - final project displays
- **CSC IAB presentations Fri, June 1, 10:00 - 12:00**
  - 20 min project presentations

Logistics

- **Term Project**
  - opening ceremony ("ribbon cutting") on Thu, May 31, 9:30 - 11:00
    - guests
    - student presentations
- **Research Activity**
  - status update
  - final version due on Thu, May 24
    - presentations in class/lab
    - include your experiences with blog, video, etc. as medium
- **Talk Doug Harr, SPLUNK, on "Big Data"**
  - Thu, May 17, 11:10 am, Philips Hall, PAC

Chapter 14

Evaluation studies: From controlled to natural settings

Motivation

- practical examples are often a good source of information
- communication is an interesting domain since it can use different methods and technologies

Objectives

- learn from practical projects how design and evaluation are brought together in the development of interactive products
- compare different combinations of design and evaluation methods, and how they are used in practice
- identify examples of design trade-offs and decisions for real-world products

The aims:

- Explain how to do usability testing
- Outline the basics of experimental design
- Describe how to do field studies

Usability testing

- Involves recording performance of typical users doing typical tasks.
- Controlled settings.
- Users are observed and timed.
- Data is recorded on video & key presses are logged.
- The data is used to calculate performance times, and to identify & explain errors.
- User satisfaction is evaluated using questionnaires & interviews.
- Field observations may be used to provide contextual understanding.

Experiments & usability testing

- Experiments test hypotheses to discover new knowledge by investigating the relationship between two or more things – i.e., variables.
- Usability testing is applied experimentation.
- Developers check that the system is usable by the intended user population for their tasks.
- Experiments may also be done in usability testing.

Usability testing & research

Usability testing

- Improve products
- Few participants
- Results inform design
- Usually not completely replicable
- Conditions controlled as much as possible
- Procedure planned
- Results reported to developers

Experiments for research

- Discover knowledge
- Many participants
- Results validated statistically
- Must be replicable
- Strongly controlled conditions
- Experimental design
- Scientific report to scientific community

Usability testing

- Goals and questions focus on how well users perform tasks with the product
- Comparison of products or prototypes common
- Focus is on
  - time to complete task
  - number of errors
  - type of errors
- Data collection
  - video and interaction logging
- Testing is central
- User satisfaction
  - questionnaires, interviews provide data about users' opinions

Usability lab with observers watching a user & assistant

Portable equipment for use in the field

Remote Usability Testing

A selected group of panelists are invited to participate

...They are asked to evaluate the web from their natural context, using Internet Explorer

...A robot (UZ Bar) guides the users and monitors their behavior

The users are asked to complete certain tasks and answer questions

The UZ Platform gatheres and saves the data in real-time

Servidores UserZoom

The data is analysed and a final report is prepared

Mobile head-mounted eye tracker

Picture courtesy of SensoMotoric Instruments (SMI), copyright 2010

Testing conditions

- Usability lab or other controlled space.
- Emphasis on:
  - selecting representative users;
  - developing representative tasks.
- 5-10 users typically selected.
- Tasks usually last no more than 30 minutes.
- The test conditions should be the same for every participant.
- Informed consent form explains procedures and deals with ethical issues.

Some type of data

- Time to complete a task.
- Time to complete a task after a specified. time away from the product.
- Number and type of errors per task.
- Number of errors per unit of time.
- Number of navigations to online help or manuals.
- Number of users making a particular error.
- Number of users completing task successfully.

Usability engineering orientation

- Aim is improvement with each version.
- Current level of performance.
- Minimum acceptable level of performance.
- Target level of performance.

How many participants is enough for user testing?

- The number is a practical issue.
- Depends on:
  - schedule for testing;
  - availability of participants;
  - cost of running tests.
- Typically 5-10 participants.
- Some experts argue that testing should continue until no new insights are gained.

Name 3 features for each that can be tested by usability testing

iPad

Experiments

- Predict the relationship between two or more variables.
- Independent variable is manipulated by the researcher.
- Dependent variable depends on the independent variable.
- Typical experimental designs have one or two independent variable.
- Validated statistically & replicable.

Experimental designs

- Different participants - single group of participants is allocated randomly to the experimental conditions.
- Same participants - all participants appear in both conditions.
- Matched participants - participants are matched in pairs, e.g., based on expertise, gender, etc.

Different, same, matched participant design

Design	Advantages	Disadvantages
Different	No order effects	Many subjects & individual differences a problem
Same	Few individuals, no individual differences	Counter-balancing needed because of ordering effects
Matched	Same as different participants but individual differences reduced	Cannot be sure of perfect matching on all differences

Field studies

- Field studies are done in natural settings.
- "in the wild" is a term for prototypes being used freely in natural settings.
- Aim to understand what users do naturally and how technology impacts them.
- Field studies are used in product design to:
  - identify opportunities for new technology;
  - determine design requirements;
  - decide how best to introduce new technology;
  - evaluate technology in use.

Data collection & analysis

- Observation & interviews
  - Notes, pictures, recordings
  - Video
  - Logging
- Analyzes
  - Categorized
  - Categories can be provided by theory
    - Grounded theory
    - Activity theory

Data presentation

- The aim is to show how the products are being appropriated and integrated into their surroundings.
- Typical presentation forms include: vignettes, excerpts, critical incidents, patterns, and narratives.

UbiFit Garden: An in the wild study

(a)

(b)

(c)

Key points

- Usability testing is done in controlled conditions.
- Usability testing is an adapted form of experimentation.
- Experiments aim to test hypotheses by manipulating certain variables while keeping others constant.
- The experimenter controls the independent variable(s) but not the dependent variable(s).
- There are three types of experimental design: different-participants, same- participants, & matched participants.
- Field studies are done in natural environments.
- "In the wild" is a recent term for studies in which a prototype is freely used in a natural setting.
- Typically observation and interviews are used to collect field studies data.
- Data is usually presented as anecdotes, excerpts, critical incidents, patterns and narratives.