Participatory Design

- Involve users in design process as “fully empowered participants” (→ “extreme UCD”)
- E.g., PICTIVE (M. Muller)
  - Plastic Interface for Collaborative Technology Initiatives through Video Exploration
  - Users given paper, plastic, markers, tape to create lo-fi/low-cost mockups that are videotaped to demonstrate interaction
Use Scenario

- Description of a representative way in which the system will be used
  - Each scenario tells a story
  - Often written to be rich in detail to capture reader’s interest
  - A set of use scenarios represents different users, tasks, devices, situations,…
  - Act out to try to understand consequences
    - Technologic, sociologic, economic,…
    - Privacy, safety, IP,…
  - Help developers understand needs, clients understand benefits

Persona

- Description of an archetypal user of the system
  - Each persona represents a stereotypical example of a class of prospective system users
  - Usually part of a set, covering a range of users
  - Developed from observation
  - Often written up as a detailed description, including personal details (name, age, background, physical appearance, job,…) to bring the persona to life
  - Serves as a stand-in for a real user
  - Allows developer to ask, “What would Helen do?”

Personas at Cisco

- Informal research by the Cisco User Experience Group showed prospective users of personas liked posters with mockup action figures more than posters with real people.
- Commissioned action figure doll for each persona.
  - Used to create posters.
- Each poster includes:
  - Persona description.
  - Scenario photos.
- Made cardboard persona pop-ups for engineers' desks.

http://doi.acm.org/10.1145/1240866.1240905

Personas at Cisco

- Name, job, brief bio
- At-a-glance
  - Age
  - Education
  - Skills
  - Experience
  - Attitude
- Business objectives
- Job priorities
- Likes
- Dislikes/problem areas
- Insights & product considerations

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Usability Labs

- Separate areas allow participants to perform tasks independent of observers
- Log computer interactions
- Record video/audio of participants (face/hand/body), interaction devices, and displays

Formal Experiments

- Experiment
  - Process carried out to resolve uncertainty
- Research question
  - Hypothesis stated in a measurable way
- Analysis
  - Set of statistical tests to be performed to analyze experiment
    - Attempt to show that the results of the experiment are not the result of chance
Experimental Design

- Independent variable
  - Something to be manipulated (e.g., size of a button, use of color, distance to screen). AKA factor
  - Value of an independent value is sometimes called the "treatment"
    - Different values are “levels of treatment”
- Dependent variable
  - Something presumed to depend on independent variable, to be measured (e.g., time to learn)
- Constant

Experimental Design

- Target group(s) of participants
  - E.g.,
    - Novice users of a program
    - Experienced users of a program
    - US children ages 8–12
    - …
  - Group may be independent variable
Experimental Design

- Want to determine if there is an experimental effect
  - Change in dependent variable caused by change in independent variable
- Must show that extraneous factors did not cause any observed change
- Confounding variable (confound)
  - Extraneous factor that affects a subset of the levels of treatment or affects them differently

Confounds

- Need to eliminate extraneous factors or assume they have an equal effect on all levels of treatment.
  - If not, experiment is confounded
**Confounds**

- Address a potential confound by measuring it and:
  - Holding it constant across all groups
    - Reduces generality (e.g., results true only for novices)
  - Randomize assignment across all groups
    - Normalize assignment of participants with different values of variable to different groups
    - Introduces more variance: bad for statistics, may need more participants/trials
  - Manipulating it (i.e., by making it an independent variable) across different groups
    - Assign to different groups based on value
    - Introduces more variance: bad for statistics, may need more participants/trials

**Types of Confounds**

- **History**
  - Event occurred during study not associated with independent variable
- **Maturation**
  - Participant grows older, wiser, stronger
- **Test–retest familiarity**
  - Participant takes same test twice
- **Instrumentation**
  - Equipment changes during experiment
- **Comparability of groups**
  - Groups may be unintentionally different
- **Amount of training**
  - Too little or too much
- **Experimenter**
  - Different experimenters may interact differently with participants
Choosing Independent Variable(s)

- Need to control relevant factors
- Examples
  - 1 factor, 2 levels
    - UI style: Menu vs. command language
  - 1 factor with 3 levels, 1 factor with 2 levels
    - Expertise × UI style
    - \{ novice, intermediate, expert \} × \{ voice, keyboard \}

Choosing Dependent Variable(s)

- Time to complete task or learn system
- Accuracy
- Number and kind of mistakes
- Frequency of events
  - # of times user pushes “Help” or asks for assistance
  - # of times user looks upset
- Retention over time
- Preferences (subjective user satisfaction)
- …

*Must be measurable*
Design Issues

- Within-subject: Each participant experiences all levels of treatment
  - Contamination of results through experience

  vs.

- Between-subject: Different participants receive different levels of treatment
  - Groups of participants may be unintentionally different

Design Issues

- When to evaluate performance
  - Base on real life task to be supported
**Formal vs. Informal Experiments**

- Formal experiments are hard to perform, control, analyze—expensive!
- Informal experiments are often easier, more useful—cheaper!

**Informal Experiments: Rationale**

- Results of a formal experiment might not be applicable to real world
  - Hard to control confounds (e.g., friends helping)
  - Environment is important
- Desire *ecological validity*
  - Degree to which a study matches the context of actual use
- Perform experiments *in vivo* in real environments
  - If you can't fight the real world, embrace it!
  - Comparisons between conditions often put more emphasis on analysis of behavioral observations, interviews, surveys