

Usability testing

Human Factors

Usability testing

- Involves recording performance of typical users doing typical tasks.
- Controlled environmental 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
- Results reported to scientific community

Usability testing

- Goals & 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 & type of errors.
- Data collected by video & interaction logging.
- User satisfaction questionnaires & interviews provide data about users' opinions.

Usability lab with observers watching a user & assistant



Image: Bloomberg

Portable equipment for use in the field



Tracksys mobile lab

Philips HomeLab



Multiple cameras



Image: Noldus

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 types 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.
- Eye fixations and scan path.

How many participants for user testing?



Image: interaction-design.org

- 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.

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 variables.

Experimental designs

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

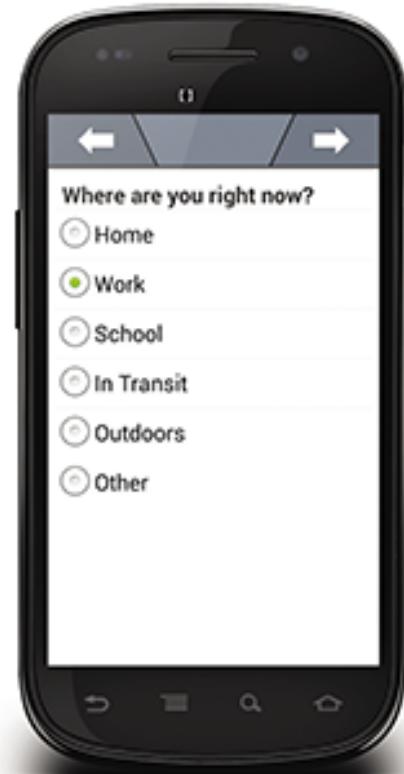
Different, same, matched participant design

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.
- The aim is to understand what users do naturally and how technology impacts them.
- Field studies can be used in product design to:
 - identify opportunities for new technology;
 - determine design requirements;
 - decide how best to introduce new technology;
 - evaluate technology in use.

Momentary Assessment and Experience Sampling



What are people doing

Where are they

How do they feel

Triggered by technology or events
(e.g. smoking craving).

Image: movisens

Key points

- Testing is a central part of usability improvement.
- 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 common types of experimental design: different-participants, same-participants, & matched participants.
- Most usability testing is intended to identify problems and opportunities for system improvement.
- Field studies are done in natural environments.
- Typically observation and interviews are used to collect field studies data.
- Categorization and theory-based techniques are used to analyze the data.