Objective and Subjective Usability

Could you explain the differences between subjective and objective measures of usability? Exemplify. (G2)

• Subjective usability concerns how a user experiences the interaction, i.e. it is dependent on perception and attitudes

• Objective usability is independent of user experience

• Example:
  – Subjective usability: How long the user felt s/he waited
  – Objective usability: How long the user actually waited

Does objective user satisfaction exist and if so; how can it be measured? (G7)

• Remember: Objective usability is independent of user perception and attitudes

• “The distinction may be applied to measures within all three aspects of the ISO standard.” (Hornbaek 2006)

• A search on “objective user satisfaction” in the ACM digital library yields no result...

• Observational studies with coding of gestures, body language, and verbalizations

• Example: Physiological measures of fun in playing computer games (Mandryk & Inkpen 2004)

How will subjective and objective usability measurements affect usability evaluation in an ongoing product development process? (G3)

• Subjective versus objective usability is independent of state of the product development process

• They are measured differently, leading to different kinds of evaluations
  – Subjective usability – measured by introspection
  – Objective usability – measuring time, accuracy etc.

• They (might) yield different results

• Both are important - a good balance is necessary

Out of objective and subjective measures of usability, which do you think is the most important for the success of a product in the market? (G5)

• High subjective usability means good user experience, high objective usability means high performance

• Both are important - a good balance is necessary - but...

• …it depends on the product. For some products the user experience is essential, for other ones the productivity is more important.

Cont.: Out of objective and subjective measures in usability, which do you think is the most important for the success of the product in the market? (G5)

• Nowadays, companies are competing on the level of user experience (The Methods for Interaction Analysis course)

• Emotional Design – why we love or hate everyday things (Donald Norman)

• Don’t underestimate the impact of experience (i.e. subjective) factors

Competitive edge

Usability

Joy, pleasure

Advanced technical functions

Technical functions


Year

Figure by Pontus Engelbrektsson & MariAnne Karlsson
Recently, the HCD community has focused on factors like fun, aesthetics and sociability. In what ways do you think such factors could enhance the actual usability? Exemplify. (G4)

- Actual usability = efficiency, effectiveness, and satisfaction
- "Attractive things work better" – Emotional Design (Donald Norman)
- Perceived aesthetics and perceived usability correlate (Kurosu & Kashimura + Tractinsky)

References

- Study of perceived versus actual waiting time:
- Emotional Design by Donald Norman (book)
- Correlation aesthetics and perceived usability
  Kurosu & Kashimura, 1995
  Tractinsky, 1997; Tractinsky, Adi, & Ikar, 2000

Laboratory and field studies

**Laboratory study**
- Study conducted under controlled conditions (usually indoors, in a usability lab) and with all other factors constant (in order to document the "experiment")
- Most UCD experiments are quasi-experiments rather than controlled experiments (like in physics)

**Field study**
- Field experiments have the advantage that outcomes are observed in their natural setting rather than in a contrived laboratory environment. However, field experiments suffer from the possibility of contamination.

G1 & G3

Q: Both laboratory studies and field observations are seen as acceptable for product evaluation. What is best then; to do a combination of both or just choose one? Think of time and cost issues as well as what kind of data is elicited in the different methods.

Q: What are the differences between laboratory tests and field studies?

**Lab vs Field - round 1 - Data**
- Study by Karlsson et al. showed no differences in the results regarding types of problems or number of problems found.

Other studies disagree:
- Low level user-artifact relations might be described as isolated cause and effect relationship, but at a higher level the artifact will take the role of a "mediating object" within a larger, more complex activity.

Karlsson et al
Lab vs Field - Round 2 - Time and Cost

Time and cost issues depend on a lot of things:

- Type of product
- The facilities you have at your disposal (in-house usability lab?)
- The amount of data you need/want to collect
- Equipment

Some estimates:
- Any observational data takes 3-4 times as much time to analyze than it did to record.
- A laboratory study might take a long time to plan and prepare.

Karlsson et al

Laboratory Tests

“The purpose of an experiment is to test which among a small number of treatments stimulates the greatest response.” (McQuarrie, 1995)

- Useful when checking against requirements (efficiency, effectiveness)
- Useful when benchmarking
- Useful for determining the placements and use of buttons, symbols etc.
- Useful for designing manuals and training programs

Field Tests

“... We cannot fully understand how people learn and work if the unit of study is the unaided individual with no access to other people or to artifacts for accomplishing the object at hand.” (Nardi. B., 1997)

- Useful for bringing “hidden” behaviors to light
- Useful for understanding the product within its context
- Useful for reducing bias (interviewee effect)

Testing using both approaches should be pursued, since they address different layers of product complexity...

Karlsson et al

Testing Requirements: Depends entirely on what kind of product you are dealing with and what features are deemed important from a marketing/product standpoint.

Data collection method: Again, it depends, but using video equipment to document the user interacting with the system might be a good idea.

Duration: The consensus is that after having tested with 12-15 users all usability problems present in a product have been identified at least once.

A more cost effective approach is to do 3 iterative user tests with five users in each iteration - Thus getting the chance to fix some of the flaws as well as testing the effectiveness of the fix in subsequent iterations.

Nielsen J.

Human centered design methods include iterative usability testing feedback. How and who decides the test cycle time interval? What could be the laps of time between two user tests?

How and when testing occurs within a project is decided by the product owner, but usually the cycle length is determined by the iterative methodology itself.

The important thing is that some kind of testing/evaluation occurs at the end of every iteration.

Ideally once every week (typically Thursdays or Fridays), with feedback “on the table” at Monday morning when the team assembles.

From personal experience

CST (Control System Theory)

Introduction

Group 4, Q3 Group 2, Q2 Group 7, Q2

The Control System Theory and the usability perspective

- A framework – not a method
- Both a way of thinking for usability professionals and an argument for management and development teams
- Supports iterative usability testing (small groups – several tests) because of its continuous feedback

Still cheap and easy to make major changes to the design

Getting harder and more expensive to make any major changes

Pagulayan, R.
CST (Control System Theory)

**Group 4, Q3:**
Alex Genov argues that the CST metaphor can be used for communicating the value of iterative usability testing to development teams and management. Do you agree? Why or why not?

**Answer:**
- Yes, I agree
- A strong metaphor
- A picture can tell more than a 1000 words

**References:**
Iterative Usability Testing as Continuous Feedback: A Control System perspective ()

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CST (Control System Theory)

**Group 2, Q2:**
CST (Control System Theory) is a useful theoretical framework for usability testing but are there any disadvantages when using it?

**Answer:**
- Yes
- Small tests might be misleading
- Close collaboration with real users might be hard
- Tests not thought through
- Tests not in phase with development
- Resources and time might be an issue

**References:**
Iterative Usability Testing as Continuous Feedback: A Control System perspective ()

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CST (Control System Theory)

**Group 7, Q2:**
What are the benefits of using the CST framework within usability, in practice? Are there any real world examples?

**Answer:**
- A common understanding within development teams and management, of the value of iterative testing
- Continuous feedback
- Can and should be adapted to the current situation or process
- Easier to make changes
- Faster recognition of potential problems
- If successful – a close collaboration with the real users

**References:**
Iterative Usability Testing as Continuous Feedback: A Control System perspective ()
A Practical Guide to Usability Testing (http://books.google.com/books?hl=sv&lr=&id=4lge5k_F9EwC&oi=fnd&pg=PR5&dq=advantages+of+iterative+usability+testing&ots=vod68Bi6wG&sig=0eYXU0c_vRP4W4eSAkpnFazILFM#PPR11,M1)}
Group 3, Question 1

What are the potential benefits of quality-in-use?

- Increased efficiency
- Improved productivity
- Reduced errors
- Reduced training
- Improved acceptance

Group 1, Question 3

The INUSE project has developed methods for assessing an organization’s position on a quality-in-use maturity scale. Much of European industry is at level 1, 2, or sometimes 3 on this scale. How can you help them to increase their levels?

- In step X:
  The question of usability has never been raised on a higher level of the company.
  The typical way of thinking in an older company, with simpler products, that have always looked the same.

- In step A:
  The customer has not been identified, nor his needs.
  The management does not know where to go from here.

- In B:
  They have realized that there is in fact a problem that should be dealt with.
  The lack of knowledge will sooner or later affect the sales.

Solution:
Education and information for key positions.

As always, any structural change will need the blessing and support from the management.

Chances of management giving full support will improve if they can see the use of usability as a both long-term and short-term profit.
Nigel Bevan states: “To achieve a good quality-in-use you need a good external quality and a good internal quality. Is this always true or are there other ways to design good quality-in-use?

Depending on the point of view, it is unclear which lock system has the best quality-in-use. Both the landlord and the tenant are users of the systems, but on different sides, and with different demands on reliability and flexibility. Therefore it can be unclear what internal quality is and what is an external quality, but different user of the system can still argue there is quality-in-use.

Maguire argues that context of use is a very important issue when assessing usability. But how can you know and predict context of use of a totally new product? In many cases the actual use is not what designers originally intended. How does this then affect the usability of the product if the intended context of use is not the same as the actual context?

Context of use
The situational factors that influence the use and usability of a system, including environmental factors, physical variables such as space time, temperature, noise, organizational factors, social factors, management and organizational pressures.

(http://www.usabilityfirst.com/glossary/term_1073.txt)

User Types
- Direct user
- Indirect user
- Supporting user
- Monitoring user

(http://www.usabilitynet.org/tools/context.htm)
Task

- **TASK EXECUTION**
  - Criticality of the task output
  - Degree of precision required in output
  - Autonomy of user in completing task

- **TASK FLOW**
  - Task input
  - Task output
  - Task side effects
  - Task dependencies
  - Linked tasks

Environment

- **SOCIAL ENVIRONMENT** (Multi/single user environment, Assistance amiable, Interruption)
- **ORGANISATIONAL ENVIRONMENT** (Policy, Culture, Mode of communication)
- **TECHNICAL ENVIRONMENT** (Standalone/Networked, Type of connection, hardware required etc.)
- **PHYSICAL ENVIRONMENT** (Location, Temperature, Time etc.)

Observation methods

- Direct Observation
- Indirect Observation

(www.usabilitynet.org/tools/userobservation.htm)

G5, Q3:
Is it the only way to measure usability by comparing it to known facts about human cognition?

- Human Cognition: Is the study of how the brain thinks.
  (http://en.wikipedia.org/wiki/Human_cognition)
- The five important factors related to the usability are as (http://www.pureinterface.com/5factors.htm)
  - Productivity
  - Learnability
  - Error Frequency
  - Memorability
  - Satisfaction

Usability together with utility are considered to influence the usefulness of the product. Usefulness is one of the attributes affecting acceptability. (Nielsen 1993)
• ISO definition of usability:
Usability is the "effectiveness, efficiency and satisfaction with which a specified set of users can achieve a specified set of tasks in a particular environment."  

The learning curve is a presentation of the level of users' performance over time. Typical measurements that can be illustrated by the learning curve include guessability, experienced user's performance (EUP) and learning time.

http://www.uiah.fi/projects/metodi158.htm

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G7, Q3:
How does the change in the ISO/IEC 9126 affect the developing process when designing software?

• Standards
  • Software standards provide a criterion or an acknowledged measure of comparison for quantitative or qualitative value for software.
    (http://ntrs.nasa.gov/archive/nasa/casi.ntrs.nasa.gov/20070021747_2007020309.pdf)
  • ISO 9126 is an international standard for the "evaluation of the software quality." (http://en.wikipedia.org/wiki/ISO_9126)
  • The standard is divided into four parts,
    – quality model
    – external metrics
    – internal metrics
    – and quality in use metrics

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Quality Model

• Divided into characteristics and sub characteristics.
  – Functionality (Suitability, Accuracy, Security, Compliance, Interoperability)
  – Reliability (Reliability, Recoverability, Fault Tolerance)
  – Usability (Learnability, Understandability, Operability)
  – Efficiency (Time behaviour, Resource behaviour)
  – Maintainability (Stability, Testability)
  – Portability (Installability, Replaceability, Adaptability)

• Each sub characteristic is further divided into the attributes.
  • The standard provides a framework for organizations to define a quality model for a software product. On doing so, however, it leaves up to each organization the task of specifying precisely its own model.

• Internal metrics are those which do not rely on software execution (static measures).
• External metrics are applicable to running software.
• Quality in use metrics are only available when the final product is used in real conditions.
Figure 4: INREC WtJi1 Dependency Model.