

Discussion for ONC/SHARP HIT Policy Committee Certification/Adoption Workgroup: April 21, 2011

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Panel 4: Measuring & Improving Usability

- *What is the state of art of measuring usability? What can and cannot be measured?*
- *What are the areas of usability measurement which we know enough to be helpful to industry?*

Usability measurement has a 30-year history of contributing to the rapid development and refinement of user interfaces. This applies equally for professional uses such as air traffic control systems, industrial equipment, and medical devices as well as for consumer electronics devices such as cellphones, digital cameras, web browsers, and email clients. There is a rich literature of books, journals, and conferences, with professional societies and industry groups around the world. Government agencies address usability issues, with admirable compilations of resources, such as HHS's www.usability.gov. National and international standards, often tuned to specific fields such as air traffic control, military equipment, and medical equipment, have created safer, more effective, and more useful technologies on a massive scale.

Since usability is an attribute of device plus human use, performance benchmark tasks and ratings criteria of many kinds have been successfully applied to improving product quality and human performance outcomes. Usability measurement is part of user-centered design processes at major platform developers such as Apple and Microsoft, thereby raising the quality and consistency of products across the range of desktop, web-based, laptop, embedded systems, and mobile devices. Many government agencies address usability such as FAA, NASA, FHA, and FDA's effort on Human Factors of Medical Devices.

Widespread adoption of user interface guidelines and usability measurement has dramatically improved usage enabling 5 billion people to use cell phones and 1-2 billion people to use web-based, office, and manufacturing tools.

Performance-based tests give informative results to guide design for screen layouts, terminology, color & graphics design, input devices, selection mechanisms, shortcuts for experts, error reduction methods, and dozens of other user interface aspects. Short-term performance tests (10-12 participants for 30-120 minutes) for usability issues have high payoffs when appropriate usability test participants are selected. Further payoffs come from longer term testing that may stretch out over weeks or months. In fact, continuous monitoring of usage to record error rates and performance speed provide the data to make improvements even for expert frequent users.

- *What areas of usability measurement are still theoretical and not ready to be applied in a commercial setting?*
- *Can usability be measured in a way that does not stifle innovation?*

Every evaluation method has its limitations, and dangers of being misused. Usability measurement is most effective when testing conditions resemble workplace settings, participant background and motivation match actual users, and when repeated testing validates the benchmark tasks and reporting methods. While performance evaluations for individuals have matured, assessing emotional responses and frustration levels are still research topics.

Usability measurement has repeatedly been shown to speed and increase innovation by rapidly and economically clarifying efficacy of user interfaces, speeding removal of problems. Focusing on usability has high payoffs for organizations and users. A series of IBM studies demonstrated \$100 payoffs for every dollar invested in usability testing and users benefit from shorter learning times, lower frustration, fewer errors, and greater self-efficacy. To put usability methods into the right perspective I would say:

Usability measurements are to user interface design what medical exams are to patient care.

The wide acceptance of usability measurement and evaluations of many kinds stems from its repeated demonstrations of value. Over the years usability measurement methods have evolved from usability tests with 10-12 participants for 30-120 minutes into many forms of online logging of usage, web analytics, and quantitative performance measures. Rigorous qualitative assessments, such as analyses of customer suggestions, observations, interviews, focus groups, and surveys, provide valuable insight into user behaviors and attitudes. Expert reviews, heuristic reviews, and cognitive walkthroughs bring further fresh perspectives. Increased use of usability measurement in Health Informatics, especially to Electronic Health Records systems could have substantial payoffs in speeding user performance, reducing errors, shortening training time, and increasing user satisfaction.

Resources

U.S. Government endorsed resources:

HHS Usability <http://www.usability.gov>

FDA Human Factors for Medical Devices

<http://www.fda.gov/MedicalDevices/DeviceRegulationandGuidance/PostmarketRequirements/HumanFactors/ucm119190.htm>

NIST Industry Usability Reporting, Common Industry Format (CIF) for Usability Test Reports,

<http://zing.ncsl.nist.gov/iusr/>

Federal Aviation Administration, *The Human Factors Design Standard*, <http://hf.tc.faa.gov/hfds/>

NASA *Standards and Guidelines*, <http://www.hq.nasa.gov/pao/portal/usability/>

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http://www.upassoc.org/upa_publications/jus/