

The IUSR Project: Industry USability Report

Jean Scholtz
National Institute of Standards and Technology
MS 8940
100 Bureau Drive
Gaithersburg, MD 20899- 8940

Abstract:

The Industry **US**ability Report (**IUSR**) Project is designed to help potential corporate purchasers of software obtain information about the usability of supplier products. There are two parts to the IUSR project: a proposed format for sharing usability information, and a pilot study which will allow both supplier (the developer of the software) and consumer (the purchaser of the software) companies to test the effectiveness of using usability test results as procurement criteria and to verify the usefulness of the reporting format.

Introduction

Many factors affect a corporation's decision about which software products to purchase. One key factor should be the software's *usability*. In simple terms, usability reflects:

1. how easy the software is to learn
2. how easy the software is to use
3. how productively users will work
4. the amount of support users will need

It is easy to see that usability can affect total cost of software ownership. Poor usability can raise training costs, increase user errors, lower overall productivity, and raise support costs. Software developers employ a variety of techniques to ensure software usability. In general terms, these techniques involve studying the users to develop an understanding of their needs and iteratively refining versions of the software based on *usability testing* results.

Purpose and Goals of the IUSR Project

In making purchase decisions, companies and organizations have traditionally had little indication of the usability of products they purchase. Therefore they have been unable to estimate training costs, support costs, and affects on user productivity. In essence, they have been unable to estimate the total cost of ownership for software products they are considering purchasing. This need for usability measurement prompted the National Institute of Standards and Technology (NIST) to define the IUSR project in conjunction with industry.

The goals of the IUSR Project are to:

- Encourage software suppliers and consumer organizations to work together to understand user needs and tasks.
- Develop a common usability reporting format for sharing usability data with consumer organizations.
- Conduct a pilot plan to determine how well the usability reporting format works and to determine the value of using this information in software procurement decisions.

Scope of the IUSR Project

Usability testing can be valuable for a wide range of products, however the IUSR Project is initially focused only on software. We do recognize that the usability of hardware (printers, copiers, fax machines, etc.) is important and often tightly integrated with software. The initial focus on software was intended to narrow the focus of the initial project so that a pilot study could be conducted. Extending the scope of the reporting standard to include hardware and other products will be addressed later in the project.

History of the IUSR Project

The IUSR Project is being conducted by a group of representatives from both supplier and consumer companies hosted by the National Institute for Standards and Technology (NIST). A list of project participants is available on the IUSR web site. (

During 1998 and 1999, the IUSR Project held three workshops. The purpose of these workshops was to bring together a group of usability experts from both supplier and consumer corporations who would be able to:

- Define a minimal common specification for reporting "procurement" usability tests.
- Design a pilot study to evaluate the costs and benefits of including usability test results in software procurement.

Organizations who are suppliers of software products or consumers of software products (many organizations are both) are invited to participate in future workshops, the pilot study and to comment on the project.

National Institute of Standards and Technology Involvement

The National Institute of Standards and Technology (NIST) is an agency of the U.S. Department of Commerce's Technology Administration. NIST was established by Congress "to assist industry in the development of technology ... needed to improve product quality, to modernize manufacturing processes, to ensure product reliability ... and to facilitate rapid commercialization ... of products based on new scientific discoveries." Established in 1901 as the National Bureau of Standards, NIST strengthens the U.S. economy and improves the quality of life by working with industry to develop and apply technology, measurements, and standards. One way in which NIST carries out this mission is through Measurement and Standards Laboratories that provide technical leadership for vital components of the nation's technology infrastructure needed by U.S. industry to continually improve its products and services. NIST's Information Technology Laboratory (ITL) concentrates on developing tests and test methods for information technologies that are still in the early stages of development—long before they are available in new products. But even once information technology products are available, tests developed by ITL provide impartial ways of measuring them so developers and users can evaluate how products perform and assess their quality based on objective criteria.

The NIST group involved in the IUSR project is from the Information Access and User Interface Division of the Information Technology Laboratory. This Division is responsible for TREC (Text Retrieval Conferences) and is also known for measurement work in spoken language recognition. More recently we have been researching measurement techniques for interactive systems. The IUSR project is a first attempt to facilitate the use of usability data by procurement decision makers in industry.

Reporting Format

The IUSR Project is developing the initial version of a common format for the reporting of usability test results, referred to as the Common Industry Format (CIF). The intended reader is a usability or human factors professional. The reporting format identifies the minimum format of shared usability information to allow

consumer organizations to evaluate test results or replicate the tests if desired. Organizations that participate in using the format may choose to provide more than the minimum format.

Why a Common Format is Needed

A format providing common information is needed because there are many possible ways to report usability test results. The purchase team may require an evaluation of the validity and relevance of any test that it uses to support its decision-making. A common format for reporting the test and its results will facilitate this evaluation of the test and the interpretation of its results. It should also reduce misinterpretation of the test results. A common format will therefore benefit both suppliers and consumers of software products.

Scope of the Reporting Format

The detailed instructions for the report format are given in the document entitled "Common Industry Format for Usability Test Reports" located at <http://www.nist.gov/iusr>.

The report format covers such topics as:

The description of the product that was tested

As some software products have several releases and versions, the product description should include this information. The description should describe basic functionality of the product and the intended users of the product.

The goals of the test

User testing may be performed to accomplish a variety of goals, including problem identification or diagnosis, design alternatives comparison, or to complete a summative test. The goal(s) of the reported test should be clearly stated.

The test participants

This section should include information on the number of users who participated and the criteria by which they were selected.

The tasks the users were asked to perform

This section should list the specific tasks that participants were asked to perform during the study.

The experimental design of the test

This section should explain the logical configuration of the test conditions, including independent variables, what comparisons, if any, are intended between groups, and how conditions which might contaminate the results are brought under control.

The method or process by which the test was conducted

This section should report the sequence of events that was actually employed to instruct the test users, how well they followed it, any intervention such as coaching, and materials used to give instructions or ask questions of them.

The usability measures and data collection methods

Usability measures may include objective measures of effectiveness, efficiency, and how much effort is required to learn to use the product successfully. Subjective data on user satisfaction may also be collected.

The numerical results

This section should report the data analysis procedures and summary data. The results may contain summary statistics such as the mean, range, standard deviation, and standard error of the estimate.

Who Performs the Test

The usability test may be performed by the software supplier using its own usability group or by contracting with an independent testing facility or a consumer organization. The consumer organization interested in purchasing this software may accept the test results or may replicate the test.

In many cases, the supplier organization will provide the results of the last usability test conducted in the course of software development to the consumer organization. This allows organizations that have a usability testing program in place, to participate without incurring the expense of additional usability testing. Proposed changes in the product design that may occur as a result of the usability test may be listed in the report documentation. This reduces the need of having to perform additional usability test solely for the purpose of delivering the report to the consumer organizations. However, proposed changes listed in the report can in no way be taken as a guarantee that a supplier organization will make those changes in the final shipping product.

How Test Results Will Be Used

The procurement process for acquiring software often involves an organization's purchasing department. Few purchasing departments have the skills needed to evaluate usability test results. For this reason, it is recommended that the consumer organization's usability group human factors group should interpret the test results. This group will be responsible for interpreting the test results and integrating their evaluation into the procurement process.

On the supplier side, the sales process is typically the responsibility of a sales and marketing organization that is not likely to have skills in usability testing. It is recommended that the sales organization will work with the supplier's usability or human factors group to identify an appropriate study and package the results in the common format.

Because usability test data may be subject to misinterpretation if incorrectly reported or published, it is assumed that in many cases the results will be shared under a non-disclosure agreement between supplier and prospective purchaser. Supplier organizations should treat both large and small consumers equally in allowing access to this information so as not to provide larger organizations with unfair advantage in competitive situations. Specific negotiations regarding non-disclosure are left to the individual organizations.

The Pilot Study

A Pilot Study will be conducted to determine the value of incorporating usability results into decision-making for software purchases, and to refine the procedures and reporting format. The initial focus will be on software for upgrades, new products, or custom applications.

Pilot Description

Suppliers and consumers who wish to participate in the formal pilot study will draft an agreement between their companies. Consumers will be responsible for collecting applicable business metrics prior to the adoption of the new software by the consumer organization. The supplier organization will provide usability test results in the CIF format to the consumer organization under nondisclosure agreements. The consumer organization will again collect the same business metrics and will do an analysis to determine any correlation between changes in the business metrics and the usability test results.

The National Institute of Standards and Technology (NIST) will act as a collection and dissemination agent and will facilitate sharing results from the pilot studies to refine the common usability reporting format and the associated metrics. NIST will collect sanitized information from the consumer organization describing the business metrics measured and any correlations with usability test data. NIST will use this information from the supplier- consumer pairs and produce a summary for dissemination to the project participants. This data will be discussed in periodic workshops hosted by NIST and will be used in refining the Pilot program.

Specific Responsibilities

The teams of Consumers and Suppliers will work together on agreed upon software products. Each pair of companies will commit to the following:

The Consumer Company will

1. Consult with the Supplier to select a target software product with a minimum two-month advance notice
2. Request usability test data from the Supplier on the target product.
3. Apply the reported results in making decisions for software purchases.
4. Gather internal data, such as, overhead, productivity, and user satisfaction, associated with the software that was acquired and record it for the NIST database.

The Supplier Company will

1. Conduct a usability test of the targeted software product.
2. Report the test and its results in the format specified by the Workshop
3. Put a nondisclosure agreement in place for sharing the usability test results with the Consumer company.

NIST will

1. Collect the sanitized information from the Consumer Corporation
2. Produce an analysis of data from all consumer-supplier pairs
3. Host a workshop to discuss the results of the data and participate in recommendations for refining the project

Current Status

The first version of the Common Reporting Format (CIF) is currently online at <http://www.nist.gov/iusr>. We are encouraging usability professionals to use this reporting format for documenting their summative usability test results. In addition, a research effort sponsored by NIST, is investigating the use of the CIF to compare usability test results conducted by different usability professionals. This is an effort to eliminate some of the variations in usability testing (Molich et. al, 1999). Many of our workshop participants are currently using the CIF and are providing feedback on the format and the time needed to produce results in this format.

Other participants are exchanging usability results in the CIF format with consumer companies and working with them on interpretations of these results. Anecdotal reports from these activities suggest that this activity is helpful to the supplier organization. Suppliers and consumers are conducting useful discussions about the end user demographics and the representative task being tested. This is providing suppliers with a better understanding of their consumers will allow the suppliers to design their products to more easily accommodate large consumer end users.

We have some consumer - supplier pairs for the pilot study but this pairing is proving to be difficult due to the timing of products for release and the interest on the consumer side of purchasing this product. Companies may, of course, use the common reporting format on their own. We recommend that consumer organizations wishing to use usability test information as a factor in purchasing decisions develop a plan to determine if there are measurable benefits in doing so. We are encouraging consumer companies involved in this project to identify corporate metrics that might be predicted by usability results and to collect these metrics for use as a baseline. Some consumer companies do their own usability testing and are collecting pilot data based on these test results and selected business metrics. Companies may contact us for guidance on implementing plans in their organizations. In addition, we encourage companies to contribute data from efforts in their companies to a database maintained at NIST. This data will be periodically reviewed to determine the effects, if any, of these efforts.

Relationship to Other Standards Organizations

The IUSR Project is currently an independent effort, not connected with any other standards body. We are working with representatives from other standards bodies such as ISO, IEEE, National Committee for Information Technology Standards (NCITS), and Human Factors and Ergonomics Society to minimize overlap in our respective efforts and to leverage each other's work. The SIGCHI liaison to Standards is a member of our workshop. The USER Project common reporting format is consistent with ISO 9241-11 and ISO 13407. We view this work as an implementation of that ISO work.

Future Plans

We are continuing to collect comments on the CIF and we have a process in place to produce future versions. We are working with workshop participants to find both pairs for the pilot study and also to define single user studies that both suppliers and consumers can conduct.

We are currently investigating approaches to turning over a later version of our work to a standards body when we have adequate validation of the usefulness of this work. We have contacted several standards bodies and we are exploring the options.

We will continue to expand the CIF in two respects. First, we want to research the changes needed to use the CIF for reporting usability testing of hardware. Secondly, we recognize that the CIF has the potential to form the basis for a testing and reporting process to report on accessibility of a product. It can provide some performance-based measure of the of a user interface alone. This is of interest to industry in the United States because of the regulation that will take effect on August 7, 2000 in the United States government concerning accessibility. Section 508, originally part of the Rehabilitation Act of 1973, as amended in the Workforce Investment Act of 1998, requires that Federal agencies acquire electronic and information technology supporting comparable access to our data and information by both employees and customers with disabilities. This means that any electronic or information technology procured by the Federal government and any information made available to the general public must be accessible.

Anyone wishing more information in this project is invited to visit the IUSR web site (<http://www.nist.gov/iusr>) or to e-mail iusr@nist.gov.

References

Molich, R., Thomsen, A., Karyukina, B., Schmidt, L., Ede, M., van Oel, W., and Arcuri, M. , 1999, Comparative Evaluation of Usability Tests, in CHI 99 Extended Abstracts, Conference on Human Factors in Computing Systems, May 15-20, Pittsburgh, PA. 83-84.