Some Usability and Ethical Issues for Captive End-User Systems

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This preface discusses some special usability, usability testing (UT), and ethical issues that arise from experience with what is called captive end-user systems (CEUS). These are systems that are required to gain access to, and participate in, a private or privileged organization, or as an employee or member of another organization that wishes to gain such access and participation. Examples are systems that are generally Web-based and required for submitting:

• articles to academic journals (editorial systems)
• job applications
• student applications to universities or academic programs
• faculty curriculum vitae (CV) material into a database

A Growing Problem
CEUS and their problems are likely to continue to increase as technology is brought to bear on more and more business and everyday life individual matters. In these systems, the end user often has little opportunity to influence the choice of the product or its design and testing. At the same time, such systems often impact very large numbers of users so that the initial usability of the system becomes very important. Such systems often impose substantial data-entry burdens on end users. Thus, they raise concerns about economizing end-user time involvement and preventing loss of productivity. For organizations, problems arise from the impact on the individual end user, who may be frustrated, have morale unfavorably impacted, and perhaps underutilize or ineffectively use the system. These problems add up quickly to managerial ones.
Because the end user has little control over such systems, they also raise ethical concerns. Since large numbers of people are often affected, they may have broad social and economic productivity impacts in case of poor design. This preface calls attention to some problems and potential needs with respect to this class of systems.

As a case in point, my college recently began to require all faculty and staff to enter professional data into a commercial database system. The adopted system was one of very few available and such a system was essentially mandated by an accreditation agency. Given that circumstance, there was no opportunity to shop for a best-of-breed alternative product. In addition, it was awkward to voice complaints other than through the system vendor’s support personnel. UT information was not made available. This system had a number of problems that suggested inadequate UT had been carried out to economize time and effort of the end users, and therefore loss of productivity to the college. This caused considerable loss of time for a large number of faculty members and other staff. In contrast, systems developed within an organization for use by its own employees, or for e-commerce Web site applications, are generally subjected to careful UT (Bruegge & Dutoit, 2004; Dennis & Wixon, 2000; Hoffer, George & Valacich, 2002; Lazar, Adams, & Greenridge, 2005; Rubin, 1994; Schach, 2005; Whitten, Bentley, & Dittman, 2001).

The system vendor advertised numerous universities as prior adopters, giving the impression that the product should be far along the UT and maturity cycle. However, a surprising number of problems were found that seem reasonably identifiable by subject area expert (SAE) end users. A few of these follow.

Expert judgment, in the SAE sense of expertise, was often required to see how best to describe certain CV features such as presentations only, as opposed to presentations with proceedings publication, letters to an editor, proceedings reprinted in refereed journals, and so on. Thus, an inadequate number of categories were provided relevant to faculty publication activity. Also, it was found that articles accepted but not yet published, one of the more important categories of publications did not appear on CV reports generated by the system. Such reports were essential checks on the systems. If these were not handled properly, there was little confidence that accreditation review reports might omit essentials. Later, a work-around was found by declaring these as actually published instead of their true status.

The literature on UT has long noted that the user profile should be broken down into two different classes of users (Caulton, 2001; Rubin, 1994). This is also known as audience analysis in the Interface Design and Human Computer Interaction literatures (Drommi, 2001). The faculty database example uncovered an interesting dimension along similar lines. There were various categories of academic entries, especially publications. It was reasonably easy to add one publication. However, as the number of entries increased, several problems were noticed. First, only one view of the already entered publications was available during data entry activity. It
was in alphabetical order on the apparent key field of the publication title. This is at odds with the usual CV ordering by publication category and dates in reverse order. Thus, it was difficult to return to specific items to check whether they had been entered and completed. Complaints to system support led to a change to a different view that was in reverse date order but mixed all publication types together. Interestingly, this kind of problem might not have been detected in usability tests that involved just one or a few publication entries. UT would have benefited by emphasis on what may be called specific category heavy users. That is, the user profile or audience should be divided into sub-classes including those who have heavy (i.e. extensive, high volume) publication activity, those who have heavy service activity, and so forth.

Other problems were also present. Two entry boxes were provided for the end user’s own name. One contained college faculty in a drop-down list and the default version of the user’s name. This would have been useful, particularly for sole or first authored publications of the user if the default name was in the form used in references. However, it was difficult to delete the default name for publications for which the user was not first author. When an article’s volume number was entered a drop-down list appeared showing past volume numbers that had been used – a case in which past choices do not have relevance. The same was true of issue numbers for articles. To make matters worse, these drop-down lists covered the entry boxes for data below them, thereby further slowing the entry process. This latter problem was later found to have a solution by working upward from the bottom of the input screen.

Problems like the foregoing not only waste time directly for end users but also cost extra time in developing work-around solutions, and describing and communicating to colleagues and vendor support staff. In such systems, end users are essentially captives of the situation and cannot participate in competitive shopping. Without representation, the end user can become an unwilling part of a “design by fixing complaints” mode of system development. Developers of such systems could be easily tempted to rely mostly on user feedback after roll-out in order to accomplish UT and iterative improvements as a by-product of actual sale and use. Since this occurs at the expense of the end user and/or the employer, it raises clear ethical concerns in addition to loss of productivity concerns. This type of ethical concern fits well in several of the general ethical systems mentioned in Hoffman (2004).

It should also be noted that the kind of time loss during system use addressed here is not the same as user-learning time or Learnability (Bennett, 1984). In fact, the faculty data system in question seemed fairly easy to learn. The time concern here is more closely related to Constantine and Lockwood’s (1999) Efficacy and Context factors, as well as Bennett’s (1984) Throughput dimension. Efficacy requires that a system should not interfere with or impede use by a skilled user who has substantial experience with the system. The CEUS time concern is similar except that it should hold without substantial experience with the system.
Context requires that the system should be suited to the actual context of use. It applies directly to CEUS with an emphasis on the SAE’s understanding of the context. Efficacy refers to the speed of task execution, and thus also directly applies to the CEUS setting.

**Solution Approaches**

What should and can be done? Hopefully, increasing awareness and further discussion of the issue will help in itself. In addition, increased stress on ethics in the business curriculum should help, especially with the aid of cases built along these lines. International standard possibilities also exist. In fact, the main international standard affecting the product development process is ISO 13407: Human-centered design processes for interactive systems (UsabilityNet, 2006). This standard outlines four design activities including carrying out user-based assessment. The same Web site lists several related ISO guidelines. However, such ISO type guidelines, while clearly helpful, tend to stress processes rather than measurable outcomes. Moreover, without competitive pressure they are on a voluntary basis.

Efforts such as the Software Engineering Institute (SEI) at Carnegie Mellon University (SEI/CMU, 2006) might be adapted to address CEUS needs. Among many other activities, SEI works through the global community of software engineers to amplify the impact of new and improved technologies. The TRUMP (TRial, Usability, Maturity, Process)(http://www.usabilitynet.org/trump/resources/standards.htm) project has similar aims.

From several Systems Analysis & Design and Software Engineering books perused for this writing, it appears that UT efforts in those fields have concentrated on goals such as user friendliness, ease of understanding, minimizing time to learn, and similar criteria. However, most of the problems center on problems of efficiency and end-user productivity in interface design (Chen, & Sharma, 2002). CEUS considerations suggest adding emphasis on specific task or scenario times with the final product and time spent on error reporting during beta tests. Once a product is released it is those kinds of times that most impact potential loss of end-user productivity. Thus, while the areas of human factors and human-computer interaction are being extensively explored, more research is needed from the point of view of society and employers as stakeholders.

Various general UT process theories and techniques have been proposed (Dilllon, 2001; Lewis et al. 1990; Molich & Nielsen, 1990; Nielson, 1994). Ju and Gluck (2005) argue that UT with real users is the most fundamental method and is essentially irreplaceable. The points underscore this point even more for CEUS. In addition, the points surfaced suggest that while general UT techniques are essential, the specific context of a system plays a critical role. In short, the right UT is needed for the right end users.
Projects such as SEI are voluntary but participating firms can gain a kind of “Good Housekeeping” distinction, while end users and/or their employers can gain a measure of confidence that sound usability practices have been promoted. These kinds of safeguards work best under competitive pressure, however, so that their application cannot be expected to fix most of the problems with CEUS. Research into the prevalence and impact of such systems within firms, as well as across the whole economy, could be influential. If the lost productivity is as substantial as feared, special ISO guidelines might be promulgated, and possibly tied-in with general ISO quality assurance guidelines. As research in the area becomes more available, the possibility of legislative action at state or federal levels might also to be deliberated. Such efforts would need to be weighed against or perhaps combined with other approaches like professional licensure of software engineers (Ficarrotta, 2004).

Further research might also be directed towards establishing categories based on estimated numbers of end users affected by various kinds of such systems. For example, a cutoff level of 100 or more expected end users, say, might be set as a flag for vendors required to have stricter CEUS-related UT standards.

Organizations also need to resist the urge to quietly accept such imposed systems. In the case of a college seeking accreditation, there is a natural tendency to acquiesce to a strongly recommended or mandated system so as not to be viewed unfavorably. However, the college’s evaluation itself depends on good employee compliance in use of the system. A poorly designed system can lead to underutilization or non-utilization and hurt the college’s standing in a different and perhaps more substantial but less direct way. Namely, a favorable review by an accreditation agency may depend critically on thorough and complete reporting of all of the college’s academic assets.

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