

UPA 1999 - Phoenix, Arizona

Position Paper for Workshop W5

Crossing the Chasm

Avi Harel

ErgoLight Ltd., Haifa, Israel

Experience in promoting usability

Between the years 1975 and 1991 I worked for Rafael, the main R&D institute of the Israeli Ministry of Defense. Between the years 1980-1983 I was the project manager for a major project in the Electronic Division. The main user tasks included data entry and data manipulation. Primary design concerns were raising the user performance and prevent accidents caused by user errors.

My first exposure to usability was between the years 1984-1985, during a sabbatical leave of absence from Rafael, I worked for the DI department of BNR (now Nortel) on the design of a prototype of a touch sensitive telephone set. On returning to Rafael, I decided to promote usability in Rafael.

Our department manager agreed to assign me a job of usability designer. In 1986 I was the first person in the Electronic Division whose job was usability evaluation. Between the years 1986-1989 I was assigned for part time studied at the Technion of Haifa, Israel, towards a Ph.D. in Behavior and Management Sciences (which unfortunately, I was prevented from completing). However, in few months I realized that they were not willing to offer me enough projects at which I could contribute.

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Between the years 1994-1996 I was a freelance consultant. I intended to offer usability consulting services to software developers. However, I had to admit that I failed. There was little interest in the Israeli industry in usability at all. I realized that the main barrier to consulting was that people had different background in computer operation, which made them disregard my advice, which was based on design rules. My conclusion was that people in the software industry would appreciate tools that provide hard evidence.

In 1996 I founded *ErgoLight Ltd.*, which I continue to manage. *ErgoLight* develops tools that provide hard evidence about the usability of Windows applications. We use these tools to conduct informal usability tests at beta sites. In addition, we offer integration of these tools in usability labs, as a means to provide hard data and objective measures of usability.

The role of testing tools in promoting usability

The need for tools

Software developers incline to spend much on technical issues and not enough on human factors. Thus, GUI design is typically based the developers intuition, rather than on the user needs, and GUI validation is typically conducted against the product specification, rather than against the users expectation and performance.

Typically, product managers consider usability as merely conforming to a style guide. Other topics, such as user work flow, are considered to be a matter of taste, depending on the designers intuition. Only few developers agree that expertise is required for designing and evaluating user interfaces.

The industry appreciates tools such as that reported by Lecerof and Paterno (1998). Members of the UTEST mailing list often ask how to get hard evidence to product managers. My position is that hard evidence is obtained by tools, because tools are considered objective. I do not propose that tools will substitute for the usability experts. What I propose is that usability professionals can integrate tools in their consulting, to support their consulting by hard data. A review of tools for automatic testing was provided by Hilbert and Redmiles (1998).

Objective measures of usability

Product managers are confused by the variability of available design options and design rules. Often, it is difficult to convince them that consulting based on human factors is applicable to their specific project. For almost every design rule, there is another design rule that contradicts the first rule. It is difficult to convince product managers to consider human factors because usability professionals often propose a selection of design options. However, they do not offer effective and efficient tools for deciding that a particular design option is better than its alternatives.

Tools may provide statistics of the utility of the product features. Product managers already appreciate this capability. In addition, tools may provide objective measures of the costs of design flaws, by measuring the time that users waste because of these flaws.

Shorten beta cycles

User acceptance is typically verified in beta sites. Developers expect the users to report on all design flaws and bugs that they encounter, including usability issues. However, it is well known that users do not report on many of the problems that they encounter, for different reasons. For example, if they cannot repeat the sequence of actions that resulted in a difficulty or if they did not follow the user documents, that support the implementation, even if it is wrong (more in <http://www.ergolight-sw.com/www/CheckTheUser.html> ([link](#))).

Tools can be used to encourage users to report on difficulties that they experience either automatically (e.g. Kaasgaard et al., 1999) or as an extension of laboratory testing (Chen et al. 1999). By matching the user intention with the user actions, a usability professional can identify user errors that resulted in unexpected system behavior. This kind of data is absent using current practices.

Save debugging costs

Many of the users reports about operational difficulties are because of their own errors, of which the users were not aware. Typically, such reports are wrongly classified as software bugs. During debugging, programmers spend much of their efforts trying to track bugs that do not exist, because the problem was reported as a bug instead of as a design flaw. Examples may be found in <http://www.ergolight->

sw.com/www/Examples.html ([link](#)).

Enhancing the product quality

UI designers find it difficult to anticipate all aspects of user errors. The costs of user errors are (e.g., <http://www.cba.hawaii.edu/panko/HumanErr/> ([link](#)))

Users waste a great deal of time recovering the data accumulated before the error

Some errors are never detected

User errors may result in accidents.

Errors made by experienced users are important for two types of systems:

Performance critical systems, for which the marketing goal is to increase the user performance. User errors degrade user performance in two ways: by introducing wrong data into the product database and by slowing down the product operation. The degradation in operation speed of experienced user due to their own errors may be as high as 50%. An example of the costs of user error is presented by Bailey (1996, p. 192);

Safety critical systems, for which the main marketing concern is to prevent accidents caused by user errors. There are indications that for each actual accident there are about 100 situations of almost accident (e.g. Hannaman, 1984).

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