

The Usability Engineering Life Cycle – Jacob Nielsen, 1992

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Summary of Paper

The importance of usability is often underestimated in this era of ubiquitous computing. At present, the end user expects to achieve high usability from their systems. The high level of effectiveness, and satisfaction users can achieve completing tasks in a particular computing environment is now an expectation rather than the result of good design. Ensuring consistent system usability includes the incorporation of methods throughout the software development process and beyond. Having good intentions without practicing established methods does not constitute usability engineering. Today's computing systems should be developed with ease of use and ease of retention premises, yet be efficient with a common look and feel and streamlined navigation. Error handling should also be simplified and direct. Following Nielsen's [1] Usability Engineering Model and incorporating usability into a project life cycle are integral components to a project's success. While getting started early and practicing the basic elements of prototyping, empirical user testing, and iterative design are the driving forces, any effort made towards the usability engineering model will allow for project gains and future growth of subsequent projects. An additional goal is to reduce costs by receiving user feedback upfront minimizing the changes made during the design phase where costs then increase exponentially.

Nielsen [2] presents a systematic way of enhancing the user experience by using established methods that are considered usability engineering. It is essential that usability activities be conducted before, during and after product design and implementation. The ten elements of the usability engineering model provide a means to navigate through the software development process and beyond. Having a systematic method to approach usability will yield an iterative process that can become a company's best practices. Recognizing that all ten elements are difficult to achieve with a first implementation, Nielsen [3] stresses the importance of getting started now even if small; growth will come. Nielsen [4] also discusses compatibility for product families and versioning of subsequent projects for the same product family.

The general stages of development discussed by Nielsen [5] include:

- Pre-design
- Design
- Post-design.

The pre-design stage focuses on getting acclimated to the user population and user tasks. Taking the time to understand the limitations and expectations of the user, along with the products intended use, would impact usability considerably. Included are five main usability goals: learnability, efficiency of use, ease of retention, error handling and user satisfaction.

The design stage objective is to arrive at a usable implementation for a release by achieving a design based on the prototype and ensuring the design meets the users' needs. Participatory design and coordinate design play a role in meeting a usable implementation by confirming that the design can be understood by the user and is consistent yet offers flexibility. This is where usability heuristics, prototyping and empirical testing play an important role.

The importance of the post design stage is to gather data for the next version and future system release(s). Capturing metrics is one way to determine usage patterns and problems. Identifying

issues and enhancements will contribute to the subsequent project release and especially the predesign phase. Evaluating cost reduction is also important to determine if the project gains outweigh the expenditures realized from the development effort.

Research Questions Addressed by Paper

A primary objective of today's computing systems is to simplify life for the user. Nielsen [6] addresses the issue surrounding the building of unusable interfaces. User interfaces that are built with good intentions but do not adhere to consistent standards are no longer considered a usability engineering effort unless supported by established methods. Additionally, Nielsen also identifies the need for a software development process and incorporation of usability throughout the development process and beyond. Ensuring good usability of computer systems is done by actively addressing usability concerns in the software development process. The emphasis is on those elements throughout the development life cycle designed to ensure good user interfaces. Nielsen states that, "only a systematic usability effort using established methods can qualify as usability engineering [7]."

Contribution of the Paper

Nielsen's "Usability Engineering Life Cycle" provides a practical method to ensure good user interfaces by placing emphasis on specific deliverables throughout the software development process. Nielsen accomplishes this through the ten step "Usability Engineering Model." Nielsen stresses the importance of a usability engineering process that includes elements before the design, during the design, and after implementation of an application. Nielsen also explains each phase within the life cycle, which usability steps apply and the level of importance.

Nielsen suggests that enhancing the users experience and simplifying the interface process should be addressed before the design phase. Recognizing that ample funding and optimal circumstances are desirable for usability implementation, Nielsen stresses the importance of getting started immediately. It is more important to introduce a simplistic method for a project than to postpone usability for a subsequent project that would implement all ten steps of the model. It is more effective to implement a gradual approach than an "all or nothing". While the ten steps are optimal, Nielsen's emphasizes that the three basic elements: user testing, prototyping and iterative design are the most important.

Integration of Course Concepts

To date, CIS677 course concepts have included behavioral aspects of human users and technology. Business globalization has also been introduced as a precursor to ecommerce topics. There is a considerable amount of overlap between theories presented by Nielsen, Benbasat and Taylor, Zwass, Shneiderman, and Goodwin alike.

Benbasat and Taylor's [8] perspective are on the behavioral aspects of information processing and encompasses various models affecting the processing behavior of humans. Their conceptual approach with regards to the importance of human behavior is essential when addressing usability. The four aspects of human information processing presented by Benbasat and Taylor [9] are discussed as a means to improve MIS systems design. Typically, enhancing the ability of

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individuals who make decisions based on information from multiple sources and streamlining information sources to aid with large amounts of information often available, contributes to a more effective design.

Zwass [10] also focuses on the behavioral aspects of information processing and changes in technology with those of the end user. As there is an increased availability of information, care must be taken not to overload the user. As Zwass [11] mentions, “we are drowning in data but need information”. Information overload isn’t only having too much information but not knowing how to extract and manipulate the needed information. Too often more information than is requested is returned to the user. Getting the right information to the decision maker can expedite the problem-solving situation. As presented by Zwass “The problem we’re facing is that the role information systems play in an organization has evolved over time [12].” The rate at which changes have taken place has made it difficult for the decision maker to keep up. Zwass also indicates “We also rely on these systems to help manage increasingly complex interactions within the company and throughout the “extended organization” consisting of our firm, its business partners, customers, and suppliers [13].” Realizing internal growth within a corporation is often challenged by cognitive strain. A much-needed change may require additional training and implementation considerations to accommodate the limitations of the end-user.

Business globalization is also within the “extended organization” as Zwass presents a need that “joint innovation by headquarters and by some of the overseas units leads to the development of relatively standardized and yet flexible products that can capture a number of local markets [14 p643].” Sharing of databases and information globally also brings to light the most important asset of an enterprise; people [15]. People often work in global teams and need to be able to communicate and overcome language barriers. Usability methods address the limitations these barriers create and also allow an opportunity for changes in predesign and prototyping.

Shneiderman also speaks of limitations and barriers “designing for a broad audience of unskilled users is a far greater challenge [16].” His belief “that accommodating a broader spectrum of usage situations forces researchers to consider a wider range of designs and often leads to innovations that benefit all users [17].” Reaching a broader spectrum is in line with globalization and strategic direction. For this to be possible, improved usability is essential to address the diverse users.

Goodwin [18] brings forth the comparison between usability and functionality. She indicates that usability could complement functionality but in turn, poor usability could result in decreased usage or no usage at all. While usability could enhance functionality, functionality should not be compromised at the expense of enhanced usability. Goodwin cites Shneiderman that “even expert users are penalized by poor design [19].” Improvements in usability can also result in cost savings in addition to increased use and functionality.

Critique/Analysis of the Paper

The need for usability continually increases. Nielsen's 'Usability Engineering Life Cycle' written in 1992 is still a viable method regardless of changes in technology. In 1992 the emphasis was on usability for application development of internal organizations, now usability has shifted toward the internet. Nonetheless, the flexibility presented by Nielsen allows the life cycle to adapt to the numerous methodologies and compatibility models alike such as ISO & CMM. A new focus has however been on heuristics especially dedicated to web applications. Nielsen mentions heuristics as part of the design phase.

Nielsen's article is instructional and informative. His tone and writing style are direct making the document usable by more than one audience. He explains the reasoning behind each of the ten steps but also suggests work around techniques for those who want to begin implementing usability methods but are unable to commit to all ten steps. The breakdown and integration within the software development life cycle is clear and concise. While cost saving measures will eventually result from successful usability, it was advantageous that it wasn't the main focus. Successful measures will automatically result in cost saving measures.

Lessons Learned

Nielsen's "Usability Engineering Life Cycle" is a practical approach to usability. It is very easy to follow and intuitive for those familiar with the Software Engineering Life Cycle (SDLC) or Compatibility Maturity Model (CMM). Even those unfamiliar with life cycle methodologies but involved in application development can understand the concepts to at least begin with a simplistic approach. While the rise of system methodologies dates back to the early 1990's, most companies have only recently begun to implement methodologies or take their importance seriously. The role usability plays in their methodology is also too frequently minimized.

Nielsen's emphasis is on getting started now and his acknowledgement that the ten steps are a goal rather than steps to be implemented as a whole. His approach lends itself to a phased-in approach. I strongly believe that a phased-in approach is essential when implementing new theories.

The article dates back to 1992 and just recently has technology been able to facilitate prototyping. While prototyping has been available for at least a decade, tools were often cumbersome or lent themselves as complete throw away. New technology allows for portability and makes prototypes a more appealing avenue. Couple this with the increased knowledge of the end user and this aspect can be capitalized upon. Corporations need to capitalize more on prototyping and iterative design to deliver systems that meet the user's needs. This will not only result in a more streamlined process but also reduce costs associated with rework, enhancements and design changes and will contribute significantly to globalization.

References

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