The Importance of Usability in the Establishment of Organizational Software Standards for End User Computing

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ABSTRACT

The rapid introduction of microcomputers into organizations throughout the last decade gave new importance to the analysis of how technology impacts organizations. In particular, research on usability has sought to become central to the design and selection of technology for large organizations. However, definitions and methods are not yet standardized. Data gathered from semi-structured interviews of three MIS managers and 125 end-users in three organizations suggest that differences in emphasis on, and definition of usability can exist between these two groups. Usability was not a central concern to managers when evaluating end-user software packages considered for adoption as the organizational standard, though it appeared to be so for end-users. Moreover, managers tended to consider and evaluate usability based only on features contained in the user interface, whereas end-users often cited contextual factors such as task and environmental considerations. Implications for technology assessment and future research into organizational impact of I.T. are presented.

I. INTRODUCTION

According to Eason (1988), when centralized information systems development fails to meet user needs, users will seek alternatives. Kaiser (1993) states that the search for such alternatives has led to the development of end-user computing (EUC), defined here as the activity of end-users in direct, hands-on computer use and application development using stand-alone microcomputers or connecting on multi-user systems, which has created a completely new set of management challenges for professionals in charge of information systems (IS).

Kaiser (1993) suggests several reasons for the growth of EUC. These include:

• the backlog of projects at the organizational IS level leading to end-users seeking their own approaches to information management;

• the increase in performance combined with the decreasing costs of microcomputers rendering end-user computing a more viable option than heretofore;

• the increase in "computer literacy" in the organizational workforce; and

• the increase in [supposedly] "user-friendly" software.

However, increased demand for new information technologies and the rise of EUC has not always led to significant organizational improvements (e.g. see Galletta and Hufnagel, 1992; Harrison and Dick, 1987; and Pyburn, 1986-87). For example, Eason (1988) reports on research which shows that only 20% of implemented systems achieve their intended benefits, while 80% achieve only marginal impact or worse, fail. MIS managers must facilitate end-user acceptance of technology, while at the same time maintaining some organizational control over technology resources. This study examines the means and extent to which managers of end-user computing are achieving these objectives.

II. BACKGROUND

Brown and Bostrom (1989) (following Henderson and Treacy, 1986) state that in order to successfully manage end-user computing, an organization must establish a planning and evaluation infrastructure to establish EUC goals, allocate resources, develop policies and procedures, and assess performance. They conclude that one structural mechanism often incorporated to achieve these goals is a steering committee with both IS and end-user representation.

Among the intended benefits of steering committees are attendance to the multiple needs of different corporate functions, informing top management of IS activities, and provision of formal links between users and IS departments. Drury (1984) provides one of the few empirical treatments of steering committees and the standards-setting process in organizations. He found that the primary functions over which steering committees have authority are defining objectives, establishing priorities, reviewing requests for resources, resolving conflicts over user needs, approving expenditures, and establishing long-range plans. Obviously, if usability of new technology is to be taken as a serious consideration in purchasing decisions, it is here that research on human-computer interaction (HCI) needs to impact. The present study examines the extent to which this is occurring.

Human Factors Research and EUC

Consistent with the need to find the best possible "fit" between the organizational and technical infrastructures, it is assumed that a key component in establishing this fit can be gathered from human factors research. Hornby *et al* (1992) have stated that system under-performance can be attributed, in part, to a lack of attention to psychological issues

such as the design of jobs, the allocations of systems tasks, and the *usability of the system* (emphasis added).

Defining *usability* , particularly for the purposes of selecting new technologies for others to use, is a problematic task. Often, usability is misconceived as an attribute of the interface rather than a quality of the total product (Dillon, Sweeney and Maguire, 1993) . Strict adherence to feature guidelines is, unfortunately, no guarantee of usable technology design, and there is a danger that equating usability with the presence or absence of certain interface attributes (e.g., "has GUI capabilities") can lead to poor or misguided selection of tools for others to use.

In recent years, the importance of contextual variables in establishing a definition of usability has been emphasized (e.g. Eason, 1988; Chapanis, 1991; Sweeney, Maguire, and Shackel, 1993). By contextual variables is meant the nature of the users, tasks to be supported, and environments in which the tool will be used. One widely-cited definition of usability is provided by Shackel (1991) , who describes usability as a technology's:

> . . . capability (in human functional terms) to be used easily and effectively by the specified range of users, given specified training and user support, to fulfill the specified range of tasks, within the specified range of environmental scenarios (page 24).

Such a definition emphasizes the *human* aspects of interaction and allows for the fact that usability is largely determined by the context in which a technology is supposed to operate, not by the presence or absence of certain features. Indeed, a technology that is deemed usable in one context, might indeed prove to be less usable in another, where different users or different tasks, for example, come into play. This perspective has clearly influenced the emerging ISO draft standard on usability (ISO 9241, Part 11).

Ultimately it is the MIS manager charged with overseeing EUC whose opinions and definitions actually impact organizational practices. Therefore, it is important to

investigate how practicing MIS managers in the field conceive of *usability*. In particular, the present researchers wanted to examine the extent to which the HCI research emphasis on contextual factors enter into MIS manager's definitions of *usability*. Furthermore, the researchers felt that it was important to compare MIS managers' definitions of usability with those offered by end-users in the organization who were impacted by these decisions.

As well as examining the interpretations placed on the concept of usability, the present authors were concerned with how organizations sought to evaluate usability. Sweeney, Maguire and Shackel (1993) have summarized the various approaches to usability evaluation in a framework which classifies evaluations in terms of three dimensions: the approach to the evaluation, the type of evaluation, and the time of the evaluation. Three approaches outlined by those authors include user-based, theory-based, and expert-based—each representing the source of information used in the evaluation. Types of evaluation are diagnostic (also known as formative), summative, and certification, which correspond to the purpose for the evaluation. Finally, the time dimension represents the phase in the product life-cycle at which the evaluation is conducted. The authors outline "usability indicators" which apply to each type of approach.

According to Nielsen and Molich (1990), practical constraints dictate that often expert-based, heuristic evaluations are the only feasible option for most organizations. Karat, Campbell, and Fiegel (1992) showed that empirical testing identifies the largest number of problems, including several "severe" problems that are missed in walkthroughs. Furthermore, Nielsen and Phillips (1993) showed that empirical testing was 4.9 times as expensive as the cheapest heuristic method. Thus, the choice of an appropriate evaluation method involves a cost-benefit analysis, based on the importance of accuracy, costs, availability of users, etc.

Given the wide variety of approaches to evaluation, their relative merits, and the variation in the cost, the most appropriate method is likely to vary for different scenarios. Only if organizations are aware of the available approaches, including associated costs and benefits, will they be able to choose the most suitable evaluation strategy for their needs. Thus, like the definition of usability, good evaluation itself appears to be highly context-sensitive. The extent to which those responsible for selecting an organization's software are aware of these issues would seem to be a crucial issue in predicting successful technological uptake in an organization.

III. METHODOLOGY

A series of semi-structured interviews with MIS managers from three differing organizations located in the American Midwest was completed. Initial contacts were facilitated through faculty within the Indiana University School of Business. MIS managers were contacted, given a brief overview of the scope of the project, and asked if they would be interested in participating. All three organizations indicated a willingness to participate, and interviews were scheduled with the respective MIS professionals.

Organizations

Organization A is a state governmental organization. The organization consists of approximately 950 personnel and has approximately 700 PCs currently in use. The MIS function includes 40 employees, about half of which are allocated to specific programs managed by the organization (though these employees still report to the MIS director). The remaining employees are managed in a traditional, centralized MIS function.

Organization B is a private-sector, service organization. This organization has over 900 employees, virtually all of whom have PC and local area network support. The IS organization consists of 100 employees, divided among two areas: Systems

Applications, designed to support the business functions within the firm, and the Data Center, designed to support hardware and software standards. The IS organization recently decentralized its end-user computing support in an attempt to locate that support "closer" to the user by moving personnel out of its (old) User Computing Services branch to the functional business units in the firm.

Organization C is a private-sector, manufacturing organization. This organization has over 3000 employees and 1500 PCs. The MIS function includes 98 individuals in a centralized structure. Unlike Organizations A and B, no MIS employees are located within the business units of the firm.

Organization	Sector/Type of Organization	Title of Participating Manager	Number of MIS Employees	Number of End-Users Supported
A	Public/State Government	Director, MIS	40	600
B	Private/Service	MIS Systems Consultant	100	900
C	Private/ Manufacturing	Vice President, Information Systems	98	3000

Table 1. Summary of Organizations Interviewed

Methods and Pilots

Primarily open-ended questions were used for the interviews due to their advantages in promoting freedom and spontaneity of answers and in allowing the interviewer the opportunity to probe for awareness of ideas on the part of respondents (Oppenheim 1992). While there are disadvantages associated with this technique as well (including time, difficulty in coding, and effort required of respondents), the researchers felt that the advantages outweighed the disadvantages in the context of this study.

To help ensure content validity, the development of a guide to be used for the semi-structured interviews followed an iterative process. First, the researchers established

content areas which they felt were important to the study. Broadly defined, these areas included organizational information, the standards-setting process, and factors involved in evaluating candidate systems. Based on the literature discussed above, more detailed areas within each of these content areas were listed. Within the organizational content area, the researchers collected background information about the organizational environment and the management of end-user computing. The standards-setting process area included items concerning standardized lists of "approved" hardware/software, reasons for creating a standards-setting body, the sequence of events leading to a standard, personnel involved at each stage in the process, reasons those individuals were chosen to participate in the process, and the MIS manager's role in standards-setting. Finally, the factors involved in evaluating candidate systems included questions on the criteria used to evaluate software packages, the relative importance of each of those criteria, how those criteria are evaluated, how information about those criteria is obtained, and the importance of usability.

Once an initial version of the interview guide was created, two experts on HCI and end-user computing management reviewed the guide. Recommendations on both content and form (question ordering, etc.) were incorporated and a second, more complete version of the guide was created. The guide was piloted on MIS doctoral students at the Indiana University School of Business for comments and suggested improvements. This review identified several weaknesses or ambiguities in wording. A third version of the guide was created incorporating those changes.

Finally, a pilot interview was scheduled with an MIS doctoral student unfamiliar with the contents of the interview guide. This individual was chosen as a result of his experience in industry, where he had served in a management role for a large IS organization for more than five years. The purpose of the pilot was to make any minor changes needed in

the content of the guide, to give the interviewer experience in handling potential questions/responses from the interviewee, and to determine the approximate length of the interview session. The pilot interview was completed and no major changes were necessary. The approximate length of the interview was one hour.

Procedure

Interviews with MIS managers were conducted by the first author at the participating organizations. Answers were recorded on the interview guides used by the interviewer. To help promote an open discussion and establish rapport, the interviewer opted not to use a tape recorder, relying on notes taken in the field as well as organizational charts, existing evaluation reports, etc. collected from the IS managers during the interview for analysis of the data.

Once interviews were completed, the MIS manager designated an organizational point-of-contact for distribution of the end-user questionnaires. Once the questionnaires were developed and piloted (as before), they were distributed to the organizational point-of-contact for distribution to end-users in the organization. Organizational points of contact were asked to distribute the questionnaires to users of varying skill levels. An analysis of the questionnaires received indicated that users of varying levels were tapped, and that the expertise level of users was not skewed. Based on a 5 point scale anchored at "novice" (1) and "expert" (5), the mean (self-reported) expertise of users for Organizations A, B and C was 3.1, 3.2, and 3.7 respectively. Furthermore, all levels of expertise were represented in each organization. A total of 180 questionnaires were sent out (60 to each organization). 125 questionnaires were returned, for an overall response rate of 69.4%. The return rate was approximately equal across Organizations A, B, and C with 38 (63.3%), 42 (70%), and 45 (75%) responses respectively.

IV. RESULTS

First, we examine the structure of each organization's standards-setting bodies and the process used to establish end-user software standards within the organization. These results are followed by the results for each research question (RQ) considered according to managers' and users' responses.

Organizations and standards setting

Organization A (state government agency) maintains an Information Resource Management Committee (IRMC) which is responsible for organizational standards. In establishing standards, the typical process involves forming an evaluation team of network administrators and end-users. This evaluation team meets and tests vendor products using a "hands-on" approach. For all organizations, the researchers elicited criteria used during the evaluation process. These criteria are discussed below and are illustrated in Table 2. Based on this testing, the evaluation team produces a recommendation to the IRMC, which consists of higher level Directors and Vice-President equivalent level managers (actual titles are not listed here to preserve the anonymity of the organization surveyed). The MIS director serves as a "technical advisor" to the IRMC and reserves the right to veto any recommendation.

Organization B (private sector, service organization) maintains a group (unnamed) within the Data Center to develop and enforce software standards. When a need for standardization develops, the Data Center forms an evaluation team, similar to that of Organization A. The evaluation team consists of both IS professionals and end-users representing all business units. Like Organization A, this evaluation team meets and tests vendor products to determine the suitability of various packages within an EUC application category (e.g. word processing, spreadsheet, etc.) for adoption as the

organizational standard for that category. When evaluation is complete, the team produces a report with a recommendation on the standardized product. MIS has the final approval authority for the actual acquisition of the recommended software.

Finally, Organization C (private sector, manufacturing organization) maintains a Computer Committee which is responsible for organizational standards. However, unlike the previous organizations, MIS staff are more directly involved in the standards-setting process. In most cases, as a need for standardization becomes apparent, an evaluation team consisting of IS management, PC Support, and an Emerging Technologies Group (both part of the IS organization) conducts the evaluation. In some cases end-users are brought in to assist with the evaluation, though this is not typical. The evaluation team forwards a recommendation to the head of the IS function for approval (with the oversight of the Computer Committee).

Each organization has either an approved list of software standards or a *de facto* set of standards that are used throughout the organization. However, there were minor differences in the makeup of the standards-setting bodies and in the standards-setting process. Given these process differences among organizations, the remainder of this section will focus on the specific questions addressed in this study (see appendix for outline of interview questions).

RQ1. What criteria are used by the software standards-setting body to evaluate corporate software standard candidates and how do those criteria differ from criteria suggested by end-users as important?

MIS MANAGER RESPONSES

Table 2 summarizes the criteria used by each organization and the relevant manager's rating of their importance. Not surprisingly, cost was identified by all three organizations as a major factor in their decision making. Compatibility with existing systems, interface

features, and vendor stability/size were each mentioned by two of the three managers as important. Reliability, feasibility, the ability to share data with existing applications, and "user-friendliness" were each identified by one of the organizations as criteria used in their standards-setting process.

	Organization		
Criterion	**A**	**B**	**C**
FINANCIAL ISSUES			
Cost of software	3	3	4
IMPLEMENTATION ISSUES			
Compatibility	5	5	—
Ability to share data	5	—	—
Feasibility	—	5	—
PERFORMANCE ISSUES			
Software features	—	4	4
Reliability	—	—	3
VENDOR ISSUES			
Stability of vendor	—	4	—
Market presence	—	—	3
HUMAN FACTORS ISSUES			
User—friendliness	—	3	—

Table 2. Criteria and Ratings Used by Organizations in Evaluating Organizational Software Standards (1 = Very Unimportant, 5 = Very Important; — Indicates criterion not used by organization)

After listing the criteria used in evaluating candidate systems, managers were asked to rate the relative importance of each of these criteria on a scale of 1 to 5, with 1 being “very unimportant” and 5 being “very important.” In Table 2 , similar items identified by managers under broad categories (identified in the table in uppercase letters) have been grouped. Verbatim terms used by the managers are represented under each broad category. Finally, the ratings for each criterion assigned by managers are listed in the

columns underneath the appropriate organization (note: dashes indicate that a given criterion was not used in evaluating systems by that organization and therefore no rating is applicable).

Usability was not mentioned by two of the three MIS professionals interviewed. Furthermore, the organization which identified "user-friendliness" as a criterion used in their evaluation process gave it the lowest importance rating of any criterion identified. These results suggest that usability is generally *not* considered a distinct or important issue by these organizations in attempting to identify standard software systems.

Given the focus of the investigation, the two managers who did not identify usability *a priori* were asked how they would rank the importance of usability on a scale of 1 to 5. Interestingly, in response to this inquiry, managers for Organization A and C each stated that they would rank usability a "4." However, they did not feel it warranted identification as a separate criterion to be used in any evaluation. Instead, these MIS managers, considered usability to be a function of software features or to be addressed as part of any comments made in a summary evaluation related to the overall "look and feel" of the software package. So, while managers typically did not list usability as an important criterion in the evaluation process, when asked about usability, most considered it as function of software features. This finding is consistent with those of Dillon et al. (1993) who found that information technology designers and managers often considered usability an attribute of the interface despite recent emphasis in HCI research that such a non-contextual view is largely inappropriate.

USER RESPONSES

End-users were asked to rate the importance of various criteria in ensuring effective technology selection for their organization. The criteria presented to users were those

suggested by their respective managers during the interview process, plus *usability* if it had not been explicitly identified. Users were only presented with a list of potential criteria—they did not know that these had been suggested by IS managers in their organizations. Users' ratings of these criteria revealed significant differences from managers' ratings of those same criteria, indicating a gulf between IS managers and end-users. Table 3 presents the mean ratings of each criteria by end-users in all 3 organizations.

	Organization		
Criterion	**A**	**B**	**C**
FINANCIAL ISSUES			
Cost of software	3.0	3.5	3.2
IMPLEMENTATION ISSUES			
Compatibility	4.2	3.8	—
Ability to share data	4.4	—	—
Feasibility	—	3.5	—
PERFORMANCE ISSUES			
Software features	—	4.5	4.4
Reliability	—	—	4.4
VENDOR ISSUES			
Stability of vendor	—	3.6	—
Market presence	—	—	2.7
HUMAN FACTORS ISSUES			
User—friendliness	4.8	4.8	4.5

Table 3. End User Ratings of Criteria Used by Organizations in Evaluating Organizational Software Standards (1 = Very Unimportant, 5 = Very Important; — Indicates criterion not used by organization)

As can be seen from Table 3, usability (user-friendliness) was the most important criterion to users in all three organizations. This is contrasted with managers' ratings

which indicated that usability, if considered at all, was the least important criterion in evaluating potential standardized software candidates.

It is also interesting to note that for other criteria (with the possible exception of implementation issues for Organization B—traditionally a higher concern for MIS management), users' ratings correspond relatively closely with those offered by managers—usability appears to be the only criterion where managers and users differ substantially. This would suggest that IS managers and steering committees are reasonably well-informed about the issues that their user base feels are important, *with the exception of the importance placed on human factors issues*.

RQ2. How does the standards-setting body define *usability* and how does this definition differ from definitions of *usability* offered by users?

IS MANAGER RESPONSES

Given the MIS managers' apparent lack of emphasis on usability as an evaluation criterion, or its aggregation under other criteria (such as features), the question of definition appears to be an important issue. In analyzing managers' definitions, the researchers attempted to classify the definition into one of three types of definition often seen for usability — semantic (defining the word), feature-based (equating usability with interface features) or contextual (defining the concept in operational terms for a given user, task and environmental context).

Classification	Definition	Examples
Semantic	Definition based on terms commonly used as synonyms for *usability*.	"User—friendliness", "Easy to use", etc.
Feature—based	Usability based on features contained in the user interface.	"Usable systems have a graphical user interface," "Usable systems have a consistent interface", etc.
Contextual	Usability dependent on the interaction among users, tasks, tools, and/or the environment	"Because we have a lot of personnel turnover, for us, a usable system is one that is easy to learn," etc.

Table 4. Classification Scheme Used for Manager and User Definitions of Usability.

Definitions of *usability* in the HCI research literature cited earlier stress the importance of context –specifically, the dependence of usability on the type of users, tasks, tools and organizational environment in which it is utilized. Thus, aggregation of *usability* under features, or more general terms such as "look and feel," appears inconsistent with contemporary definitions of *usability* reported in the HCI literature.

While the authors did not expect a traditional "academic" definition of *usability*, in each case, managers tended to define *usability* in terms of software features. For example, Organization A defined usability as "intuitive" and having a "point and click" interface. Organization B, which had identified user-friendliness *a priori* as a criteria used in evaluation, defined *usability* as "ease of use" and "not requiring training." They also identified the inclusion of "good built-in help" as part of *usability*. Finally, Organization C repeated ideas expressed by the first organization in defining usability as "intuitively obvious" and the ability of a user to figure out what they need to do without a lot of effort.

These definitions are consistent with a *features-based* conception of usability. To verify this, the interviewer asked each manager what factors contributed to usability. The

factors identified by each organization (either in the "definition" question or the "features" question) are listed in Table 5. As in Table 2, the researchers broadly grouped the comments of managers into broader categories (illustrated in uppercase letters) to aid in interpreting the findings.

In no case did managers mention users, tasks, tools or environments as part of a definition of *usability* or as factors contributing to *usability*. These results represent a significant gap between HCI research on usability and the use and evaluation of usability in practice. Given the managers' features-based approach to usability, the researchers felt that it was important to examine end-users within each of the organizations sampled here and their conceptions of usability.

	Organization		
Factor	**A**	**B**	**C**
CONSISTENCY			
Consistency		•	•
Similarity between DOS and Windows products	•		
GRAPHICAL USER INTERFACE			
Presence of graphical user interface		•	
Windows "look and feel"	•	•	
"Point and click" interface	•		
EASE OF USE			
Ease of use		•	
Intuitive	•		•
Can accomplish tasks without a lot of effort			•
When doing things user does not do often, can do them easily	•		
EASE OF LEARNING			
Good built—in help feature		•	
Doesn't require consulting manual			•

Table 5. Factors Identified by Managers as Contributing to Usability

END USER RESPONSES

There were a total of 193 definitions offered by 125 end-users, relatively evenly distributed across the classes of definitions described above. Frequently, users offered more than one definition. These definitions were classified separately, accounting for the difference between number of definitions and end-users. Overall results and those by organization are presented in Table 6.

Common examples of semantic definitions offered by users included “how easily the software can be used,” “ease of use,” and “user-friendly.” Like many offered by managers, feature-based definitions included “menu-driven or Windows applications,” “an intuitive interface with extensive on-line help,” and “speed.” As shown in the table, users offered a surprising number of (at least partially) contextual definitions. Examples included “being able to use the software to perform the tasks needed without excessive consultation,” “the ability to accomplish required tasks with a minimum of effort,” and “usability allows you to perform the activities required of your organization efficiently and effectively.” Unlike the definitions given by managers, well over one-third of the users surveyed indicated that usability was contingent upon other factors in some way (e.g. “the tasks I perform,” “as a novice user. . .”). Definitions which indicated that usability was contingent on other factors were classified as “contextual.”

	Definition Classification			
	Semantic	Feature—based	Contextual	Total
Organization A	22	16	27	65
Organization B	23	19	21	63
Organization C	22	22	21	65
Total	**67**	**57**	**69**	**193**

Table 6. Types of Definitions Offered by End Users by Organization.

RQ3. How is *usability* evaluated by the software standards-setting body?

As mentioned previously, part of the evaluation process for each organization includes hands-on testing by an evaluation team. While "user-friendliness" was explicitly identified by only one organization as a criterion used, the other two managers stated that usability ratings were evaluated as part of a features component. In other words, a feature would be rated more highly if it were easy to use than if it were cumbersome to use. As no dedicated usability testing (such as that discussed by Sweeney *et al*, 1993) was carried out in any organization, the interviewer asked managers what sources were used by the assessment group to get information about usability. Table 7 lists sources used by each organization to get usability information.

It appears that for these organizations, responsibility for usability-related evaluation is delegated to outside agencies, including trade press and vendors. As organizational context of use was not mentioned as an important determining factor of usability, this result is perhaps not surprising. However, it again represents a gap between usability evaluation methods suggested by HCI researchers or advocates of the socio-technical organizational perspective, and current practice by MIS managers. Most HCI researchers would not endorse usability evaluations conducted by agencies unfamiliar with the users,

tasks, tools, etc. in place in the organization. However, the results here, along with those reported by Dillon *et al* (1993) suggest that this form of evaluation is frequently the case. For the organizations examined in this study, MIS professionals seem comfortable in basing evaluations of usability on test or reports from vendors, trade press, and other even users outside their organization.

	Organization		
Source of Information	**A**	**B**	**C**
Evaluation Team	•	•	•
Other users	•		•
Other companies		•	
Vendors	•	•	•
Trade press/magazines		•	•

Table 7. Sources Used by Organizations to Gather Information About Product Usability.

In conclusion, usability is generally not identified as a criterion used by managers in evaluating potential standard software systems. When it is identified as a separate criterion, it is not considered as important as other factors such as compatibility or feasibility. However, while the importance users' place on various criteria generally mirrors those of managers, the two groups are distinguishable in their ratings of usability. Unlike the evaluations of manager, users believe that usability is the most important criterion used in the evaluation of standardized software. It is clear that the human factors concerns of end-users are not explicitly represented by MIS managers or MIS steering committees.

In examining differences between managers and users in how they define *usability*, most MIS managers apparently take a features-based view of usability. Features such as good built-in help, a graphical user interface, or an "intuitive" interface were often cited as important. On the other hand, users offered a more balanced view of usability, citing

semantic, feature-based, and contextual definitions of usability with equal frequency. Again, this represents an important difference from the way managers' conceive of usability and illustrates an apparent gap between these two groups of stakeholders in the evaluation process.

Finally, besides some objective and subjective in-house evaluations, it appears that these organizations were content to rely on entities outside the organization for usability data. In particular, trade magazines and vendors were often cited as important sources of information. Discussions with other companies or users were also used by most organizations under the assumption that software that is "usable" for one organization will be usable by others as well.

V. DISCUSSION

Summary

Based on the interviews with MIS managers, it appears that usability is still not considered one of the factors of primary importance in evaluating standardized software packages for organizational use. This finding is in contrast to the importance end-users placed on usability, for whom usability was clearly the most important criterion in evaluating software. The one organization which did specify "user-friendliness" as a criterion provided it with the lowest rating among all identified evaluation criteria.

It appears that IS managers maintain a *features-based* perspective to usability. That is, they feel that product usability is based on the presence/absence of various features within the product. No mention of contextual information (gained through task or user analyses for example) were cited by any of the managers as part of evaluating usability. Users, on the other hand, often cited contextual factors as important in their definitions of *usability*.

The MIS managers' view represents a significant departure from the concept of usability suggested by HCI researchers. Furthermore, no organization used in this study conducted formal usability evaluations as part of their testing procedure. Instead, information on usability was typically gathered from outside sources such as trade journals, vendors, and other users. While such data is probably useful, given the importance of organizational context expressed by many HCI researchers, this approach would appear to be insufficient in terms of contemporary evaluation recommendations.

It might be that managers do not fully understand how to incorporate HCI issues into organizational procedures and policies. Many of the HCI concepts discussed above have been examined only in a design context. In other words, most of the HCI research (and research on usability evaluation in particular) has focused in how to design and develop "usable" systems in-house. As organizations move toward more off-the-shelf purchasing of software packages developed by external sources (especially for end-user support), the desire for generalizable usability metrics is likely to grow.

Limitations

A major limitation of these findings is obviously the sample size. For this project, only three organizations were identified and interviewed. Furthermore, these organizations varied on many dimensions. It is conceivable that different types of organizations define and measure usability in different ways. Therefore, it is possible that a more detailed look at a more narrowly-defined set of organizations (for example, only private sector, manufacturing firms) would yield less diverse results.

Similarly, the interview and questionnaire method can introduce elements of unreliability. It would be helpful to compare the findings, particularly from the managers, with company records and stated policy on standards setting and management of technology,

or to be a participant in a committee managing these activities over the lifecycle of an application.

Similarly, an analysis that enabled more statistically robust comparisons to be drawn between committee members and end-users would be beneficial, though given the obvious disparity in numbers between the two, this is a non-trivial problem. Research that focused on the workings and resulting recommendations of standards setting bodies with varying rates of end-user involvement might be one way around this. such work would be particularly useful where subsequent analysis of end-user response to these recommendations could be performed.

Suggestions for future research

The results reported here suggest several avenues for future research in this domain. Research that targets specific types of organizations would be useful to determine whether different types of organizations treat this issue differently. For example, public sector firms may be constrained by regulatory requirements which necessitate different evaluation procedures from those of private sector firms. Obviously, research with larger samples should be conducted to validate these findings.

This project focused on the evaluation of commercial off-the-shelf software packages. A similar project assessing the evaluation and importance of different criteria for in-house development efforts would also be useful. It is possible that the criteria used for in-house development and commercial acquisition are different within organizations. Comparing differences in these two approaches could provide insight into the usefulness of different criteria (such as usability) for in-house development, and commercial, off-the-shelf acquisition.

Finally, while standards-setting is often described as an important issue in the management of EUC management, surprisingly little research has specifically addressed this issue. Research on the nature of standards-setting bodies, as well as descriptive and normative models of standards-setting within organizations have not been developed and would represent an important contribution to this EUC literature.

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