Information Systems Quality Assurance: Users' Perceptions Of Information Systems And Systems Design Quality Factors[1]

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Abstract

With the emergence of information systems reliability and quality assurance and its perceived revenue generation in the billions of dollars, the accounting profession has developed a keen interest in improving the understanding of the underlying factors affecting information quality. This paper expands the Havelka et al. (1999) study, which explored the key quality factors impacting the information requirements definition stage of the systems development process. The extensions explored within the current paper focus on the relationship between users' perceptions toward information systems and key quality factors for systems design. In particular, user involvement and user satisfaction are examined for their potential impact on the weightings of quality factors. The results indicate that users' perceptions toward information systems do influence their perceptions of the importance of the key quality factors for systems design. This result may allow practitioners to tailor a project management strategy for IS development based on targeted users' current perceptions of information systems.

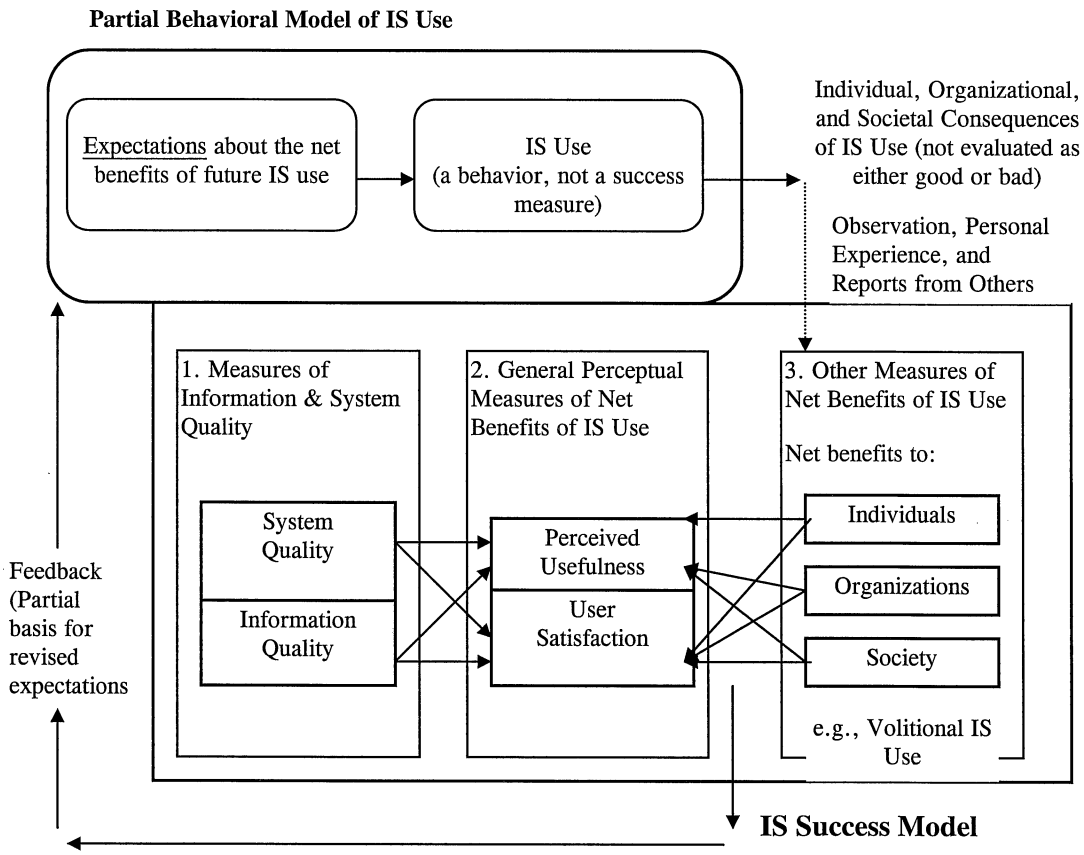
1. Introduction

The information systems quality and reliability assurance market is projected to be worth billions of dollars in revenue (Elliott and Pallais 1997). Yet, very little is known regarding the factors that influence information systems quality. Indeed, Elliott and Pallais note that research on information systems reliability assurance is one of the greatest research needs of the CICA/AICPA joint task forces on assurance services.

Havelka et al. (1999) conducted a research study designed specifically to address this research issue and identified 30 key factors influencing the quality of the information gathering stage of the systems development process. The primary reason for the focus on the information

Readers with comments or questions are encouraged to contact the authors via email.

Figure 1
Seddon's Respecified Version of DeLone and McLean's 1992 Model of IS Success



Key:
Rectangular boxes: IS Success Model
Rounded boxes: Partial Behavioral Model of IS Use
Solid-line arrows: Independent (necessary and sufficient) causality
Dotted-line arrows: Influence (not causal, since observer's goals are unknown)

gathering stage was the belief that this stage had the most impact on the ultimate system design from a users' perspective. This impact arises from the focus on determining users' information needs for a system and the concurrent determination of how that information will be aggregated and distributed to the users. As such, the study focuses on systems design quality and not on users' perceptions of information systems quality.

Seddon (1997) suggests, however, that systems reliability and systems quality should have a primary effect on users' perceptions—specifically users' satisfaction and involvement with the system. While the interest in this study is not on a direct measurement of the influence of systems reliability and quality on users' satisfaction or involvement, the focus is on understanding how users' satisfaction and involvement with an information system may impact users' perceptions of the systems design process. This research extends the Havelka et al. (1999) study to examine how users' satisfaction and involvement with the system impact their perceptions of the relative importance of key quality factors for systems design. Relationships between satisfaction or involvement and these quality factors may provide insights into when certain systems design quality factors become more important based on the users' perceptions of information systems, thereby, giving project managers and IS specialists a prescriptive tool for managing information systems quality and reliability.

The remainder of this paper is divided into four sections. The first section provides the background and conceptual development for the study, along with research questions. The second section describes the research method and the third section presents the results of the study. The fourth and final section includes an overview of the study results and discusses the implications for information systems reliability and quality assurance services.

2. Background

"Systems reliability service focuses on how well the information system fulfills its role" (AICPA 1997). Assurance services related to information systems reliability have been defined as providing "assurance that systems are designed and operate in a manner that provides reliable information or operate according to accepted criteria." Elliott and Pallais (1997). Systems success is not new to information systems researchers, but rather has been the subject of study for over 20 years. The majority of this research has examined systems success from either a behavioral approach focused on *systems use* (e.g., Lucas 1975) or a psychological approach focused on *user satisfaction* (e.g., Ives et al. 1983). Delone and McLean (1992) synthesized the cumulative research in an effort to develop an integrative framework for information systems success. Subsequent work by Seddon (1997) resulted in the revised model shown in Figure 1.

In Seddon's (1997) version of the IS Success Model, success is viewed as consisting of three categories of variables: (1) measures of information and systems quality, (2) general perceptual measures of net benefits of information systems use, and (3) other perceptual measures of net benefits of information systems use. Seddon (1997, 248) notes that the second category focuses on perceptions of benefits of IS use (*ex post* measures), while category one deals with systems development and design measures (*ex ante* measures). As Havelka et al. (1999) note, for assurance services *ex ante* measures are critical to allow prescriptive action and hence the emphasis on measures for systems and information quality. However, the users' perceptions of the key systems design quality factors may be influenced by their prior participation in development efforts and their current perceptions of the benefits of IS use (i.e., *ex post* measures of success). This study investigates the existence of this relationship. This is explicitly recognized in the Seddon (1997) model by the feedback loop from the success measures to the expectations regarding IS use and IS usage behavior.

The purpose of this study is to extend Havelka et al. (1999) by examining the relationship

between users' perceptions of information systems (user information satisfaction and user involvement) with their perceptions of the importance of key systems design quality factors. In the remainder of this section of the paper, emphasis will be placed on these three components of the success model: (1) systems quality factors, (2) user satisfaction, and (3) user involvement.

2.1 Information Systems Quality

The Havelka et al. (1999) study developed and validated a process for deriving measurement criteria for assurance services. They then used the methodology to explore criteria for assessing information systems quality assurance. The results suggest the methodology was in fact robust and that the systems design quality factors generated via the structured group processes should be similarly robust. While the factors were limited to the information requirements determination phase of the systems design process, this phase is clearly the critical phase in terms of enhancing *information quality*. To the degree that the focus is on *information quality*, the identified factors should be fairly comprehensive.

The structured focus groups in Havelka et al. (1999) resulted in the identification of 51 productivity and quality factors that were perceived as critical to process quality during the information requirements determination process (see Table 1). These factors include a mix of user/IS specialists interaction oriented factors, IT technical factors, IS specialist characteristics, user characteristics, and environmental factors. While many of the factors are similar to those that have been emphasized in information systems texts for many years, the information systems community had not previously identified others as key to systems development success.

2.2 User Satisfaction

The importance of the relationship between user information satisfaction and key systems design quality factors is derived primarily from the frequent use of user satisfaction as a surrogate for measuring system success; as presented in the Seddon (1997) model in Figure 1. As noted earlier, Seddon explicitly recognizes the feedback loop from the systems success measures to expectations of users regarding the benefits of future IS usage and the IS usage itself. Similarly, when users have previously participated in the systems design process a relationship should exist between users' perceptions of IS success (user satisfaction) and users' perceptions toward the systems design process.

The relationship between user participation in the systems development process and systems success has received much attention in IS research. Despite the debate concerning the efficacy of the user information satisfaction construct (e.g., Etezadi-Amoli and Farhoomand, 1991; Gatian, 1994; Melone, 1990), research has been performed to show the effects of user participation on user information satisfaction as an indicant of system success. In addition, the proposition that user participation during systems development has a positive influence on the effectiveness of the system that is developed appears to be widely accepted in practice (Corbin, 1988; Delone, 1988; Rush, 1985; Wood and Silver, 1989).

Other related studies have found: that the users' perceptions of their representation on the project team and their perceptions of the level of management support for the project were the two leading indicators of user information satisfaction (Lawrence and Low, 1993), that users' with higher perceptions of their level of control during development had higher levels of user information satisfaction (Baronas and Louis, 1988), that increased levels of procedural justice during participation generally improved users' attitudes and behaviors (Hunton and Flowers, 1997), that the congruence (or discrepancy) between a user's perceived level of participation and the user's desired level of participation during development is related to the user's level of information satisfaction after development (Doll and Torkzadeh, 1989; 1991), and user participation during

Table 1
Critical Productivity Factors Selected by All Focus Groups

Productivity Factor	U1	U2	U3	IT1	IT2	IT3
Management Commitment	*	*	*	*	*	*
Time Constraints	*	*	*	*	*	*
Data Gathering Techniques	*	*	*	*	*	*
Budget	*	*	*	*	*	*
Communication with Users	*	*	*	*	*	*
Team Composition	*	*	*		*	
Feasibility Study	*	*	*		*	
IS Domain Knowledge	*	*	*		*	*
User Commitment	*	*	*		*	*
Goal Congruence	*	*	*			*
Systems Integration	*	*	*			*
User Bias		*	*	*	*	*
Current System Quality	*			*	*	*
IS Bias				*	*	*
IS Experience				*	*	*
User Computer Literacy				*	*	*
User Understanding of Needs				*	*	*
Current System Documentation	*	*		*		*
Planning	*		*	*		*
Unique System Requirements	*		*	*	*	
User Participation		*	*		*	*
IS Communication Skills	*		*	*		
Politics		*			*	*
Interaction between Users and IS	*	*				
User Understanding of Current System	*			*		
Flexibility Required	*					*
IS Technical Skills			*			*
System Size				*		*
Team Motivation				*	*	
Team Authority					*	*

(continued on next page)

different stages of the development of a technology influenced the final satisfaction with the technology (Leonard-Barton and Sinha, 1993). Earlier studies that did not consider other contingencies on user participation's influence on user satisfaction had mixed results (Baroudi et al., 1986; Olson and Ives, 1981). The authors of these studies concluded, "that there is a complex relationship between the type and degree of user [participation] and other organizational and individual factors."

These studies have shown that a relationship between users' perceptions toward the systems development process, and their participation in it, have an impact on their perceptions toward the system after development. The study presented in this paper recognizes this relationship and suggests an approach to manage users' participation in the systems development process based on users' current perceptions toward information systems. That is, based on the users' current satisfaction or involvement can certain systems design

Table 1 (Continued)

Productivity Factor	U1	U2	U3	IT1	IT2	IT3
Control of Project	*					
Outside Resources	*					
Project Leader	*					
Technical Resources	*					
User Ownership	*					
Testing	*					
Project Initiator		*				
Multiple User Groups		*				
Accountability		*				
Rapport between IS and Users			*			
Persuasion				*		
Team Size				*		
Clarification				*		
Management Goals for System				*		
User Procedures					*	
User Communication Skills					*	
Complexity of Application					*	
Adequate Supervision						*
Stability of Requirements						*
IS Organizational Skills						*
Hardware and Software Environment						*

quality factors be manipulated to enhance a new system's success and reliability? In their discussion Doll and Torkzadeh (1991) highlight the question "How can user [participation] be motivated?" and emphasize that the early stages of systems development offer "the best opportunity to ... ensure that they attain their values." The results of this study attempt to provide some guidance to attain this value.

This discussion of the relationship between users' satisfaction and systems development participation would suggest that different key system design quality factors may be appropriate for users with different experiences and levels of user satisfaction. Knowledge and understanding of these relationships may enhance the systems development process by learning how to manage systems development projects, the resources available, and the users that are involved. The first research question relates to this anticipated relationship.

RQ1: Is there a relationship between users' satisfaction with information systems and users' perceptions of key systems design quality factors?

2.3 User Involvement

Barki and Hartwick (1989, 1994) originated the contemporary perspective of user participation in systems development. Prior to their work no distinction was made between the terms *user participation* and *user involvement*. These terms were used interchangeably to represent the activities or operations performed or the role taken by users during systems development. The recognition of the importance of cognitive factors in the development process led Barki and Hartwick (1989) to

the conceptualization of user involvement as a distinct and separate construct from user participation in IS research. Based on work in psychology, marketing, and management; Barki and Hartwick (1989) define user involvement as a psychological state representing the importance and personal relevance of a system to the user. While they found no evidence indicating a relationship between users' involvement toward a system prior to systems development and the level of users' participation during development; this observation leads them to "wonder...what are the determinants of participation" (p. 456) and to suggest that "...research needs to be directed towards the discovery of such antecedents" (p. 457).

Kappelman and McLean (1991) provide empirical evidence that the influence of user participation during implementation on user information satisfaction is moderated by user involvement. These results suggest that not only does user involvement impact post implementation behavior (usage), but that it has an effect on post-implementation beliefs as well (user information satisfaction). Additional research (e.g., Jarvenpaa and Ives, 1991) tends to confirm these findings.

The potential impact of user involvement on the evaluation of key quality factors raises the issue as to whether key system design quality factor ratings are affected by the users' level of involvement with the information systems. If such a relationship exists, similar to users' satisfaction, additional knowledge about relationships should aid a firm's planning and staffing objectives accordingly. As such, the second research question is stated as:

RQ2: Is there a relationship between users' involvement with information systems and users' perceptions of key systems design quality factors?

3. Research Method

The research method applied in the Havelka et al (1999) study, which was a hybrid combination of grounded theory philosophies and structured nominal group techniques, are followed for this research. Grounded theory is an approach advocated by Glaser and Strauss (1967) for situations in which a firm understanding of the basic components underlying a theory is not available. In these situations, it is posited that the qualitative synthesis of multiple perspectives can preserve the complexities and integrity of the phenomenon under study (Covaleski and Dirsmith 1988). A continuous comparative analysis of the data collected from each additional observation group is used to formulate an understanding and basis for the identification of the underlying components. The fundamental heuristic for model evolution is that the researcher discontinues gathering data once additional data becomes repetitive and only confirms already existing components of the model. (Glaser and Strauss 1967).

While Glaser and Strauss advocate keeping the data collection fairly open-ended and broad-based; however, maintaining control of the elicitation process within the confines of the topic being studied is also important. Havelka et al. (1999) used a structured form of nominal group techniques to assure the efficient collection of data (Adam et al., 1986; Lampe and Sutton, 1994; Sutton, 1993; Sutton and Lampe, 1991). An underlying assumption of the method is that individuals can provide valuable insight into the important factors influencing their ability to achieve a high level of productivity when performing a task (Adam et al., 1986). The method was used to identify factors that users and IS specialists believe affect the productivity of the information requirements gathering process for application level information systems.

3.1 Questionnaire Development

This study addresses whether users' perceptions of current information systems are related to their perceptions toward key system design quality factors. The research project involved the use of a magnitude measurement questionnaire to determine the relative importance of each of the key systems design quality factors. The magnitude

measurement scaling technique was selected because it allows subjects to comparatively judge items on a ratio scale level (i.e., relative importance). This provides more information about the relative importance of items when the items are being compared to one another. An extensive discussion of validation and reliability tests conducted on magnitude measurement can be found in Howard (1981) and the use of magnitude measurement in other studies can be found in Howard and Nikolai (1983), Sutton and Lampe (1991), and Lampe and Sutton (1994).

To establish the relative importance of each factor, one factor is selected as a benchmark. The factor selected should be easy to understand and is expected to have average importance. This item is assigned a value of 100. All the remaining items are evaluated in relation to this item. Thus an item that is considered twice as important would be rated as 200, an item considered half as important is rated at 50, and so forth. The geometric mean of all the individual ratings is used as the point estimate for each item (Howard, 1981; Lampe and Sutton, 1994; Sutton and Lampe, 1991).

The instrument used to collect the magnitude measurement data on the key systems design quality factors was also used to gather information on users' level of satisfaction and level of involvement with the information system. Barki and Hartwick (1989) validated the user involvement instrument used and Doll and Torkzadeh (1988) previously validated the user satisfaction instrument used. These constructs have been identified by IS researchers as important to systems development success (Kappelman and McLean 1991; Seddon 1997) and as such may influence the perceptions of users' toward the relative importance of the key systems design quality factors. These data were used to determine if a relationship exists between these constructs and the users' perceptions of the systems design process.

3.2 Questionnaire Administration& Data Analyses

The population of interest is users who have participated in the systems design process. In order to identify such users, several organizations were identified that had appropriate users and were asked to participate in the study. A total of 26 organizations representing 11 different industries agreed to aid in the identification of potential subjects. The contact person for each of the organizations was provided with the desired number of questionnaires and asked to maintain a record of how many questionnaires were actually distributed (undistributed questionnaires were collected from the contacts). Eighty-four questionnaires were distributed to users, 70 were returned of which four were unusable (i.e., substantially incomplete), leaving 66 usable responses for a usable response rate of 79%.

The questionnaire study was conducted to gather additional evidence regarding the consistency in users' perceptions toward the information requirements gathering process. The geometric mean of each factor is calculated and used as a point estimate for each factor. The geometric mean is used instead of an arithmetic mean due to the proportional nature of the data generated by the magnitude measurement technique. The geometric mean is calculated by taking the logarithm of each response, calculating an arithmetic mean of the logs, and then taking the antilog of the arithmetic mean of the logs (Snedecor and Cochran 1980).

The potential relationship between users' satisfaction with information systems and the key systems design quality factors is addressed in RQ1. This relationship is tested using a Pearson correlation to measure the degree of association between each factor and the user satisfaction construct. Similarly, to investigate the relationship between the users' involvement with information systems and the key systems design quality factors a comparison of the users' ratings of the critical factors and the user involvement construct is conducted. This relationship is also tested using a Pearson correlation to measure the degree of association between each factor and the user involvement construct. In addition, a stepwise re-

Table 2
User Questionnaire Ratings of Critical Productivity Factors

Productivity Factor	Rating
Management Commitment to the Project	179
Goal Congruence among IS, Users, and Management	157
Interaction between IS Specialists and Users	156
User Commitment to Project	138
Relationship between IS Specialists and Users	136
Project Team Motivation	131
IS Specialist Understanding of Application	126
User Understanding of Needs	125
Planning	123
IS Specialist Communication Skills	123
Financial Resources	120
IS Specialist Technical Skills	114
User Communication Skills	113
Project Manager	103
User Participation	100
Integration with other Systems	98
IS Specialist Experience	98
Project Team Authority	96
Stability of Requirements	95
Time Constraints/Scheduling	93
Project Team	87
Data Collection Techniques	79
User Experience with Information Systems	78
Feasibility Study	78
Bias of Users and IS Specialists	78
Complexity of the Application	77
Development Environment	77
Current System Features	64
Documentation of Current System	64
Political Issues	56

gression is performed to identify key quality factors that may explain similar dimensions of the user involvement variation.

4. Results

The geometric means representing the overall perceptions of the respondents toward the relative importance of the key systems design quality factors are presented in Table 2. Approximately half of the factors are rated greater than the benchmark factor (i.e., *user participation* was set at 100), with the other half rated lower. From a reliability perspective for magnitude measurement scales, this median weight is considered ideal. Additionally, the low variance of the magnitude ranges on each side of the benchmark also suggest the reliability of the scale should be high (i.e., the highest measure is less than twice the benchmark and the lowest rated factor is greater than 1/2 the benchmark).[2]

Table 3
Results of Pearson's Correlation Coefficient Calculations
Between Users' Level of Satisfaction and each
Critical Productivity Factor

Productivity Factor	RHO	P-Value
IS Specialist Experience	-0.26164	0.0338
Bias of Users and IS Specialists	0.24884	0.0439
IS Specialist Technical Skills	-0.20465	0.0993
User Commitment to Project	-0.20442	0.0997
Goal Congruence among IS, Users, and Management	-0.18763	0.1314
Stability of Requirements	-0.17166	0.1681
Interaction between IS Specialists and Users	-0.14452	0.2470
Project Team Authority	-0.12885	0.3025
IS Specialist Communication Skills	-0.12752	0.3076
Management Commitment to the Project	-0.12721	0.3087
Project Manager	-0.12191	0.3295
IS Specialist Understanding of Application	-0.11925	0.3402
Integration with other Systems	-0.11813	0.3448
Project Team	-0.11756	0.3472
Financial Resources	-0.11714	0.3489
Project Team Motivation	-0.11537	0.3563
Time Constraints/Scheduling	0.10490	0.4019
User Understanding of Needs	-0.10219	0.4142
Current System Features	0.09881	0.4299
Feasibility Study	0.08293	0.5080
User Experience with Information Systems	-0.07080	0.5721
User Communication Skills	-0.06479	0.6052
Documentation of Current System	0.05504	0.6607
Complexity of the Application	-0.05263	0.6747
Relationship between IS Specialists and Users	-0.04964	0.7016
Planning	0.04091	0.7443
Data Collection Techniques	0.02783	0.8244
Development Environment	0.02359	0.8508
Political Issues	-0.00381	0.9758

To determine whether users' perceptions toward information systems affect their perceptions toward the systems design process, users' satisfaction with information systems was compared to the users' ratings of each of the key systems design quality factors. The user satisfaction construct measures the beliefs users' hold toward an information system. Data from all 66 questionnaires were used in the analysis. At a significance level of .10, four of the systems design quality factors have an observable significant relationship with user satisfaction (see Table 3). Two of the factors, IS Specialist Experience and Bias of Users and IS Specialists, were significant at the .05 levels.

Similar to the expected relationship with user satisfaction, a user's belief regarding the importance and relevance of an information system may influence the users' perception about the systems design process. In particular, the user's involve-

Table 4
Results of Pearson's Correlation Coefficient Calculations between Users' Level of Involvement and each Critical Productivity Factor

Productivity Factor	RHO	P-Value
IS Specialist Communication Skills	-0.25878	0.0347
Political Issues	-0.24160	0.0585
Financial Resources	-0.23473	0.0663
IS Specialist Experience	-0.23202	0.0696
Management Commitment to the Project	-0.22891	0.0735
Development Environment	-0.22718	0.0758
Project Team Motivation	-0.20659	0.1072
Project Team Authority	-0.19187	0.1352
Bias of Users and IS Specialists	-0.17869	0.1647
Stability of Requirements	-0.15300	0.2351
User Communication Skills	-0.12250	0.3429
Current System Features	0.11875	0.3579
Time Constraints/Scheduling	0.11795	0.3612
Data Collection Techniques	-0.10216	0.4294
Documentation of Current System	0.10021	0.4384
Planning	-0.09816	0.4478
Goal Congruence among IS, Users, and Management	-0.08053	0.5338
User Experience with Information Systems	-0.73470	0.5704
User Commitment to Project	0.07286	0.5736
Project Manager	-0.06755	0.6019
IS Specialist Technical Skills	0.05261	0.6847
User Understanding of Needs	0.05201	0.6881
Interaction between IS Specialists and Users	-0.05105	0.6935
Project Team	-0.04697	0.7170
Integration with other Systems	0.04439	0.7319
Relationship between IS Specialists and Users	-0.03561	0.7765
IS Specialist Understanding of Application	0.01776	0.8910
Complexity of the Application	-0.01364	0.9162
Feasibility Study	0.00923	0.9432

ment with the information system may be a primary influence on interactions with IS specialists. To determine whether these beliefs may influence the users' perceptions about the systems design process, the users' level of involvement with information systems was compared to the users' ratings of each of the critical quality factors. This analysis addresses the second research question. Only 62 of the questionnaires were used in this test as four respondents opted not to complete the user involvement instrument. The results of the Pearson correlation tests are presented in Table 4. Using a significance level of .10, six of the quality factors are significantly related to the user involvement measure. Only IS Specialist Communication Skills is significant at a .05 level.

To control for the possibility that some of the factors may be measuring similar dimensions of user involvement, a stepwise regression was also performed to identify the factors that best explain

Table 5
Results of Stepwise Regression for User Involvement and Users' Beliefs

Dependent Variable: User Involvement
R-Square: 0.3443
F Statistic: 5.88
Prob > F: 0.0002

Variable	Parameter Estimate	Prob > F
Intercept	4.2893	0.0001
IS Specialist Communication Skills	-1.3277	0.0009
IS Specialist Technical Skills	0.7456	0.0508
Financial Resources	-1.1336	0.0002
Time Constraints/Scheduling	0.9145	0.0035
User Commitment to Project	1.2288	0.0074

the change in user involvement. Using the stepwise procedure, five variables are entered into the model. The model is significant at a .0002 level with an R-square of .3443 (see Table 5). Hence, there appears to be some relationship between users' involvement with information systems and users' perceptions of the systems design process. In addition, it should be noted that the key quality factors entered into the regression model were not all the same key factors that were significantly related using the correlation calculations. This may indicate that some of the factors may have some multicollinearity properties in explaining the variation in user involvement. Further study would be required to investigate these complexities.

5. Discussion and Implications

This study investigated an area of information systems research that has received only sparse attention in prior studies—the perceptions of users that may influence their interaction with IS specialists during the systems design process. The empirical study specifically focused on identifying relationships between users' perceptions toward information systems and their perceptions of key systems design quality factors. The results of the study can be summarized as:

1. There is evidence supporting a relationship between users' level of satisfaction with information systems and their perceptions of the relative importance of key systems design quality factors.
2. Users' level of involvement with information systems appear to be significantly related to their perceptions of the relative importance of key systems design quality factors.

On an overall basis, the results of the study provide some interesting perspectives on users' perceptions about the relative importance of key systems design quality factors. Based on these results providers of assurance services could proactively manage a systems development project by determining the users' levels of satisfaction and involvement with information systems and adjust the application of resources appropriately. By emphasizing or enhancing certain key systems design quality factors an assurance service provider could improve the quality and reliability of the system design. For example, based on the stepwise regression results, for a set of users' that are highly involved with information systems a manager should be sure to include highly competent technical IS team members, ensure that the time constraints and scheduling were adequate, and be certain to obtain user commitment to the project.

Future research is still needed before the validity of these factors can really be assessed. While the approach used in this study enhances the likely validity of the factors, they are still based on the subjective perceptions of the participating users. Additional study may be desirable

with other stakeholders in the development process--most notably with the information systems specialists that are also directly involved in the projects. Further, development of a means for assessing the factors and the subsequent monitoring of these measurements will be necessary before the value of the factors can be determined in terms of practical usability.

There are, of course, limitations to this study that should also be considered when examining the results that have been presented. First, the focus of the study has been on users' perceptions and the value of the factors relies somewhat on how well these users are able to assess the situation. A second weakness is derived directly by the time commitment required to participate in the study that lead to a definite self-selection issue. However, by using diverse groups of participants in almost every demographic of interest (e.g., age, experience, training, industry, functional area, etc.), the bias from the self-selection should be fairly minimal. Finally, the use of the magnitude measurement scale is considered by many researchers to provide a much better assessment of the relative importance of individual items, but there certainly will be some error in the magnitude measures as a result of using human perceptions. Nonetheless, the magnitude measurement approach does provide richer data and explanation of the underlying relationships between the data than alternative assessment scales.

6. Suggestions For Future Research

The results of this study suggest several areas for further research. First, as noted above, research directed at confirming the validity of the factors identified and their impact on the requirements gathering process should be undertaken. Second, this study focused on the perceptions of users that have had experience on systems development teams, other studies aimed at the IS specialists, project managers, or other stakeholder groups would be valuable. Third, research to determine if the factors identified here would also be relevant in different stages of the development process should be performed. Lastly, the precise nature of the relationship between users' perceptions toward IS and systems development success is still a gray area and requires further research.

Endnotes

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2. See Howard (1981) for further discussion on the reliability of magnitude measurement scales. In simple terms the closer the rating values are to the benchmark value the more accurate subjects generally are in their assessments.

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