Measuring User Involvement: A Diffusion of Innovation Perspective

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Abstract

User involvement is a need-based motivational attitude toward information systems and their development. As such, it has important implications for the successful creation and deployment of information systems in organizations. This paper reports on the development and validation of an instrument to determine if the distinction between a user's involvement in the process of information system diffusion can be measured independently of that user's involvement with the information system innovation itself. Utilizing previously-validated instruments from consumer behavior research, these two object-based categories of user involvement were operationalized.

A longitudinal field study was conducted of users in a large financial institution during the implementation phase, in particular the later activities of the adaptation stage, of the information system diffusion process. During adaptation, the information system product becomes available for use in the organization. Late adaptation stage activities include hardware installation, system conversion, and training. The instruments were pre-tested and assessed as to their content validity, internal consistency, convergent validity, unidimensionality, temporal stability, discriminant validity, predictive validity, and factorial validity. The evidence indicates that the measurement scales are reliable and valid. The primary question of scale independence was examined by discriminant validity. The empirical evidence supports the theoretical distinction between user process involvement and user system involvement. The implications of these findings to research and practice are discussed.

Keywords: adaptation, attitude, diffusion of innovation, implementation, instrument validation, measurement, research frameworks, research methods, user engagement, user involvement, user participation, user process involvement, user satisfaction, user system involvement.

Introduction

Innovation diffusion theory (Rogers, 1983) provides a general explanation for the manner in which new things and ideas disseminate through social systems over time. In the diffusion of innovation literature, an innovation is "an idea or behavior that is new to the organization adopting it" (Swanson, 1994, p. 1070). The theory has a communication-oriented view of innovation-based change with a focus at the individual level of the process. Information system (IS) studies utilizing the theory have therefore considered individual characteristics and perceptions, as well as other theory elements such as social norms, communication channels, opinion leaders, technology champions, the time factor, and the characteristics of the technology being implemented (e.g., Brancheau and Wetherbe, 1990; Moore and Benbasat, 1991; Hoffer and Alexander, 1992; Borton and Brancheau, 1993; Swanson). Roger's theory appears to be quite applicable to the implementation of information technologies in organizations, albeit imperfectly (Brancheau and Wetherbe; Attewell, 1992).

An important consideration in studies that utilize innovation diffusion theory is how potential adopters' perceptions of the innovation influence the diffusion process (Moore and Benbasat, 1991). This paper reports on the development and validation of an instrument with which to operationalize one such attitude, user involvement, in the context of the diffusion of an information system innovation. In particular, a study was conducted to determine if the distinction drawn by Cooper and Zmud (1990), between a user's involvement in the process of diffusion and a user's involvement with the information system innovation itself can be operationalized with independent measures.[1]

User Involvement

Drawing on the experience of researchers in psychology and marketing, the distinction between the behavioral and psychological engagement of information system users with information systems and their development was proposed by Barki and Hartwick (1989). They suggested the term participation to refer to the ***behavioral*** engagement of users in information system development activities and the term "involvement" to refer to the ***psychological*** engagement of users with the resultant information system product of that development process. Behaviors are visible actions, unlike psychological states, which are invisible to the eye. Empirical evidence that participation and involvement are, in fact, independent constructs has been provided by use of discriminant validity in two studies utilizing different operationalizations (Jarvenpaa and Ives, 1991; Barki and Hartwick, 1994). Moreover, several studies have provided empirical evidence that ***both*** participation ***and*** involvement are important in understanding information system implementation success (Kappelman, 1990; Barki and Hartwick, 1991, 1994; Jarvenpaa and Ives, 1991; Kappelman and McLean, 1991, 1992; and Guimaraes and McKeen, 1993).

Although there is no universal definition for the involvement construct in any field (e.g., Blau, 1985; Zaichowsky, 1986; Bearden, Netemeyer, and Mobley, 1993), a psychological state of involvement is generally said to be engendered by an object when it is of importance, significance, and/or relevance to the individual (e.g., Sherif and Hovland, 1961; Sherif and Sherif, 1967; Apsler and Sears, 1968; Kanungo, Gorn, and Dauderis, 1976; Kanungo, 1979, 1982; Zaichowsky, 1985, 1986). Involvement is conceptualized as a need-based cognitive (or belief) state of psychological identification with some object. Such a state depends upon 1) one's salient needs, and 2) one's perception about the need-satisfying potentialities of some object or situation (Kanungo, 1979; Zaichowsky, 1986). Since human motivation is about the satisfaction of needs (Maslow, 1954; Herzberg, 1968), a psychological state of involvement is a result of the perceived (and/or actually experienced) motivational potentialities of some object. Involvement and motivation are closely related, and sometimes synonymous, phenomena (Cook, Hepworth, Wall, and Warr, 1981; Price and Mueller, 1986). Semantic subtleties aside, a motivational state of involvement toward an innovation could markedly affect the outcomes of its diffusion.

The consumer behavior literature distinguishes between the task and product objects of one's involvement (e.g., Bloch and Richins, 1983). This distinction is analogous to the differentiation between attitudes toward behaviors and attitudes toward things (Fishbein and Ajzen, 1974).

Utilizing this differentiation, a user's "attitude toward a[n information] system would be considered an attitude toward an object[; ... whereas,] an attitude concerning system use would be considered an attitude concerning a behavior" (Hartwick and Barki, 1994). Such a distinction is important because it parallels the two dominant "sets of information systems activities ...: first, recognizing and assessing information technology innovations; and second, facilitating the diffusion of appropriate technologies into an organization's work units" (Kwon and Zmud, 1987). Correspondingly, Cooper and Zmud (1990) distinguish between *process* and *product* related concerns at every stage of their *model* of information system implementation "viewed from a technological diffusion perspective" (p. 124).

Making this distinction between the task and product objects of user involvement was proposed by Kappelman and McLean (1993, 1994). Using the nomenclature of their User Engagement Taxonomy (depicted in Table 1), they suggested that the psychological identification of users with the process of information system development be termed *user process involvement* (i.e., their subjective attitude toward the IS development task). In addition, they proposed *user system involvement* as the term used in reference to the psychological identification of users with respect to the information system itself (i.e., their subjective attitude toward the product of development). Correspondingly, they noted, this process-system dichotomy also applies to the behavioral component of a user's engagement. Thus, as also denoted in Table 1, *participation* is the term applied to the behavioral engagement of users in the process of information system development, and *use* is the term employed to designate the behavioral engagement of users with an information system.[2]

Examining the distinctions depicted in Table 1, it seems self evident that there is, in fact, a difference between user participation in the information system development process and their use of the resultant information system product of that process. Such behaviors are easily observable and are observably different. It seems plausible, therefore, that the conceptual distinction between the psychological involvement of users in the process of information system development may, in fact, be different from their psychological involvement with the resultant information system product of that process; i.e., with the innovation itself. But can this distinction between process involvement and system involvement be ***empirically*** demonstrated?

The primary research question therefore asks: Is there an empirically demonstrable difference

OBJECTS OF ENGAGEMENT		COMPONENTS OF ENGAGEMENT: BEHAVIORAL User Activities	COMPONENTS OF ENGAGEMENT: ATTITUDINAL User Involvement
	*ISD PROCESS (task)	PROCESS PARTICIPATION (task-related behavior)	PROCESS INVOLVEMENT (task involvement)
	*ISD PRODUCT (The IS)	SYSTEM USE (IS-related behavior)	SYSTEM INVOLVEMENT (product involvement)

(Kappel and McLean, 1993, 1994)

*ISD = information system development

Table 1. A User Engagement Taxonomy

between the psychological involvement of users in the process of information system diffusion, and their psychological involvement with the information system innovation itself? This distinction is pictured in Figure 1 which differentiates the user involvement construct into the two separate and distinctive constructs of user process involvement and user system involvement, respectively, as these concepts were depicted in Table 1. Their independence, of course, would not preclude their also being related; much like participation and involvement have been shown to be independent *and also* related phenomena (Jarvenpaa and Ives, 1991; Barki and Hartwick, 1994).

It was the purpose of this study to determine if this distinction between these two object-types of user involvement can be empirically operationalized. Thus, Figure 1 can be said to represent a "theory" about the independence of these two involvement constructs. This theory can be tested through the analysis of two measurements, one for each of the two constructs of interest; assuming, of course, the existence of such measurements. Specifically, it is hypothesized that,

H1: User process involvement and user system involvement are independent phenomena.

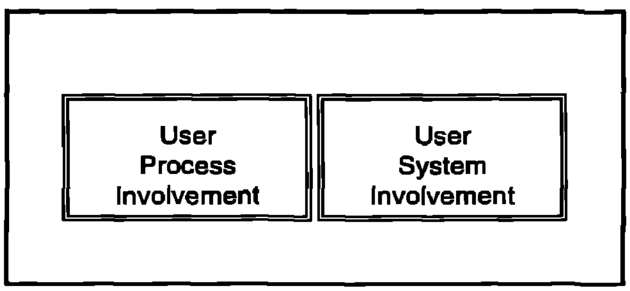

Figure 1. Independence of User Process Involvement and User System Involvement

The Conduct of the Study

A field study was conducted in fifty-two (52) branch offices of a twenty-eight billion dollar ($28,000,000,000) regional interstate bank-holding company. All of the branches were located in a large metropolitan city situated in the southeast United States. These branches were all recently acquired from several small local bank companies and were now being converted to the holding company's organization-wide information system. In terms of the information system diffusion process, this places these branches into the "implementation" phase as per Swanson (1994), and specifically into the "adaptation" stage as per Cooper and Zmud (1990). During adaptation, the information system "product ... [becomes] available for use in the organization" as the "process ... [sees to it that the] application is developed, installed, and maintained, ... procedures are revised and developed[, and] organizational members are trained" (p. 124). The information system under study supported all of the bank's activities and linked the bank's branches by satellite, across five southeastern states, to a central data center. Although this information system had been operational for over five years in over 600 of the bank's more than 700 branches, it was a completely new innovation to these 52 branches. Because software development was already successfully completed, this study focusses on the later activities of adaptation, in particular hardware installation, system conversion, and training. The fact that this was a well-established and proven information system facilitated the purposes of the study as it minimized the possibility of confounding due to technological or design failure. This information system had already demonstrated that it did in fact meet the needs (i.e., technological and information requirements) of the organization and presumably of these branches. This high degree of task-technology congruence (Cooper and Zmud, 1990) facilitated a more concise and valid examination of the variables of interest.

The study consisted of two main phases, which not only differed in time and purpose, but also with respect to the sample and the data they employed. Named for these differences, the terms pre-test and primary are used to distinguish these two phases and the data collected during them. A questionnaire was developed, pre-tested, and used to collect the relevant data. The regional vice-president of operations provided sponsorship letters which were sent with both the pre-test and primary questionnaires. Complete confidentiality was guaranteed to the respondents by the researcher and by the bank.

Sealable envelopes were provided for the return of the questionnaires. The bank's inter-office mail system was used for distribution and collection of questionnaires, but complete information for direct response to the researchers was also provided.

The pre-test was conducted during a period of time which began approximately two weeks before cutover to the new information system. Hardware was being installed and tested, and training was underway. A total of 311 questionnaires were sent out. The sampling methodology used for this pre-test was stratified (Cochran, 1977) in order to facilitate equal representation of each of the 52 branches in the sample. The subjects were given less than two weeks in which to respond, and no follow-up letter was used. A total of 103 usable questionnaires were returned.

Five weeks after cutover, which took place over the course of a three-day weekend, the primary research questionnaires were distributed. Training was ongoing during this period. Basic bank transaction processing was fully supported by the new system, but some system capabilities were yet to be made available to the branches. Although there are many similarities between the pre-test and the primary data collections, there were three important differences motivated by the researchers' desire to increase the size of the actual response: 1) The entire population of 512 users was polled in the primary data collection; 2) the respondents were given more than twice as much time to respond to the primary questionnaire, i.e., nearly four full weeks; and 3) a follow-up postcard was distributed at the beginning of the third week in order to remind the subjects to respond. A total of 146 usable questionnaires were returned. These response rates of 33.1% (103/311) and 28.5% (146/512) are considered acceptable for research of this kind (Cochran, 1977; Dillman, 1978). No consideration was made in this study for non-response bias (Cochran).

The Users and their Participation in the Innovation Diffusion Process

Nearly 89% of the branch banks (46 of 52) were represented in the sample of 146 subjects responding to the primary data collection questionnaire. More than 73% of the branches (38/52) were represented by two or more respondents. The subjects (of the 131 responding) ranged in age from 18 to 66 years. Twenty-four percent were younger than 25, 47% were 25 to 40, and nearly 30% indicated that they were 41 or older. Nearly 87% of the 143 subjects responding to the gender question were female. More than 99% of the subjects were high school graduates, 43% (63/145) had some college, and 22% (32/145) held four-year college degrees. More than 15% (22/146) of the respondents reported that they were still attending college. In order to facilitate predictive and nomological validation of the user involvement measurements, data were also collected concerning the behavioral participation of these users in information system implementation activities. More than 88% of the subjects responding to the primary data collection questionnaire indicated that they had participated in activities typically associated with the adaptation stage in the diffusion of this information system (Cooper and Zmud, 1990). These ten user-participation-in-adaptation questions, and their Likert-type response scale, are shown in Appendix A. Since this information system was already extant, these 10 questions, adapted from Kappelman (1990), were selected because of their focus on training and installation activities. Participation in software development activities was not possible for these users; however, some of these users did participate in system development activities like hardware installation and testing, file conversion and verification, as well as project management and training-related activities.

Training was the primary form of adaptation-stage participation engaged in by these subject employees, with nearly 73% of the responding subjects (105 of 144) indicating their participation as a trainee.[3] Scheduling their own training was the next most common form of participation indicated among the respondents, with nearly 56% (80 of 144) responding positively. Thirty-three percent (48/144) indicated their participation as a trainer, more that 31% (45/144) indicated their participation in evaluating the performance of the installed system, and nearly 28% scheduled the training of others. Seventeen to 20 percent of the respondents perceived that they had participated either in planning (17.5%) or scheduling (19%) the conversion, in actual conversion and installation (17.5% and 19%), and in testing the new system (19%).

It is noteworthy, although not directly related to the primary research question of this study, that all of these subjects were involuntary adopters and non-discretionary users. The technology diffusion phases of initiation and adoption took place at the corporate level, and no branch or individual adoption decisions took place. Moreover, as employees of the corporation, these users were required to use this information system to do their jobs. Nevertheless, these subjects were participants in the diffusion of this innovation, they were affected by (and had some effect on) the process, and they were affected by the information system. Moreover, even small effects on employee attitudes, especially motivation-related ones, can have significant economic consequences to the organization (Zedeck and Cascio, 1984; Schneider, 1985), as well as significant implications to the overall success of the innovation diffusion process. Furthermore, if the distinction between process involvement and system involvement can be operationalized for these users, then the measurements used to do so will be applicable to 1) other types of users, including the voluntary user more typically examined in the diffusion of innovation literature; 2) other stages in the process of diffusion; and 3) other types of information systems (and perhaps, with some modifications, even to other types of innovations).

Instrument Development

Since the user process involvement and user product involvement constructs are actually variations of the larger concept called user involvement, differing primarily in their respective objects of involvement, they were measured using minor variations of the same instrument. The user involvement construct was operationalized by Zaichowsky's (1985) Personal Involvement Inventory which was developed "to measure a person's involvement with products" in purchase decisions (p. 349). There is strong evidence of reliability and validity for this instrument (Barki and Hartwick, 1989), and it has been used in information system research (e.g., Kappelman, 1990; Kappelman and McLean, 1991, 1992; Barki and Hartwick, 1994). Moreover, like Kanungo's (1982) job involvement definition, this is also a need-based construct. Zaichowsky's definition of involvement used for the purposes of scale development was:

> "A person's perceived relevance of the object based on inherent needs, values, and interests" (p. 342).

As shown in Appendix B, the instrument consists of an object statement followed by 20 bipolar adjective-paired items and a seven-choice response scale situated between them. Half of the items are reverse (i.e., negative-positive) scored. Zaichowsky's (1985) instructions were very complete (as can be seen in Appendix B). Since the same instrument was used to operationalize both user process involvement and user system involvement, the only modification to the content of the measure was in the object name and the instructions as they related to that object name. The sequential ordering of the 20 individual items was also changed in the two versions of the instrument.

User process involvement, an attitude toward a behavior (Fishbein and Ajzen, 1974), was operationalized as user participation involvement; i.e., a user's involvement with their own participation in the information system diffusion process. As Kappelman and McLean (1994) pointed out:

> Since "user involvement" refers to the set of all such user subjective attitudes toward, or psychological identifications with, information systems and their development, ... distinctions could also be made among many other object-of-involvement- based sub-categories within this task- product dichotomy. For example, *one's state of psychological identification with their own participation in information system development activities could be termed their "participation involvement"* (or, perhaps more lucidly, their "involvement in their participation") which is a type of user process involvement (p. 515, italics added).

Analysis and Results

As stated above, the theory embodied in the primary research question (as well as its associated research hypothesis and Figure 1) can be tested through an analysis of two measurements. Given the existence of these two measurements, the primary research question is essentially a question of instrument validation, particularly discriminant validity. Thus, the analysis which follows is largely a description of the validation of these two instruments. The approach is fashioned after the strategy employed by Barki and Hartwick (1994) in assessing the construct validity (i.e., "the extent to which a scale measures a theoretical variable of interest" p. 69) of their measurements. Specifically, in making such an assessment here, the following are considered: 1) content validity, 2) internal consistency, 3) convergent validity, 4) temporal stability, 5) discriminant validity, 6) predictive validity, 7) nomological validity, and 8) (uni)dimensionality (i.e., factorial validity).

Data Set/Instrument	Cronbach's Alpha
Pre-Test Data (n = 96)	
User process involvement	.943
User system involvement	.955
Primary Data (n = 146)	
User process involvement	.966
User system involvement	.942

Table 2. Internal Consistency Coefficients of 20-Item User Involvement Scales

In the following narrative, abbreviations are used when referring to the various scales and subscales which are discussed. The number in parenthesis after a construct abbreviation indicates that a reference is being made to a scale consisting of that number of items, e.g., UPI(20) stands for the full 20- item user process involvement scale. Consistent with prior use of the scale by its developer (Zaichowsky, 1985), the individual items comprising these two scales were not individually numbered. In order to simplify references to the individual items in these scales, the items which comprise these two user involvement scales are referred to by their sequence number in the scale. Thus, UPI-1 refers to the first item in the UPI(20) scale, UPI-2 the second, and so on. Similarly, USI-1 refers to the first item in the USI(20) 20-item user system involvement scale and USI-20 refers to the last.

Content Validity

Content validity considers individual scale items' representativeness and comprehensiveness. It is assessed through an examination of the process by which scale items are generated (Nunnally, 1978; Straub, 1989). As described above, all of the items in both scales were taken from Zaichowsky's (1985) 20-item Personal Involvement Inventory. Her item generation process and content validation of the scale items had four main stages. It began with a two-phase process, using two panels of experts, 168 word pairs, and resulted in a 30-item pool of word pairs. Then, data were collected with these 30 items, and an assessment of internal scale reliability (via item-to-total correlations, Cronbach's alpha, and factorial validity) resulted in six items being dropped. Using another sample, data were collected with the remaining 24 items and their test-retest correlations examined: Four items were dropped, and internal consistency reliability assessed for the remaining 20 items. Finally, using a combination of an additional data collection and a panel of expert judges, a second content validation phase was conducted.

Internal Consistency, Unidimensionality, and Convergent Validity

Reliability in terms of internal consistency, important because the "items on an opinion scale will be summed in deriving a total score" (Crano and Brewer, 1973, p. 234), was assessed by means of Cronbach's (1951) coefficient alpha, "probably the best estimate of internal consistency" (Crano and Brewer, p. 230). The results are shown in Table 2 which also reports the sample size actually used in the calculation. Based on the greater than .80 rule-of-thumb (Crano and Brewer, 1973; Nunnally, 1978; Blau, 1988), these calculated coefficients indicate that both the process and system involvement scales appear to have high internal consistency. These results are comparable to Zaichowsky's (1985).

Although Cronbach's (1951) alpha is a widely-used method for assessing internal consistency (e.g, Straub, 1989; Barki and Hartwick, 1994), it is not the only method. Alpha is based on an evaluation of inter-item correlation. Another method of assessing internal consistency is by an evaluation of inter-item variability to determine whether the items "share only one common focus" (Crano and Brewer, 1973, p. 231). The purpose of this is to examine the unidimensionality of the scale. "This property states that a *single* construct underlies a set of scale items" (Segars, 1994, p. 2, emphasis in original). Zaichowsky's (1985) instrument, as originally developed and examined, is believed to be unidimensional (Bearden, Netemeyer, and Mobley, 1993); however, there is some evidence to the contrary (Zaichowsky, 1985; Munson, and McQuarrie, 1987; Kappelman and Seitz, 1991; Seitz, Kappelman, and Massey, 1993; Barki and Hartwick, 1994). Based on the literature and an analysis of the data collected in this study, the assumption of a unidimensional scale was made. Nevertheless, in an effort to reconcile some of the conflicting evidence, this topic is more thoroughly examined in the last part of this analysis and results section.

Convergent validity is concerned with determining whether multiple measures of the same construct agree. Other measures of user involvement were not used in this study; and as such, convergent validity was not assessed. Zaichowsky (1985), however, did assess "criterion-related validity ... by comparing the scores from the developed instrument with one or more external variables that provide a direct measure of the variable in question" (p. 345). Her focus was on the level of involvement (low to high) across different product categories, and her findings were in agreement with other studies.

Temporal Stability

Reliability in terms of temporal stability was evaluated here by means of a test/retest reliability coefficient (Galletta and Lederer, 1989, p. 424). Zaichowsky (1985) utilized this technique to assess the temporal stability of each item (in determining its suitability for inclusion) and then of the entire 20-item scale. Since some of the pre-test subjects were also primary data collection subjects, a test/retest reliability coefficient was calculated for the two user involvement instruments. These Pearson correlation coefficients between the two administrations of the same instrument, paired by subject, are reported in Table 3. These represent the correlations between the linear sums (Blau, 1985) of all of the items in each scale. Both of these user involvement scales have high test/retest reliability, and therefore, appear to be temporally stable.

Discriminant Validity: The Primary Research Question

The primary research question addressed by this study asks: Is there a difference between the psychological involvement of users in the

Instrument	Test/Retest Correlation	Number of Items	Sample Size#
User process involvement	.534 +	20	39
User system involvement	.691 *	20	40

P-values: * ≤ .0001 + ≤ .0005

Subjects were eliminated because of missing values.

Table 3. Test/Retest Correlation Coefficients (n = 42)

process of information system diffusion and their psychological involvement with the information system innovation itself? In order to answer this question, it was necessary to determine if the relationship depicted in Figure 1 could be operationalized. Re-stated this way, the research question became: Can two measurements be found that are operationally distinct, i.e., independent, such that one measures a user's involvement in the information system development process and the other measures a user's involvement with the information system? This is a question of instrument validation, particularly, the ability of n instruments (n = 2 in this study), when used together (e.g., in the same questionnaire), to validly discriminate between n (n = 2 here) constructs. An assessment of this ability of instruments to so discriminate is the domain of discriminant validity (i.e., measurement scale independence) and is assessed here utilizing principle components and factor analysis (Saleh and Hosek, 1976; Nunnally, 1978; Kanungo, 1982; Blau, 1985, 1987, 1988; Jarvenpaa and Ives, 1991; Barki and Hartwick, 1994); although, other techniques are extant (e.g., Bagozzi, 1980; Joreskog and Sorbom, 1981, Pedhauzer, 1982). Specifically, it was hypothesized that:

H1: User process involvement and user system involvement are independent phenomena.

Since, "to demonstrate discriminant validity, ... [process involvement and system involvement] items should load on different factors" (Blau, 1987, p. 248), hypothesis H1 was restated in terms of the individual items in a scale. Thus emerged the hypothesis actually tested to determine discriminant validity, hypothesis H1a.

H1a: In a two-factor, orthogonal solution of the 40 items from the UPI(20) and USI(20) scales, each item will load predominately on its respective factor.

The user process involvement and user system involvement scales, UPI(20) and USI(20) respectively, were subjected to a factor analysis which forced an orthogonal two-factor solution of the 40 items. The SAS PROC FACTOR procedure was utilized (SAS, 1990). Criteria were established for determining whether an item loaded predominantly on its respective factor and did not load on the other. Nunnally (1978) propounded the minimum-factor-loading-of-.30 criteria as a guideline for considering an item to be part of a factor. This criteria was used by Blau (1985, 1987, 1988) in order to assess the independence of scale items for various psychometric constructs. Straub (1989) used a minimum factor loading of 0.50 in his research, as did Ives, Olson, and Baroudi (1983) and Barki and Hartwick (1994). "On the basis of such information, [the researcher] might decide to retain only a certain subset of items" (Crano and Brewer, 1973, p. 232). This item-dropping technique is widely used in instrument development and validation (e.g., Blau, 1985; Zaichowsky, 1985; Barki and Hartwick, 1994; Segars, 1994). The criteria used in this research to operationalize "load predominately on its respective factor" were as follows. Each item was subjected to both decision rules.

1. A minimum loading of .50 is required to consider an item to be a measure of its hypothesized factor, and therefore retained.
2. An minimum loading of 0.30 is required to consider an item to be a measure of its not-hypothesized factor, and therefore eliminated.

The two-principal-component solution of the 40 items which comprised the UPI(20) and USI(20) scales accounted for 57.3% of the variance in the scales. A varimax (orthogonal) rotation of these two components resulted in a two-factor solution in which each individual item had two factor loadings, one on each of these two orthogonal factors. These loadings represent the correlation of the item with the factor. The larger of these two factor loadings for each of the twenty items in the UPI(20) scale were on the same factor, and the larger of these two factor loadings for each of the twenty items in the USI(20) scale were on the other factor. The larger factor loading of each of the UPI(20) items ranged from .48 to .90 on one factor, and the larger factor loading of each of the USI(20) items ranged from .47 to .82 on the other factor. This suggested that these two factors could reasonably be named *user process involvement* and *user system involvement* respectively. But the smaller factor loading of six of the items from the UPI(20) scale and four of the items from the USI(20) scale were 0.30 or larger.

Taking this into account, and including the two USI(20) items with small factor loadings of 0.29, it was concluded that twelve of the items in the two scales were not indicative of independent measures. Six items from each scale seemed to be also measuring, to some extent, whatever it was the other scale was measuring. This indicated a lack of independence. In other words, using Nunnally's (1978) minimum factor loading of 0.30 as guidance, each of those 12 items individually failed the test, which resulted in the rejection of hypothesis H1a insofar as that particular item was concerned, and thereby disconfirmed the theory that this item was a valid discriminator. These twelve items were eliminated from the scales, in order to reduce this lack of independence between the two scales.

Thus, items UPI-9, UPI-13, UPI-14, UPI-15, UPI-16, UPI-18, USI-1, USI-4, USI-6, USI-7, USI-9, and USI-15 were eliminated from the analysis. An additional item from each scale had a loading under .50 on its hypothesized factor, and thus failed to meet the other criteria of independence; therefore, UPI-2 and USI-2 were also eliminated.[4] The remaining 26 items, 13 for each scale, were subjected to a principal components factor analysis which forced a two-factor solution. These "pruned" versions of the UPI(20) and USI(20) scales are referred to as the UPI(13) and USI(13) scales. Cronbach's (1951) coefficient alphas of .96 (n = 135) and .93 (n = 143) were calculated for the UPI(13) and USI(13) scales respectively. This was similar to the alpha values calculated for the UPI(20) and USI(20) scales and reported in Table 2. Hypothesis H1a evolved into hypothesis H1b:

H1b: In a two-factor, orthogonal solution of the twenty-six (26) items from the UPI(13) and USI(13) scales, each item will load predominately on its respective factor.

The individual items in these scales are referred to by their sequence in the original 20-item scale. The results of this analysis are reported in Table 4. This two-factor solution of the UPI(13) and USI(13) scales accounted for 62.4% of the variance in the scales. Using the two decision rules described above for hypothesis testing, the factor loadings of each of these 26 items indicated that it loaded cleanly only on its hypothesized factor. These two factors, as seen in Table 4, were named for the constructs they were intended to measure: user process involvement and user system involvement. Although half of the adjective pairs in each of these instruments were in reversed (i.e., negative-positive) order, in Table 4 the positive adjective is listed first. This is representative of the way the data were analyzed. Moreover, all 146 observations were used in the analysis of both the 20-item and 13-item scales; however, SAS omitted 19 from the former and 17 from the latter because of missing values, leaving effective sample sizes of 127 and 129 respectively.[5]

Table 4 is the orthogonal, two-factor solution of the 26 items of these two pruned user involvement scales. The higher an item loaded on its respective factor and the lower it loaded on the other indicates how well that item discriminates the construct of interest. The factor loadings shown in Table 4 indicate that each of these 26 items has withstood the test of hypothesis H1b (Nunnally, 1978). Therefore, an affirmative response to the primary research question is suggested. In other words, it appears that independent empirical measurements do exist to operationalize the distinctive difference between the involvement of users in the process of information system implementation (specifically adaptation) and their involvement with the information system innovation itself. This indicates that user process involvement and user system involvement are independent phenomena.

Predictive Validity and Nomological Validity

Predictive and nomological validity differ only by degree since both are concerned with the theory-based ability of measures to predict measures of other constructs (Bagozzi, Davis, and Warshaw, 1992). In the case of the latter, the other constructs are part of a theoretical network of relationships. Space and study limitations preclude a more thorough analysis; however, correlations are used to provide some

Adjective Pair	Sequence # in Scale	User Involvement	
		Process Scale: UPI(13)	System Scale: USI(13)
vital-superfluous	UPI-12	90	04
valuable: worthless	UPI-6	89	19
significant: insignificant	UPI-11	88	10
essential: nonessential	UPI-17	87	17
beneficial: not beneficial	UPI-8	85	23
relevant: irrelevant	UPI-3	84	06
useful: useless	UPI-5	82	20
needed: not needed	UPI-20	82	22
wanted: unwanted	UPI-19	80	23
important: unimportant	UPI-1	79	06
fundamental: trivial	UPI-7	78	20
means a lot: means nothing	UPI-4	76	12
interested: uninterested	UPI-10	72	23
important: unimportant	USI-14	16	82
valuable: worthless	USI-13	10	82
appealing: unappealing	USI-5	16	79
desirable: undesirable	USI-20	07	77
essential: nonessential	USI-19	17	76
relevant: irrelevant	USI-16	17	74
needed: not needed	USI-12	00	72
wanted: unwanted	USI-11	14	72
beneficial: not beneficial	USI-3	10	69
vital: superfluous	USI-8	21	65
interesting: boring	USI-10	21	64
fascinating: mundane	USI-18	17	58
fundamental: trivial	USI-17	10	56
Percent of 2-factor variance accounted for:		56.4%	43.6%

Table 4. Varimax-Rotated Factor Loadings (x100) of 13-Item User Involvement Scales

indications as to congruence with theoretical expectations.

***Participation — Involvement*:** In the innovation literature, participation is generally positively associated with attitudes toward change (Kwon and Zmud, 1987). User participation was hypothesized (Barki and Hartwick, 1989) and confirmed (Kappelman and McLean, 1991, 1992) as an antecedent of user system involvement. It follows that participation is also an antecedent of process involvement. Causality aside, it was hypothesized that:

H2a: User participation is positively associated with user system involvement.

H2b: User participation is positively associated with user process involvement.

The correlations between the linear sums of the 10-item user participation scale (Appendix A) and the two 13-item user involvement scales were 0.29 ($p \leq .0006$, $n = 134$) for process involvement and 0.20 ($p \leq .0155$, $n = 142$) for system involvement. Both hypotheses are confirmed.

***Process Involvement — System Involvement*:** In situations when process participation actually precedes actual system contact, it would seem logical that process involvement is an antecedent of system involvement. It is posited that this is similar to the associations depicted in the Technology Acceptance Model (Davis, Bagozzi, and Warshaw, 1989), where related attitudes gradually become more directed toward the information system as a whole. Issues of antecedence aside, it is hypothesized that:

H2c: User process involvement and user system involvement are positively associated.

The correlation between the linear sum of the two 20-item scales was 0.52 ($p \leq .0001$, $n = 137$) and the correlation between the linear sum of the two 13-item scales was 0.38 ($p \leq .0001$, $n = 133$). Although smaller in size, it is believed that this latter number represents a more valid and accurate reflection of the true association between process involvement and system involvement in this study. The hypothesis is thus confirmed.

Participation — Involvement — Satisfaction: There is evidence that involvement mediates the participation-satisfaction relationship; and as such, both user participation and user involvement are antecedents of user satisfaction (Kappelman and McLean, 1991, 1992). Causal models aside, it was hypothesized that:

H2d: User participation is positively associated with user satisfaction.

H2e: User process involvement is positively associated with user satisfaction.

H2f: User system involvement is positively associated with user satisfaction.

The single overall user satisfaction item (shown in Appendix A) was used in this analysis. It was taken from Kappelman and McLean (1991, 1992), and such single-item overall satisfaction measures have been shown to be reliable and valid (Galletta and Lederer, 1989). The correlations with this single item were calculated to be 0.15 ($p \leq .0821$, $n = 132$) for process involvement, 0.33 ($p \leq .0001$, $n = 139$) for system involvement, and 0.22 ($p \leq .0095$, $n = 140$) for participation. These findings are comparable to Kappelman and McLean (1991, 1992), except they did not examine process involvement. The hypotheses are confirmed although the evidence of an association between process involvement and satisfaction is weak.

On the Dimensionality of the User Involvement Construct

Concern for the unidimensionality of a scale, sometimes discussed in terms of the *homogeneity* among a set of scale items, is substantiated by the work of many researchers (e.g., Allen and Yen, 1979; Scarpello and Campbell, 1983; Galletta and Lederer, 1989, Segars, 1994). This concern is founded on "cautions against combining measures of separate personal qualities into composite variables in the hope of tapping a deeper theoretical construct" (Bynner, 1988, p. 403). Moreover, Cronbach's (1951) alpha assumes item homogeneity (Galletta and Lederer). Factorial validity, sometimes considered to be an indicator of both the reliability and validity of research measurements (e.g., Blau, 1985; Straub, 1989; *cf.*, Crano and Brewer, 1973; Bynner, 1988), was used to assess the dimensionality of the two user involvement scales.

"Factorial validity helps to confirm that a certain set of measures do or do not reflect latent constructs" (Straub, 1989, p. 160) and that the individual items which make-up an instrument "share only one common focus" (Crano and Brewer, 1973, p. 231). The factorial validity of the two 13-item scales was assessed using primary data by means of principal components and factor analysis using SAS PROC FACTOR (SAS, 1990); although, other techniques to assess unidimensionality are sometimes used (e.g., Segars, 1994). Regardless of technique, however, those who wish to interpret factors or other statistical evidence as "real dimensions must shoulder a substantial burden of proof" cautioned Cronbach and Meehl (1955, quoted in Bynner, 1988, p. 391). Theory, logic, and common sense are also important in this decision process (e.g., Bynner; Galletta and Lederer, 1989). Nevertheless, some guidelines have been developed for interpreting the statistical indications.

Kaiser (1960) proposed the eigenvalue-greater-than-one criteria as evidence of a component or factor indicating an underlying construct. Cattell (1966) proffered the use of the graphical screen test as evidence of the number of underlying constructs. Gorsuch (1974) posited the use of both these guidelines. Another important consideration is the amount of overall variance accounted for by a principal component, measured in terms of the eigenvalue of that component. Another "generally accepted criteria for unidimensionality" in a set of scale items is for the first principal component to account for at least six times the variance of the scale accounted for by the second principal component (Bynner, 1988, p. 397); although, it would seem that instrument size may be a consideration in using this rule-of-thumb. Minimum factor loading guidelines for considering an item to be part of a factor (e.g., Nunnally, 1978; Straub, 1989) are also applied, and item dropping used in order to achieve a unidimensional scale (e.g., Crano and Brewer, 1973; Blau, 1985; Zaichowsky, 1985; Kappelman and McLean, 1991, 1992; Barki and Hartwick, 1994; Segars, 1994).

The UPI(13) scale had only one principal component with eigenvalues greater than one, a range of factor loadings from 75 to 91 on the first principal component that accounted for 70.4% of the variance in the scale and was 12.5 times larger than the second principal component. By all guidelines, the evidence suggested that this process involvement scale was unidimensional. On the other hand, mixed indications were calculated for the USI(13) scale which had three principal components with eigenvalues greater than one, a range of factor loadings from 60 to 85 on the first principal component that accounted for 54.7% of the variance in the scale and was 5.0 times larger than the second principal component.

As mentioned above, this was not the first evidence questioning the unidimensionality of Zaichowsky's (1985) scale (e.g., Munson and McQuarrie, 1987; Kappelman and Seitz, 1991; Seitz, Kappelman, and Massey, 1993; Barki and Hartwick, 1994). Zaichowsky found a varying number of greater-than-one eigenvalues depending on the object of involvement, although one component consistently accounted for about 70% of the variation in the data. McQuarrie and Munson (1986) suggested that Zaichowsky's scale was contaminated with attitudinal items and proposed a modified two-dimensional 16-item version (Munson and McQuarrie, 1987) of the scale, but the two dimensions (attitudinal and arousal involvement) were by no means independent. Another version (McQuarrie and Munson, 1991) had two dimensions named perceived importance and interest. Similarly, Barki and Hartwick (1994) derived a 13-item three-dimensional instrument from Zaichowsky's scale. None of the factor patterns of individual items shared among these instruments is consistent; neither do the same items consistently load together, nor do the factor patterns appear to be stable across objects or over time.

As an example, Zaichowsky's (1985) item *relevant/irrelevant* loaded cleanly on Barki and Hartwick's (1994) *personal relevance* factor; it also loaded on their *importance* and *attitude* factors in their pre-development data set. Similarly, Zaichowsky's *important/unimportant* item loaded cleanly on Barki and Hartwick's *importance* factor; it also loaded strongly on their *relevance* and *attitude* factors in their pre-development data set. They concluded that "involvement and attitude ... were not distinguishable ... in the pre-development sample" (p. 67). But both of these items are part of McQuarrie and Munson's (1991) *importance* factor, and both of them loaded on both factors in their earlier scale (1987). Moreover, their two-factor pattern appeared in just slightly more that half their samples (1987). And this is only the tip of the iceberg. There is a plethora of additional involvement instruments, versions of involvement instruments, and proposed dimensions of involvement (e.g., Cook, Hepworth, Wall, and Warr, 1981; Price and Mueller, 1986; Blau, 1985; Zaichowsky, 1986; Bruner and Hensel, 1992; Bearden, Netemeyer, and Mobley, 1993).

There is no simple answer. The situation is in transition, under development, and being studied. Even the possibility that perhaps there is dimensional stability over object types, in particular information system objects of involvement, seems faint. A replication (using the data set of this study) of the two-factor, varimax rotation of the nine system-involvement items from Zaichowsky (1985) that Barki and Hartwick (1994) used, only confirmed their findings for two items from each of their two dimensions. Neither the important/unimportant nor the relevant/irrelevant item loaded cleanly on a single factor, and they both loaded more significantly on the same factor. A similar pattern was evident for the nine-item user process involvement scale. Moreover, an 18-item, 2-factor, orthogonal solution of these two instruments did not exhibit discriminant validity and had five items that failed to meet the two decision rules described above.[5] Perhaps Zaichowsky was right when she said "the assumption is that no individual item is sufficient, and that it is the scale taken as a whole that tends to measure the involvement construct" (1985, p. 344). She (1990) too, however, derived an allegedly unidimensional, 10-item version of her original 20-item scale, for the purposes of measuring involvement toward advertising, that included items from all three of Barki and Hartwick's (1994) dimensions.

There is neither sound theoretical nor empirical evidence for concluding that Zaichowsky's (1985) Personal Involvement Inventory is anything other than a unidimensional scale for measuring "a person's perceived relevance of the object based on inherent needs, values, and interests" (p. 342). There is evidence, however, for concluding that 1) the factor pattern of the scale items varies by the object of involvement and over time, and 2) that further research is clearly needed. Nevertheless, none of this diminishes the facts that 1) significant improvements have been made recently in the development of measurements for important user-related behavioral and attitudinal variables (e.g., Kappelman and McLean, 1991, 1992; Barki and Hartwick, 1994), and 2) that user process involvement and user system involvement have been distinctly operationalized here. These facts have important implications to those who practice, study, and teach information systems.

Summary, Implications, and Conclusion

Kappelman and McLean (1993, 1994) categorized the associations of users with information systems and their development as forms of *user engagement* along two dimensions. On the one hand, a distinction is made between the behavioral and attitudinal components of such engagements; and on the other, a distinction is made between the process and product objects of such engagements. These distinctions result in the four dimensions of user engagement depicted in Table 1. Empirical evidence in support of the validity and importance of some of these distinctions was already available (Kappelman, 1990; Barki and Hartwick, 1991, 1994; Jarvenpaa and Ives, 1991; Kappelman and McLean, 1991, 1992; and Guimaraes and McKeen, 1993). Moreover, the distinction between attitudes toward things and attitudes toward behaviors was well established (e.g., Fishbein and Ajzen, 1974). Nevertheless, little was known about the theorized distinction between the psychological involvement of users with information systems and their psychological involvement with the process of developing and implementing such systems. This study endeavored to remedy that situation with a focus on the adaptation stage in the diffusion of an information system innovation.

Utilizing previously-validated instruments from consumer behavior research, these two object-based categories of user involvement were operationalized. A longitudinal field study was conducted of users during information system conversion in a large financial institution. The instruments were pre-tested and assessed as to their content validity, internal consistency, convergent validity, unidimensionality, temporal stability, discriminant validity, predictive validity, and factorial validity. The evidence indicated that the scales were reliable and valid. The primary question of scale independence was examined by discriminant validity. The empirical evidence supports the concepts embodied in the user engagement taxonomy. The theoretical distinction between user process involvement and user system involvement has been empirically confirmed.

There are important implications, both for research and practice, of this newly-found ability to discriminate between process involvement and system involvement because this distinction parallels the two dominant sets of information systems activities: 1) recognizing and assessing information-system innovations and 2) facilitating their diffusion (Kwon and Zmud, 1987). Moreover, the ability to measure these important motivational constructs is not diminished by uncertainty over which items or which dimensions. That is not to say that these yet-to-be-understood considerations should be forgotten; in fact, they should be rigorously examined. But these unknowns should not stop us from using assessments of these motivational outcomes in order to help us more effectively study, and more successfully implement and manage, information systems in organizations.

Until more is known about the dimensionality of the user involvement construct, it is recommended that the instruments examined here be used in their full 20-item form. Adjustments can easily be made for poorly discriminating items following the procedures described in this paper. Since all of the data examined here were collected only during the adaptation stage in the diffusion of this information system, it raises questions about how these instruments might perform during other phases and/or with other types of information systems and/or with other types of users (e.g., discretionary or voluntary). For example, it may be that user involvement, since it is a motivational construct, may help in the early identification of different types of adopters, champions, and change agents (e.g., Rogers, 1983; Beath, 1991; Kappelman, 1995). Moreover, considerations of repeated-use and long-term temporal stability should be examined, since innovation diffusion theory is itself a longitudinal theory and since IS-based change is a longitudinal phenomenon.

Future research should determine if some kind of attitude formation phenomena has been identified with regard to user involvement (Barki and Hartwick, 1994). Is it possible that the strong evidence for a unidimensional process-involvement scale presented in this study was a function of the fact that the process of adaptation was largely behind these users and their involvement with it had stabilized? Concomitantly, is the weak evidence of unidimensionality for the system-involvement scale a sign that the "jury was still out" because the system innovation itself was still too new? The lower test/retest score for process involvement suggests that more change occurred in this measure. Longitudinal studies would certainly be one potentially fruitful avenue to take in examining these issues. So would the use of other statistical techniques, in particular structural equation modeling (e.g., Bagozzi, 1980; Joreskog and Sorbom, 1981, Pedhauzer, 1982; Segars, 1994). This technique would be particularly valuable not only for purposes of scale development and validation, but also to further our understanding of the nomological networks and causal models which may include these user involvement constructs.

Previous research has established that *both* user involvement (i.e., attitudinal engagement) *and* user participation (i.e., behavioral engagement) are important in understanding (and achieving) information system implementation success (e.g., Kappelman, 1990; Barki and Hartwick, 1991, 1994; Jarvenpaa and Ives, 1991; Kappelman and McLean, 1991, 1992). Previous evidence suggests that participation induces system involvement, which intervenes (i.e., mediates) in the participation-satisfaction relationship (Kappelman, 1998; Kappelman and McLean, 1991, 1992). The correlation analysis conducted in this study in assessing predictive validity suggests the hypothesis that participation induces process involvement, which intervenes in the relationship between participation and system involvement. Given the potential importance of these need-based, motivational involvement constructs in understanding user behaviors, additional research could prove worthwhile. Moreover, these involvement constructs must be examined in relationship to other user attitudes that have already been examined in a diffusion-of-innovation context. It would seem that these motivational states of involvement may help us to understand better such important behavioral constructs as use, adoption, and acceptance (especially in the context of voluntary users). One fertile research direction may be to examine user process and system involvement in the context of some of the behavioral-attitudinal work already conducted in these areas (e.g., Davis, 1989; Davis, Bagozzi, and Warshaw, 1989; Moore and Benbasat, 1991).

The user involvement instruments suggested by this study may provide information system researchers and practitioners with the ability to understand better, and thereby manage, these critically important psychological components of users. Information system vendors, practitioners, researchers, and academics would be well served to know what kinds of user assistance and support services, opportunities for behavioral and attitudinal engagement, and system diffusion and implementation strategies produce the largest payoff in various situations.

Notes

1. For simplicity, and because it was not necessary for the purposes of this research, no formal distinction is made in this paper among perceptions, attitudes, feelings, beliefs, expectations, and other invisible mental and/or psychological states (*cf.*, Galletta & Lederer, 1989).

2. In reference to the total process of conceiving, building, deploying, and operating information systems in organizations, the terms "development" and "diffusion" are used synonymously here to refer to that entire process.

3. User training is a visible behavior that users do engage in during the development and implementation of an information system and is therefore a form of user participation (Kappelman and McLean, 1991, 1992; Barki & Hartwick, 1994).

4. It is worth noting that three of these seven eliminated items were shared by the two instruments. These three items were UPI-9:USI-9 (matters to me — doesn't matter to me), UPI-14:USI-4 (unexciting — exciting), and UPI-2:USI-15 (of no concern — of concern to me). The significance of this is unclear and may be a rewarding topic for future research.

5. Due to space constraints, some of the empirical evidence could not be included here. Please contact the author for additional information such as 1) factor loadings (before and after rotation) and covariance matrices of the 40-item, 26-item, 18-item, 13-item, and 9-item involvement analyses; 2) individual item descriptive statistics (mean, standard deviation, sum, minimum, maximum); and (3) item-to-item and item-to-total correlations; etc.

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APPENDIX A

QUESTIONNAIRE ITEMS FOR USER PARTICIPATION AND USER SATISFACTION

Adaptation Stage User Participation Questions:

Regarding the NEW SYSTEM, I participated ...

1 .... in testing the new system.
2 .... in planning the installation or conversion.
3 .... in scheduling conversion or installation tasks.
4 .... in the actual installation and/or conversion.
5 .... in scheduling training sessions for others.
6 .... in scheduling my own training sessions.
7 .... in training sessions (as a trainee).
8 .... in training or instructing others (as trainer).
9 .... in installing, converting, or implementing it.
10 .... in evaluating its performance.

Adaptation Stage User Participation Answer Scale:

0	1	2	3	4	5
Not Applicable	Very Little	A Little	Moderately	Much	Very Much

Overall User Satisfaction Question:

Overall, I am very satisfied with the new system.

Overall User Satisfaction Answer Scale:

1	2	3	4	5
Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree

APPENDIX B: User Involvement Questionnaires

INSTRUCTIONS: The purpose of the following questions is to measure a person's involvement or interest in the PROCESS OF IMPLEMENTING a new computer-based information system.

PLEASE NOTE: "Implementation" refers to the activities listed in the previous questions about your participation. Part of implementation is the actual "conversion" to the new system.

To take this measurement, we need you to judge your participation in the new system implementation process against a series of descriptive scales, according to how YOU perceive it. Here is how to use these scales:

If you feel that your participation in the process of implementation was very closely related to one end of the scale, you should place your mark as follows:
important X :__:__:__:__:__:__ unimportant or important __:__:__:__:__:__: X unimportant

If you feel that your participation was closely related to one or the other end of the scale (but not extremely), you should place your mark as follows: appealing __: X :__: or :__: X :__ unappealing

If you feel that your participation seems only slightly related to one end of the scale (but not really neutral), you should place your mark as follows: uninterested __:__: X : or : X :__:__ interested

If you feel that your participation was equally related to either end of the scale (that is, neutral), you should place your mark as follows: essential __:__:__: X :__:__:__ nonessential

IMPORTANT:
1. Be sure that you mark every item. Please do not omit any.
2. Never put more than one mark on a single item.
3. Make each item a separate and independent judgment.
4. Work at a fairly high speed. Don't worry or puzzle over individual items. It's your first impressions and immediate feelings about the items that we want. On the other hand, please do not be careless, we want your true impressions.

MY PARTICIPATION IN THE new system IMPLEMENTATION PROCESS (is/was) ...

important __:__:__:__:__:__:__ unimportant
of no concern __:__:__:__:__:__:__ of concern to me
irrelevant __:__:__:__:__:__:__ relevant
means a lot to me __:__:__:__:__:__:__ means nothing to me
useless __:__:__:__:__:__:__ useful
valuable __:__:__:__:__:__:__ worthless
trivial __:__:__:__:__:__:__ fundamental
beneficial __:__:__:__:__:__:__ not beneficial
matters to me __:__:__:__:__:__:__ doesn't matter to me
uninterested __:__:__:__:__:__:__ interested
significant __:__:__:__:__:__:__ insignificant
vital __:__:__:__:__:__:__ superfluous
boring __:__:__:__:__:__:__ interesting
unexciting __:__:__:__:__:__:__ exciting
appealing __:__:__:__:__:__:__ unappealing
mundane __:__:__:__:__:__:__ fascinating
essential __:__:__:__:__:__:__ nonessential
undesirable __:__:__:__:__:__:__ desirable
wanted __:__:__:__:__:__:__ unwanted
not needed __:__:__:__:__:__:__ needed

continued...

...continued

INSTRUCTIONS: The purpose of the following questions is to measure your involvement or interest in the new computer-based information system itself. The instructions are the same as in the section you just completed, except that now you are to judge the NEW COMPUTER SYSTEM against a series of descriptive scales according to how YOU perceive it.

Please, only one mark for each scale.

Very closely related to one end:	_X:__:__: or :__:__:X_
Closely related to one end:	__:_X___: or :__:X_:__
Slightly related to one end:	__:__:_X: or :X_:__:__
Equally related to either end:	__:__:__:_X_:__:__:__

THE NEW COMPUTER SYSTEM (is/was) ...

means a lot to me	__:__:__:__:__:__:__	means nothing to me
useless	__:__:__:__:__:__:__	useful
beneficial	__:__:__:__:__:__:__	not beneficial
unexciting	__:__:__:__:__:__:__	exciting
appealing	__:__:__:__:__:__:__	unappealing
uninterested	__:__:__:__:__:__:__	interested
significant	__:__:__:__:__:__:__	insignificant
vital	__:__:__:__:__:__:__	superfluous
matters to me	__:__:__:__:__:__:__	doesn't matter to me
boring	__:__:__:__:__:__:__	interesting
wanted	__:__:__:__:__:__:__	unwanted
not needed	__:__:__:__:__:__:__	needed
valuable	__:__:__:__:__:__:__	worthless
important	__:__:__:__:__:__:__	unimportant
of no concern	__:__:__:__:__:__:__	of concern to me
irrelevant	__:__:__:__:__:__:__	relevant
trivial	__:__:__:__:__:__:__	fundamental
mundane	__:__:__:__:__:__:__	fascinating
essential	__:__:__:__:__:__:__	nonessential