Communications of the Association for Information Systems

Volume 26 Article 6

3-2010

Information Systems Appraisal and Coping: The Role of User Perceptions

Kelly J. Fadel
Department of Management Information Systems, Huntsman School of Business, Utah State University, kelly.fadel@usu.edu

Susan A. Brown
Department of Management Information Systems, Eller College of Management, The University of Arizona

Communications of the Association for Information Systems

CAIS

Information Systems Appraisal and Coping: The Role of User Perceptions

Kelly J. Fadel

Department of Management Information Systems, Huntsman School of Business, Utah State University

kelly.fadel@usu.edu

Susan A. Brown

Department of Management Information Systems, Eller College of Management, The University of Arizona

Abstract:

Organizations increasingly rely on complex information systems (IS) to preserve and enhance competitive advantage. Prior work has shown that these IS are often underutilized, prompting researchers and practitioners to seek out better explanations to account for IS use behaviors. Coping theory has recently emerged as a promising foundation for understanding users' post-adoptive reactions to IS. This paper takes a first step toward integrating theories of IS adoption and use with coping theory by examining how adoption-related IS perceptions influence individual-level post-adoptive IS appraisal. Survey data collected from IS users at a university health center indicate that performance and effort expectancies surrounding use of the IS strongly influence primary IS appraisal (judgments of what is at stake as a result of the IS), while the presence of facilitating conditions relates to secondary IS appraisal (judgments of what can be done in response to the IS).

Keywords: Information Systems adoption, use, appraisal, coping, post-adoptive behavior, technology acceptance

Volume 26, Article 6, pp. 107-126, March 2010

Communications of the Association for Information Systems

I. INTRODUCTION

Today's organizations increasingly rely on complex information systems (IS) to preserve and enhance competitive advantage. Examples of such systems include enterprise resource planning, supply chain management, and electronic medical record systems that combine and streamline diverse business functions under an integrated technological platform. Because the benefits of IS are contingent upon how the systems are used by individuals, organizations that invest in these systems have a considerable stake in ensuring that they are used fully and appropriately. Yet, research has shown that IS are often underutilized [Jasperson et al. 2005; Mabert et al. 2001; Robey et al. 2002; Wei et al. 2008], prompting researchers and practitioners to seek better explanations for user responses to IS and consequent use behaviors.

Recently, coping theory has emerged as a promising foundation for understanding users' varied post-adoptive reactions to an IS. Coping theory provides a framework for understanding how individuals respond to disruptive events in their environment [Beaudry and Pinsonneault 2005; Lazarus and Folkman 1984] and is becoming recognized as a valuable lens for explaining a variety of IS-related behaviors [Lee and Larsen 2009; Liang and Xue 2009]. Drawing on coping theory, Beaudry and Pinsonneault [2005] proposed the Coping Model of User Adaptation (CMUA) to explain how IS users "restore emotional stability, modify their tasks, reinvent and adapt the technology, or even resist it" (p. 494). CMUA (abstracted in Figure 1) posits that individual outcomes (e.g., increased efficiency and effectiveness, restoration of emotional stability) associated with use of the IS depend on adaptation behaviors users employ to cope with the IS. These adaptation behaviors are in turn shaped by a process of cognitive IS appraisal, whereby the user assesses what is at stake with respect to the IS and what can be done in response to it. As observed by Beaudry and Pinsonneault [2005], the outcomes of this process have implications for the way the IS is used and the benefits deriving from this use. For example, an individual who feels threatened by a new workplace IS and sees limited options for responding positively may learn only basic IS functions and, consequently, engage in superficial or perfunctory use that produces minimal performance benefits. In contrast, an individual who perceives the IS as a challenge and feels empowered to respond positively will be more likely to adapt her work procedures in order to take full advantage of the IS's capabilities. IS continuance research has suggested that these types of affective reactions to an IS more strongly determine post-adoptive behaviors than do cognitive beliefs alone [Bhattacherjee 2001; Bhattacherjee et al. 2008] or intention to use the IS, particularly in mandated use contexts involving complex systems [Brown et al. 2002]. However, this body of research has lacked a comprehensive theoretical framework for examining such reactions. Because it provides a comprehensive and empirically validated framework for examining a full range of individual perceptions, responses, and consequent outcomes, we believe that coping theory provides a valuable theoretical lens that can enrich our understanding of individual responses to IS and resultant use behaviors.

The current study focuses on the antecedents of cognitive appraisal, a critical subcomponent of the coping process. Although CMUA identifies cognitive appraisal of an IS as a determinant of subsequent coping behaviors, it does not explicitly incorporate or explore factors that influence how users appraise an IS. Beaudry and Pinsonneault [2005] suggest that several factors known to influence the decision to adopt and initially use an IS [see Venkatesh et al. 2003 for review] are also likely to influence IS appraisal. Many have argued that although these factors alone are not sufficient to account for the complexities of post-adoptive behavior, they are nevertheless an essential ingredient in the larger picture of post-adoptive use [e.g., Boudreau and Seligman 2005; Chin and Marcolin 2001]. As noted by Jasperson et al. [2005, p. 527], "the cumulative tradition of research on technology acceptance and initial use should enrich our understanding of individual post adoptive behaviors. … post-adoptive behavior must be framed within this larger context." In other words, a critical step in advancing a comprehensive theory of ongoing IS use is to link our established understanding of pre-adoptive processes with new, richer theoretical perspectives (such as CMUA) that can illuminate subsequent IS-related behavior.

The purpose of this study, as shown in Figure 1, is to integrate CMUA with extant technology adoption theories by examining how adoption-related IS perceptions influence individual-level post-adoptive IS appraisal. Specifically, this study addresses the following research question: How is individual-level appraisal of an IS influenced by key adoption-related IS perceptions? In addressing this question, we make three contributions. First, we establish and test a theoretical connection between key antecedents of technology use and the cognitive appraisal process, a critical step toward integrating extant IS use and continuance research with the enriched theoretical perspective offered by coping theory. Second, we extend the work of Beaudry and Pinsonneault [2005] by exploring an expanded set of appraisal outcomes as identified in the coping literature, thus providing more nuanced framework

for understanding the varied and complex user reactions to an IS. Finally, we provide practical insight for managers seeking to understand and influence the factors that shape post-adoptive IS appraisal.

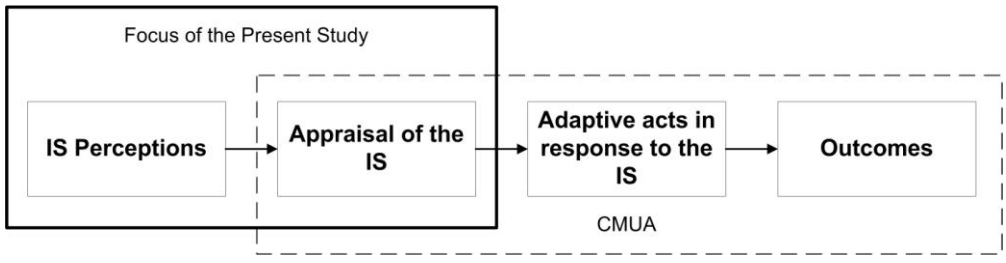

Figure 1: CMUA and Focus of the Present Study

II. THEORETICAL BACKGROUND

Coping and Appraisal

Coping is defined as "the cognitive and behavioral efforts to manage specific internal or external demands that are appraised as taxing or exceeding the resources of the person" [Lazarus and Folkman 1984, p. 141]. The most widely accepted theory of coping is the transactional model [Folkman and Lazarus 1985; Lazarus and Folkman 1984], which describes coping as an evolving process of cognitive appraisal of a situation followed by behaviors aimed at handling the situation and/or reducing stress. Although commonly associated with negative events or situations, coping may also occur in response to events that are perceived positively, yet still require adaptation. Coping behaviors can be problem-focused (aimed at managing or altering the situation) or emotion-focused (aimed at altering or regulating one's emotions in response to the situation).

The current study focuses on cognitive appraisal, the first step in the coping process. The transactional model defines appraisal as "the process of categorizing an encounter, and its various facets, with respect to its significance for well-being" [Lazarus and Folkman 1984, p. 31]. Appraisal is central to coping because it is during this process that the individual assesses what is at stake in the situation and what can be done about it. Appraisal influences coping responses which, in turn, partially determine situational outcomes [Kessler 1998; Lazarus and Folkman 1984; McRae 1984].

Appraisal is typically divided into two conceptual subprocesses termed *primary* and *secondary appraisal.* Table 1 summarizes these subprocesses and their potential outcomes. During primary appraisal, an individual assesses what is personally at stake in the situation. Three primary appraisal outcomes are identified by the transactional model: irrelevant, benign/positive, and stress [Lazarus and Folkman 1984]. Irrelevant appraisals occur when the individual has no investment in the outcomes of the situation. Benign/positive appraisals occur when the individual evaluates the situation as positive or conducive to enhanced well-being. Stress appraisals occur when the situation is perceived to harm, threaten, or challenge the individual's well-being. A stressful situation is appraised as harmful if it has already resulted in damage or loss, or as a threat if it seems likely to do so. Conversely, a stressful situation is appraised as a challenge if it is evaluated as an opportunity for gain or growth.

While primary appraisal addresses what is at stake in a situation, secondary appraisal concerns the coping options available to respond to the situation. Secondary appraisal involves an assessment of personal, social, psychological, emotional, and physical resources that can be applied to the situation. The evaluation of these resources determines the coping options available to the individual and her sense of control over the situation; thus secondary appraisal is a key factor in determining coping behaviors [Lazarus and Folkman 1984]. Coping researchers have generally assessed secondary appraisal outcomes by asking individuals to identify an event as one that they (a) could change or do something about, (b) had to accept or get used to, (c) needed to know more about before they could act, or (d) had to hold themselves back from doing what they wanted to do [Coyne et al. 1981; Folkman et al. 1986a, Lazarus and Folkman 1984; Parkes 1984].

Table 1: Cognitive Appraisals			
Type	**Summary Question**	**Outcomes**	
Primary Appraisal	What is at stake for me in this situation?	**Irrelevant:** Situation carries no implication for the person's well-being	
		Benign/positive: Situation construed as positive; preserves or enhances person's well-being	
		Stress	**Harm:** Situation has resulted in some damage or loss to the person
			Threat: Situation involves harm/loss that has not yet taken place, but is anticipated
			Challenge: Situation is regarded as an opportunity for gain or growth
Secondary Appraisal	What can I do about it?	Situation is something that the person… … can change or do something about … has to accept or get used to … needs to know more about before acting … has to hold back from doing what is wanted	

IS Appraisal

End users may evaluate a new information system in many different ways. For instance, if an individual does not foresee a significant personal impact from the introduction of an IS, she may deem it largely irrelevant to her personal well-being.[1] If she believes that the IS offers benefits such as improved work effectiveness or efficiency, or if there is considerable social support for the IS, the user is likely to perceive it positively [Davis 1989; Moore and Benbasat 1991; Taylor and Todd 1995a; Taylor and Todd 1995b; Venkatesh et al. 2003]. Conversely, a belief that the IS will hamper productivity or be difficult to use will likely induce a stress reaction to the IS, i.e., viewing the IS as harmful, threatening, or challenging.

IS appraisal is critical because it affects downstream use behavior. Information systems are increasingly intertwined with key business functions, rendering their use a necessity for many jobs. Yet, research has indicated that users still retain considerable discretion over *how* and *to what extent* the IS is used, even when use itself is mandated [Boudreau and Seligman 2005; Jasperson et al. 2005]. Users who view the IS favorably are more likely to enthusiastically engage the IS in their work, seeking to incorporate its advanced features to produce performance benefits [Majchrzak et al. 2000]. On the other hand, users who view the IS as threatening or harmful may engage in counterproductive behaviors such as superficial use, passive acceptance, or even sabotage [Kimberly 1987; Markus 1983; Robey et al. 2002; Zuboff 1988]. CMUA frames these reactions in terms of coping theory by explaining how IS appraisals influence subsequent adaptive behaviors and performance outcomes [Beaudry and Pinsonneault 2005]. According to CMUA, users appraise a new workplace IS by assessing it as an opportunity or a threat (primary appraisal) and evaluating how much control they have over the IS context (i.e., the triumvirate of the IS, the work task, and the self) given their options for responding (secondary appraisal). Based on these appraisals, users engage in various combinations of coping behaviors vis-à-vis the new IS. For example, if the user sees the IS as an opportunity and feels that she has a high degree of control over the technology-work environment, she is likely to adapt herself, the IS, and her work procedures to better take advantage of the IS's capabilities (a strategy CMUA terms *benefits maximizing*). On the other hand, a user who perceives the IS as a threat and has limited coping options may resort to emotion-focused behaviors, such as distancing, avoidance, or withdrawal (a strategy CMUA terms *self preservation).* Coping strategies employed by individuals determine how and whether their use of the IS produces individual and organizational performance benefits.

Given the potential of IS appraisal to shape subsequent use behaviors, understanding the factors that shape the appraisal process is paramount to IS researchers and practitioners. CMUA does not explicitly model determinants of IS appraisal, though Beaudry and Pinsonneault [2005] note several factors that may play a role. IS adoption

[1] Irrelevant appraisal is somewhat less interesting from a practical perspective in that such appraisal requires no mobilization of coping behaviors. Moreover, we contend that appraising an IS as completely irrelevant is unlikely unless the individual does not use the system at all and is in no way affected by its proximal use by others. Thus, our focus in this study is on other types of primary appraisal (benign/positive, threat, harm, and challenge).

research has identified a multitude of factors that represent a user's stake and control with respect to a new IS [e.g., Davis 1989; Dishaw and Strong 1999; Lapointe and Rivard 2007; Moore and Benbasat 1991; Venkatesh and Bala 2008]. Empirical research in this area has demonstrated how subsets of these factors impact a user's intention to use an IS and subsequent use behaviors. Recognizing the need for a comprehensive integration of these studies, Venkatesh and colleagues [2003] proposed the Unified Theory of Acceptance and Use of Technology (UTAUT), which incorporates and synthesizes key technology perceptions from various technology adoption models into a single unifying framework. The perceptions identified by UTAUT include performance expectancy, effort expectancy, social influence, and facilitating conditions (see Table 2 for definitions). Despite the fact that the UTAUT relationships have not been well-examined in empirical studies [Benbasat and Barki 2007], Jasperson et al. [2005] and others [e.g., Boudreau and Seligman 2005], expect that the user perceptions identified in UTAUT (termed individual cognitions) will play a significant role in ongoing technology sensemaking and use behavior. Thus, we both draw from and extend previous work by examining UTAUT perceptions as key antecedents to post-adoptive IS appraisal.

Table 2: UTAUT Perceptions [Venkatesh et al. 2003]

Perception	Definition	Root Constructs
Performance Expectancy	"The degree to which an individual believes that using the system will help him or her to attain gains in job performance" (p. 447)	Perceived usefulness, extrinsic motivation, job-fit, relative advantage, and outcome expectations
Effort Expectancy	"The degree of ease associated with use of the system" (p. 450)	Perceived ease of use, complexity, ease of use
Social Influence	"The degree to which an individual perceives that important others believe he or she should use the new system" (p. 451)	Subjective norm, social factors, image
Facilitating Conditions	"The degree to which an individual believes that an organizational and technical infrastructure exists to support use of the system" (p. 453)	Perceived behavioral control, facilitating conditions, compatibility

III. MODEL AND HYPOTHESES

Coping theory identifies individual beliefs with regard to a potentially stressful encounter as a key antecedent to the appraisal process [Lazarus and Folkman 1984]. Beliefs or perceptions about an IS have been shown to impact intention to use the IS and the subsequent occurrence of IS use [Davis 1989; Davis et al. 1989; Taylor and Todd 1995a; Venkatesh and Davis 2000]. As noted above, UTAUT proposes four key IS perceptions that shape IS adoption and use behavior. We hypothesize that these perceptions play a role in shaping not only a user's intention to use the IS, but also her appraisal of the IS as benign/positive, threatening, harmful, or challenging. The following paragraphs develop research hypotheses linking each UTAUT perception to these appraisal outcomes.

The first UTAUT perception is performance expectancy, the degree to which the individual believes that using the system will help her attain gains in job performance [Venkatesh et al. 2003]. Performance expectancy has been shown to be a key determinant in shaping an individual's intention to use an IS, both in mandatory and voluntary settings [Agarwal and Prasad 1998a; Brown et al. 2002; Compeau and Higgins 1995; Davis et al. 1992]. Because job security, compensation, and other benefits usually depend on satisfactory performance of job duties, the perceived impact of an IS on workplace productivity constitutes a substantial stake for a prospective user. Indeed, organizational psychology research has identified the introduction of new technology at work as a potential source of occupational stress [Arnetz 1997; Kahn and Cooper 1986; Korunka and Vitouch 1999], with significant relationships existing between appraisal of the IS and performance-related professional efficacy outcomes such as job self-confidence and goal attainment [Salanova and Schaufeli 2000]. An IS that is perceived to weaken or undermine satisfactory performance of job duties is likely to prompt negative reactions from users whose job outcomes are contingent upon its use [Davis 1989; Davis et al. 1989; Goodhue and Thompson 1995; Taylor and Todd 1995a; Venkatesh and Davis 2000]. This observation is consistent with the findings of Beaudry and Pinsonneault [2005], who noted that users who perceived favorably the instrumentality of the IS in performing their job duties were more inclined toward positive IS appraisals, while negative appraisals tended to emerge from those who felt their job performance was at risk. Accordingly, we postulate that when performance expectancy is low, the user is likely to judge the IS as threatening or harmful to success on the job. Conversely, when performance expectancy is high, the

user is likely to view the IS as beneficial or challenging. Specifically, we hypothesize that performance expectancy of using an IS will be related to primary appraisal of the IS such that:

H1a: Performance expectancy of using an IS will be positively related to benign/positive primary appraisal of the IS.

H1b: Performance expectancy of using an IS will be negatively related to harm primary appraisal of the IS.

H1c: Performance expectancy of using an IS will be negatively related to threat primary appraisal of the IS.

H1d: Performance expectancy of using an IS will be positively related to challenge primary appraisal of the IS.

The second perception identified by UTAUT, effort expectancy, is defined as the degree of ease associated with use of the system [Venkatesh et al. 2003]. Somewhat counter-intuitively, this definition means that *higher* effort expectancy results from *lower* perceived effort associated with use of the system. Effort expectancy (or a related construct) has been shown to be particularly salient prior to IS adoption and during early IS use [Davis 1989; Thompson et al. 1991; Thompson et al. 1994], and less salient during later IS use [Karahanna et al. 1999; Venkatesh 1999]. This is expected because effort-related challenges associated with a new behavior decrease as the individual acquires more experience and expertise performing the behavior. However, in cases where mastery of a behavior requires sustained exertion, effort expectancy may be an ongoing concern. Difficulties associated with system use place increased demands on users who must use the IS to perform their jobs. Research on occupational stress has demonstrated that high job demands produce deleterious effects such as burnout, depression, and job dissatisfaction [Karasek 1979; Karasek and Theorell 1990; Van der Doef and Maes 1999]. IS research has confirmed these relationships, finding that high job demands associated with IS use resulted in increased work stress [Korunka et al. 1997] and dissatisfaction [Shen and Gallivan 2004] among IS users. In terms of appraisal, a user who must master an extended repertoire of IS features might feel that the required effort threatens or harms her ability to function on the job, while an individual who feels that the effort required to master the IS is within reasonable bounds should be more likely to appraise the IS as a benefit or a challenge. Supporting this notion, Boudreau and Seligman [2005] found that users' perceived ease of use of a complex workplace IS affected their satisfaction with the system and, consequently, the quality of their system use. Specifically, users who found the system prohibitively difficult to use were prone to frustration that resulted in sub-optimal use outcomes. Correspondingly, we hypothesize that effort expectancy of using an IS will be related to primary appraisal of the IS such that:

H2a: Effort expectancy of using an IS will be positively related to benign/positive primary appraisal of the IS.

H2b: Effort expectancy of using an IS will be negatively related to harm primary appraisal of the IS.

H2c: Effort expectancy of using an IS will be negatively related to threat primary appraisal of the IS.

H2d: Effort expectancy of using an IS will be positively related to challenge primary appraisal of the IS.

The third perception identified by UTAUT is social influence, or the degree to which an individual perceives that important others believe he or she should use the new system [Venkatesh et al. 2003]. Research has shown that the impact of social influence on behavioral intention to use an IS is strongest in mandatory use settings [Hartwick and Barki 1994], and early in the IS use period [Agarwal and Prasad 1997; Hartwick and Barki 1994; Karahanna et al. 1999; Venkatesh and Davis 2000]. Venkatesh and Davis [2000] theorize that social influence occurs through the mechanisms of compliance, internalization, and identification. Compliance acts to directly change behavioral intention in response to social pressure without necessarily changing the individual's belief structure. Thus, an individual may comply with a mandate to use an IS despite feeling that it is detrimental to success in the workplace. Conversely, internalization and identification (which can occur in voluntary or mandatory IS use settings) operate by modifying the individual's belief structure to fit with the beliefs of a referent other, or by enticement from potential social status gains. Because they operate by modifying IS perceptions [Gallivan et al. 2005; Venkatesh and Davis 2000], internalization and identification are likely to influence IS appraisal. Kelman [1958] notes that internalization occurs "when an individual accepts influence because the content of the induced behavior—the ideas and actions of which it is composed—is intrinsically rewarding" (p. 53). Hence, an individual who internalizes signals from an important work referent that use of the system is beneficial should view the consequences resulting from IS use as positive, while internalization of negative IS-related cues should produce an appraisal of the IS as threatening or harmful. In the case of identification, the individual accepts social influence not because of the intrinsic value of the behavior, but to "maintain a satisfying self-defining relationship to another person or a group…. The individual actually believes in the responses which he adopts through identification … [but] he adopts the induced behavior because it is associated with the desired relationship" [Kelman 1958, p. 53]. Applying this notion to the context of IS, an individual seeking social reward from an important work referent should be more likely to appraise the IS positively if social gains or enhancements to the relationship will derive from its use, but negatively if IS use

threatens these outcomes. Therefore, we hypothesize that social influence (operating via internalization and identification) surrounding use of an IS will be related to primary appraisal of the IS such that:[2]

H3a: Social influence surrounding use of an IS will be positively related to benign/positive primary appraisal of the IS.

H3b: Social influence surrounding use of an IS will be negatively related to harm primary appraisal of the IS.

H3c: Social influence surrounding use of an IS will be negatively related to threat primary appraisal of the IS.

H3d: Social influence surrounding use of an IS will be positively related to challenge primary appraisal of the IS.

The fourth perception identified by UTAUT is facilitating conditions. Facilitating conditions are defined as the degree to which an individual believes that organizational and technical infrastructure exists to support use of the system [Venkatesh et al. 2003]. Although this definition emphasizes supporting infrastructure that is external to the user, facilitating conditions may also include enabling or constraining factors that are internal to the user, such as requisite knowledge, time, or self-efficacy [Taylor and Todd 1995a; Taylor and Todd 1995b; Thompson et al. 1991; Venkatesh et al. 2003].

While perceptions of performance expectancy, effort expectancy, and social influence are hypothesized to influence primary appraisal (i.e., assessment of what is at stake in the situation), facilitating conditions are closely related to the concept of secondary appraisal (i.e., assessment of what can be done about the situation). If appropriate facilitating conditions are in place, the user is likely to feel empowered in dealing with the new IS [Thompson et al. 1991; Venkatesh et al. 2003]. Such empowerment could result from conditions that are external to the user (e.g., ongoing training and user support) or conditions that are internal to the user (e.g., computer self-efficacy or prior knowledge of similar information systems from which to draw) [Taylor and Todd 1995b]. If, on the other hand, the user perceives an absence of necessary facilitating conditions, she is likely to feel limited control in dealing with the situation [Triandis 1979]. Such a scenario could yield passive resignation to using the IS or postponed action resulting from a "wait and see" attitude. Based on this logic, we hypothesize that:

H4: Facilitating conditions surrounding use of an IS will be positively related to high control secondary appraisal of the IS.

In summary, theory suggests that IS perceptions identified in UTAUT are likely to play a role in primary and secondary appraisal of the IS. The research hypotheses developed in this section are summarized in Figure 2.

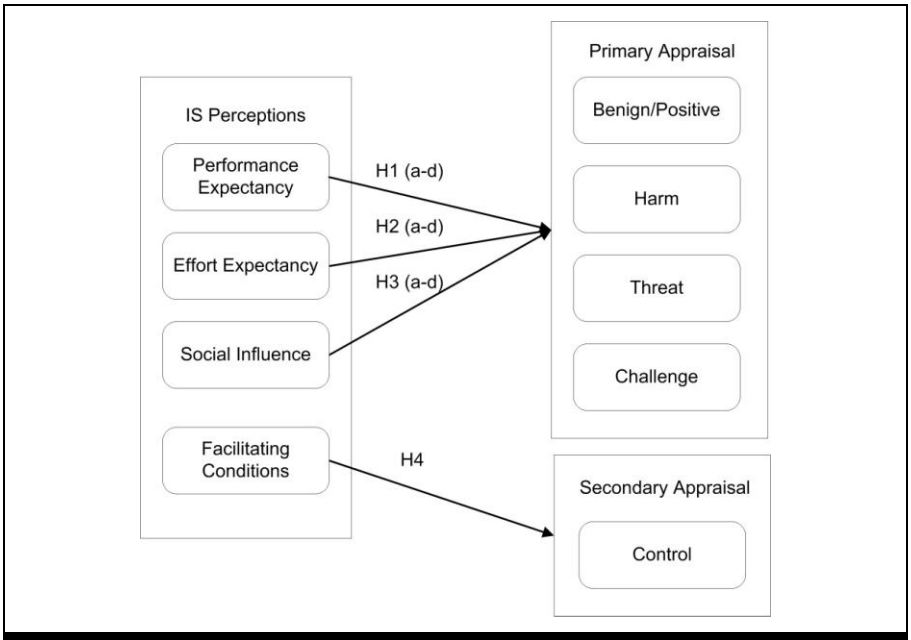

Figure 2: Theoretical Model

[2] Although compliance operates primarily through changing behavior, it may also intensify the appraisal of an IS as a threat if it is already perceived as such. Thus, while identification and internalization are expected to be the primary means by which social influence shapes appraisal, all three mechanisms of social influence may play a role in some cases.

IV. RESEARCH METHODOLOGY AND ANALYSIS

Subjects and Data Collection

Data collection was conducted via survey at the campus health department (CH) of a large public university. CH is a health care facility dedicated to promoting and preserving the health and wellness of university students, faculty, staff, and affiliates, and is organized according to the various functions and services it provides, including patient care, reception/scheduling, lab, pharmacy, radiology, and so forth. To address various process inefficiencies and remain on the forefront of medical service technology, CH acquired and implemented a third-party integrated Electronic Medical System (EMS). The EMS provided a unified software platform for managing electronic medical records, patient scheduling, patient billing, and lab and pharmacy ordering. Although implementation efforts with select user sub-groups had been underway for approximately 1.5 years, most users had been using the system for less than one year at the time of data collection. Because the EMS completely replaced all previous systems and processes, its use was mandatory for CH employees. Further, it met the key characteristics of mandatory technology use suggested by Brown et al. [2002]: it was necessary to complete job tasks and employees were dependent on one another's use of the system in order to access needed information.

Before administering the survey, interviews were conducted with specific CH managers in order to ensure that survey items were worded clearly and appropriately. An e-mail was then sent to all other CH employees inviting them to fill out the online survey. A web-based survey was chosen for this study because it was preferred by CH management and because all CH employees had easy access to the Internet at work. An incentive to participate was provided by entering participants in a drawing to receive one of five gift certificates to a popular online retailer. Of 65 targeted participants, 57 usable responses were received, resulting in an approximate response rate of 87 percent—a highly representative sample. Respondents were 85 percent female with a mean age of forty-six years and an average tenure of eight years at CH.

Measurement

This study utilized measures that have been validated in prior research (see Appendix A). Following Venkatesh et al. [2003], measures for IS perceptions were adopted from root constructs of performance expectancy, effort expectancy, social influence, and facilitating conditions. For instance, performance expectancy is measured using items originally designed to assess perceived usefulness [Davis 1989; Davis et al. 1989], a key root construct of effort expectancy. Similarly, effort expectancy and social influence are measured using validated scales of perceived ease of use [Davis 1989; Davis et al. 1989] and subjective norm [Ajzen 1991; Davis et al. 1989], respectively. Items measuring facilitating conditions include those of Thompson et al. [1991] as well as measures of perceived behavioral control from Ajzen [1991] and Taylor and Todd [1995b].

Items measuring appraisal were adapted from the Cognitive Appraisal of Health Scale (CAHS) [Ahmad 2004; Kessler 1998], developed to measure appraisal of health crisis events such as illness or injury. The CAHS was chosen for this study because of its validated psychometric properties, and because many of the items in the instrument were generalizable to a non-health-related context. Drawing conceptually from the transactional model of coping [Lazarus and Folkman 1984], CAHS improves on earlier appraisal scales [e.g., Folkman et al. 1986a; Folkman et al. 1986b] by incorporating reflective measures for each dimension of primary appraisal identified by the transactional model (i.e., benign/positive, threat, harm, challenge), as well as a formative measure of secondary appraisal developed by Lazarus and Folkman [1984].[3] The specific scale items used in this study were selected based on their factor loadings in earlier studies [Ahmad 2004; Kessler 1998], as well as their fit for an IS context. In addition, because interviews revealed that most CH employees evaluated the EMS in terms of its impact on patient care, an item reflecting this impact was included in the appraisal scales.

Analysis Methods

Partial Least Squares (PLS: PLSGraph Version 3.0 Build 1130) was used to test the research hypotheses. As in linear regression (e.g., OLS), PLS examines the significance of the relationships and their resulting R^2 [Gefen et al. 2000]. Path coefficients in PLS indicate the strength of the relationship between constructs and can be interpreted as regression coefficients between standardized variables. PLS was chosen rather than regression (e.g., OLS) because PLS allows the analysis of systems of independent and dependent variables at the same time, whereas regression does not. In addition PLS is more appropriate for predictive applications and theory building than is covariance-based SEM [Gefen et al. 2000]. The sample size requirement is 10 times the number of items in the most complex construct in the model [Barclay et al. 1995; Gefen et al. 2000]. The most complex construct in this

[3] The secondary appraisal scale is considered formative because items tap divergent user reactions rather than attempting to converge on a single underlying dimension, as with a reflective scale. See [Petter et al. 2007] for further discussion of formative vs. reflective constructs.

study is represented by five items and the sample size is 57. Hence, the sample size requirements for testing the model using PLS were met.

Measurement Model

As a first step, reliability and validity were evaluated for each construct in the model. Reliability was assessed by observing factor loading scores and by noting composite reliability [Raykov and Grayson 2003; Werts et al. 1974] as calculated in the PLS analysis. The items and their respective loadings are shown in Appendix A. All items (with the exception of the formative secondary appraisal items) exhibited a factor loading of at least 0.7 on their respective constructs. Composite reliability scores for each construct exceeded the 0.7 value recommended by Nunnally [1978], and are shown in Table 3. For the secondary appraisal scale, items denoting lack of control (SA1, SA4, SA5) were reverse-coded to clarify the interpretation of subsequent path coefficients. Because interpretation of formative constructs should focus on factor weights as opposed to factor loadings [Chin 1998; Petter et al. 2007], factor weights for each secondary appraisal item are reported in Appendix A.

Table 3: Means, Standard Deviations, PLS Composite Reliabilities

Construct	No. of Items	Mean	SD	Composite Reliability
Performance Expectancy	3	5.44	1.20	0.918
Effort Expectancy	3	5.67	1.22	0.942
Social Influence	2	5.65	1.12	0.875
Facilitating Conditions	5	5.75	0.99	0.896
Benign/Positive Appraisal	2	5.44	1.20	0.863
Harm Appraisal	3	2.14	1.10	0.840
Threat Appraisal	4	2.15	1.22	0.927
Challenge Appraisal	3	5.76	0.95	0.882
Secondary Appraisal	5	N/A	N/A	N/A

Convergent and discriminant validity were assessed by examining (1) average variance extracted (AVE); (2) item-construct correlations as generated by PLS; and (3) a modified multitrait-multimethod (MTMM) correlational approach. AVE is the percentage of the total variance of a measure represented or extracted by the variance due to the construct [Fornell and Larcker 1981; Gefen and Straub 2005], and ranges from 0 to 1. AVE values for each construct in this study are given in Table 4. Fornell and Larcker [1981] suggested that measures exhibiting convergent validity should contain less than 50 percent error variance (i.e., AVE should be 0.50 or above). Adequate discriminant validity at the construct level is established if the square root of AVE values (on the diagonal of Table 4) is greater than the off-diagonal correlations. Both of these criteria were met (excluding the formative secondary appraisal construct), indicating adequate convergent and discriminant validity.

Table 4: Construct AVEs and Inter-Construct Correlations

#	Construct	AVE	1	2	3	4	5	6	7	8	9
1	Performance Expectancy	0.788	**0.888**								
2	Effort Expectancy	0.843	0.704	**0.918**							
3	Social Influence	0.779	0.145	-0.043	**0.883**						
4	Facilitating Conditions	0.634	0.606	0.790	0.143	**0.796**					
5	Benign/ Positive Appraisal	0.759	0.571	0.822	-0.095	0.620	**0.871**				
6	Harm Appraisal	0.636	-0.625	-0.736	0.059	-0.661	-0.644	**0.797**			
7	Threat Appraisal	0.763	-0.497	-0.614	-0.102	-0.662	-0.589	0.723	**0.873**		
8	Challenge Appraisal	0.715	0.779	0.684	0.206	0.703	0.660	-0.664	-0.634	**0.846**	
9	Secondary Appraisal	N/A	0.392	0.552	0.052	0.666	0.602	-0.494	-0.534	0.448	**N/A**

While measures of the IS perceptions in our model have been widely used and validated in MIS research, items measuring the dependent appraisal constructs have not been so validated. Following the procedure outlined by Gefen and Straub [2005], a second validity check for these items was performed by correlating responses with latent variable scores derived from the PLS analysis to ensure that items correlated more strongly (at least one order of magnitude higher according to Gefen and Straub) with their assigned construct than with any other appraisal construct. The results of this analysis (shown in Table 5) confirm that appraisal items display adequate discriminant validity.

Table 5: Appraisal Item-Construct Correlations

	TA	HA	BPA	CA
TA1	**0.925**	0.679	-0.382	-0.639
TA2	**0.913**	0.687	-0.559	-0.613
TA3	**0.887**	0.675	-0.421	-0.594
TA4	**0.768**	0.503	-0.314	-0.384
HA1	0.445	**0.799**	-0.394	-0.499
HA2	0.666	**0.794**	-0.446	-0.656
HA3	0.620	**0.788**	-0.410	-0.453
BPA1	-0.520	-0.551	**0.917**	0.556
BPA2	-0.335	-0.398	**0.871**	0.482
CA1	-0.380	-0.595	0.386	**0.830**
CA2	-0.641	-0.583	0.418	**0.913**
CA3	-0.638	-0.546	0.683	**0.800**

Finally, because our study included both formative and reflective constructs, we conducted a third validity test using a modified MTMM approach that has been utilized in prior IS studies [e.g., Loch et al. 2003; Lowry et al. 2009; Marakas et al. 2007]. In this approach, construct scores for each respondent are calculated by computing the product of each observed score with its factor loading for reflective constructs, or its factor weight for formative constructs. These products are then summed for each construct to compute an overall weighted construct score for each observation. Finally, bivariate Pearson correlation coefficients are computed for each inter-item and item-construct pair. In general, convergent and discriminant validity are supported if the items for a specific construct are highly correlated with both each other and their assigned construct and less highly correlated with the measures of other constructs. As shown in the correlation table in Appendix B, nearly all of the items exhibited correlation patterns confirming convergent and discriminant validity, with the exception of some of the items measuring the formative secondary appraisal construct. However, as noted by Lowry et al. [2009, p. 177], in the presence of formative constructs these guidelines "cannot be strictly enforced as there are exceptions depending on the theoretical nature of the formative measure." In other words, the composite nature of formative measures may produce correlation patterns that do not converge in the way that would be expected of reflective measures [Petter et al. 2007]. Moreover, Campbell and Fiske [1959] note that statistical distributions in a large matrix will produce exceptions that may not be meaningful; thus, theoretical judgment must be exercised in interpreting results. Because of its established theoretical basis in the coping literature and the composite nature of its items (which would account for non-convergent correlations), we chose to retain the secondary appraisal scale.

Structural Model

Given some high inter-construct correlations among independent variables (see Table 4), our first step in testing the structural model was to check for the presence of multicollinearity by calculating variance-inflation factor (VIF) scores for each of the independent variables. VIF values ranged from 1.28 for social influence to 2.09 for performance expectancy—well below the commonly accepted maximum threshold of 10 [Hair et al. 2005] or the more stringent threshold of 3.3 for formative indicators [Petter et al. 2007]. Hence, multicollinearity was not deemed a problem for our analysis. A bootstrapping resampling procedure (200 samples) was used to test the significance of path coefficients. The results of the analysis are shown in Table 6.

As hypothesized, performance expectancy was negatively related to harm appraisal (H1b) and positively related to challenge appraisal (H1d) of the IS. However, no significant relationship was found between performance expectancy and benign/positive (H1a) or threat (H1c) IS appraisal. Effort expectancy related strongly with all

dimensions of primary appraisal, exhibiting significant positive relationships with benign/positive and challenge appraisals (H2a, H2d) and significant negative relationships with harm and threat appraisals (H2b, H2c). Of the hypothesized effects of social influence on primary appraisal outcomes (H3a-H3d), only the relationship with challenge appraisal was significant (H3d). Finally, the positive relationship between facilitating conditions and control in secondary appraisal was supported (H4).

Table 6: Results of Hypothesis Testing

	Hypothesized relation to:				
	Primary Appraisal				**Secondary Appraisal**
Individual IS Perceptions	Benign/ Positive (R^2=0.68**)	Harm (R^2=0.57**)	Threat (R^2=0.40**)	Challenge (R^2=0.66**)	Control (R^2=0.44**)
Performance Expectancy (H1a-H1d)	0.006	**-0.235****	-0.089	**0.540****	
Effort Expectancy (H2a-H2d)	**0.815****	**-0.568****	**-0.556****	**0.310****	
Social Influence (H3a-H3d)	-0.061	0.068	-0.113	**0.141***	
Facilitating Conditions (H4)					**0.666****

Numbers in table are PLS path coefficients
Supported Hypotheses are in bold

* $p \leq 0.05$
** $p \leq 0.01$

Two additional tests were performed to assess the validity of our analysis. First, our modest sample size warranted a test of statistical power. Our primary objective was to detect large effect sizes, since such effects are most interesting both theoretically and practically. Power analyses [Chin and Newsted 1999; Cohen 1988] yielded high power (> 0.80) for detecting effects of this magnitude. Second, because both dependent and independent variables were measured using the same cross-sectional survey, we tested for the presence of common method variance (CMV). CMV is the amount of spurious covariance among variables that is attributable not to any theoretical relationship between the variables, but to the common method used to measure them. To test for CMV, we employed the marker variable test [Lindell and Whitney 2001; Malhotra et al. 2006], in which the correlation between theoretical variables and an unrelated "marker variable" is used to estimate the level of CMV present in the analysis. CMV is deemed problematic when previously significant correlations between theoretical variables become non-significant after adjusting for the marker variable correlation. While a marker variable can be selected a priori and purposely included in the measurement instrument, an alternative is to use the second-largest positive correlation as a proxy for CMV [Lindell and Whitney 2001]. Using the procedures outlined by Malhotra et al. [2006] we computed an adjusted correlation matrix using 0.059 ($r_{\text{Social Influence x Harm Appraisal}}$) as an estimate for CMV. The resulting matrix exhibited identical significance patterns among theoretical variables. Hence, CMV was not deemed a threat to our analysis.

V. DISCUSSION, IMPLICATIONS, AND LIMITATIONS

The results of this study indicate that salient perceptions identified in IS adoption and use research do impact primary and secondary appraisals of an IS, though some perceptions seem to have stronger influence than others. As anticipated, effort expectancy exhibited significant relationships with all primary appraisal outcomes, while performance expectancy related positively to challenge appraisal and negatively to harm appraisal. This supports our proposition that performance- and effort-related perceptions play a key role in shaping users' appraisal of an IS. Also supported was the hypothesis that the presence of facilitating conditions relates positively to appraisals of high control in responding to an IS. Together, these results imply that organizational efforts directed at improving users' performance and effort expectancies, coupled with the provision of enabling facilitating conditions, should improve the way users appraise a new workplace IS and, as suggested by other researchers [e.g., Beaudry and Pinsonneault 2005], the performance benefits derived from its use.

In contrast to these expected results, performance expectancy did not relate significantly to threat or to benign/positive primary appraisal, suggesting that, at least for this sample, performance-related perceptions associated with the IS did not factor into evaluation of the IS as positive or threatening. However, as noted above, performance expectancy did relate significantly to harm appraisal. This combination of results could be due to users using the system for enough time that gains or losses in performance had already occurred and were no longer an issue. In such a case, performance losses from using the IS would be reflected in harm appraisals of the system, i.e., performance impairments that had already occurred. Additionally, social influence surrounding use of the IS did not seem to be a strong indicator of primary appraisal, significantly relating only to challenge IS appraisal. In terms of the evolving nature of IS appraisal and use, this result is consistent with at least two possible scenarios. First, social influence may play a role in early IS appraisal, but wane in its effect on later IS appraisal. This explanation would be consistent with the observed relationship between social influence and intention to use an IS, which, though initially significant, attenuates over time as the user gains increased personal experience with the IS [e.g., Agarwal and Prasad 1997; Karahanna et al. 1999; Venkatesh and Davis 2000]. Alternatively, it is possible that appraisal is based primarily on effort and performance impacts associated with the system, and that social influence has little or no impact on IS appraisal at any point in the use lifecycle. Future longitudinal studies can examine these alternatives in more detail.

Viewing the results in terms of appraisals (the columns in Table 6) highlights an interesting pattern. Of all primary appraisal outcomes, only challenge appraisal relates significantly to all three perceptions of performance expectancy, effort expectancy, and social influence. Challenge appraisal is distinctive because it entails both positive and negative components (e.g., anticipation of gain or growth coupled with stress), while other appraisals are primarily positive or negative. Hence, while other types of appraisals could be principally shaped by one or two IS perceptions, appraising IS as challenging might arise from the combination of several perceptions. For example, a user may feel a degree of threat from perceived difficulty of using the system while simultaneously recognizing positive performance enhancements that could derive from its use. This juxtaposition of positive and negative perceptions could produce simultaneous benign/positive-harm-threat reactions that culminate in appraisal of the IS as a challenge. Such a scenario would be consistent with observations of coping theorists that positive and negative appraisals are not always mutually exclusive and can produce mixed adaptive reactions [Lazarus and Folkman 1984]. Exploring the specific perceptual combinations that drive IS appraisal and subsequent use behavior is clearly an important avenue for future research.

As with any research, this study has limitations. From a theoretical perspective, our parsimonious analysis has focused on UTAUT perceptions as antecedents to IS appraisal. This approach is consistent with recent recommendations identifying UTAUT factors as the primary antecedents of IS-use related behaviors [Jasperson et al. 2005; Venkatesh et al. 2003]. However, other factors might also play a role in shaping appraisal outcomes. For instance, individual characteristics such as commitment [Lewis et al. 2003; Newman and Sabherwal 1996], self-efficacy [Compeau and Higgins 1995], and personal innovativeness [Agarwal and Prasad 1998a; Agarwal and Prasad 1998b] have been shown to impact the human-system dynamic, and might also influence IS appraisal. In addition, variables such as gender, age, and experience that have been shown to moderate UTAUT relationships may also play a role. Future research should thus examine an expanded set of appraisal determinants. From a methodological perspective, the use of a cross-sectional survey limits the degree to which causal relationships among constructs can be definitively ascertained. Although this paper draws on well-established theory to identify causal mechanisms at play, future research should include longitudinal assessment of IS perceptions and appraisals. Such an approach can also yield additional insight into the evolving impact of specific technology perceptions on the appraisal process. Further, the reliance on a single company raises questions regarding the generalizability of the results. Future work should vary the type and size of organization studied. Finally, although adequate for the PLS method, the modest sample size of the present analysis warrants some caution in interpreting the results of this study, particularly the non-significant relationships.

Implications for Research and Practice

This work makes important contributions to both research and practice. First, from a theoretical perspective, we expand on the work of Beaudry and Pinsonneault by (a) empirically linking key IS perceptions to the appraisal process identified in CMUA, and (b) expanding CMUA's opportunity/threat appraisal outcomes to include a more detailed set of appraisal outcomes identified in the coping literature. In so doing, we lay the groundwork for more nuanced investigations of how particular perceptions prompt unique combinations of appraisal outcomes, and how appraisal outcomes shape patterns of post-adoptive use. For example, future research might address such issues as differences in use behavior resulting from benign/positive vs. challenge IS appraisals, or how particular appraisals change over time as beliefs are modified.

Second, our results highlight a possible divergence in the pattern of factors affecting IS appraisal and intention to use the IS. Past studies of post-adoptive IS use have suggested that the effect of effort expectancy on post-adoptive use intentions diminishes over time, while performance expectancy remains a strong determinant of intention to use an IS [e.g., Agarwal and Prasad 1997; Bhattacherjee 2001; Karahanna et al. 1999]. Our results, however, suggest that effort expectancy continues to play a pivotal role in shaping post-adoptive IS appraisal, a finding that could have important implications for understanding ongoing use of today's increasingly complex and feature-rich organizational IS. Researchers have observed that even after organizational and individual-level adoption decisions have been made, users retain considerable discretion in the adoption, use, and extension of particular IS features [Hartwick and Barki 1994; Jasperson et al. 2005]. The way the user appraises an IS may determine these behaviors beyond mere intention to use the IS as a whole [Brown et al. 2002]. For instance, a user who is required to use an IS in her work but feels that significant effort must be devoted to using the IS appropriately may intend to use the IS (due in part to mandated use), but may still appraise it as a threat due to the high effort associated with its use. Such an appraisal may result in the user doing enough to "get by" with the system without incurring the effort expenditure to master more advanced features [Boudreau and Seligman 2005; Robey et al. 2002]. Conversely, a user who intends to use an IS due to pressure from superiors or peers but who also views the IS as benefiting her job performance should be more likely to engage in exploratory and emergent use behaviors that enhance the IS's individual and organizational benefits [De Sousa 2005; Nambisan et al. 1999]. Thus, while intention may drive the *occurrence* of IS use to maintain compliance with organizational mandate, appraisal may impact the *type* or *quality* of use in which the user engages. Future research should examine the evolution of appraisal and intention and how appraisal impacts subsequent adaptation and IS use behaviors. In particular, exploring how appraisals change from early adoption to full integration and routinization of the system, and how these appraisals continue to shape adaptation behaviors and intention to use the system, would be particularly important extensions of this work.

For IS practitioners, this study identifies salient factors that shape ongoing appraisal of an IS, an essential prerequisite for designing interventions to help users achieve desired IS use outcomes. Our results suggest that organizations interested in improving ongoing end-user IS appraisal should focus primarily on monitoring and addressing performance- and effort-related perceptions throughout the IS use lifecycle. Possible post-implementation interventions may include ongoing user training and development programs customized to help users overcome use difficulties and develop use skills that can enhance their individual performance. Finally, our results suggest that organizations striving to engender a sense of control among end users should ensure that adequate facilitating conditions supporting use of the IS are in place.

VI. CONCLUSION

IS researchers have acknowledged that technology adoption models are inadequate for explaining post-adoptive IS use behavior, while simultaneously recognizing the need for post-adoptive use theories to build on key acceptance constructs. Coping theory has been identified as a promising lens for understanding post-adoptive IS use behaviors. This study has taken an initial step toward integrating coping theory with theories of IS acceptance and use by examining how key IS perceptions influence cognitive IS appraisal. Analysis of our survey data indicated that perceptions do impact appraisal; specifically, performance and effort expectancy were noteworthy predictors of primary appraisal outcomes while facilitating conditions determined secondary appraisal outcomes. Future research should build on this step by examining subsequent stages of the coping process, including how primary and secondary appraisal outcomes impact coping behaviors, and how coping behaviors impact situational outcomes (e.g., IS use levels and performance).

REFERENCES

Editor's Note: The following reference list contains hyperlinks to World Wide Web pages. Readers who have the ability to access the Web directly from their word processor or are reading the paper on the Web, can gain direct access to these linked references. Readers are warned, however, that:

1. These links existed as of the date of publication but are not guaranteed to be working thereafter.
2. The contents of Web pages may change over time. Where version information is provided in the References, different versions may not contain the information or the conclusions referenced.
3. The author(s) of the Web pages, not AIS, is (are) responsible for the accuracy of their content.
4. The author(s) of this article, not AIS, is (are) responsible for the accuracy of the URL and version information.

Agarwal, R., and J. Prasad (1997) "The Role of Innovation Characteristics and Perceived Voluntariness in the Acceptance of Information Technologies", *Decision Sciences* (28)3, pp. 557–582.

Agarwal, R., and J. Prasad (1998a) "The Antecedents and Consequents of User Perceptions in Information Technology Adoption", *Decision Support Systems* (22)1, pp. 15–29.

Agarwal, R., and J. Prasad (1998b) "A Conceptual and Operational Definition of Personal Innovativeness in the Domain of Information Technology", *Information Systems Research* (9)2, pp. 204–215.

Ahmad, M.M. (2004) "Psychometric Evaluation of the Cognitive Appraisal of Health Scale with Patients with Prostate Cancer", *Journal of Advanced Nursing* (49)1, pp. 78–86.

Ajzen, I. (1991) "The Theory of Planned Behavior", *Organizational Behavior and Human Decision Processes* (50)2, pp. 179–211.

Arnetz, B.B. (1997) "Technical Stress: Psychophysiological Aspects of Working with Modern Information Technology", *Scandinavian Journal of Work, Environment & Health* (23)3, pp. 97–103.

Barclay, D., R. Thompson, and C. Higgins (1995) "The Partial Least Squares (Pls) Approach to Causal Modeling: Personal Computer Adoption and Use an Illustration", *Technology Studies* (2)2, pp. 285–309.

Beaudry, A., and A. Pinsonneault (2005) "Understanding User Responses to Information Technology: A Coping Model of User Adaptation", *MIS Quarterly* (29)3, pp. 493–524.

Benbasat, I., and H. Barki (2007) "Quo Vadis, Tam?" *Journal of the Association for Information Systems* (8)4, pp. 212–218.

Bhattacherjee, A. (2001) "Understanding Information Systems Continuance: An Expectation- Confirmation Model", *MIS Quarterly* (25)3, pp. 351–370.

Bhattacherjee, A., J. Perols, and C. Sanford (2008) "Information Technology Continuance: A Theoretic Extension and Empirical Test", *Journal of Computer Information Systems* (49)1, pp. 17–26.

Boudreau, M.-C., and L. Seligman (2005) "Quality of Use of a Complex Technology: A Learning-Based Model", *Journal of Organizational and End User Computing* (17)4, pp. 1–22.

Brown, S.A., et al. (2002) "Do I Really Have To? User Acceptance of Mandated Technology", *European Journal of Information Systems* (11)4, pp. 283–295.

Campbell, D.T., and D.W. Fiske (1959) "Convergent and Discriminant Validation by the Multitrait-Multimethod Matrix", *Psych. Bulletin* (56)2, pp. 81–105.

Chin, W., and P. Newsted (1999) Structural Equation Modeling Analysis with Small Samples Using Partial Least Squares, in R. Hoyle (ed.) *Statistical Strategies for Small Sample Research*, Thousand Oaks, CA: Sage, pp. 307–341.

Chin, W.W. (1998) The Partial Least Squares Approach to Structural Equation Modeling, in G.A. Marcoulides (ed.) *Modern Methods for Business Research*, London, pp. 295–336.

Chin, W.W., and B.L. Marcolin (2001) "The Future of Diffusion Research", *The DATA BASE for Advances in Information Systems* (32)3, pp. 8–12.

Cohen, J. (1988) *Statistical Power Analysis for the Behavioral Sciences*, Hillsdale, NJ: Lawrence Erlbaum.

Compeau, D.R., and C.A. Higgins (1995) "Computer Self-Efficacy: Development of a Measure and Initial Test", *MIS Quarterly* (19)2, pp. 189–211.

Coyne, J.D., C. Aldwin, and R.S. Lazarus (1981) "Depression and Coping in Stressful Episodes", *Journal of Abnormal Psychology* (90)5, pp. 439–477.

Davis, F.D. (1989) "Perceived Usefulness, Perceived Ease of Use and User Acceptance of Information Technology", *MIS Quarterly* (13)3, pp. 319–340.

Davis, F.D., R.P. Bagozzi, and P.R. Warshaw (1989) "User Acceptance of Computer-Technology—A Comparison of Two Theoretical-Models", *Management Science* (35)8, pp. 982–1003.

Davis, F.D., R.P. Bagozzi, and P.R. Warshaw (1992) "Extrinsic and Intrinsic Motivation to Use Computers in the Workplace", *Journal of Applied Social Psychology* (22)14, pp. 1111–1132.

De Sousa, R.M.D. (2005) *Complex Information Technology Usage: Toward Higher Levels Through Exploratory Use—The Erp Systems Case,* Atlanta: The University of Georgia.

Dishaw, M.T., and D.M. Strong (1999) "Extending the Technology Acceptance Model with Task-Technology Fit Constructs", *Information & Management* (36)1, pp. 9–21.

Folkman, S., and R.S. Lazarus (1985) "If It Changes It Must Be a Process: Study of Emotion and Coping During Three Stages of a College Examination", *Journal of Personality and Social Psychology* (48)1, pp. 150–170.

Folkman, S., et al. (1986a) "Dynamics of a Stressful Encounter: Cognitive Appraisal, Coping, and Encounter Outcomes", *Journal of Personality and Social Psychology* (50)5, pp. 992–1003.

Folkman, S., et al. (1986b) "Appraisal, Coping, Health Status, and Psychological Symptoms", *Journal of Personality and Social Psychology* (50)3, pp. 571–579.

Fornell, C., and D. Larcker (1981) "Evaluating Structural Equation Models with Unobservable Variables and Measurement Error", *Journal of Marketing Research* (18)2, pp. 39–50.

Gallivan, M.J., V.K. Spitler, and M. Koufaris (2005) "Does Information Technology Training Really Matter? A Social Information Processing Analysis of Coworkers' Influence on It Usage in the Workplace", *Journal of Management Information Systems* (22)1, pp. 153–192.

Gefen, D., and D. Straub (2005) "A Practical Guide to Factorial Validity Using Pls-Graph: Tutorial and Annotated Example", *Communications of the Association for Information Systems* (16)5, pp. 91–109.

Gefen, D., D. Straub, and M. Boudreau (2000) "Structural Equation Modeling Techniques and Regression: Guidelines for Research Practice", *Communications of AIS* (7)7, pp. 1–78.

Goodhue, D.I., and R.L. Thompson (1995) "Task-Technology Fit and Individual Performance", *MIS Quarterly* (19)2, pp. 213–236.

Hair, J.F., Jr., et al. (2005) *Multivariate Data Analysis*, 6th edition, Upper Saddle River, NJ: Pearson Prentice Hall.

Hartwick, J., and H. Barki (1994) "Explaining the Role of User Participation in Information System Use", *Management Science* (40)4, pp. 440–465.

Jasperson, J., P.E. Carter, and R.W. Zmud (2005) "A Comprehensive Conceptualization of Post-Adoptive Behaviors Associated with Information Technology Enabled Work Systems", *MIS Quarterly* (29)3, pp. 525–558.

Kahn, H., and C.L. Cooper (1986) "Computing Stress", *Current Psychological Research & Reviews* (5)2, pp. 148–162.

Karahanna, E., D.W. Straub, and N.L. Chervany (1999) "Information Technology Adoption Across Time: A Cross-Sectional Comparison of Pre-Adoption and Post-Adoption Beliefs", *MIS Quarterly* (23)2, pp. 183–213.

Karasek, R.A. (1979) "Job Demands, Job Decision Latitude, and Mental Strain: Implications for Job Redesign", *Administrative Science Quarterly* (24)2, pp. 285–308.

Karasek, R.A., and T. Theorell (1990) *Health Work: Stress, Productivity, and the Reconstruction of Working Life*. New York: Basic Books.

Kelman, H.C. (1958) "Compliance, Identification, and Internalization: Three Processes of Attitude Change", *Journal of Conflict Resolution* (2)1, pp. 51–60.

Kessler, T.A. (1998) "The Cognitive Appraisal of Health Scale: Development and Psychometric Evaluation", *Research in Nursing & Health* (21)1, pp. 73–82.

Kimberly, J.R. (1987) Organizational and Contextual Influences on the Diffusion of Technological Innovation, in *New Technology as Organizational Innovation*, Cambridge, MA: Ballinger.

Korunka, C., and O. Vitouch (1999) "Effects of Implementation of Information Technology on Employees' Strain and Job Satisfaction: A Context-Dependent Approach", *Work & Stress* (13)4, pp. 341–363.

Korunka, C., S. Zauchner, and A. Weiss (1997) "New Information Technologies, Job Profiles, and External Workload as Predictors of Subjectively Experienced Stress and Dissatisfaction at Work", *International Journal of Human-Computer Interaction* (9)4, pp. 407–424.

Lapointe, L., and S. Rivard (2007) "A Triple Take on Information System Implementation", *Organization Science* (18)1, pp. 89-107.

Lazarus, R.S., and S. Folkman (1984) *Stress, Appraisal, and Coping*. New York: Springer Publishing Company.

Lee, Y., and K.R. Larsen (2009) "Threat or Coping Appraisal: Determinants of SMB Executives' Decision to Adopt Anti-Malware Software", *European Journal of Information Systems* (18)2, pp. 177–187.

Lewis, W., R. Agarwal, and V. Sambamurthy (2003) "Sources of Influence on Beliefs About Information Technology Use: An Empirical Study of Knowledge Workers", *MIS Quarterly* (27)4, pp. 657–678.

Liang, H., and Y. Xue (2009) "Avoidance of Information Technology Threats: A Theoretical Perspective", *MIS Quarterly* (33)1, pp. 71–90.

Lindell, M.K., and D.J. Whitney (2001) "Accounting for Common Method Variance in Cross-Sectional Research Designs", *Journal of Applied Psychology* (86)1, pp. 114–121.

Loch, K.D., D.W. Straub, and S. Kamel (2003) "Diffusing the Internet in the Arab World: The Role of Social Norms and Technological Culturation", *IEEE Transactions on Engineering Management* (50)1, pp. 45–63.

Lowry, P.B., et al. (2009) "The Cmc Interactivity Model: How Interactivity Enhances Communication Quality and Process Satisfaction in Lean-Media Groups", *Journal of Management Information Systems* (26)1, pp. 155–195.

Mabert, V.A., A. Soni, and M.A. Venkataramanan (2001) "Enterprise Resource Planning: Common Myths Versus Evolving Reality", *Business Horizons* (44)3, pp. 69–76.

Majchrzak, A., R.E. Rice, A. Malhotra, N. King, et al. (2000) "Technology Adaptation: The Case of a Computer-Supported Inter-Organizational Virtual Team", *MIS Quarterly* (24)4, pp. 569–600.

Malhotra, N.K., S.S. Kim, and A. Patil (2006) "Common Method Variance in Is Research: A Comparison of Alternative Approaches and a Reanalysis of Past Research", *Management Science* (52)12, pp. 1865–1883.

Marakas, G.M., R.D. Johnson, and P.F. Clay (2007) "The Evolving Nature of the Computer Self-Efficacy Construct: An Empirical Investigation of Measurement Construction, Validity, Reliability, and Stability over Time", *Journal of the Association for Information Systems* (8)1, pp. 16–46.

Markus, M.L., (1983) "Power, Politics, and MIS Implementation", *Communications of the ACM* (26), pp. 430–444.

McRae, R.R. (1984) "Situation Determinants of Coping Responses: Loss, Threat, and Challenge", *Journal of Personality and Social Psychology* (46)4, pp. 919–928.

Moore, G.C., and I. Benbasat, "Development of an Instrument to Measure the Perceptions of Adopting an Information Technology Innovation", *Information Systems Research* (September 1991), pp. 192–223.

Nambisan, S., R. Agarwal, and M. Tanniru (1999) "Organizational Mechanisms for Enhancing User Innovation in Information Technology", *MIS Quarterly* (23)3, pp. 365–396.

Newman, M., and R. Sabherwal (1996) "Determinants of Commitment to Information Systems Development: A Longitudinal Investigation", *MIS Quarterly* (20)1, pp. 23–54.

Nunnally, J.C. (1978) *Psychometric Theory*, New York: McGraw-Hill.

Parkes, K.R. (1984) "Locus of Control, Cognitive Appraisal, and Coping in Stressful Episodes", *Journal of Personality and Social Psychology* (46)3, pp. 655–668.

Petter, S., D.W. Straub, and A. Rai (2007) "Specifying Formative Constructs in Information Systems Research", *MIS Quarterly* (31)4, pp. 623–656.

Raykov, T., and D.A. Grayson (2003) "A Test for Change of Composite Reliability in Scale Development", *Multivariate Behavioral Research* (38)2, pp. 143–159.

Robey, D., J.W. Ross, and M.-C. Boudreau (2002) "Learning to Implement Enterprise Systems: An Exploratory Study of the Dialectics of Change", *Journal of Management Information Systems* (19)1, pp. 17–46.

Salanova, M., and W.B. Schaufeli (2000) "Exposure to Information Technology and Its Relation to Burnout", *Behaviour & Information Technology* (19)5, pp. 385–392.

Shen, Y., and M. Gallivan, “An Empirical Test of the Job Demand/control Model among IT Users”, ACM SIGMIS Conference on Computer Personnel Research, Tucson, AZ, 2004, pp. 39–47.

Taylor, S., and P. Todd, (1995a) "Assessing IT Usage: The Role of Prior Experience”, *MIS Quarterly* 19:4, pp. 561–570.

Taylor, S., and P.A. Todd, (1995b) "Understanding Information Technology Uusage—A Test of Competing Models”, *Information Systems Research* 6:2, pp. 144–176.

Thompson, R.L., C.A. Higgins, and J.M. Howell (1991) "Personal Computing: Toward a Conceptual Model of Utilization”, *MIS Quarterly* (15)1, pp. 125–142.

Thompson, R.L., C.A. Higgins, and J.M. Howell (1994) "Influence of Experience on Personal Computer Utilization: Testing a Conceptual Model”, *Journal of Management Information Systems* (11)1, pp. 167–187.

Triandis, H.C., “Values, Attitudes, and Interpersonal Behavior”, *Nebraska Symposium on Motivation, 1979: Beliefs, Attitudes and Values,* Lincoln, NE, 1979, pp. 195–259.

Van der Doef, M. and S. Maes (1999) "The Job-Demand-Control-Support Model of Psychological Well-Being: A Review of 20 Years of Empirical Research”, *Work & Stress* (13)2, pp. 87–114.

Venkatesh, V. (1999) "Creation of Favorable User Perceptions: Exploring the Role of Intrinsic Motivation”, *MIS Quarterly* (23)2, pp. 239–260.

Venkatesh, V., and H. Bala (2008) "Technology Acceptance Model 3 and a Research Agenda on Interventions”, *Decision Sciences* (39)2, pp. 273–315.

Venkatesh, V., and F.D. Davis (2000) "A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies”, *Management Science* (46)2, pp. 186–204.

Venkatesh, V., et al. (2003) "User Acceptance of Information Technology: Toward a Unified View”, *MIS Quarterly* (27)3, pp. 425–478.

Wei, W., et al. (2008) "Innovate with Complex Information Technologies: A Theoretical Model and Empirical Examination”, *Journal of Computer Information Systems* (49)1, pp. 27–36.

Werts, C.E., R.L. Linn, and K.G. Joreskog (1974) "Intraclass Reliability Estimates: Testing Structural Assumptions”, *Educational Psychology Measurement* (34)1, pp. 25–33.

Zuboff, S. (1988) *In the Age of Smart Machines*: Basic Books.

APPENDIX A: CONSTRUCTS AND MEASURES

Construct	Abbreviation	Item	PLS Loading/Factor Weight
Performance Expectancy (PE)	PE1	Using Point n' Click enhances my effectiveness on the job.	0.89
	PE2	Using Point n' Click in my job increases my productivity.	0.88
	PE3	I find Point n' Click useful in my job.	0.88
Effort Expectancy (EE)	EE1	I find Point n' Click easy to use.	0.94
	EE2	Learning to operate Point n' Click has been easy for me.	0.87
	EE3	My interaction with Point n' Click is clear and understandable.	0.93
Social Influence (SI)	SI1	People who are important to me think that I should use Point n' Click.	0.82
	SI2	People who influence me in my work think that I should use Point n' Click.	0.93
Facilitating Conditions (FC)	FC1	Guidance in using Point n' Click is available to me.	0.88
	FC2	Specialized instruction concerning Point n' Click is available to me.	0.76
	FC3	A specific person (or group) is available for assistance with Point n' Click difficulties.	0.76
	FC4	I have the resources necessary to use Point n' Click.	0.84
	FC5	I have the knowledge necessary to use Point n' Click.	0.71
Benign/Positive Appraisal (BPA)	BPA1	Using Point n' Click is NOT stressful for me.	0.89
	BPA2	I feel I have nothing to lose because of Point n' Click.	0.84
Harm Appraisal (HA)	HA1	I haven't been able to do my job the way I want because of Point n' Click.	0.81
	HA2	I have had to give up a great deal at work because of Point n' Click.	0.79
	HA3	I have been harmed in some way by using Point n' Click.	0.78
Threat Appraisal (TA)	TA1	I feel that things at Campus Health will not go well due to Point n' Click.	0.92
	TA2	I feel I have a lot to lose because of Point n' Click.	0.91
	TA3	I worry about what is happening at work because of Point n' Click.	0.88
	TA4	I feel that using Point n' Click negatively affects the quality of care delivered to Campus Health patients.	0.76
Challenge Appraisal (CA)	CA1	I view Point n' Click as a chance to change for the better.	0.82
	CA2	I see Point n' Click as a chance to develop new skills.	0.90
	CA3	I feel that I am successfully managing the transition to Point n' Click.	0.79
Secondary Appraisal (SA)*	SA1+	I feel that I have to hold back from doing what I want in my job because of Point n' Click.	0.35*
	SA2	I feel that I can do something about the transition to Point n' Click.	0.14*
	SA3	I feel that there is nothing that I need to do about the transition to Point n' Click.	0.34*
	SA4+	I feel that I need to know more about Point n' Click before I can respond appropriately	0.76*
	SA5+	I feel that I have to accept Point n' Click.	0.57*

* Indicates formative construct. Numbers in right column are factor weights rather than factor loadings
+ Reverse-coded

APPENDIX B: INTER-ITEM AND ITEM-TO-CONSTRUCT CORRELATIONS

	PE1	PE2	PE3	**PE**	EE1	EE2	EE3	**EE**	SI1	SI2	**SI**	FC1	FC2	FC3	FC4	FC5	**FC**
PE1	---																
PE2	.813**	---															
PE3	.667**	.644**	---														
PE	.930**	.935**	.820**	---													
EE1	.604**	.578**	.660**	.672**	---												
EE2	.523**	.498**	.481**	.556**	.742**	---											
EE3	.637**	.653**	.674**	.715**	.875**	.758**	---										
EE	.576**	.625**	.664**	.683**	.905**	.863**	.946**	---									
SI1	.118	.028	.225	.120	.060	-.153	.082	.019	---								
SI2	.013	-.077	.084	-.006	-.106	-.276	-.008	-.126	.496**	---							
SI	.085	-.050	.168	.057	-.025	-.131	.070	-.027	.578**	.878**	---						
FC1	.467**	.312*	.517**	.460**	.578**	.580**	.588**	.654**	.080	.157	.123	---					
FC2	.411**	.380**	.405**	.439**	.385**	.526**	.467**	.531**	-.032	.105	.057	.667**	---				
FC3	.330*	.180	.329*	.297*	.574**	.675**	.515**	.609**	-.081	-.067	-.112	.787**	.561**	---			
FC4	.477**	.445**	.668**	.565**	.717**	.575**	.809**	.789**	.227	.253	.288*	.709**	.520**	.460**	---		
FC5	.471**	.430**	.569**	.529**	.607**	.581**	.751**	.704**	.105	.080	.230	.461**	.317*	.295*	.759**	---	
FC	.404**	.290*	.571**	.443**	.582**	.569**	.589**	.639**	.072	.168	.356**	.918**	.646**	.794**	.845**	.572**	---
BPA1	.373**	.321*	.471**	.417**	.677**	.685**	.651**	.693**	-.099	.094	.014	.504**	.363**	.520**	.562**	.589**	.564**
BPA2	.372**	.322*	.264	.359*	.517**	.421**	.487**	.463**	-.163	.187	.004	.306*	.305*	.358*	.280	.216	.376**
BPA	.283*	.212	.385**	.309*	.512**	.563**	.511**	.533**	-.187	.133	.078	.494**	.373**	.579**	.490**	.359**	.624**
HA1	-.485**	-.492**	-.579**	-.564**	-.666**	-.491**	-.587**	-.612**	.120	.159	.044	-.221	-.280*	-.228	-.480**	-.468**	-.399**
HA2	-.445**	-.365**	-.452**	-.458**	-.541**	-.629**	-.528**	-.578**	.024	.094	.074	-.545**	-.552**	-.735**	-.422**	-.208	-.619**
HA3	-.239	-.302*	-.555**	-.381**	-.544**	-.399**	-.577**	-.605**	-.084	.041	-.045	-.557**	-.282*	-.503**	-.450**	-.366**	-.568**
HA	-.534**	-.539**	-.642**	-.622**	-.755**	-.605**	-.711**	-.757**	-.008	.113	.112	-.547**	-.429**	-.566**	-.581**	-.455**	-.429**
TA1	-.362**	-.414**	-.608**	-.490**	-.507**	-.375**	-.562**	-.528**	-.088	-.100	-.020	-.547**	-.343*	-.441**	-.561**	-.414**	-.577**
TA2	-.338*	-.349*	-.517**	-.428**	-.647**	-.462**	-.615**	-.599**	-.114	-.066	-.113	-.609**	-.373**	-.607**	-.527**	-.423**	-.665**
TA3	-.331*	-.302*	-.470**	-.392**	-.465**	-.598**	-.600**	-.568**	-.010	.016	-.075	-.604**	-.555**	-.612**	-.572**	-.506**	-.683**
TA4	-.234	-.258	-.458**	-.332*	-.390**	-.343*	-.385**	-.397**	.060	.084	.126	-.363**	-.198	-.276	-.312*	-.251	-.353*
TA	-.384**	-.405**	-.558**	-.482**	-.569**	-.489**	-.614**	-.591**	-.070	-.023	.050	-.595**	-.393**	-.508**	-.555**	-.459**	-.444**
CA1	.697**	.611**	.702**	.733**	.609**	.389**	.560**	.529**	.098	.141	.193	.361*	.402**	.294*	.583**	.537**	.532**
CA2	.580**	.566**	.693**	.666**	.512**	.419**	.627**	.541**	.020	.091	.018	.523**	.397**	.487**	.513**	.457**	.575**
CA3	.474**	.385**	.578**	.513**	.567**	.602**	.666**	.624**	.065	.174	.074	.625**	.367**	.627**	.556**	.488**	.645**
CA	.332*	.239	.520**	.378**	.389**	.456**	.430**	.431**	-.044	.048	.229	.527**	.429**	.677**	.563**	.342*	.784**
SA1	.354*	.321*	.406**	.391**	.533**	.321*	.504**	.447**	-.020	-.072	.028	.226	.250	.246	.323*	.358*	.366**
SA2	.100	.120	.098	.119	-.032	-.100	-.058	-.074	-.118	.222	.023	.052	.265	-.021	.029	.006	.094
SA3	-.091	-.193	-.041	-.132	.044	.046	-.015	.022	-.301*	-.049	-.119	.125	.008	.105	.086	.028	.067
SA4	.205	.078	.283*	.192	.315*	.295*	.321*	.385**	.276*	.106	.159	.432**	.261	.410**	.446**	.430**	.456**
SA5	.195	.212	.074	.189	.189	.252	.138	.197	-.137	-.068	-.029	.145	.207	.213	.139	.067	.107
SA	.159	.060	.288*	.168	.302*	.250	.245	.299*	-.096	.026	.180	.481**	.284*	.494**	.526**	.279*	.611**

	BPA1	BPA2	**BPA**	HA1	HA2	HA3	**HA**	TA1	TA2	TA3	TA4	**TA**	CA1	CA2	CA3	**CA**	SA1	SA2	SA3	SA4	SA5	**SA**
BPA1	---																					
BPA2	.604**	---																				
BPA	.883**	.843**	---																			
HA1	-.413**	-.273	-.338*	---																		
HA2	-.480**	-.384**	-.517**	.408**	---																	
HA3	-.438**	-.275	-.376**	.402**	.528**	---																
HA	-.545**	-.399**	-.324*	.803**	.728**	.792**	---															
TA1	-.408**	-.255	-.343*	.413**	.639**	.614**	.677**	---														
TA2	-.552**	-.436**	-.480**	.404**	.615**	.635**	.688**	.803**	---													
TA3	-.501**	-.265	-.457**	.402**	.737**	.486**	.629**	.820**	.759**	---												
TA4	-.371**	-.170	-.224	.381**	.390**	.419**	.521**	.671**	.605**	.539**	---											
TA	-.503**	-.309*	-.259	.448**	.610**	.594**	.728**	.923**	.879**	.846**	.826**	---										
CA1	.366**	.322*	.380**	-.584**	-.514**	-.300*	-.582**	-.433**	-.357*	-.349*	-.184	-.359*	---									
CA2	.395**	.359*	.464**	-.363**	-.613**	-.452**	-.579**	-.651**	-.642**	-.620**	-.321*	-.615**	.669**	---								
CA3	.674**	.562**	.729**	-.311*	-.594**	-.441**	-.541**	-.554**	-.640**	-.583**	-.494**	-.630**	.416**	.654**	---							
CA	.494**	.343*	.642**	-.498**	-.778**	-.443**	-.349*	-.647**	-.492**	-.676**	-.234	-.284*	.794**	.884**	.764**	---						
SA1	.513**	.306*	.360**	-.718**	-.371**	-.344*	-.641**	-.350*	-.549**	-.433**	-.394**	-.491**	.315*	.359*	.392**	.271	---					
SA2	-.034	.014	-.015	-.103	-.047	.094	-.037	-.095	-.063	-.077	-.236	-.145	.215	.046	.033	.063	.022	---				
SA3	.261	.243	.259	-.050	-.029	-.059	-.053	.011	-.001	-.052	-.131	-.051	-.067	-.079	.029	.005	.059	-.276*	---			
SA4	.387**	.055	.265	-.143	-.224	-.271	-.268	-.223	-.371**	-.323*	-.205	-.314*	.195	.266	.354*	.255	.304*	-.063	-.038	---		
SA5	.127	.101	.125	.068	-.202	-.047	-.074	-.161	-.056	-.154	-.048	-.123	.133	.081	.036	.123	-.155	.177	-.283*	-.209	---	
SA	.629**	.291*	.603**	-.313*	-.396**	-.330*	-.170	-.330*	-.476**	-.463**	-.356**	-.204	.329*	.343*	.395**	.536**	.563**	.047	.218	.754**	.200	---

ABOUT THE AUTHORS

Kelly Fadel is an Assistant Professor of Management Information Systems at Utah State University. He received his Ph.D. from The University of Arizona. His research areas include IT change management, knowledge management, end-user learning, and post-adoptive technology use and impact. His research has appeared in journals such as the *Data Base for Advances in Information Systems, International Journal of Knowledge Management,* and *Review of Business Information Systems* and has received awards at the ACM SIGCPR Conference on Computer Personnel Research and other international IS conferences.

Susan Brown is an Associate Professor in MIS at the University of Arizona. She received her Ph.D. from the University of Minnesota and an MBA from Syracuse University. Her research interests include technology implementation, individual adoption, computer-mediated communication, technology-mediated learning, and related topics. Her research has been or will be published in *MIS Quarterly, Information Systems Research, Organizational Behavior and Human Decision Processes, IEEE Transactions on Engineering Management*, *Communications of the ACM, Journal of the AIS,* and others. She has served or is currently serving as an associate editor for *MIS Quarterly, Information Systems Research, Journal of the AIS,* and *Decision Sciences.* She received *MIS Quarterly's* reviewer of the year award for 2001, and in 2008, she received the best associate editor award from *Information Systems Research.*

Communications of the Association for Information Systems

ISSN: 1529-3181