

MIS Quarterly

RESEARCH ARTICLE

UNDERSTANDING USER RESPONSES TO INFORMATION TECHNOLOGY: A COPING MODEL OF USER ADAPTATION¹

By: Anne Beaudry
John Molson School of Business
Concordia University
1455 de Maisonneuve Boulevard West
Montréal, QC H3G 1M8
Canada
abeaudry@jmsb.concordia.ca

Alain Pinsonneault
Faculty of Management
McGill University
1001 Sherbrooke Street West
Montréal, QC H3A 1G5
Canada
alain.pinsonneault@mcgill.ca

Abstract

This paper defines user adaptation as the cognitive and behavioral efforts performed by users to cope with significant information technology events that occur in their work environment. Drawing on coping theory, we posit that users choose different adaptation strategies based on a combination of primary appraisal (i.e., a user's assessment of the

expected consequences of an IT event) and secondary appraisal (i.e., a user's assessment of his/her control over the situation). On that basis, we identify four adaptation strategies (benefits maximizing, benefits satisficing, disturbance handling, and self-preservation) which are hypothesized to result in three different individual-level outcomes: restoring emotional stability, minimizing the perceived threats of the technology, and improving user effectiveness and efficiency. A study of the adaptation behaviors of six account managers in two large North American banks provides preliminary support for our model. By explaining adaptation patterns based on users' initial appraisal and subsequent responses to an IT event, our model offers predictive power while retaining an agency view of user adaptation. Also, by focusing on user cognitive and behavioral adaptation responses related to the technology, the work system, and the self, our model accounts for a wide range of user behaviors such as technology appropriation, avoidance, and resistance.

Keywords: Coping theory, user adaptation, IT appropriation, individual performance

Introduction

The introduction of a new information technology generates a multitude of expected and unexpected

¹Ritu Agarwal was the accepting senior editor for this paper. Susan Brown was the associate editor. Bradley Wheeler, Pamela Carter, and Julie Rennecker served as reviewers.

consequences in the users' environment (Griffith 1999; Weick 1990). These consequences are interpreted and understood in a variety of ways by users, triggering equally plentiful, varied, and complex user responses (Griffith 1999; Pinsonneault and Rivard 1998). Researchers, managers, and information systems professionals face the critical but daunting task of explaining why, and trying to predict how, users will react to new technologies. To date, two main streams of research have addressed this complex phenomenon. The first stream, which has applied a **variance** approach, has mainly focused on the antecedents of adoption and usage of new technologies and has yielded numerous models of user acceptance (Venkatesh et al. 2003). Four models have identified factors that can influence user adaptation (e.g., performance expectancy, social influence, task-technology fit, and compatibility) and are particularly relevant to this paper, namely the *technology acceptance model/unified theory of acceptance and use of technology* (TAM/UTAUT) (Davis 1989; Davis et al. 1989; Venkatesh et al. 2003), *innovation diffusion theory* (IDT) (Rogers 1983), *decomposed theory of planned behavior* (DTPB) (Taylor and Todd 1995b), and *task-technology fit* (TTF) (Dishaw and Strong 1999; Dishaw et al. 2002; Goodhue 1995; Goodhue and Thompson 1995; Zigurs and Buckland 1998; Zigurs et al. 1999).

The second stream of research has mainly relied upon a **process** approach and has focused on user adaptation (Orlikowski 1996; Tyre and Orlikowski 1994, 1996) and its effects on outcomes such as group performance (DeSanctis and Poole 1994; Majchrzak et al. 2000). This stream showed the rich and complex nature of user adaptation and described how users change their skills, knowledge, beliefs, attitudes, aspirations, and work commitment (Majchrzak and Cotton 1988; Tyre and Orlikowski 1994), modify their work procedures and communication patterns (Leonard-Barton 1988; Poole and DeSanctis 1988, 1990), and adapt/use the technology in unanticipated ways (Griffith 1999; Kraut et al. 1989).

While these two streams of research have provided significant insights into different aspects related to user adaptation, the extant research is

fragmented and has evolved over the years in a fairly nonintegrated way. There is a need to progress toward a framework that integrates both approaches and allows studying the antecedents, behaviors, and outcomes of user adaptation together. This paper takes the study of user adaptation a step further in that direction by proposing an integrative model, the *coping model of user adaptation* (CMUA). *The fundamental premise of CMUA is that the introduction of a new technology or the modification of an existing one can bring about changes that are perceived as novel (Louis and Sutton 1991) and can constitute a disruption in organizations (Lyytinen and Rose 2003). Adaptation behaviors are, in fact, acts that users perform in order to cope with the perceived consequences of the technological event.* By defining user adaptation as coping, we can study a wide range of user responses including how users restore emotional stability, modify their tasks, reinvent and adapt the technology, or even resist it. We can also understand the antecedents and effects of these user behaviors. Considering user adaptation as coping also allows us to study user behaviors that occur before, during, and after the implementation of a new technology.

The paper is organized into five sections. The first section presents the coping theory and describes the coping process. The second section summarizes the extant literature on user adaptation, conceptualizes user adaptation as coping, and presents the coping model of user adaptation (CMUA) and our research propositions. The third section describes the research method and the fourth section presents the results of our study. The last section discusses the contributions and implications of our paper and suggests an agenda for future research.

Coping Theory

Coping: An Overview

Coping deals with the adaptational acts that an individual performs in response to disruptive events that occur in his/her environment. In the

contextual model, identified as the one most widely used and accepted in psychology (Lazarus 2000),² coping is defined as "the cognitive and behavioral efforts exerted to manage specific external and/or internal demands that are appraised as taxing or exceeding the resources of the person" (Lazarus and Folkman 1984, p. 141). *Cognitive efforts* such as acceptance, distancing, and escaping aim at altering the subjective meaning of the event while *behavioral efforts*, which include activities such as seeking additional information and evidence and confronting individuals, aim at altering the situation itself (Folkman and Lazarus 1985; Lazarus and Folkman 1984). *Internal demands* are personal desires or requirements that the environment must meet, for example, an individual's desire to get challenging work versus the challenges that a specific job effectively carries (French et al. 1974). *External demands* emanate from the contextual or social environment and must be met by individuals. They are related to the roles one has to play in a given environment, for example, a secretarial position requiring a typing speed of 50 words per minutes versus the effective typing ability of a candidate. Finally, the ways in which people cope depend upon the *resources* (financial, material, physical, psychological, cognitive, and social) that are available to them (Lazarus and Folkman 1984).

The Coping Process

Individuals cope with disruptions by using two key subprocesses that continuously influence each other (Lazarus 1966; Lazarus and Folkman 1984). First, individuals evaluate the potential consequences of an event (*appraisal*). They assess the nature of the particular event and its personal importance and relevance (*primary appraisal*). In other words, when a disruption occurs, one first asks: "What is at stake for me in this situation?" The paramount issue is to determine what are the

likely consequences (specific internal/external demands) of this event and what is the personal significance of the disruption (Folkman 1992). In management, disruptive events have been categorized into two main types: challenges, which are events perceived as having positive consequences, or threats, defined as events perceived as having negative consequences (Carpenter 1992; McCrae 1989). Events are multifaceted and they are usually perceived as comprising both challenges and threats (Lazarus and Folkman 1984). In addition to assessing the importance of an event, individuals also evaluate the coping options available to them (*secondary appraisal*). They determine the level of control they exert over the situation and what they feel they can do about it given the coping resources available to them (Lazarus and Folkman 1984).

Second, individuals perform different actions to deal with the situation at hand (*coping efforts*). They rely on a combination of cognitive and behavioral efforts, both of which have been categorized as either problem- or emotion-focused (Folkman 1992; Lazarus and Folkman 1984; Stone et al. 1992). *Problem-focused* coping aims at managing the disruptive issue itself. It is oriented toward dealing with the specific aspects of the situation by changing the environment (e.g., altering or alleviating environmental pressures, barriers, resources, or procedures) or changing one's self (e.g., developing new standards of behavior, shifting levels of aspiration, finding new channels of gratification, and learning new skills or procedures) (Lazarus and Folkman 1984). *Emotion-focused* coping changes one's perception of the situation, but does not alter the situation itself. It aims at regulating personal emotions and tensions, restoring or maintaining a sense of stability, and reducing emotional distress (Lazarus and Folkman 1984). Emotion-focused coping is oriented only toward one's self and includes minimizing the consequences of threats (e.g., maintaining hope and optimism, refusing to acknowledge the negative side of an event), positive comparison (e.g., comparing one's situation with other situations that are worse off), situation redefinition and passive acceptance, avoidance (e.g., escaping the situation), denial (e.g., denying

²Space limitation does not allow us to discuss the other perspectives used to study coping behaviors. Readers can consult Folkman (1992) and Lazarus and Folkman (1984) for an extensive discussion of the topic.

the facts and their implications and acting as if the event never happened), selective attention, venting anger, and seeking psychological or emotional support (Folkman et al. 1986; Lazarus and Folkman 1984; McCrae 1989; Stone et al. 1992).

The specific combination of problem- and emotion-focused coping efforts depends upon one's appraisals of a given situation (Lazarus and Folkman 1984). Individuals tend to choose the coping strategy that promises the greater chance of success and the restoration of a sense of well being (Begley 1998). Consequently, emotion-focused coping occurs mainly when individuals feel that they have limited control over the situation (Folkman 1992; Folkman et al. 1986; Folkman and Moskowitz 2000; Lazarus and Folkman 1984). Over-relying on problem-focused coping in such a situation leads to frustration and distress, while having little effect on the issue at hand (Begley 1998; Cohen et al. 1986; Folkman 1992). Alternatively, problem-focused coping occurs primarily when individuals feel that they are in control of the situation (Folkman 1992; Folkman et al. 1986; Folkman and Moskowitz 2000; Lazarus and Folkman 1984). In this case, relying heavily on emotion-focused coping rather than handling the situation is likely to result in frustration (Begley 1998; Folkman 1992). Coping theory indicates that in extreme cases, when the expected consequences of an event are threatening and the situation is perceived as being insurmountable or too demanding, individuals might withdraw from the situation and consciously escape from it, for example, by asking for a transfer, quitting a job, or retiring (Begley 1998).

The entire coping process can occur in what psychologists call the *anticipation* period, before the event actually occurs, the *impact* period, as the event happens, or the *post-impact* period, after the event has taken place (Folkman 1992). Because it explains individuals' adaptation behaviors conducted in response to changes that occur in their environment, coping theory offers a new lens through which to study how and why users adapt to IT in organizations. It also provides the conceptual foundation to enable the development

of an integrative model that allows a richer understanding of this complex organizational phenomenon.

The Coping Model of User Adaptation (CMUA)

User adaptation has been diversely understood and defined in Information Systems. As shown in Table 1, different labels are used by Clark (1987), Ives and Olson (1984), Leonard-Barton (1988), Poole and DeSanctis (1988), and Rice and Rogers (1980) to describe the modifications made to a technology by users. Furthermore, similar concepts are defined differently across studies. See, for example, the competing definitions of "adaptation" in Leonard-Barton (1988), Sokol (1994), and Tyre and Orlikowski (1996). However, Table 1 indicates that the studies all fundamentally focus on a key phenomenon: the way users respond to changes or disruptions induced by IT (Clark 1987; Leonard-Barton 1988; Tyre and Orlikowski 1994). In essence, user adaptation is very similar to the concept of coping. Therefore, we define user adaptation as the *cognitive and behavioral efforts exerted by users to manage specific consequences³ associated with a significant IT event⁴ that occurs in their work environment*. This definition reconciles and integrates the various dimensions studied in prior research (see Table 1). As such, the process of user adaptation can thus be understood in light of coping theory.

³Consequences and demands are used interchangeably in the literature on coping. To avoid confusion, we only use the term consequences.

⁴Modifications made to an existing IT can sometimes be perceived as significant enough to stimulate similar user responses as with the implementation of a new IT (Griffith 1999; Louis and Sutton 1991). We use "IT event" to refer to both the implementation of a new IT as well as significant modifications made to an existing IT.

Table 1. User Adaptation

Authors	Concept	Working Definition	Focus
Rice and Rogers (1980)	Reinvention	The extent to which an innovation is changed during its adoption and implementation.	Technology
Ives and Olson (1984)	Adaptation	Alignment or alteration of the technology in such a way that it meets users' needs.	Technology
Clark (1987)	Appropriation	A situation where the user starts by recognizing the potential value of a particular IT and manages to narrow the absorption gap between the requirements of the IT and its own limited capacities, then begins to creatively modify, refine, and use it in such a way that it will meet his/her needs. <i>Appropriation implies the continuous, cumulative, and incremental modification of an innovation in all its aspects (p. 156).</i>	Technology
Leonard-Barton (1988)	Reinvention	The alteration of the initial innovation as users change it to suit their needs or use it in ways unforeseen by developers (p. 253).	Technology
Leonard-Barton (1988)	Adaptation	The reinvention of the technology and the simultaneous adaptation occurring at multiple levels within the organization (p. 253).	Technology, Work system
Majchrzak and Cotton (1988)	Adjustment	Has four different aspects: changes in job satisfactions, work commitment, psychological and stress problems, and perceived quality of life (p. 48).	User
Poole and DeSanctis (1988)	Appropriation	Concerns alterations brought by users to the technology while using it (p. 9).	Technology
Poole and DeSanctis (1990)	Appropriation	The way a group uses, adapts, and reproduces the structures of a technology.	Technology, Work system
DeSanctis and Poole (1994)	Appropriation	Is visible through acts that reveal a deep structuration process of IT use.	Technology, Work system
Sokol (1994)	Adaptation	The modifications brought to the technology, the environment, social protocols, others expectations, and the development of contingency plans.	Technology, Work system
Tyre and Orlikowski (1994)	Adaptation	Refers to the adjustments and changes following the new IT implementation. The adaptations may concern the physical aspects of the technology as well as the procedures, beliefs, knowledge, or relationships of the users (p. 99).	Technology, Work system, User
Orlikowski (1996)	Appropriation	The continuous, progressive, and mutual adjustments, accommodations, and improvisations between the technology and the users (p. 69).	Technology, User
Tyre and Orlikowski (1996)	Adaptation	Modifications brought to the technology, working procedures, and users' beliefs (p. 791).	Technology, Work system, User

Assessing an IT Event: Appraisal

As discussed in the section on coping theory, the assessment of an IT event starts with *primary appraisal*. At this stage, the user determines the expected consequences of the IT event and how they are likely to affect him/her both personally and professionally. For example, a user might think that a new system will make her job less tedious and more interesting and that she will need to learn new skills and to adapt her working procedures. Another user might be afraid of losing his job and think that he does not have the necessary skills to obtain a new and interesting job. Consequences can be categorized as either threats or opportunities (Chattopadhyay et al. 2001; Dutton and Jackson 1987; Jackson and Dutton 1988; Milburn et al. 1983). However, due to the fact that most IT events are multifaceted, they are likely to be assessed as containing both types of expected consequences (Beaudry and Pinsonneault 2001; Cartwright and Cooper 1996; Louis and Sutton 1991) and it is their relative importance that influences what adaptation efforts will occur (Lazarus and Folkman 1984).

As shown in Figure 1, user adaptation in CMUA is triggered by a significant IT event that disrupts the work environment of users. More specifically, user adaptation starts when a user gains an awareness of the potential consequences of a significant IT event and evaluates them to be of personal and/or professional relevance and importance (i.e., an opportunity or a threat) (Folkman 1992; Griffith 1999; McCrae 1984). Because individual users are likely to have asymmetrical information about the IT event and because they synthesize information differently (Fiske and Taylor 1991; Griffith 1999; Lewis et al. 2003; Louis and Sutton 1991), users are likely to begin the adaptation process at different points. Some users might begin adapting when they first hear of the forthcoming IT event, while others might begin adapting when the IT event occurs, and still others might adapt later, only after they have started interacting with the technology. The triggering of the adaptation process is also likely to be influenced by a number of individual charac-

teristics (Griffith 1999; Louis and Sutton 1991). For example, personal innovativeness, which represents the degree to which users are willing to try out new IT (Agarwal and Prasad 1998; Lewis et al. 2003) might influence the point at which users begin their adaptation process. Similarly, Rotter (1966) suggests that an individual with a strong belief about his ability to control his destiny (internal locus of control) is likely to be more alert to environmental stimuli, suggesting that users with high internal locus of control might start adapting sooner (Louis and Sutton 1991).

While coping theory is mute regarding what elements of a disruption are used in primary appraisal, the IS literature provides some insights on this issue. Numerous authors have suggested that users' beliefs are mainly developed based upon their understanding of certain key aspects of a technology (Davis 1989; Griffith 1999; Moore and Benbasat 1991; Rogers 1983; Venkatesh et al. 2003). For example, Griffith (1999) argued that a new or adapted feature of a technology that is seen as concrete, meaning that it can be directly and specifically observed and described (as opposed to abstract), or core, referring to a dimension that is critical to the functionality, or the goal of a technology (as opposed to tangential) is more likely to be experienced as novel and discrepant and to generate more individual sensemaking. The perceived or expected fit between a technology and a task (Dishaw and Strong 1999; Ziguers and Buckland 1998) and the perceived compatibility of the technology with users' values, needs, and past experiences (Karahanna et al. 1999; Moore and Benbasat 1991) might also influence user appraisal. For instance, the perceived inability of an IT to support the user's task (task-technology misfit) might lead one to assess an IT event as threatening, whereas a strong task-technology fit might be considered an opportunity to improve one's performance. In addition, performance expectancy has been found to influence users' behavior (Venkatesh et al. 2003) and might affect whether one considers an IT event to be an opportunity or not (i.e., a technology associated with high performance expectancy is likely to be assessed positively).

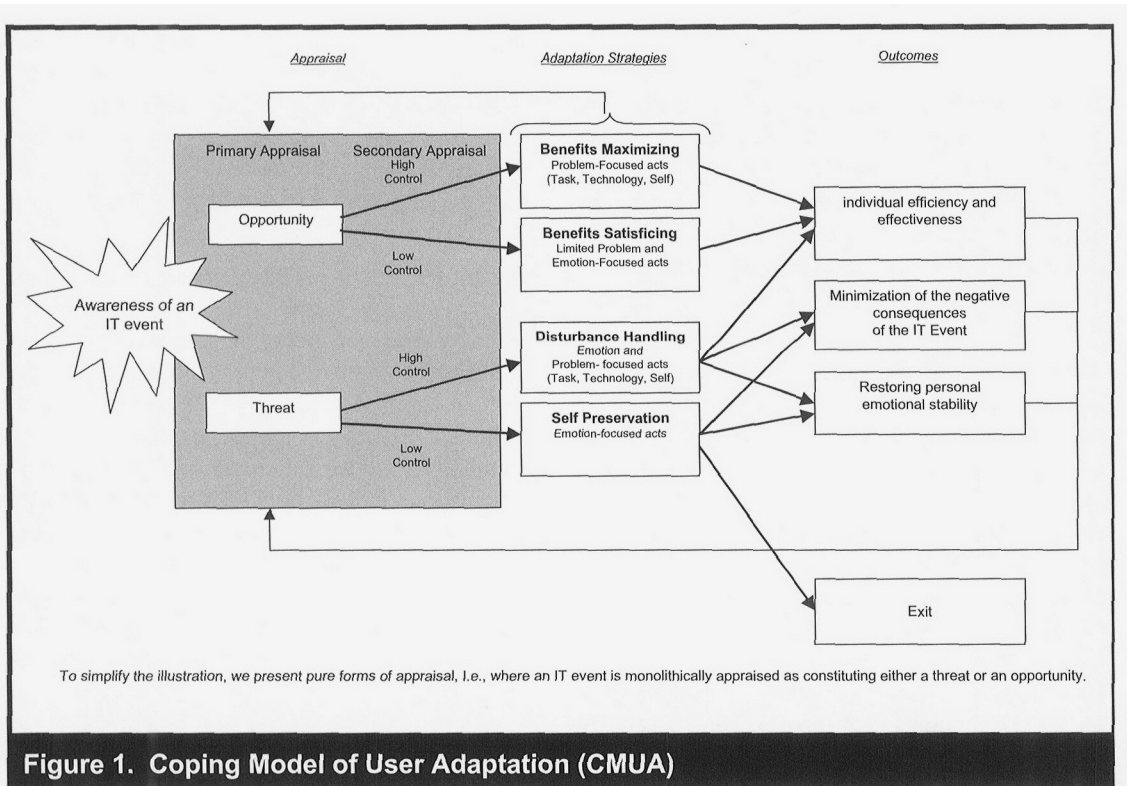


Figure 1. Coping Model of User Adaptation (CMUA)

Some factors relating to the individuals themselves are also likely to affect users' primary appraisal. For instance, it has been shown that an individual's anxiety with regard to a specific situation tends to generate further anxiety through anticipatory self-arousal (Bandura 1977; Rosen et al. 1987). In an IT appraisal context, this cycle of anxiety can negatively influence beliefs about the technology (Venkatesh 2000) and engender fear (Weil and Wugalter 1990). Similarly, individuals with higher personal innovativeness have been found to exhibit more positive beliefs about a target technology (Agarwal et al. 2000; Lewis et al. 2003). Users' prior experience with a technology has also been found to shape how they perceive a new technology (Agarwal and Prasad 1999; Agarwal et al. 2000; Taylor and Todd 1995a; Venkatesh 2000).

Primary appraisal occurs in a specific context and it is, therefore, likely to be influenced by some social and institutional factors such as what peers and superiors think of the technology (Lewis et al.

2003; Taylor and Todd 1995b; Venkatesh et al. 2003). Top management's commitment and support for a technology has been found to positively influence users' beliefs about the usefulness and ease of use of a technology (Lewis et al. 2003). The organizational and group subjective norms associated with technology acceptance and use as well as the culture of an organization are also likely to shape user appraisal (Ajzen 1985; Davis et al. 1989; Taylor and Todd 1995b; Thompson et al. 1991; Venkatesh et al. 2003).

In *secondary appraisal*, users assess how much control they have over the IT event and what their adaptation options are given the resources available to them (Lazarus and Folkman 1984). In the context of IT, secondary appraisal will be done with respect to three main components: work, self, and technology (see Table 1). As outlined in Shaw and Barrett-Power (1997), *control over the work* refers to the degree to which users feel they have sufficient autonomy over their jobs and are able to modify their tasks in response to an IT event.

Control over the self refers to whether users feel they can adapt themselves to the new environment (Lazarus and Folkman 1984). Finally, *control over technology* refers to how much influence users feel they have over the features and functionalities of the IT (Beaudry 2002) during its development or usage (Clark 1987; Orlikowski 1996; Poole and DeSanctis 1988; Tyre and Orlikowski 1994).

The Focus of Adaptation Efforts

Adaptation follows appraisal and, similar to coping, can be emotion- and/or problem-focused. *Emotion-focused adaptation* is oriented toward one's self and aims at changing one's perception of the consequences of the IT event or at reducing emotional distress. Emotion-focused adaptation includes self-deception and avoidance (e.g., denying that the IT affects one, acting as if the IT event had not occurred; Zuboff 1988), minimization of the consequences of the IT event, selective attention (e.g., removing thoughts of the event), positive comparison (e.g., comparing oneself to other users who are more badly affected by the event; Lazarus and Folkman 1984), and passive acceptance (e.g., accepting the IT event as a fact of life by changing beliefs and attitudes; Tyre and Orlikowski 1994, 1996). *Problem-focused adaptation* aims at managing the issues associated with the IT event directly by (1) *adapting one's self* such as adjusting personal habits to fit the requirements of the technology (Orlikowski 1996; Tyre and Orlikowski 1994), learning new skills (Tyre and Orlikowski 1994), and adjusting work commitment (Majchrzak and Cotton 1988); (2) *adapting the work* by modifying procedures and routines (Sokol 1994; Tyre and Orlikowski 1996); and/or (3) *adapting the technology* by changing its functionalities and features (Clark 1987; Leonard-Barton 1988; Rice and Rogers 1980).

As most significant IT events are complex, users will rely on both types of adaptation efforts (for example, in Table 1, see Majchrzak and Cotton 1988, Tyre and Orlikowski 1994, 1996). However, the relative emphasis on emotion- and problem-focused adaptation will depend upon the user's

appraisal of the IT event (i.e., the combination of primary and secondary appraisals; Folkman 1992; Folkman and Lazarus 1985; Lazarus and Folkman 1984; McCrae 1984; Oakland and Ostell 1996; Patterson et al. 1990; Stone et al. 1992).

Four Principal Adaptation Strategies

Primary and secondary appraisals, being continuous rather than dichotomous constructs, can be expected to result in various forms of user adaptation strategies. However, for the purpose of simplicity, we present here the four "pure" forms of adaptation which we derived by combining the two extreme cases of both types of appraisal (opportunity and threat; high or low control). The four adaptation strategies (benefits maximizing, benefits satisficing, disturbance handling, and self-preservation) are presented in Figure 2 and described next.

Benefits Maximizing Strategy

In an instance where the expected consequences of an IT event are appraised as an opportunity and users feel that they have control over the situation (IT, work, self), adaptation efforts will be mainly problem-focused (Folkman 1992; Folkman et al. 1986; Folkman and Moskowitz 2000; Lazarus and Folkman 1984) and oriented to take full advantage of the opportunities offered by the IT event and maximize personal benefits. As the IS literature indicates (Majchrzak and Cotton 1988; Poole and DeSanctis 1988 1990), users can achieve this objective by adapting the work system (e.g., modify operational procedures, focus users' time on the most important and productive activities), the technology (e.g., modify, add, delete screens; personalize the IT; change its functionalities), and/or themselves (e.g., develop new standards of behavior by extensively using the IT, shift levels of aspiration and channels of gratification such as becoming the renowned "expert" user, seek training). Since most adaptation efforts are oriented toward reaping the benefits associated with the IT event, they are likely to result in perfor-

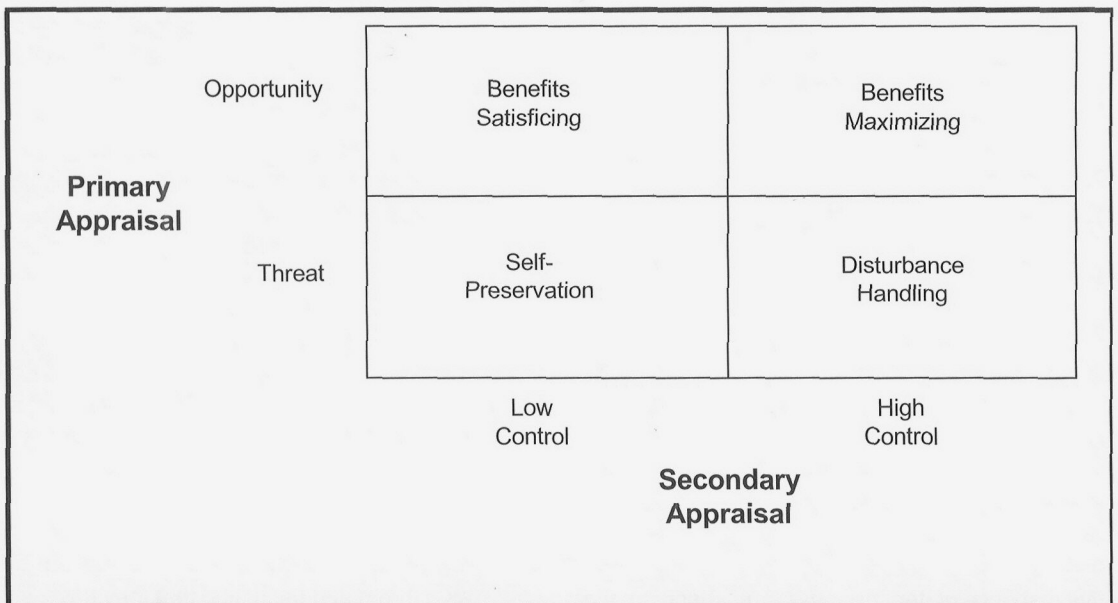


Figure 2. User Adaptation Strategies

mance improvements such as reducing errors, doing the work faster, and increasing revenues (Goodhue and Thompson 1995; Pentland 1989; Vessey and Galletta 1991). Majchrzak et al. (2000) illustrate this adaptation strategy well by documenting how the members of a team, in a situation similar to the one described above, extensively adapted their work system and their new technology (problem-focused adaptation) and subsequently significantly improved their performance. Thus, our first proposition is as follows:

Proposition 1: When the perceived consequences of an IT event are appraised as an opportunity and users feel that they have control over the situation, they will engage in a *benefits maximizing strategy*, which will increase their individual efficiency and effectiveness.

Benefits Satisficing Strategy

In a situation where the perceived consequences of an IT event are appraised as an opportunity but users feel that they have limited control over the situation, adaptation efforts are likely to be

minimal. Emotion-focused efforts will be limited because users do not feel the need to reduce tensions emanating from the IT event (Lazarus and Folkman 1984) and problem-focused efforts will be limited because users feel they cannot do much to further exploit the IT and reap its benefits (Folkman 1992; Folkman et al. 1986; Folkman and Moskowitz 2000; Lazarus and Folkman 1984). Therefore, users will satisfy themselves with the benefits the IT offers, which, in absence of individual adaptation, are likely to be limited (Pinsonneault and Rivard 1998). Zuboff (1988, pp. 90-91) documented a situation in both the Cedar Bluff and Pine Wood paper mills that resembles this strategy. Operators felt that the new automated control system offered interesting opportunities to improve their work, but felt that they had very little autonomy to change their work and the technology. Minimal adaptation was carried out and the new system generated few benefits other than allowing the operators to relax and enjoy life. Thus our second proposition.

Proposition 2: When the perceived consequences of an IT event are appraised as an opportunity and users feel that they have limited control over the situation,

they will engage in a *benefits satisficing strategy*, which will have limited effects on their individual efficiency and effectiveness.

Disturbance Handling Strategy

When one appraises an IT event as a threat and feels that she has some control over the situation, she is likely to rely on problem-focused adaptation to manage the situation and on emotion-focused adaptation to minimize the expected negative consequences and restore emotional stability (Folkman 1992; Folkman et al. 1986; Folkman and Moskowitz 2000). Adaptation efforts are likely to be oriented toward one's self (e.g., seeking training), the technology (e.g., reducing the negative aspects of the new system, changing the features of the IT), and the task (e.g., adjusting work procedures so that they better fit with the technology) (Majchrzak et al. 2000; Tyre and Orlikowski 1996). Because the IT event is threatening, emotion-focused adaptation is also likely to be used and might include positive comparison, threat minimization, and positive reappraisal (Folkman 1992; Folkman and Lazarus 1985; McCrae 1984; Stone et al. 1992).

The adaptation, if successful, will lead to the restoration of personal emotional stability and to the minimization of the perceived negative consequences associated with the IT event. Kraut et al. (1989) presented a case that demonstrates this strategy. They described how service representatives responded to a new record system that eliminated their ability to perform several tasks simultaneously, which was once the hallmark of their competence. In an effort to minimize the negative consequences of the new IT, the representatives quickly discovered ways to perform tasks simultaneously and to work on two records in parallel by logging into the database twice. They also feared that the new system would eliminate some existing social ties by limiting the possibilities to exchange information and, therefore, created a clandestine note-passing system within the record system. Service representatives responded by modifying the technology and their

work habits (problem-focused adaptation) and, in doing so, were able to minimize the negative consequences of the IT event.

It is also possible that users are able to turn an IT event around and improve their individual efficiency and effectiveness by relying on adaptation efforts such as benefit-finding and benefit-appraisal (i.e., trying to find a positive aspect of any situation, even those first assessed as negative) and growth-oriented functioning (i.e., trying to find ways to grow and improve in all situations) (Folkman and Moskowitz 2000; Holahan et al. 1996; Lazarus 1999; Somerfield and McCrae 2000; Tennen and Affleck 1999).

Proposition 3: When the perceived consequences of an IT event are appraised as a threat and users feel that they have control over the situation, they will engage in a *disturbance handling strategy*, which will restore their emotional stability and minimize the perceived negative consequences of the event. It can also increase their individual efficiency and effectiveness.

Self-Preservation Strategy

In a situation where the expected consequences of an IT event are perceived as a threat and users feel that they have only limited control over the situation, their adaptation efforts will be mainly emotion-focused and aimed at restoring emotional stability and reducing the tensions emanating from the IT event (Folkman 1992; Folkman et al. 1986; Folkman and Moskowitz 2000; Lazarus and Folkman 1984). Users will try to change their perception of the IT event by minimizing the perceived negative consequences (e.g., maintaining hope that the expected negative consequences will not materialize), positive comparison (e.g., comparing themselves to other users who are worse off), self-deception and avoidance, selective attention, and distancing (e.g., reducing their involvement in their work) (Lazarus and Folkman 1984; Zuboff 1988). This strategy, if successful, will restore emotional stability but will have little or

no impact on users' performance at work. Patrickson's (1986) study of newspaper compositors' reactions to the implementation of an electronic production system illustrates this strategy. Because they expected that the new technology would deskil and/or eliminate their jobs and reduce their prestige and influence, newspaper compositors avoided the system, using it as little as possible, and distanced themselves from their work. Our fourth proposition is as follows:

Proposition 4: When the perceived consequences of an IT event are appraised as a threat and users feel that they have limited control the situation, they will engage in a *self-preservation strategy*, which will restore their emotional stability. It can also minimize the perceived negative consequences of the event.

As illustrated in CMUA (Figure 1), in cases where users perceive the circumstances as too demanding and overwhelming in light of the resources available and where they feel optionless, users might totally withdraw from the situation (Begley 1998; Lazarus and Folkman 1984). Here, emotional adjustments and modifications of the situation are simply insufficient to allow users to adapt to the IT event; users are thus likely to emotionally disengage themselves from it and exit the situation altogether (Begley 1998).

User Adaptation Process as a Whole

As illustrated in Figure 1, the adaptation process is highly iterative and continually evolves as a function of the ongoing changes that occur in the user/environment relationship. Appraisal and adaptation constantly influence each other. Shifts may be due to the adaptation efforts that changed the technology, the work, or the individual; to changes in the environment that might have occurred independently of the person; or to changes in the meaning and subjective understanding one has of the situation (Folkman and Lazarus 1985). In other words, appraisal influ-

ences the adaptation efforts that are likely to be performed, which in turn lead to the reappraisal of the situation (Folkman 1992; Stone et al. 1992). This is illustrated in Figure 1 by the feedback loop that goes from adaptation strategies back to appraisal.

Further, the outcomes of the adaptation process (i.e., restoring emotional stability, improving individual performance, minimizing the negative consequences of an IT event) are likely to change the user's perception of the IT event, which can lead to a reappraisal of the situation and can trigger a new adaptation efforts sequence. This is illustrated in CMUA by the feedback arrow that goes from outcomes back to appraisal. This loop is particularly important because it helps account for both the negative and positive recursive spirals of appraisal-adaptation-outcomes. For instance, it is possible that a user appraised the expected consequences of an IT event as threatening, but that her adaptation efforts minimized the negative consequences and that, in light of this, she reappraises the new technology more positively and engages in a new and different adaptation sequence. Alternatively, an IT event appraised as an opportunity might end-up having negative consequences for a user, which may, in turn, change her prior appraisal and trigger a new series of adaptation efforts. CMUA allows for both reinforcement loops (positive and negative) as well as for reversal loops (i.e., negative assessment becoming positive and positive assessment becoming negative). Thus our fifth proposition.

Proposition 5: The adaptation efforts and outcomes lead to the reappraisal of the IT event, which can trigger a new sequence of adaptation efforts.

Research Method

Research Sites

In order to provide a preliminary test of our model, case studies were conducted in two North American banks. There were three main reasons

for this choice. First, both banks had implemented a new account management system two years before, just past the 18-month window during which user adaptation behaviors have been observed to occur (Tyre and Orlowski 1994, 1996). Second, the two systems were customizable and their usage was strongly encouraged in both banks. This was important in order to study how appraisal of the perceived consequences of the new technology might have influenced how users adapted. Third, users at both banks had wide-ranging latitude and autonomy in their work and in the way they used the system, which was important for studying adaptation efforts related to work routines and to the technology. Users' control in the pre-implementation phases of the systems was, however, very limited in both banks as they were company-wide systems that were developed with minimal user involvement.

Bank A

Bank A has over \$15 billion in assets, employs 3,200 people, and serves over one million clients through 204 branches. Account managers at Bank A are entrepreneurs who have their own clients and are responsible for generating new business and managing their portfolio of accounts. Their performance and remuneration are based on the growth and profitability of their portfolio. Prior to the implementation of the new account management system, account managers met their clients at the branch and used a terminal to access the bank's centralized database in order to print a copy of the client's record. That record, in addition to providing the client's name, address, phone number, and employment information, listed the client's account numbers with their balances and all transactions from the previous two weeks. It also listed all loans and investment products along with their balances, terms, and interest rates. In each branch, an administrative assistant was present to help account managers with paperwork. Any discussion about an investment or a request for a loan would result in a two-page paper form to be completed and signed both by the account manager and the client. Investment forms would then be sent by internal mail to the head office

where the database would be updated, whereas loan request forms would be dispatched to the branch manager for approval before being sent to the head office.

Link, as the new system is called, was developed in-house and is a Windows-based platform consisting of a transactional application and an expert system called "Personal Investment Profile" (PIP). The transactional application allows account managers to write documents, open and close accounts, assign credit lines, register deposits and loans, buy mutual funds, link with the credit bureau, and register mortgages. PIP, which is complementary to the transactional system, uses the client's financial situation, demographics, risk aversion information, and personal financial goals. It determines one's risk propensity, draws an investment profile, and suggests an ideal-type personalized portfolio. At the time of the implementation, all account managers attended a four-hour training session, which used PowerPoint slides and handouts. No hands-on activity was part of the formal training. Users were invited to try the new system and to rely on the online tutorial, help function, and help desk for any questions with regard to its use.

It was hoped that *Link* would help account managers better understand their clients' needs and allow them to offer more personalized products, services, and investment strategies. *Link* was also expected to improve the quality of their work, their efficiency and effectiveness, and the profitability of their portfolio, as well as to increase clients' satisfaction. Ultimately, reaching these goals was expected to allow the bank to abolish the position of administrative assistant and to increase its revenues.

Bank B

Bank B's assets are worth \$69 billion. It operates 655 branches and employs 200 account managers who share the responsibility for managing the accounts of corporate clients. At Bank B, the account manager position is prestigious. As in Bank A, although very detailed working procedures

exist, account managers benefit from significant latitude in terms of the way they fulfill their jobs. Account managers' performance appraisal and pay are, as in Bank A, based on the value of their portfolio and on growth in sales. There are 125 administrative assistants who help account managers with their administrative and clerical tasks.

Before the new system was implemented, account managers had prepared for meetings with clients using a printout of the client's record that the administrative assistant obtained from the centralized database. Account managers met with their clients either at the bank, at the clients' premises, at a restaurant for lunch, or even on the golf course. If a decision was made to grant a loan, the account manager would write the details on a piece of paper, sometimes a paper napkin, and give it to his/her assistant who would enter the data in the system and print the required forms for the client to sign. The clients could either sign the documents at the bank or, alternatively, the account manager would go to the client's office. This process drastically changed when the Windows-based platform called *Reach* was implemented and account managers were provided with laptops.

Reach was developed in-house and comprises many applications to support account managers in their work. The main application is the clients database management system. It provides the account manager with the client's profile, credit history, incidents, and portfolio of products. Other applications include an agenda, e-mail, MSOffice, a Web browser, a financial analysis module, and a simulation tool; the latter two were also developed in-house. *Reach* was installed on laptops to allow account managers to carry it when meeting their clients outside of the bank's premises. It was hoped that *Reach* would increase the account managers' efficiency and effectiveness by streamlining their job, providing them with faster access to better information, and increasing their ability to meet the clients' needs, all while minimizing the need for administrative assistants. Since the introduction of *Reach*, account managers' official working procedures have changed significantly. Account managers now directly access and update client files online and use the system interactively during meetings with their clients.

Data Collection

Our study examined the relationships among the four main constructs of our model: primary appraisal, secondary appraisal, adaptation strategies, and outcomes. An additional objective was to develop a sense of how the systems were reappraised after two years of usage to give an indication of the feedback loops that could lead to new series of adaptation efforts. Finally, the *organizational context* (e.g., structure, culture, account managers' job, autonomy, and remuneration) and *IT context* (e.g., how the system was developed and implemented, training, support, and functionalities of the system) were also studied as they have the potential to influence user adaptation. Data sources included interviews, annual reports of each bank, training and user manuals, and account managers' job descriptions. Using multiple sources of data allowed the triangulation of the data and provided an appropriate level of internal validity (Kirk and Miller 1986; Miles and Huberman 1994). Table 2 summarizes the data collection process for each construct.

As shown in Table 2, nine semi-structured interviews were conducted in Bank A and eight in Bank B. Interviews lasted on average two hours and were tape-recorded and transcribed. In each bank, we followed the same procedure. First, we gathered information on the organizational and IT contexts through interviews with two senior managers (vice president IS and project director in Bank A; CIO and director of operations in Bank B). Additional information specific to the branch in which the account managers of Bank A worked was obtained by interviewing the branch manager. The annual reports were consulted to obtain information on the banks and on the performance of the account managers (e.g., historical data on portfolio profitability and growth). The project managers of the two banks were interviewed to explain how the systems had been developed and implemented and to get their impressions about how account managers were using them. In order to familiarize ourselves with the systems, the first author attended a three-hour training session at each bank and studied the user manuals. Finally, we obtained a good preliminary understanding of

Table 2. Data Collection		Bank A										Bank B					
Organizational Context	V-P IS	X	X	X	X	X	X	X	X	X	X	CIO	X	X	X	X	Account Managers' Job Description (Internal Document)
	Project Director	X	X	X	X	X	X	X	X	X	X	Director of Operations and Former Branch Manager	X	X	X	X	Project Manager
	Branch Manager	X	X	X	X	X	X	X	X	X	X	Bill, Account Manager	X	X	X	X	Former Branch Manager
	Project Manager	X	X	X	X	X	X	X	X	X	X	Mark, Account Manager	X	X	X	X	Project Manager
	Peter, Account Manager	X	X	X	X	X	X	X	X	X	X	Dave, Account Manager	X	X	X	X	IT Trainer
	Michele, Account Manager	X	X	X	X	X	X	X	X	X	X	Administrative Assistant	X	X	X	X	Administrative Assistant
	John, Account Manager	X	X	X	X	X	X	X	X	X	X	Training Session and Manuals	X	X	X	X	Training Session and Manual
	Account Manager Trainer	X	X	X	X	X	X	X	X	X	X	Annual Reports	X	X	X	X	Annual Reports
	Help Desk Employee	X	X	X	X	X	X	X	X	X	X	Account Managers' Job Description (Internal Document)	X	X	X	X	Account Managers' Job Description (Internal Document)
	Account Manager	X	X	X	X	X	X	X	X	X	X	Account Managers' Job Description (Internal Document)	X	X	X	X	Account Managers' Job Description (Internal Document)
Account Managers' Job Description		X	X	X	X	X	X	X	X	X	X	Account Managers' Job Description (Internal Document)	X	X	X	X	Account Managers' Job Description (Internal Document)
IT Context		X	X	X	X	X	X	X	X	X	X	Account Managers' Job Description (Internal Document)	X	X	X	X	Account Managers' Job Description (Internal Document)
Primary Appraisal		X	X	X	X	X	X	X	X	X	X	Account Managers' Job Description (Internal Document)	X	X	X	X	Account Managers' Job Description (Internal Document)
Secondary Appraisal		X	X	X	X	X	X	X	X	X	X	Account Managers' Job Description (Internal Document)	X	X	X	X	Account Managers' Job Description (Internal Document)
Adaptation Efforts		X	X	X	X	X	X	X	X	X	X	Account Managers' Job Description (Internal Document)	X	X	X	X	Account Managers' Job Description (Internal Document)
Outcomes		X	X	X	X	X	X	X	X	X	X	Account Managers' Job Description (Internal Document)	X	X	X	X	Account Managers' Job Description (Internal Document)
Reappraisal		X	X	X	X	X	X	X	X	X	X	Account Managers' Job Description (Internal Document)	X	X	X	X	Account Managers' Job Description (Internal Document)

an account manager's job through interviews with the senior managers and the project managers of each bank and by consulting detailed job descriptions. Although it was not the primary purpose of these interviews, we also benefitted from their perspective to gain a preliminary understanding of account managers' reactions to the new systems and of how they adapted.

The second step consisted of studying the adaptation process of three account managers in Bank A and three account managers in Bank B. Following Miles and Huberman (1994), we tried to maximize variation by selecting respondents who were known to hold different views and opinions about the systems and to have different usage patterns. In addition, in an effort to triangulate the information obtained directly from the account managers, we interviewed an IT trainer and one help desk support specialist in Bank A, and one administrative assistant and an IT trainer in Bank B. These individuals were chosen because they had close professional relationships with the account managers and they had worked with them during the two years covered by the study. They were thus asked to describe how, to their knowledge, each account manager had initially appraised the consequences of the new system, how they had adapted, how the IT had affected their performance, and how the account managers had reappraised the system at the time of the study.

The interviews with the six account managers aimed at understanding how each originally appraised the consequences of the technology (primary appraisal); what control they felt they had over the technology, their work, and themselves (secondary appraisal); how they adapted (adaptation strategy); and what effects they perceived the new system had on them personally and on their performance at work (outcomes). The account managers were asked to provide a detailed narrative description of the implementation process, all the related major events, and their individual reactions. In order to minimize recall biases, we followed Collopy's (1996) and Hufnagel and Conca's (1994) recommendations and anchored questions with significant event flags, for example, questions such as "Do you recall the moment

when you were first made aware that a new IT would soon be introduced?" and "What was your reaction when you saw the computer on your desk for the very first time?" In addition, in an attempt to explore the notion of reappraisal, all interviews ended with an open discussion of how the account managers perceived their system at the time of the interview.

Data Analysis

The unit of analysis of the model is the adaptation strategy (i.e., patterns in streams of adaptation acts of users). In order to discover these patterns, we had to document the different adaptation efforts and acts used by account managers and group them into adaptation strategies. To do this, the data analysis was conducted in two main steps: *coding* and *construction of the chains of evidence*. *Coding* was done in two phases. First, the data obtained in interviews about the adaptation process of account managers was coded into broad categories (primary appraisal, secondary appraisal, adaptation efforts, and outcomes) by the two authors independently. As suggested by Miles and Huberman, the researchers compared their classifications after having coded two interviews. No significant differences were identified at that point and the coding thus proceeded for the remaining interviews. Second, a finer-grained coding was performed. Quotes relating to primary appraisal were further categorized into perceived opportunity or threat. Those related to secondary appraisal were categorized into perceived high or low control with regard to the technology, the work, and the individual. Adaptation efforts were further categorized into problem- or emotion-focused and outcomes were categorized into improving individual effectiveness and efficiency, minimizing threat, or restoring emotional stability. The entire coding process yielded a total of 247 coded quotes. Inter-coder agreement between the two researchers was above 90 percent.⁵ An agree-

⁵The code given to each quote by both researchers was compared. Both researchers had assigned the same code to 226 quotes, leaving 21 coding discrepancies to be resolved.

ment was reached between the two researchers after discussing the 21 discrepant quotes.

The second step in the data analysis was the construction of the chains of evidence that grouped quotes from each account manager about primary and secondary appraisals and adaptation efforts into patterns of actions, thereby identifying adaptation strategies. The data gathered in the interviews with the two IT trainers, the administrative assistant, and the help desk support employee were used to provide additional insight into the adaptation process of the account managers. A table was constructed for each account manager organizing all the data related to his/her adaptation process into patterns allowing us to identify the four main strategies under study. Finally, account managers with similar adaptation strategies were grouped into separate tables which include relevant quotes to illustrate the given strategy. This process yielded the four tables presented in the next section.

Results

The reactions and responses of account managers with regard to the new systems varied extensively within each bank.

Link was perceived by most account managers as an improvement to their tool kit. Generally speaking, account managers received it very well. Obviously, there were a few very bad reactions to its introduction. It's easy to understand; we were introducing a major change in their work process....a certain number of account managers still utilize the paper-based version that has been in use at the Bank since 1995. (IS Vice President, Bank A)

I've seen everything: from an account manager who tried to open his laptop using a screwdriver, to one who was mad because they were not provided with an Internet access. [The Internet access

was provided to account managers only a year after the initial implementation.] One even left slamming the door. He came back two days later only to pack up: he retired. (Director of Operations, Bank A)

We thought all account managers would welcome the system, it is such a good system, but we were mistaken. Several were mad at us for implementing it; we almost had a revolution....Nowadays, it's when the system is down that we hear them. Some expect it to be up and running 24/7! (Project Manager, Bank B)

At first, several account managers welcomed the laptop but some were unhappy. Obviously, the new system did not please everyone; many account managers felt they were demoted to secretarial positions while many administrative assistants felt they were doing the account managers' job without being paid for it....I wonder how many account managers really use it as it should. (Chief Information Officer, Bank B)

The data provided evidence for our four adaptation strategies and their link with appraisal and outcomes. We present and discuss chains of evidence relating to the four strategies below: benefits maximizing (Peter, Bank A; Mark, Bank B); benefits satisficing (Dave, Bank B); disturbance handling (John, Bank A; Bill, Bank B); and self-preservation (Michele, Bank A).

Benefits Maximizing

Peter welcomed the new system (quote Q1, Table 3)⁶ and saw it as an opportunity to improve

⁶Quotes in each of Tables 3 to 6 have been numbered sequentially in order to facilitate referencing.

Table 3. Chains of Evidence: Benefits Maximizing

	Appraisal		Adaptation Efforts	Outcomes
	Primary	Secondary		
Peter (Bank A)	<p>Q1 "I felt happy and relieved. It was about time for us to be equipped with such a tool."</p> <p>Q2 "I was confident that this system would give me an opportunity to do things differently and better and to be much faster, to do much fewer errors and to improve the quality of service I give to my client."</p>	<p>Q3 "I was convinced that I would become proficient using it in no time and that I would use it to improve the way I work."</p>	<p>Q4 "I spent numerous hours trying new things on the system. I quickly learned how to use the system and found creative uses for it.... I used the help function and called the help desk many times over the first few weeks after which I discovered new uses mostly by trial and error."</p> <p>Q5 "Peter is one of those who used to call us many times a day during the weeks following the implementation. He wanted to know how to do everything and even things the system hasn't been developed for." (Help Desk Employee)</p> <p>Q6 "The system allowed me to completely change the way I was used to work and interact with my clients. It brought me to forget about my favorite stocks or funds, those that I was used to recommend to everyone, and to explore new personal avenues with each customer."</p> <p>Q7 "I can benchmark my services against competitors and I can get information on my clients."</p>	<p>Q8 "This system really helped me improve my performance. It is easier to convince clients to transfer their accounts with me. Also, I am much more efficient. I am faster and I make fewer errors. My profit and my salary increased since I have it."</p>
Mark (Bank B)	<p>Q9 "I felt so relieved when they gave it to us. I would not have to fill piles of paper forms anymore. I felt like I was working in the old age era using a pen and paper all the time and not having up-to-date information about my clients."</p> <p>Q10 "That was good news."</p> <p>Q11 "Mark not only welcomed the system but he also quickly became a strong proponent of it. Since day one, he has been helping his colleagues a lot." (Director of Operations)</p>	<p>Q12 "Our work is flexible and I have a lot of autonomy in the way I do my job."</p> <p>Q13 "We are pretty free to use the system how and when we want. There are some standard forms that we need to fill on the system, but how and when I use it is my decision. I don't think management really cares how we use it. As long as the job is done."</p>	<p>Q14 "At first, I really played with it, trying out everything up to the last command in each menu. I discovered that I could use the system to do many more things than what they said during the training session."</p> <p>Q15 "I created links to import data from the financial module into Excel to analyze my clients' sales forecasts and to create graphs to show to my clients."</p> <p>Q16 "At first, we did not have access to the internet, but there is very useful information on the net for account managers. You can find information on your clients, you can compare your clients to industry standards, and you can even find information on your competitors. So, I found a way to use Reach to access the Internet."</p> <p>Q17 "As I was learning how it worked and what it could do, I was integrating various functionalities in my working procedures. I changed about everything in the way I do my job."</p> <p>Q18 "When he was provided with the laptop, Mark started to do everything by himself, he would only let me answer the phone! After a few weeks, he started to give me back some work to do, the most boring tasks, like typing letters." (Administrative Assistant)</p>	<p>Q19 "The reports that I produce using Reach make me save a lot of time. After having spent 5 minutes analyzing this report for instance (showing an 8½ by 11 inches sheet loaded with figures), I have a pretty good idea of my client's situation. It used to take me hours before."</p> <p>Q20 "It doesn't only save me time, it shortens the response time to my clients."</p> <p>Q21 "It's obvious. Before Reach, we didn't have a good risk evaluation tool. Now it's much easier to evaluate risk and I have a much better overall picture and I make better decisions."</p> <p>Q22 "I doubled my bonuses since we have this system."</p>

his efficiency (e.g., reducing time and effort), effectiveness (e.g., improving the quality of services), and overall performance (Q2). As Q3 indicates, Peter felt he had control over the situation, in particular with regard to his ability to learn and use the system (control over self and technology) and to change the way he worked (control over the work system). In the interview, he stressed that since he had always been successful in that job, he thought this new tool could help him in becoming even better.

Peter's adaptation efforts were almost exclusively problem-focused and oriented toward enhancing the benefits of *Link*. He wanted to make sure that he would rapidly master *Link* so that he could take advantage of it as soon as possible and use it to increase his performance. His adaptation efforts were quite extensive and addressed himself, the work system, and the technology. Through training and discovery by trial and error, he quickly learned how to exploit the new system (Q4). He often called the help desk during the first few weeks in an effort to learn as many functionalities as possible (Q5). Peter's adaptation efforts also focused on the work system and his working habits and procedures. He changed his interactions with his clients and used the new system to explore different financial alternatives and analyze new stocks and funds with his clients, something he had never done before (Q6). Peter's adaptation efforts were also oriented toward the technology. Although *Link* was not originally designed as such, Peter found ways to use it to gather information on competitors' products and services and to benchmark his own service level against that of his competitors (Q7). As Q8 indicates, according to Peter, the system allowed him to improve his efficiency (work faster, make fewer errors) and his effectiveness (convince clients to transfer their accounts with him), which improved his overall performance and his salary. Peter concluded by stating how good the system was and how happy he was.

Mark, from Bank B, positively appraised *Reach* and saw it as an opportunity to eliminate the tedious and low-value tasks of his job, an opportunity that could improve his performance (Q9,

Table 3). For him, *Reach*'s implementation was good news (Q10, Q11). Mark also felt he had extensive control over his job as well as over the new system. As an account manager, he had great autonomy in his job and felt that his supervisor was interested in his results, but not in the way he did his job (Q12). Similarly, while the Bank promoted *Reach*, Mark felt its usage was voluntary. He could decide how and when he would use it (Q13).

Mark's adaptation efforts were problem-focused and directed at himself and at the environment (adapting *Reach* and modifying his work system) so that he could maximize the benefits of *Reach*. During the first weeks, Mark learned how to use the system rapidly in order to quickly reap the benefits he thought *Reach* could bring (Q14). He tried every single application, clicking on every single icon (Q14). Mark also adapted the new technology to his work routines and preferences by creating new applications using MS Excel and importing data into his financial analysis application (Q15). He also connected *Reach* to the Internet to gather important information about his clients and to benchmark his services against competitors (Q16). Finally, Mark modified his work system quite substantially (Q17). He indicated that *Reach* allowed him to focus on the most important activities of his job and to delegate the rest to his assistant (Q18).

Mark felt that the system provided very significant improvements in his performance. He indicated that *Reach* helped him improve his efficiency (saving time, faster response to client Q19, Q20) and effectiveness (better risk assessment, better decisions Q21), which increased his overall performance and contributed to increasing his bonuses (Q22). Mark concluded by saying that he was very satisfied with this system: "*I would never want to go back to the old way of doing things.*"

The adaptation processes used by both Peter and Mark illustrate the benefits maximizing strategy described in our model (Figure 2) and support Proposition 1. Peter and Mark appraised the new IT as an opportunity to improve their work and productivity and felt that they had control over the

Table 4. Chain of Evidence: Benefits Satisficing

	Appraisal		Adaptation Efforts	Outcomes
	Primary	Secondary		
Dave (Bank B)	Q1 "It was obvious right from the start that this would help us. One could see that it had great potential." Q2 "Most of us were very happy."	Q3 "We don't have much control over things here. Top management decides and we follow." Q4 "Like it or not, the system was going to be implemented. I thought that the system would not be flexible. It was a standard tool that was developed and implemented across the bank."	Q5 "We helped each other a lot. It took time but we succeeded." Q6 "Management really insisted and after a while, the only thing we could do was to learn how to use it." Q7 "So I learned how to use it. Hey, it was not that easy, it was a major change for us." Q8 "Apart from learning how to use it, I didn't do much about this system."	Q9 "All the documents that account managers produce have a much better look." Q10 "The system prevents a lot of errors, so we loose less time." Q11 "After all, it did not change a lot of things in my work."

situation at all three levels: the technology, their working system, and themselves. They both performed extensive problem-focused adaptation efforts, which resulted in significant improvements in their efficiency and effectiveness.

Benefits Satisficing

Like Mark, **Dave** positively appraised *Reach* and was very happy when Bank B implemented it (Q1, Q2, Table 4). He was convinced that the new system was good and that it had a great potential to improve his job. Contrary to Mark, however, Dave felt he had very little control over the situation in general (Q3). He felt that he had no control over the new system and that, being a standard tool implemented across the bank, *Reach* was not very flexible. So he felt he could not really modify nor adapt it (Q4).

Dave's adaptation efforts were minimal. We found no evidence that he performed any emotion-focused adaptation efforts and his problem-focused efforts were strictly limited to learning how to use the minimum number of functionalities he needed to perform his job (Q5, Q6, and Q7). In fact, as he stated in the interview, he adopted a *laissez faire* approach and, contrary to Mark, Dave did not modify his work routines or the technology (Q8). His adaptation was limited to learning how to use *Reach*.

Dave considers the benefits associated with *Reach* to be relatively limited, consisting of marginal improvements in the quality of the documents and in his efficiency in producing them (Q9, Q10). He concluded that the system did not change much after all (Q11). This is consistent with our model and supports Proposition 2. Dave's positive appraisal of the technology and his perceived lack of control over the situation led him to perform minimal adaptation efforts, which resulted in limited benefits.

Disturbance Handling

Table 5 presents quotes from interviews with John (Bank A) and Bill (Bank B), both of whom adapted

in ways that are similar to what was described in the disturbance handling strategy of our model.

At first, **John** was discouraged and afraid that Bank A might use the new system to cut his job (Q1, Q2, Table 5). He was preoccupied by the fact that *Link* might cause him to make errors and to lose data (Q3). However, John felt that he had some control over the situation (Q4), especially with regard to his ability to learn the system (Q5) and his ability to control the way he performed his job (Q6).

John performed both emotion- and problem-focused adaptation efforts. John's emotion-focused efforts were threefold. By comparing learning to use *Link* to learning to play the piano (a nonthreatening situation), he minimized the threats associated with the new technology (Q7). He also convinced himself that since *Link* had been designed by experts like him, it must be a good system that was probably not as threatening as he had initially believed (Q8). This resembles positive comparison and positive reappraisal emotion-focused adaptation as they were previously discussed. Also, similarly to passive acceptance as described in psychology, he convinced himself that using the system and learning to use it were part of his job and his responsibilities (Q9). John's problem-focused efforts were oriented toward himself and consisted mainly of obtaining training to learn to use the new system (Q10, Q11).

It is interesting to note that, contrary to his preliminary expectations, John felt, in the end, that *Link* did not affect him negatively. As indicated in our model and in Proposition 3, through his adaptation efforts, John was able to minimize the perceived negative consequences of *Link* and even to increase his efficiency, although not to the same extent that Peter did. John thought that the system helped to improve the satisfaction of his clients (Q12) and made him look more professional, while also enabling him to make fewer errors (Q13). At the end of the interview, John indicated that *Link* was a good system after all, suggesting that two years after the implementation, he reappraised *Link* positively.

Table 5. Chains of Evidence: Disturbance Handling

	Appraisal		Adaptation Efforts	Outcomes
	Primary	Secondary		
John (Bank A)	<p>Q1 "We were all afraid that the Bank would use the technology to cut jobs."</p> <p>Q2 "It was not an easy period. John was frightened and frustrated. I understand that. When you have been successful at doing something for many years, it's difficult to accept that you have to change." (Branch Manager)</p> <p>Q3 "Along with others, I was afraid of it and I thought that it would lead us to make errors and that we would lose data.... This is really not good, especially when you deal directly with clients and your salary directly depends on your performance.... At first, I was really afraid for my job."</p>	<p>Q4 "I was confident that with enough good will and efforts, I would be able to face this challenge."</p> <p>Q5 "I was convinced that with enough time and practice, I would learn the system and I would become more efficient and effective in my job."</p> <p>Q6 "We control our job and this is part of our job, we need to be able to use it."</p>	<p>Q7 "At first, I did not want to use this system. Then, I kept saying to myself: you have to use computers to learn it. There are no other ways. The more you use it, the better you are at using it.... In fact, it is like learning to play the piano. You don't learn to play the piano by reading about it. You need to try it and play. You have to get hands on experience."</p> <p>Q8 "I told myself: you know it is not the computer that makes the decision, it is me. Plus, how do you think that the computer can make a decision? It is because it was programmed to do so by aggregating the expertise of account managers, like me, so it must be good."</p> <p>Q9 "And, after all, it is our responsibility to learn new tools."</p> <p>Q10 "I decided to take some additional training thinking it might help. It helped me a lot to learn how to use the software, it made me realize that the only way to learn to use Link was to use it."</p> <p>Q11 "John was reluctant to use the system at first but a few weeks after the implementation, User Services offered one to one special training sessions. John enrolled and attended one of these sessions." (Branch Manager)</p>	<p>Q12 "Generally speaking, my clients like to see the computer's results... it helps me suggest investment products with the objective of reaching the "ideal" portfolio as suggested by the system."</p> <p>Q13 "I make fewer errors and I look more professional."</p>

Table 5. Chains of Evidence: Disturbance Handling (Continued)

	Appraisal		Adaptation Efforts	Outcomes
	Primary	Secondary		
Bill (Bank B)	Q14 "I was afraid to look ignorant in front of my colleagues. I had never worked with a computer before." Q15 "I thought this system would make me do my assistant's job." Q16 "I was afraid of losing my job. After all, the bank has used technology to eliminate jobs in the past." Q17 "Bill was really afraid at first." (Director of Operations)	Q18 "If I had enough time I know that I could learn the technology." Q19 "They tried to impose it on us but I've been here for many years, and I control my job and the way I do it. I knew they wouldn't kick me out because I did not use it. So, I told Karen: with or without it, it's business as usual."	Q20 "Bill is one of the many who resisted a lot in the beginning." (Director of Operations) Q21 "I didn't use it at first. I didn't want to." Q22 "At the beginning, Bill didn't do anything. He was acting as if no system had been implemented. He used to say that the computer was my job (pointing to her)...It really took him a lot of time before he started to use it." (Administrative Assistant) Q23 "At first, I was really angry that they wanted us to use that system and I voiced my opinion about this. I felt that we had enough work, we did not need to do our secretary's job on top of it."	Q28 "After a couple of months, I quieted down and calmed myself. I think I had realized that the system was not that bad." Q29 "After a while, and with the help of Mark, Bill came to accept it. He was OK with it." (Director of Operations) → → → Q30 "It produces very professional looking letters for my clients." Q31 "No, it doesn't help me be more productive. It doesn't help me find new clients but the documents I produce have a much better and professional look."
			Q24 "After a while, I decided that I should try to learn the new system. I'm grateful to Mark, he is a nerd and he helped me a lot to learn how to use the system. I always ask him when I have a problem." Q25 "Bill is always in Mark's office to ask for help on how to do this and that." (Administrative Assistant) Q26 "I brought it at home a few times at the beginning to try it and to learn how to use it." Q27 "Now, I use it all the time. It is completely integrated in my job. I changed a couple of things about the system that bogged me and also, I changed my job a little bit. I think I spend more time using the system than with my clients."	

Bill (Bank B) initially negatively appraised the system and felt personally and professionally threatened because he was afraid that *Reach* would reduce his credibility and deskill his job (Q14, Q15, Table 5). He was also afraid that the system could be used to eliminate his job (Q16, Q17). Bill felt, however, that he had some control over the situation, especially regarding how he did his job and the extent to which he would use *Reach* (Q18, Q19).

Bill's adaptation process is quite interesting as the interview allowed us to clearly delineate two phases (identified by vertical arrows in Table 5). The first phase transpired from the implementation of *Reach* until about six months later and the second phase afterward. These two phases provide support for our Proposition 5, which suggests that adaptation efforts and outcomes may lead one to reappraise the situation and trigger a new series of adaptation efforts. In the initial phase, Bill's adaptation efforts were mostly oriented toward restoring emotional stability. At first, Bill resisted the implementation of the new system (Q20). As Q21 and Q22 indicate, he did not use it, ignored its presence, and acted as if *Reach* had not been implemented (self-deception and avoidance). He also expressed his anger to colleagues (Q23), which is similar to the "venting anger" coping act documented in psychology (Lazarus and Folkman 1984). These efforts seemed successful in restoring his emotional stability. For instance, Bill indicated that after two or three months, he had "calmed down" and started to see the system differently and not as negatively (Q28). This was corroborated by the Director of Operations, who indicated that after a while, "*Bill came to accept it. He was OK with it.*" (Q29).

Bill's interview clearly indicates that another series of adaptation efforts occurred approximately six months after the implementation of *Reach*. At that time, most adaptation efforts were problem-focused and oriented toward himself and, to a lesser degree, toward the technology and the work system. With the help of Mark, Bill decided to learn how to use the system (Q24, Q25) and he even brought it home to practice in what was a less threatening environment, one where his

mistakes would go unnoticed (Q26). Bill indicated in the interview that only when he had reached a certain level of expertise did he start to use it overtly at the office. He also slightly modified his work and the technology so that they would better fit together (Q27). Bill indicated that, in the end, although *Reach* did not improve his efficiency, it allowed him to write professional looking documents, improve his credibility, and increase the satisfaction of his clients (Q30, Q31).

Bill's adaptation strategy was successful as he was able to restore emotional stability and integrate *Reach* into his work. He was able to turn the situation around from originally perceiving the new technology as a threat to finally using it to improve his performance. In fact, our data indicates that, at the time of the interview, he had positively reappraised the technology: "*Today, I like that system. It makes me look very smart and up to date with technology, but don't get me wrong, it will never replace the account manager.*"

The cases of John and Bill illustrate the disturbance handling strategy of our model and provide support for Propositions 3 and 5. Both account managers initially perceived the new systems as constituting a threat and both felt that they had control over the way they performed their job and over how they would integrate the new IT in it. Through a series of emotion- and problem-focused adaptation efforts, they were able to restore emotional stability and even improve their performance, thus leading to a positive reappraisal of the systems and, in Bill's case, to a new sequence of adaptation efforts.

Self-Preservation

Michele, like John, initially negatively appraised *Link*. She felt that the new system would increase her workload, reduce her productivity, and decrease her commission-based salary (Q1, Q2, Table 6). She perceived the system as a threat, thinking that it might replace her (Q3). Contrary to John, however, Michele felt that she had little control over the technology and its usage (Q4, Q5) and had insufficient time to learn the new system

Table 6. Chain of Evidence: Self-Preservation

	Appraisal		Adaptation Efforts	Outcomes
	Primary	Secondary		
Michele (Bank A)	<p>Q1 "I did not see how the system could improve clients' satisfaction, grow my portfolio, or help be more productive."</p> <p>Q2 "I knew that it would only add steps in my job. I had enough to do like that; I did not need that above everything else. I thought it could not help me be more productive anyway."</p> <p>Q3 "I was really hesitant at first. I think I was afraid. It was very frustrating and I was afraid that the system might actually replace me. I was afraid that I would lose my job."</p>	<p>Q4 "We had no choice, really.... There was nothing I could do about it."</p> <p>Q5 "The system is here, that's it!"</p> <p>Q6 "I have so much to do in my job that I don't even have the time to think about improving it."</p> <p>Q7 "If I had the time, maybe I would try to get some training, but I don't."</p>	<p>Q8 "Anyway, after a while, I decided to stop complaining. After all, there are more important things in life!"</p> <p>Q9 "I came to the conclusion that since the system decides everything, I would simply accept it and do whatever the system recommends."</p> <p>Q10 "Moreover, I'm convinced that my clients would hate to see me using a computer; they trust my judgment and me, not the computer. Actually, if I were to use the computer to make investment decisions, I think several of my clients would close their accounts and go to another bank. In anyway, that's what I'd do if I were the client. I trust people, not computers."</p> <p>Q11 "Fortunately, the help desk people are very nice and knowledgeable. Sometimes, they ask me to use the contextual help menu or to refer to the manual but I keep on calling them every time I encounter a problem, it's much faster than looking for the answer myself..."</p> <p>Q12 "Michele is one of those who still call us on a weekly basis...most of the time for the same basic questions....Some account managers just don't get it. It's like she doesn't want to learn it." (Help Desk Employee)</p> <p>Q13 "others, (referring to Michele) do not use it a lot, nor as they should, and when they do, they rely on their colleagues and on the help desk." (Branch Manager)</p> <p>Q14 "Although I tried to convince my colleagues who refused to use it, some of them postponed its use for many months and some still do not use it." (John, Account Manager)</p>	<p>Q15 "The system does not allow me to better manage my work, to organize my work better or to manage my accounts more efficiently."</p> <p>Q16 "I know some say that the system helps us but I disagree. The system does not help me increase my portfolio or my client base. It simply reduced some of the paperwork."</p> <p>Q17 "I'm much faster using paper and pencil."</p>

or to try to adapt her work routines to make them fit together (Q6, Q7).

Michele's reactions resemble those described in the self-preservation strategy of our model and in our Proposition 4. Michele relied essentially on emotion-focused adaptation efforts. At some point, she decided to stop complaining about the new system and convinced herself that there were more important things to care about, thus minimizing the perceived threat of *Link* (Q8). She simply accepted the new system as a fact of life (Q9). She was also convinced that her clients would not accept seeing her use a computer, thus redefining the situation by using someone else's perspective (Q10). Finally, she avoided the system and tried to escape the situation not only by trying not to learn it (Q11, Q12, Q13), but also by not using it (Q14).

Overall, it seems that although Michele still thinks that *Link* does not help her to be more productive, she was able to minimize the perceived threats of the system. She indicated that although *Link* had some positive effects on her job (e.g., reducing paper work Q16), she felt it did not improve her performance and did not allow her to be a better account manager (Q15, Q16, Q17). In fact, Michele's reappraisal of the system is still quite negative as she felt that *Link* had reduced her autonomy and her pride and gratification associated with making decisions about loans:

We have lost all autonomy and control over our job. The system decides for us. There are very limited opportunities to make a decision. It is automated 100 percent. We don't even have to think anymore. The system does it for you. Before, I was proud of making decisions about loans. It was gratifying. Now, the system decides everything. The only thing left is to decide the interest rate that we will charge for the loan.

Michele's situation contrasts with that of John and Bill. While the three of them started with a negative appraisal of the systems, John and Bill were able to turn the situation around and derive

benefits from it, which led them to reappraise the system more positively. Interestingly, John and Michele work for the same Bank and thus appraised the same technology. However, Michele's adaptation efforts did not help improve her productivity. Rather, they seemed to have reinforced her initial appraisal and led to a negative reappraisal.

Discussion and Contributions

The case studies provide preliminary support for CMUA and our five propositions. Convergent with the sensemaking literature (Griffith 1999; Weick 1990), a given technology was appraised differently by different account managers who adopted different adaptation strategies.

Our research shows that the four strategies are different patterns in streams of actions that are initiated by different appraisals and lead to different outcomes. What strategy one uses depends on one's assessment of an IT and on a broader contingent of organizational factors. From an individual point of view, all of the strategies can be effective in helping to address personally relevant issues raised by an IT event. For some, restoring emotional stability and reducing the stress associated with the IT event is a significant outcome that allows them to continue to work and function properly in an environment they had initially perceived as threatening. For others, pushing their limits further by learning to use a new IT will constitute a major achievement. Still others will grasp an opportunity to increase their productivity and overall performance. From an organizational point of view, the benefits satisfying and self-preservation strategies might at first appear suboptimal because individuals are not trying to maximize the potential benefits of an IT event. In some situations, however, inducing individuals to try to maximize IT benefits might require substantial organizational changes and investments (e.g., increasing job autonomy, decentralizing decision-making authority, extensive user training, or empowering users) that might outweigh the benefits an organization can achieve in doing so. On the

other hand, although employees' ability to restore emotional stability is not an end in itself, it should not be overlooked. For some, it might be a required step before they can perform problem-focused adaptation efforts which will eventually increase operational efficiency and effectiveness.

Implications for Practice and Research

The fundamental contribution of this research to practice is to highlight the importance of an individual user's perception of an IT event in managing adaptation efforts. Hence, this research demonstrates the need for managers to understand how users appraise an IT event and to appreciate the importance of providing users with adequate resources so that they can adapt to it. By doing so, managers can promote adaptation strategies that are likely to improve users' performance and minimize negative emotions associated with an IT event. This study indicates that while users' responses vary from one individual to another, they can be grouped into four broad adaptation strategies, which can be used by managers to choose appropriate management approaches.

Further, CMUA can help managers to proactively manage IT-induced changes, in anticipation periods, even before an IT event occurs. It also provides managers with tools that can help them better understand the components of user adaptation, better predict users' reactions, and hence manage them more efficiently. For example, using CMUA, managers could identify future proponents and opponents of a new IT, more judiciously select local champions, and assist employees who need help adapting to the situation. Depending on users' appraisal of the situation, this can include, for example, providing additional training, communicating additional information about the new system so that users have a better understanding of its consequences, increasing the support provided by colleagues, mentoring, or temporarily reducing performance or productivity targets. In an adaptation context, a key role of managers is to create an environment in which appraisal is openly discussed with individuals and adaptation efforts are welcomed.

This study makes four contributions to research. First, CMUA provides a rich understanding of a broad variety of user behaviors. Prior models, (e.g., TAM, IDT, TTF) help in predicting adoption and use of a given technology. CMUA helps explain and predict how and why users will adapt the technology, the work, and themselves. Grounding the predictions in the users' appraisals of the technology allows for variations to occur among individuals facing a given IT event, and for variations within individuals over time, affording a dynamism that is unavailable in factor models such as personality characteristics or in single-cycle models. It also offers predictive power while retaining an agency view of IT-related behaviors, allowing for and explaining a myriad of response patterns such as technological adjustment and reinvention, changes in individual habits, and resistance to IT-induced changes.

Second, by integrating antecedents, adaptation efforts, and outcomes, by focusing on both positive and negative emotions associated with an IT event, and by taking into account what objectives users seek to achieve when adapting, CMUA offers a complementary perspective to the variance and process approaches to the study of user adaptation.

Third, this research might help shed some light on the relationship between IT and individual performance at work. Despite significant research efforts, the empirical evidence to date is inconclusive and even seems contradictory (Pinsonneault and Rivard 1998). While several hypotheses can be proposed to explain this state of empirical evidence, the possibility that an intervening variable acts upon the relationship between IT use and individual performance seems plausible. It may well be that users' appraisal and adaptation influence how they use the technology and how it will affect their performance. This study suggests that when individuals appraise an IT event as a threat, their efforts will be mostly oriented toward either diminishing emotional distress associated with the technology or reducing the perceived negative consequences associated with it. While these strategies can be successful and allow the individual to restore emotional stability, they are

not likely to quickly lead to any significant improvements in the performance of the individual. On the other hand, adaptation efforts associated with positive appraisals can lead to actions aimed at improving operational and functional efficiency and effectiveness, which are likely to positively affect user performance.

Fourth, this research provides a contribution to psychology by adapting and extending coping theory (Lazarus 1966). To our knowledge, this is the first time that coping theory has been applied to understanding how individuals react to the introduction of a tangible artifact as opposed to abstract events such as mergers, losing a job, or getting divorced. This can lead to a different appraisal process. Users can rely on both the abstract and concrete features of the IT event to assess its potential consequences. This may also trigger a wider range of adaptation efforts. For instance, users can act directly on the object that is perceived as being the source of the disruption and try to physically eliminate it (e.g., sabotage, theft). A second contribution of CMUA to psychology is that it shows how coping can be applied to positive events. It is known that coping theory can be used to assess positively appraised events (Folkman and Moskowitz 2000), but to our knowledge it has never been used in that context. Finally, coping theory is relatively vague in defining and describing the coping strategies and linking them to antecedents. Our research identified four precise strategies and the contingent situations in which they are likely to occur. It also provides preliminary evidence of their validity.

Study Limitations and Future Research

This study has limitations that should be acknowledged. First, the retrospective nature of our empirical study might have left room for a recall bias from our respondents. Despite careful attention to this issue, it is possible that some respondents have reported weaker or distorted stories about their appraisal and adaptation process. Additionally, it was not possible to interview individuals who either retired or were transferred

since the IT events had occurred in the two banks. Such interviews might have provided us with a different perspective from respondents who may have appraised the situation as too demanding and who may have decided to withdraw from the situation. Finally, because our two research sites offered very similar characteristics, the generalizability of our model to other contexts needs to be further investigated.

This research suggests five main avenues for future study. First, more research is needed to further explore, test, and refine CMUA. While our study was conducted with knowledge workers adapting to flexible technologies, it seems that CMUA has a broader scope and can explain the adaptation behavior of various types of users dealing with other technologies. More research is needed to test the model with different users and technologies. In particular, large-scale studies involving numerous users would help assess the model's generalizability. Also, more work needs to be done to further understand the effects of some social factors (e.g., group norms, top management influence, organizational culture, and colleagues' attitude) on user adaptation. To do so, one could study the adaptation behaviors of comparable users who face a similar IT-induced disruption in different organizational or group contexts.

Second, the sequencing and interplay of problem- and emotion-focused adaptation efforts should be studied. For example, because some individuals need to feel worse before they can feel better (Lazarus and Folkman 1984), it is possible that, for some users, emotion-focused efforts that temporarily increase emotional distress (e.g., self-blame) are necessary to induce problem-focused adaptation and mobilize individuals to adapt to an IT event. Longitudinal studies are thus required to examine the user adaptation process in depth.

Third, this research proposes four principal user adaptation strategies related to IT events in organizations. More research is needed to document and build a comprehensive inventory of IT-related adaptation efforts and develop a typology of adaptation strategies. For instance, it would be interesting to apply CMUA to understand extreme

user responses such as sabotage. Using CMUA, it could be argued that sabotage occurs when an IT event is assessed as extremely threatening, when users feel they lack control over the situation, when the resources available are insufficient to handle the situation, and when they cannot withdraw from the situation. In such a situation, users might be forced to stay in the threatening situation and they might see no other alternatives except to try to manage the situation at hand and restore emotional stability by rendering the IT inoffensive.

Fourth, one's self-efficacy (one's belief in his/her ability to adapt to a specific situation) has been found to moderate the appraisal-coping relationship (Jerusalem and Mittag 1995; Jex and Bliese 1999; Jex and Gudanski 1992; Schaubroeck et al. 2000). Research is needed to examine the notion of self-efficacy in the context of user adaptation (e.g., as a belief about one's capability to adapt the IT, the self, and the job) and determine what effect it has on appraisal and adaptation. Moderating effects of other known antecedents of IT acceptance and use (e.g., user innovativeness, computer anxiety, perceived ease of use, and perceived usefulness) should also be investigated.

Finally, the timing of appraisal and adaptation efforts should be studied. The coping process has been found to occur at different points in time for various individuals (Folkman 1992). The whole process can occur in the *anticipation* period (which we would call pre-implementation) or in what psychologists call the *impact* and *post-impact* periods (implementation and post-implementation periods). When adaptation occurs in the anticipation period, users can modify their work and themselves based on the expected consequences and features of the future IT event. Modifications to the technology are also possible when it is being designed (e.g., users participating in a project can influence the functionalities and features of the new IT or adjust their requirements; Orlikowski 1996). During the post-implementation period, users can modify their work, themselves, and the technology while using it. Future studies could shed some light on how adaptation strategies

unfold at different points in time and across periods.

Despite the fact that user adaptation behaviors are widely accepted as key to understanding several important issues related to the development, implementation, usage, and effects of IT in organizations, little is known on the topic. While the framework proposed in this paper constitutes a step toward a better understanding of user adaptation, it raises as many questions as it provides answers. It is hoped that this study will stimulate research in this domain.

Acknowledgements

The authors are grateful for the insightful comments and suggestions received from the senior editor, associate editor, and three reviewers. The paper has benefitted from comments of the participants of the research seminar of the Marshall Business School of University of Southern California. We thank the Social Sciences and Humanities Research Council of Canada (SSHRC) for providing support for this research and the Center for Research on Information Technology and Organization at the University of California, Irvine.

References

- Agarwal, R., and Prasad, J. "Are Individual Differences Germane to the Acceptance of New Information Technologies?," *Decision Sciences* (30:2), 1999, pp. 361-391.
- Agarwal, R., and Prasad, J. "A Conceptual and Operational Definition of Personal Innovativeness in the Domain of Information Technology", *Information Systems Research* (9:2), 1998, pp. 204-215.
- Agarwal, R., Sambamurthy, V., and Stair, R. "The Evolving Relationship between General and Specific Computer Self-Efficacy: An Empirical Investigation," *Information Systems Research* (11:4), 2000, pp. 418-430.
- Ajzen, I. "From Intentions to Actions: A Theory of Planned Behavior," in *Action Control: From*

- Cognition to Behavior*, J. Kuhl and J. Beckmann (Eds.), Springer Verlag, New York, 1985, pp. 11-39.
- Bandura, A. "Self-Efficacy: Toward a Unifying Theory of Behavioral Change," *Psychological Review* (84:2), 1977, pp. 191-215.
- Beaudry, A. *Coping, technologies de l'information et performance individuelle: une étude empirique*, Unpublished Doctoral Dissertation, École des HEC, Montreal, 2002.
- Beaudry, A., and Pinsonneault, A. "IT-Induced Adaptation and Individual Performance: A Coping Acts Model," in *Proceedings of the 22nd International Conference on Information Systems*, V. Storey, S. Sarkar, and J. I. DeGross (Eds.), New Orleans, LA, 2001, pp. 475-479.
- Begley, T. M. "Coping Strategies as Predictors of Employee Distress and Turnover after an Organizational Consolidation: A Longitudinal Analysis," *Journal of Occupational and Organizational Psychology* (71), 1998, pp. 305-329.
- Carpenter, B. "Issues and Advances in Coping Research," *Personal Coping: Theory, Research, and Application*, B. Carpenter (Ed.), Praeger, Westport, CT, 1992, pp. 1-14.
- Cartwright, S., and Cooper, C. L. "Coping in Occupational Settings," *Handbook of Coping: Theory, Research, Applications*, M. Zeidner and N. S. Endler (Eds.), John Wiley & Sons, New York, 1996, pp. 202-220.
- Chattopadhyay, P., Glick, W., and Huber, G. P. "Organizational Actions in Response to Threats and Opportunities," *Academy of Management Journal* (44:5), 2001, pp. 937-955.
- Clark, P.A. *Anglo-American Innovation*, DeGruyter, New York, 1987.
- Cohen, S., Evans, G. W., Stokols, D., and Krantz, D. S. *Behavioral, Health, and Environmental Stress*, Plenum, New York, 1986.
- Collopy, F. "Biases in Retrospective Self-Reports of Time Use: An Empirical Study of Computer Users," *Management Science* (42:5), 1996, pp. 758-767.
- Davis, F. D. "Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology," *MIS Quarterly* (13:3), 1989, pp. 319-340.
- Davis, F. D., Bagozzi, R. P., and Warshaw, P. R. "User Acceptance of Computer Technology: A Comparison of Two Theoretical Models," *Management Science* (35:8), 1989, pp. 982-1003.
- DeSanctis, G., and Poole, M. S. "Capturing the Complexity in Advanced Technology Use: Adaptive Structuration Theory," *Organization Science* (5:2), 1994, pp. 121-147.
- Dishaw, M. T., and Strong, D. M. "Extending the Technology Acceptance Model with Task-Technology Fit Constructs," *Information and Management* (36:1), 1999, pp. 9-21.
- Dishaw, M. T., Strong, D. M., and Brandy, D. B. "Extending the Task-Technology Fit Model with Self-Efficacy Constructs," in *Proceedings of the 8th Americas Conference on Information Systems*, R. Ramsower and J. Windsor (Eds.), Dallas, TX, 2002, pp. 1021-1027.
- Dutton, J. E., and Jackson, S. E. "Categorizing Strategic Issues: Links to Organizational Actions," *Academy of Management Review* (12:1), 1987, pp. 76-90.
- Fiske, S. T., and Taylor, S. E. *Social Cognition* (2nd ed.), McGraw-Hill, New York, 1991.
- Folkman, S. "Making the Case for Coping," in *Personal Coping: Theory, Research, and Application*, B. N. Carpenter (Ed.), Praeger, Westport, CT, 1992, pp. 31-46.
- Folkman, S., and Lazarus, R. S. "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), 1985, pp. 150-170.
- Folkman, S., Lazarus, R. S., Gruen, R. J., and DeLongis, A. "Appraisal, Coping, Health Status and Psychological Symptoms," *Journal of Personality and Social Psychology* (50:3), 1986, pp. 571-579.
- Folkman, S., and Moskowitz, J. T. "Positive Affect and the Other Side of Coping," *American Psychologist* (55: 6), 2000, pp. 647-654.
- French, Jr., J. R. P., Rodgers, W., and Cobb, S. "Adjustment as Person-Environment Fit," in *Coping and Adaptation*, G. V. Coelho, D. A. Hamburg, and J. E. Adams (Eds.), Basic Books, New York, 1974, pp. 316-333.
- Goodhue, D. L. "Understanding User Evaluations of Information Systems," *Management Science*, 1995 (41:12), pp. 1827-1844.
- Goodhue, D. L., and Thompson, R. L. "Task-Technology Fit and Individual Performance," *MIS Quarterly* (19:2), 1995, pp. 213-236.

- Griffith, T. L. "Technology Features as Triggers for Sensemaking," *Academy of Management Review* (24:3), 1999, pp. 472-488.
- Holanan, C. J., Moos, R. H., and Schaefer, J. A. "Coping, Stress Resistance, and Growth: Conceptualizing Adaptive Functioning," in *Handbook of Coping*, M. Zeidner and N. S. Endler (Eds.), John Wiley & Son, New York, 1996, pp. 24-43.
- Hufnagel, E. M., and Conca, C. "User Response Data: The Potential for Errors and Biases," *Information Systems Research* (5:1), 1994, pp. 48-73.
- Ives, B., and Olson, M. H. "User Involvement and MIS Success: A Review of Research," *Management Science* (30:5), 1984, pp. 586-603.
- Jackson, S. E., and Dutton, J. E. "Discerning Threats and Opportunities," *Administrative Science Quarterly* (33), 1988, pp. 370-387.
- Jerusalem, M., and Mittag, W. "Self-Efficacy in Stressful Life Transitions," in *Self-Efficacy in Changing Societies*, A. Bandura (Ed.), Cambridge University Press, Cambridge, England, 1995, pp. 177-201.
- Jex, S. M., and Bliese, P. D. "Efficacy Beliefs as a Moderator of the Effects of Work-Related Stressors: A Multilevel Study," *Journal of Applied Psychology* (84), 1999, pp. 349-361.
- Jex, S. M., and Gudanowski, D. M. "Efficacy Beliefs and Work Stress: An Exploratory Study," *Journal of Organizational Behavior* (13), 1992, pp. 507-519.
- Karahanna, E., Straub, D. W., and Chervany, N. L. "Information Technology Adoption Across Time: A Cross-Sectional Comparison of Pre-Adoption and Post-Adoption Beliefs," *MIS Quarterly* (23:2), 1999, pp. 183-213.
- Kirk, J., and Miller, M. L. *Reliability and Validity in Qualitative Research*, Sage Publications, Beverly Hills, CA, 1986.
- Kraut, R., Dumais, S., and Koch, S. "Computerization, Productivity, and Quality of Work-Life," *Communications of the ACM* (32:2), 1989, pp. 220-238.
- Lazarus, R. S. *Psychological Stress and the Coping Process*, McGraw-Hill, New York, 1966.
- Lazarus, R. S. *Stress and Emotion: A New Synthesis*, Springer, New York, 1999.
- Lazarus, R. S. "Toward Better Research on Stress and Coping," *American Psychologist* (55:6), 2000, pp. 665-673.
- Lazarus, R. S., and Folkman, S. *Stress, Appraisal, and Coping*, Springer Publishing Company, New York, 1984.
- Leana, C. R., Feldman, D. C., and Tan, G. Y. "Predictors of Coping Behavior after a Layoff," *Journal of Organizational Behavior* (19), 1998, pp. 85-97.
- Leonard-Barton, D. "Implementation as Mutual Adaptation of Technology and Organization," *Research Policy* (17), 1988, pp. 251-267.
- Lewis, W., Agarwal, R., and Sambamurthy, V. "Sources of Influence on Beliefs About Information Technology Use: An Empirical Study of Knowledge Workers," *MIS Quarterly* (27:4), 2003, pp. 657-678.
- Louis, M. R., and Sutton, R. I. "Switching Cognitive Gears: From Habits of Mind to Active Thinking," *Human Relations* (44), 1991, pp. 55-76.
- Lyytinen, K., and Rose, G. M. "The Disruptive Nature of Information Technology Innovations: The Case of Internet Computing in Systems Development Organizations," *MIS Quarterly* (27:4), 2003, pp. 557-596.
- Majchrzak, A., and Cotton, J. "A Longitudinal Study of Adjustment to Technological Change: From Mass to Computer-Automated Batch Production," *Journal of Occupational Psychology*, 61, 1988, pp. 43-66.
- Majchrzak, A., Rice, R. E., Malhotra, A., King, N., and Ba, S. "Technology Adaptation: The Case of a Computer-Supported Inter-Organizational Virtual Team," *MIS Quarterly* (24:4), 2000, pp. 569-600.
- McCrae, R. R. "Age Differences and Changes in the Use of Coping Mechanisms," *Journal of Gerontology* (44), 1989, pp. 161-169.
- McCrae, R. R. "Situation Determinants of Coping Responses: Loss, Threat, and Challenge," *Journal of Personality and Social Psychology* (46), 1984, pp. 919-928.
- Milburn, T. W., Schuler, R. S., and Watman, K. H. "Organizational Crisis, Definition and Conceptualization," *Human Relations* (36:12), 1983, pp. 1141-1160.

- Miles, M. B., and Huberman, A. M. *Qualitative Data Analysis* (2nd ed.), Sage Publications, Newbury Park, CA, 1994.
- Moore, G. C., and Benbasat, I. "Development of an Instrument to Measure the Perceptions of Adopting an Information Technology Innovation," *Information Systems Research* (2:3), 1991, pp. 192-222.
- Oakland, S., and Ostell, A. "Measuring Coping: A Review and Critique," *Human Relations* (49:2), 1996, pp. 133-155.
- Orlikowski, W. J. "Improvising Organizational Transformation Over Time: A Situated Change Perspective," *Information Systems Research* (7:1), 1996, pp. 63-92.
- Patrickson, M. "Adaptation by Employees to New Technology," *Journal of Occupational Psychology* (59), 1986, pp. 1-11.
- Patterson, T. L., Smith, L. W., Grant, I. Clopton, P., Josepho, S., and Yager, J. "Internal vs External Determinants of Coping Responses to Stressful Life Events in the Elderly," *British Journal of Medical Psychology* (63), 1990, pp. 149-160.
- Pentland, B. T. "Use and Productivity in Personal Computing: An Empirical Test," in *Proceedings of the 10th International Conference on Information Systems*, J. I. DeGross, J. C. Henderson, and B. R. Konsynski (Eds.), Boston, December 1989, pp. 211-222.
- Pinsonneault, A., and Rivard, S. "The Impact of Information Technologies on Managerial Work: From the Productivity Paradox to the Icarus Paradox?," *MIS Quarterly* (22:3), 1998, pp. 287-312.
- Poole, M. S., and DeSanctis, G., "Understanding the Use of Group Decision Support Systems: The Theory of Adaptive Structuration," in *Organizations and Communication Technology*, J. Fulk and C. Steinfield (Eds.), Sage Publications, Newbury Park, CA, 1990, pp. 173-193.
- Poole, M. S., and DeSanctis, G. "Use of Group Decision Support Systems as an Appropriation Process," in *Proceedings of the 22nd Hawaii International Conference on System Sciences* (Volume 4), IEEE Computer Society Press, Los Alamitos, CA, 1988, pp. 149-157.
- Rice, R., and Rogers, E. M. "Reinvention in the Innovation Process," *Knowledge: Creation, Diffusion, Utilization* (1:4), 1980, pp. 499-514.
- Rogers, E. M. *Diffusion of Innovations* (3rd ed.), Free Press, New York, 1983.
- Rosen, L. D., Sears, D. C., and Weil, M. M. "Computerphobia," *Behavioral Research Methods, Instruments, and Computers* (19:2), 1987, pp. 167-179.
- Rotter, J. B. "Generalized Expectations for Internal Versus External Control of Reinforcement," *Psychological Monographs: General and Applied* (80:1), 1966, pp. 1-28.
- Schaubroeck, J., Lam, S. K., and Xie, J. L. "Collective Efficacy Versus Self-Efficacy in Coping Responses to Stressors and Control: A Cross-Cultural Study," *Journal of Applied Psychology* (85:4), 2000, pp. 512-525.
- Shaw, J. B., and Barrett-Power, E. "A Conceptual Framework for Assessing Organization, Work Group, and Individual Effectiveness During and After Downsizing," *Human Relations* (50:2), 1997, pp. 109-127.
- Sokol, M. B. "Adaptation to Difficult Designs: Facilitating Use of New Technology," *Journal of Business and Psychology* (8:3), Spring 1994, pp. 277-296.
- Somerfield, M. R., and McCrae, R. R. "Stress and Coping Research," *American Psychologist* (55:6), 2000, pp. 620-625.
- Stone, A. A., Kennedy-Moore, E., Newman, M. G., Greenberg, M., and Neale, J. M. "Conceptual and Methodological Issues in Current Coping Assessments," in *Personal Coping: Theory, Research, and Application*, B. N. Carpenter (Ed.), Praeger, Westport, CT, 1992, pp. 15-29.
- Taylor, S., and Todd, P. A. "Assessing IT Usage: The Role of Prior Experience," *MIS Quarterly* (19:4), 1995a, pp. 561-570.
- Taylor, S., and Todd, P. A. "Understanding Information Technology Usage: A Test of Competing Models," *Information Systems Research* (6:2), 1995b, pp. 144-176.
- Tennen, H., and Affleck, G. "Finding Benefits in Adversity," in *Coping: The Psychology of What Works*, C.R. Snyder (Ed.), Oxford University Press, New York, 1999, pp. 279-304.
- Thompson, R. L., Higgins, C. A., and Howell, J. M. "Personal Computing: Towards a Conceptual Model of Utilization," *MIS Quarterly* (15:1), 1991, pp. 125-143.

- Tyre, M. J., and Orlikowski, W. J. "The Episodic Process of Learning by Using," *International Journal of Technology Management* (11:7/8), 1996, pp. 790-798.
- Tyre, M. J., and Orlikowski, W. J. "Windows of Opportunity: Temporal Patterns of Technological Adaptation in Organizations," *Organization Science* (5:1), 1994, pp. 98-118.
- Venkatesh, V. "Determinants of Perceived Ease of Use: Integrating Control, Intrinsic Motivation, and Emotion into the Technology Acceptance Model," *Information Systems Research* (11:4), 2000, pp. 342-365.
- Venkatesh, V., Morris, M. G., Davis, G. B., and Davis, F. D. "User Acceptance of Information Technology: Toward a Unified View," *MIS Quarterly* (27:3), 2003, pp. 425-478.
- Vessey, I., and Galletta, D. "Cognitive Fit: An Empirical Study of Information Acquisition," *Information Systems Research* (2:1), 1991, pp. 63-84.
- Weick, K. E. "Technology as Equivoque: Sense-making in New Technologies," in *Technology and Organizations*, P. S. Goodman and L. S. Sproull (Eds.), Jossey-Bass, San Francisco, 1990, pp. 1-44.
- Weil, M. M., and Wugalter, S. E. "The Etiology of Computerphobia," *Computer in Human Behavior* (6), 1990, pp. 361-379.
- Zigurs, I., and Buckland, B. K. "A Theory of Task/Technology Fit and Group Support Systems Effectiveness," *MIS Quarterly* (22:2), 1998, pp. 313-334.
- Zigurs, I., Buckland, B. K., Connolly, J. R., and Wilson, E. V. "A Test of Task-Technology Fit Theory for Group Support Systems," *The DATA*

BASE for Advances in Information Systems (30:3,4), Summer-Fall 1999, pp. 34-50.

Zuboff, S. *In the Age of the Smart Machine: The Future of Work and Power*, Basic Books, New York, 1988.

About the Authors

Anne Beaudry is an assistant professor at the John Molson School of Business, Concordia University. She obtained her Ph.D. from HEC-Montréal. Her research has been presented at the Academy of Management, Americas' Conference on Information Systems, the Administrative Sciences Association of Canada, and the International Conference on Information Systems. Her research interests focus on IT-induced behaviors and on individual and organizational impacts of IT implementation and use.

Alain Pinsonneault is the Imasco Chair of IS and James McGill Professor in the Faculty of Management at McGill University. He obtained his Ph.D. at the University of California, Irvine. His current research interests include the business value of IT, organizational and individual impacts of IT, ERP, health informatics, electronic commerce, and management of IT departments. He has published papers in *Management Science*, *MIS Quarterly*, *Information Systems Research*, *The Journal of Management Information Systems*, *Organization Science*, *Decision Support Systems*, and the *European Journal of Operational Research*.