Communications of the Association for Information Systems

Volume 45 Article 15

9-2019

IT Adaptation Patterns to Enterprise-wide Systems

Paweena Wanchai
Khon Kaen University, wpaweena@kku.ac.th

Antonio Díaz Andrade
Auckland University of Technology

Angsana Techatassanasoontorn
Auckland University of Technology

Recommended Citation
Wanchai, P., Díaz Andrade, A., & Techatassanasoontorn, A. (2019). IT Adaptation Patterns to Enterprise-wide Systems. Communications of the Association for Information Systems, 45, pp-pp. https://doi.org/10.17705/1CAIS.04515

Communications of the Association for Information Systems

Research Paper DOI: 10.17705/1CAIS.04515 ISSN: 1529-3181

IT Adaptation Patterns to Enterprise-wide Systems

Paweena Wanchai
Department of Computer Science
Khon Kaen University
Thailand
wpaweena@kku.ac.th

Antonio Díaz Andrade
Business Information Systems
Auckland University of Technology
New Zealand

Angsana Techatassanasoontorn
Business Information Systems
Auckland University of Technology
New Zealand

Abstract:

The introduction of enterprise-wide systems requires users to simultaneously adjust to both the new system's requirements and changes associated with modified business processes—an adaptation that often goes beyond conspicuous behavioral elements. Therefore, to investigate the underlying attributes that characterize user interaction with and adaptation to information technology (IT), we collected data from four organizations that had implemented enterprise-wide systems for at least three years prior to commencing fieldwork. By taking a grounded theory approach, we identify four distinct adaptation patterns: reluctant, compliant, faithful, and enthusiastic. These patterns represent configurations of five interrelated attributes that users espouse in their interaction with enterprise-wide systems: attitude towards the system, approach to learning how to use the system, level of interaction with the system, exploration of system features, and stance towards changing work practices. We propose an emergent, substantive theory of IT adaptation patterns that explains the intricate interplay of individual, task, and organizational initiatives in shaping these adaptation patterns.

Keywords: Adaptation Patterns, Configurational Approach, Enterprise-wide Systems, Grounded Theory.

This manuscript underwent peer review. It was received 03/08/2017 and was with the authors for 14 months for 4 revisions. The Associate Editor chose to remain anonymous.

1 Introduction

Information systems (IS) use is intricately linked to adaptation since individuals develop different responses depending on how they perceive an information technology (IT) event. These responses may range from excitement to ambivalence to fear (Ahuja & Thatcher, 2005; Lapointe & Rivard, 2005), which may lead to divergent behaviors such as fervent acceptance and overt resistance (Bhattacherjee & Hikmet, 2007). Research on IT use generally agrees that adaptation incorporates various behaviors that focus on modifying the IT artifact, tasks, and business processes and changes that individuals make to themselves to adapt to IT (Bagayogo, Lapointe, & Bassellier, 2014; Barki, Titah, & Boffo, 2007; Beaudry & Pinsonneault, 2005; Haake, Mädche, Mueller, & Lauterbach, 2015; Ortiz de Guinea & Webster, 2013; Sun, 2012). This broad range of responses poses a challenge for organizations since the benefits that they can derive from IT ultimately depend on how individuals use it.

Since the early "computerization" days, researchers have recognized that that the introduction of technology inevitably leads to changes in the locus of decision making and shifts in the power base in organizations (Patrickson, 1986; Thach & Woodman, 1994). In particular, when organizations deploy enterprise-wide systems—typically, enterprise resource planning (ERP) systems—users often need to learn not only about system functionalities but also new ways to perform their jobs. Volkoff, Strong, and Elmes (2007) explain that, once users in an organization have embedded organizational routines, roles, and data in ERP systems, a series of cyclical changes occur in the organization that reflect the tensions between the system's rigid properties and how users enact the now embedded routines, roles, and data. In addition, the deployment of ERP systems can potentially create confusion and uncertainty in employees' work environment due to misalignments that the opposition between ERP logic and organizational practices creates (Soh, Sia, Boh, & Tang, 2003), which may result in users' inappropriately using the system due to their negative reactions to it (Boudreau & Robey, 2005). This evidence from previous research explains why many ERP functionalities go unused (Jones, Zmud, & Clark, 2008).

A growing number of studies in the rich IS use tradition and ERP research suggests that, to more deeply understand adaptation, research needs to go beyond the most visible behavioral aspects of IT interactions and incorporate other attributes of individuals' orientations toward IT that ultimately lead to the observed behaviors. Thus, we propose an alternative conception that encompasses not only the conspicuous behavioral elements but also the rarely observable attributes of user-IT interaction and attitudes toward IT and adaptation efforts. In other words, we believe that reason exists to think about adaptation as a multidimensional concept (Pulakos, Arad, Donovan, & Plamondon, 2000) that patterns of interrelated attributes with reciprocal relationships constitute (see Meyer, Tsui, and Hinings's (1993) "configurational thinking"). With this approach, we can discern distinct adaptation patterns to IT and identify their associated attributes.

In this study, we focus on 1) identifying distinct adaptation patterns to IT and elaborate on key attributes that constitute each adaptation pattern by conceptualizing adaptation patterns as a multidimensional concept and 2) explaining the underlying conditions that give rise to different adaptation patterns to IT in an organization. Specifically, we examine the following research questions (RQ):

RQ1: What distinct adaptation patterns to IT exist and what constitutive attributes do they have?

RQ2: What conditions shape adaptation patterns to IT in organizations?

We grounded our (retrospective) examination in the ERP use context. Specifically, we conducted an interpretive grounded theory analysis to reveal adaptation patterns and their shaping conditions. We did not enter the field with a set of predefined theoretical frameworks. Instead, we sought a "practical middle ground" (Suddaby, 2006, p. 635) whereby we drew iteratively from the concepts that emerged from data analysis and from our knowledge of theories related to those emerging concepts.

The paper proceeds as follows: in Section 2, we summarize the extant literature on user interaction with IT and adaptation. In Section 3, we explain the research procedures we applied and describe the organizational context in which we conducted the study. In Section 4, we present our findings. In Section 5, we discuss our findings and present our emergent, substantive theory. Section 6, we conclude the paper by summarizing the theoretical contributions, practical implications, and opportunities for future research.

2 Perspectives on User Interaction with IT and Adaptation

Consistent with the grounded theory approach, we could only scrutinize the relevance of the literature that we discuss in this section after we finished analyzing the data (Urquhart, Lehmann, & Myers, 2010); as such, we present a non-committal literature review (Urquhart, 2013). The following exposition constitutes a "sensitizing device" (Klein & Myers, 1999, p. 75) that we used to enhance our theoretical sensitivity (Glaser, 1978) in relation to the adaptation patterns to IT that we expected to discover throughout our analysis.

To understand how the literature has treated user interaction with IT, we first map the IT-implementation stages (see Figure 1). We use the term IT implementation at an organizational level as an umbrella term and broadly distinguish between two main phases: pre-implementation and post-implementation. One can represent the entire IT-implementation process with a six-stage model (Cooper & Zmud, 1990; Kwon & Zmud, 1987). Under the pre-implementation phase, we distinguish between three stages: initiation (scanning organizational problems/opportunities and sourcing IT solutions), adoption (reaching a decision to adopt the system in an organization), and rollout (deploying the system and training employees in both the new process and system). Under the post-implementation phase, we distinguish between three other stages: acceptance (inducing users to use the system), routinization (encouraging the system's use as a normal activity), and infusion (deeply and comprehensively embedding the system in an organization). In practice, these stages may occur in parallel (Saga & Zmud, 1994). Similar to Lauterbach and Mueller (2014), we argue that comprehensively understanding adaptation patterns in the presence of enterprise-wide systems requires one to scrutinize the last stage of the pre-implementation phase in conjunction with the early stages of the post-implementation phase.

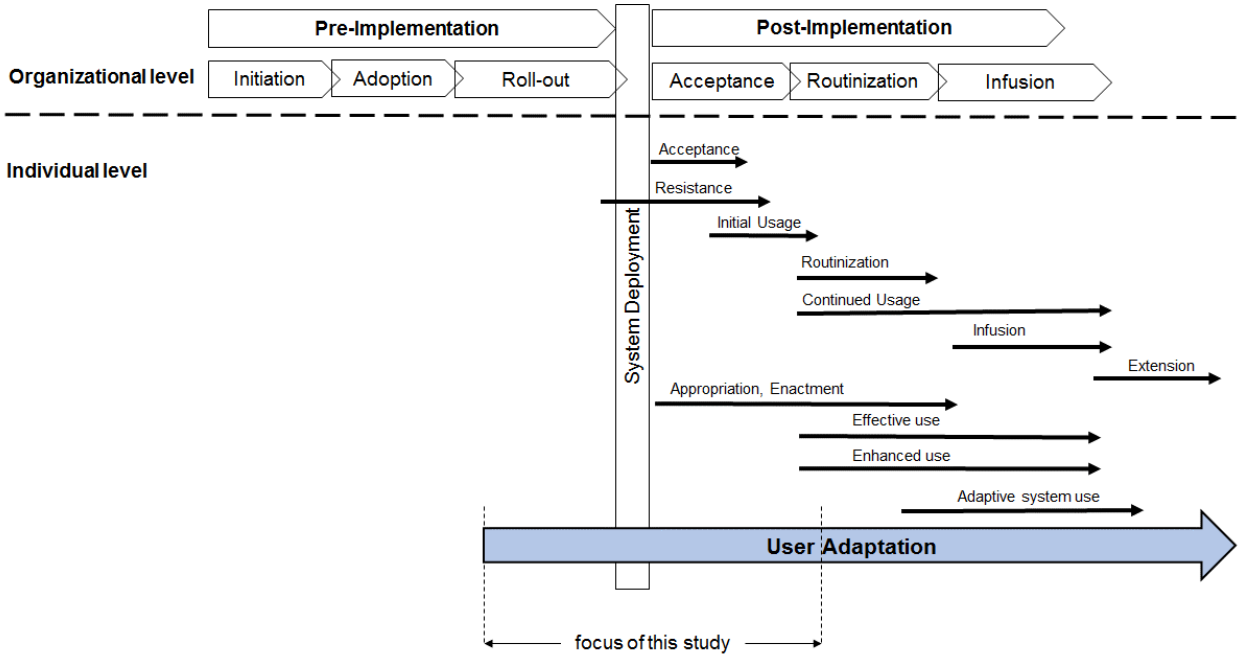

Figure 1. Mapping of IT-implementation Stages and User Adaptation (Adapted from Kwon & Zmud, 1987; Cooper & Zmud, 1990; Lauterbach & Mueller, 2014)

IT use lies at the core of the IS discipline. The IS literature provides abundant studies on IT use and how users respond to IT-related events. These studies range from models that explain how users accept and use IT, such as Davis's (1989) technology acceptance model (TAM) and its extensions TAM2 (Venkatesh & Davis, 2000) and the unified theory of acceptance and use of technology (Venkatesh, Morris, Davis, & Davis, 2003), to studies that examine resistance to use (Lapointe & Rivard, 2005). In their study, Tyre and Orlikowski (1994) illustrate this diversity in responses by showing how some users integrated IT into their work tasks according to organizational expectations and some others abandoned it altogether.

IT use encompasses a certain degree of adaptation. Previous research has conceptualized adaptation as actions that involve changes to how users interact with IT and modify tasks and/or systems (Bagayogo et al., 2014; Barki et al., 2007; Haake et al., 2015; Ortiz de Guinea & Webster, 2013; Sun, 2012). From a behavioral perspective, users engage in an iterative process of interacting with IT and making it a better fit to their work style, the task at hand, or the organizational procedures in place (Barki et al., 2007). This iterative process leads to an improvement in their IT use, which helps them improve their performance (Burton-Jones & Grange, 2013; Haake et al., 2015). Recognizing adaptation's importance in productive IT use, Sun (2012) presents the model of "adaptive system use" to describe how individuals selectively explore and integrate IT features, which includes trying new features, substituting features, combining features, and repurposing features. Building on Sun's (2012) model, Haake et al. (2015) hypothesize that the extent to which users adaptively use IT features influences how well they effectively use enterprise systems. In a similar vein, Bagayogo et al. (2014) propose the idea "enhanced use"—which includes asking experts how to use IT, exploring and experimenting with IT features, and changing tasks and business processes—and focus on novel ways to employ IT features around three attributes: locus of innovation, extent of substantive use, and adaptation. More recently, Li, Haake, and Mueller (2017) investigated why workarounds can allow users to more effectively using enterprise systems.

To richly conceptualize IS use, Ortiz de Guinea and Webster (2013) pay attention to not only behaviors but also emotions and cognition in order to identify IS use patterns that emerge as individuals accomplish work-related tasks. These IS use patterns depend on the nature of IT events, which these authors classify as expected (when IT works as planned), discrepant (or negative—when problems with IT arise), and discovery (or positive—when individuals have new opportunities to interact with IT). In their study, they focus only on expected and discrepant IT events and characterize users' responses as automatic and adjusting patterns, respectively. In another study, Beaudry and Pinsonneault (2005) present their coping model of user adaptation (CMUA) to explain how users handle significant IT events, such as a new IT's introduction. CMUA postulates that users proceed through a primary appraisal in which they assess the expected consequences of the IT event as an opportunity or a threat and a secondary appraisal in which they evaluate their personal control over the situation. The outcomes of these appraisals lead users to engage in one of four different adaptation strategies. CMUA has two main merits: it explains user adaptation to IT events in a process-oriented way and identifies distinct user adaptation responses. Both Ortiz de Guinea and Webster (2013) and Beaudry and Pinsonneault (2005) draw on coping theory, which Lazarus and Folkman (1984) originally developed to explain how individuals address negative stressful situations. In explaining adjusting patterns, Ortiz de Guinea and Webster (2013) recognize that "coping represents individuals' emotional, cognitive, and behavioral *efforts to adapt and deal with specific demands that generate stress*" (p. 1168, emphasis added). In a similar manner, CMUA fundamentally assumes that adaptation equates to coping—itself a reaction to harm, threat, or challenge; in this sense, CMUA emphasizes "efforts to manage psychological stress [from] a troubled person-environment relationship" (Lazarus, 1993, pp. 237-238). However, as previous studies have shown, individuals do not always perceive IT events as stressful situations. In examining ERP assimilation, Liu, Feng, Hu, and Huang (2011) show that some users perceive a new IT's introduction as a blessing. Similarly, Stein, Newell, Wagner, and Galliers (2015) present evidence that user-adaptation strategies cover a continuum that spans from negative to positive reactions. Thus, in our study, we remained receptive to the various perceptions and reactions that users may have in interacting with and adapting to a new IT. Table 1 summarizes the relevant literature that we discuss above.

We followed grounded theory to inductively develop distinct adaptation patterns that comprise multidimensional attributes (Glaser & Strauss, 1967). While we focus on how the interplay between individual and task conditions shape these adaptation patterns in our analysis, we also observe the surrounding context in which the interplay occurs (Markus & Robey, 1998).

Table 1. Relevant Studies on User–IT Interaction and Adaptation

Study	Focus	Context	Key findings
Bagayogo et al. (2014)	Post-adoptive IT use behavior; adaptation behavior	Enterprise system applications across professions and industries	Attributes of enhanced IT use: adaptation, locus of innovation, and extent of substantive use
Barki et al. (2007)	IT use behavior; adaptation behavior	Organizational IT users across various types of IT	IT use behaviors include technology interaction, task-technology adaptation and individual adaptation behaviors
Beaudry & Pinsonneault (2005)	Adaptation as cognitive and behavioral efforts	Organizational IT users of account management system	Four adaptation strategies depending on a user's expected consequences of an IT event and perceived level of control over technology
Burton-Jones & Grange (2013)	Effective use and individual performance	Conceptual discussion with illustrations of different types of IT	Adaptation and learning actions that IT users take to more effectively use IT
Haake et al. (2015)	Post-adoptive IT use behavior; adaptation behavior	Product information management software	Task-technology adaptation behaviors shape effective use
Li et al. (2017)	Post-adoptive IT use behavior	Organizational IT users of supply chain management system	Individuals may revise the spirit of IT features and define new ways of using them to enhance effective use
Liu et al. (2011)	Cognitive understanding of IT and extent of IT use	ERP systems	A classification of users depending on how they cognitively understand and use IT
Ortiz de Guinea & Webster (2013)	IT use pattern as a configuration of emotions, cognitions, and behaviors; adaptation behavior	Organizational IT users across various types of IT	Negative IT events are associated with adjusting IT use pattern that involve adaptation behaviors to modify an aspect of IT
Stein et al. (2015)	Adaptation behavior	Organizational IT users	Emotions from IT stimulus events shape adaptation behaviors
Sun (2012)	Post-adoptive IT use behavior at a feature level	Organizational IT users of productivity software	Individuals adapt their IT use when a new system is introduced or new tasks are required

3 Research Methods

The first author conducted the fieldwork in Thailand from July to November, 2012. Four organizations that used SAP provided the empirical grounding for this study: one private organization (PR), one state-owned organization (SO), one multinational organization (MN) and one non-profit organization (NP). We selected these organizations because they had different strategic foci and managerial practices; that is, we used maximum variation sampling (Patton, 2002). With this sampling strategy, we could scrutinize possible contrasting adaptation patterns and observe the contextual conditions that influence these patterns. Although these organizations used the SAP financials module (FI) and/or the material management module (MM), they performed clearly distinct activities: PR operated in the food processing and bioenergy sectors, SO operated in the banking sector, MN operated in the petrochemical sector, and NP served as the local branch for a multilateral organization. In addition, they differed in their approaches to deploying SAP. While some organizations adopted a strong mandate whereby they officially endorsed SAP and evaluated employees' performance based on their system use, others adopted a soft mandate whereby they encouraged system use but did not punish employees when evaluating them if they did not use the system. In between these two ends on a continuum, we recognize a moderate mandate whereby an organization would not officially sanction SAP use, but, in practice, employees would feel the need to use if to complete their work tasks.

Our approach in choosing diverse organizational contexts aligns with the view that they may influence IT use and adaptation (Barki et al., 2007; Beaudry & Pinsonneault, 2005). Table 2 summarizes the background information about the participating organizations.

We used multiple data sources to establish the chain of evidence between data and the emergent theory. In-depth interviews constituted the main source of primary data. We followed a theoretical sampling strategy whereby we selected participants based on their potential to offer rich insights for the problem at hand (Glaser & Strauss, 1967). The fact that these organizations had deployed SAP for at least three years prior to our fieldwork gave participants a considerable amount of time to experience the system. We conducted in-depth interviews with 46 participants according to the following distribution: 12 from PR, 12 from SO, 11 from MN, and 11 from NP, which included SAP users (from the departments of accounting and finance, purchasing, human resource, and maintenance), their immediate supervisors (i.e., middle managers), and IT specialists. In the process of recruiting individual participants, we applied the two-layered cycle of theoretical sampling, intra-case and inter-case sampling, simultaneously (Fernández & Lehmann, 2011). We interviewed participants in order to generate conceptual categories in each organization (i.e., intra-case sampling). We then compared these categories to the ones we generated in other organizations (i.e., inter-case sampling). Data coming from diverse groups of participants and organizations provided multiple perspectives, supplied more information on emerging concepts, allowed for cross-checking, and yielded stronger substantiation of concepts (Glaser & Strauss, 1967).

Table 2. Background Information of Participating Organizations

Organization	Organizational structure and culture	SAP implementation and initial mandate tactics	Role of SAP
PR: Founded in 1946, operates in the food processing and bioenergy sectors and employs 2,000+ staff with annual sales of US$2.1 billion	• Relatively flat hierarchy that values individual responsibility and autonomy • Collaborative and cohesive work environment with informal communication channels • Operates in a competitive environment	• Roll-out between October, 2007, and April, 2008 • Soft mandate	• Supporting core business operations • Reducing time and cost • Streamlining operations • Seeking to achieve competitive advantage
SO: Founded in 1942, operates in the banking sector and employs 3,600+ staff with annual revenue of US$2.5 billion	• Vertical hierarchy with largely autonomous business units • Respect for formal ranks and top-down decision making • Operates in a non-competitive environment	• Roll-out between March, 2007, and April, 2008 • Mandate tactics varied among departments: strong in Accounting & Finance; moderate in Purchasing, Human Resources, and Maintenance	• Reducing cost • Streamlining operations
MN: Started operations in 1947 and employs 557 staff in Thailand in the petrochemical sector with global revenue of US$5.4 billion	• Vertical hierarchy that explicitly cultivates individual talent • Emphasis on high standards of integrity in business conduct and teamwork with open communication channels among employees • Operates in a competitive environment	• Roll-out between November 2005 and September 2006 • Strong mandate	• Supporting core business • Increasing efficiency • Streamlining operations • Seeking to achieve competitive advantage
NP: Started operations in 1975 and employs 340 staff in Thailand in inter-governmental cooperation with global donations of US$1.6 billion	• Vertical hierarchy organized around projects • High degree of independence for each department that coordinates work in a cooperative manner • Operates in a non-competitive environment	• Deployed in April, 2008 (following deployment in other countries) • Mandate tactics varied among departments: strong in accounting and finance; moderate in purchasing, human resources, and maintenance	• Supporting commitment to accountability and transparency in relation to its member states, donors, and other stakeholders across the globe

Given our study's retrospective nature, we used the critical incident technique. With this technique, we could capture our participants' perspectives and experiences (Chell, 1998) to understand the conditions associated with the system in the period around its deployment. In this way, we could uncover their perceptions and level of engagement with the system. By no means did we make the SAP deployment the

critical incident. Instead, based on our participants' narratives, we identified "any incident in which [they were] required to adapt to a job situation" (Pulakos et al., 2000, p. 615) in relation to the SAP deployment.

During the interviews, besides enquiring about their perceptions and interaction with SAP, we asked participants to talk about the implications of its deployment on their work practices and describe their attitudes toward it. The interviews lasted from 45 minutes to three hours. We conducted group discussions with key users, managers, and IT specialists first before we conducted one-on-one interviews. In the group discussions, we focused on understanding the organizational circumstances surrounding the SAP deployment. We conducted all the interviews and group discussions in Thai and audio recorded them, which resulted in 977 transcription pages. We conducted our data analysis on the original material in the Thai language. Two authors with fluency with Thai and English then translated the codes and categories that emerged from the analysis and the key quotes that we present in this paper (Birbili, 2000). Observations of how participants engaged in SAP use, which materialized as field notes and photographs, constituted additional primary data sources. Our secondary data sources comprised organizational websites and documents, which included vendor-provided user manuals, training documents, user-created manuals, SAP implementation plan, policies, procedures, and mission statements. We used this secondary data to supplement our analysis.

We collected and analyzed data in tandem. We stopped collecting data when we reached theoretical saturation (Glaser & Strauss, 1967); that is, no new concepts emerged from the data. We used NVivo to help analyze the data. Concepts emerged from coding raw data, which involved constantly comparing data slices with other data slices and data slices with emerging concepts to reveal categories. We schematically represent the coding process in Appendix A.

We began the analysis with open coding by labeling data with no preconceived theoretical frameworks (Fernández, 2004). In open coding the data, we found early hints of the adaptation patterns that we corroborated in the coding procedure's later stages. For instance, the expression "I was doing things by printing off a copy [of a form] and then I filled it in and then sent it to the key user", which we open coded as "relying on other people to complete tasks", revealed some degree of disinclination to use SAP. Conversely, the statement "I am always finding new features that are great about the new system", which we open coded as "inquisitively exploring the system", indicated a proactive engagement with SAP. Naturally, these responses represented only opposite ends of a continuum for how our participants reacted to the system. In between, expressions such as "I am still using Excel concurrently with SAP", which we open coded as "using shadow systems", and "I always put my manual beside me here, beside my computer… I think if I lose it I may not be able to work", which we open coded as "following step-by-step instructions", reflect a somewhat hesitant and rather careful use of the system, respectively. After several rounds of coding, we developed a set of 88 open codes (see the first column in Appendix B).

Then, we grouped conceptually linked open codes into 10 selective codes. For instance, open codes such as "inquisitively exploring the system", "trying out new functionalities", "personal/professional gratification", "trying to enhance system utilization", and "seeking new knowledge" pointed to excitement in relation to SAP. In our inductive analysis, we clustered these open codes under one selective code that we labeled as "enthusiastic adaptation". We followed a similar inductive analytical approach to generate the other nine selective codes (see the second column in Appendix B).

We used the selective codes as a basis to construct categories. In order to identify the categories that would coherently conceptualize our emergent theory (Glaser, 1992), we continued applying the constant comparison procedure and looked for similarities and differences among selective codes. Throughout this analysis at a higher level of abstraction, besides the selective code we labeled as "enthusiastic adaptation", we identified that adaptation manifested in three other ways: "reluctant adaptation", "compliant adaptation", and "faithful adaptation". We abstracted these four selective codes as "adaptation patterns". This category, which describes adaptation patterns, and the other categories that we derived throughout our inductive analysis constitute the central concepts of our research problem (see the third column in Appendix B).

Once we identified categories, we engaged in theoretical coding. In the theoretical coding, we examined the categories and their relationships in abstract terms (Charmaz, 2006), which eventually accounted for our substantive, emergent theory. Then, we theoretically integrated our findings (Urquhart & Fernández, 2006; Urquhart et al., 2010). In doing so, we compared our emergent theory on adaptation patterns to enterprise-wide systems against the background literature on user interaction with IT and adaptation, which we elaborate on in Section 5.

4 Findings

While most real-life events do not readily allow one to cleanly categorize them with well-delineated boundaries, in line with our grounded theory approach, we present how we inductively constructed the categories that answer our research questions in this section. We present four adaptation patterns along with the individual and task conditions that appear to be salient in shaping them. We discuss the role of organizational initiatives when we present our emergent theory in Section 5. In presenting our findings, we insert selected participant quotes that support our analysis.

4.1 Adaptation Patterns

We identified four distinct adaptation patterns in our grounded theory analysis: reluctant, compliant, faithful, and enthusiastic. These adaptation patterns constitute manifestations of how users adjusted themselves to the conditions that the deployed technology (i.e., SAP) imposed on them. In our analysis, we examined the attitudes that users took toward SAP, their approach to learning how to use it, their level of interaction with it, the extent to which they explored SAP features, and their stance toward changing work practices that SAP imposed on them.

4.1.1 Reluctant Adaptation

Reluctant adaptation describes the situation in which users made little or no effort to learn how to use SAP and delayed its use for as long as possible. In general, users who espoused a reluctant adaptation pattern did not wish to change their work routines to conform to SAP and, in some cases, showed hostility toward it.

The embedded work practices in SAP, which often differed from the existing ones, made some users perceive the system as an obstacle that affected their ability to work. As a result, these users felt that they had less control over their jobs and, thus, had less motivation to adapt to the system. As one of the participants explained: "I felt that I no longer had control over my job…. I was too busy to spend time trying to figure out how to use it [complaining about the system, unwilling to learn][1]" (NP10)[2]. Even though the organization mandated SAP use, some users did not want to change their work practices and did not make the effort to learn how to use it:

> *At that point, I thought: "Oh! Another change.". I did not want to adjust to it [unwilling to change work practices]. This whole SAP, to me, was blindsided. Then, I had to totally learn a whole new system [unwilling to learn]. I felt so miserable [complaining about the system].* (PR9)

This expression reveals a feeling of resistance to the system.

A reluctant adaptation pattern manifested in different ways, such as in people relying on other people to complete the tasks associated with the system, in feelings of hesitation and worry, and even in outright rejection in a few cases. Typically, users who exhibited a reluctant adaptation felt threatened by the system and believed that it hindered their work activities. As a user said: "Somehow I was afraid of making mistakes [fear of making mistakes]. I did not like it" (SO11). Another one bemoaned: "I was so frustrated with it. I refused to use it and did not even want to look at it [refusing to use the system, rejecting the system]. I was feeling discouraged" (PR7). This latter user articulated his hostility toward the system in unambiguous terms.

Some users believed that they would be able to accomplish their tasks without using the system. They tried to continue using legacy systems and, in some cases, relying on paper-based forms. For instance, a user shared his experience: "After the system went live, I continued to run the old system and kept using it for a year until they took it out from my computer! [using legacy systems]" (SO5). Some users tried to stay away from using the system by relying on other people to complete their tasks: "I went to my colleagues for help to create a requisition form for me whenever I needed to request new material" [relying on other people to complete tasks] (SO11). In some other cases, users avoided interacting with the system by entering transactional data on paper forms, obtaining the necessary signatures for approval, and asking

[1] The text in square brackets refers to open codes. We follow this convention throughout the paper.
[2] We identify participants with an alphanumeric code: the letters identify the organization and the number identifies the participant in the organization. Thus, NP10 identifies participant 10 from organization NP. We follow this convention throughout the paper.

key users to type the data into the SAP form for them. All these actions reflect how some participants circumvented using the system as much as they could.

4.1.2 Compliant Adaptation

Compliant adaptation refers to the strategy that some users followed to avoid the negative consequences of not using SAP or not adjusting their work practices to those embedded in SAP. This adaptation pattern involved superficially learning and partially using the system—just enough to satisfy immediate work demands while trying to minimize changes in their existing work practices. For example, one user said:

> *I felt I did not want to spend my time away from my main job to figure out how to use SAP, but the organization forced me to use it, so I learned how to use it just enough to do my tasks [superficial learning]. I did not pay much attention to it [lack of attention].* (MN8)

This superficial learning prevented users from becoming more knowledgeable about the system. In this case, users could not exploit SAP functionalities fully and identify the root cause of discrepancies in the work process as another user explained:

> *I did not really know how to go back and see if my purchase requisition went through. If I ordered something and it never arrived, I did not know if somebody down the line was having problems with the system or if the system failed because I did not put in the order correctly [limited understanding of the system capability].* (MN10)

Users who exhibited a compliant adaptation often only partially used the system and, thus, gained only marginal performance benefits. The following remark from an accounting and finance manager referring to users who did not exploit SAP's functionalities illustrates the consequences of partial system use: "They were not as productive as they should have been from the organization's standpoint because they did not use the system to the fullest capacity [making partial use of the system]" (NP1).

Some users who followed a compliant adaptation tried to minimize their reliance on the system. The need to duplicate work in spreadsheets persisted such that we could observe it throughout our fieldwork. As one user said: "I usually work in Excel first, and then I enter data from Excel into SAP [using shadow systems, duplicating work]. I want to make sure that I do everything correctly before entering data into SAP" (NP7). Nevertheless, errors still occurred as a user in the accounting and finance department reflected on her colleagues' blunders: "Usually, they tended to forget to enter data or entered incomplete data into the system [entering inaccurate data]. I remember a few times…[that] all the reports were wrong and the top management was blaming my team" (PR3). We observed that users who engaged in superficial learning often relied on shadow systems and were prone to make errors when interacting with the new system.

4.1.3 Faithful Adaptation

Faithful adaptation involves users' making an effort to learn how to use SAP and modifying their existing work practices to fit the system's functionalities. We observed this adaptation pattern when users felt the need to be able to use SAP in order to perform their tasks at a satisfactory level, although they did not eagerly embrace the system. Hence, they used the system in a strict true-to-the-letter fashion that mimicked the interaction that the users experienced in training sessions. For example, one user reasoned: "The way I know is the way I was told [true-to-the-letter use]" (MN9). Users who exhibited a faithful adaptation pattern typically had less drive to creatively use the system as one user said: "I do not really have to think when I want to create a transaction. I have an instruction here that tells me what I have to do, like steps 1-2-3-4. I just feel like I have become a machine [following step-by-step instructions]" (SO6).

These users incorporated what they learned from training into work practices by simply following the instructions in the manuals that their organizations provided. Further, some users created their own manuals in Microsoft Word by capturing SAP screenshots and adding notes with step-by-step instructions. A user in the accounting and finance department explained how she faithfully followed the manual she had produced (see Figure 2):

> *Actually, they provided a manual but it was too long with too much information that I did not need. So, I created my own manual in Microsoft Word [producing a personal manual]. And I still have to follow my script; I mean I have to follow my manual every time that I do something with the system. I just go step by step [following step-by-step instructions].* (NP3)

As a user elaborated, individuals who espoused a faithful adaptation pattern used the system without venturing into exploring non-taught features: “I learned by attending training sessions and reading the manual [learning efforts]…. After that, it was just a matter of repeating it…. It became my routine and that is it [routinizing the use of the system]” (PR2). This quote reflects how some users used the system in a rather mechanical way.

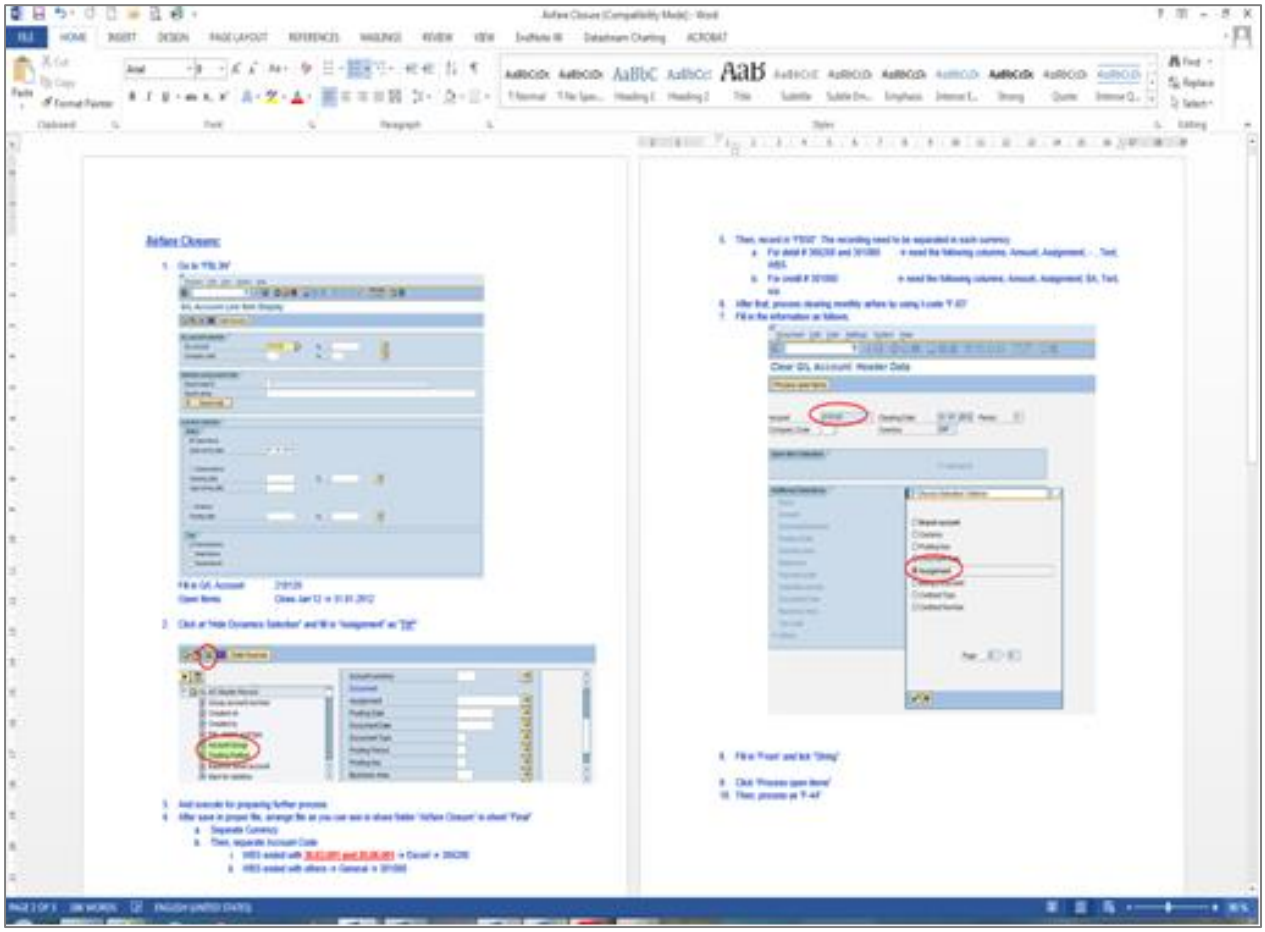

Figure 2. SAP Manual that a User Created in Microsoft Word

4.1.4 Enthusiastic Adaptation

Enthusiastic adaptation entails a proactive learning approach and using SAP in an earnest way to maximize the benefits that the system offers. This adaptation pattern manifested when individuals not only keenly used SAP based on their training but also invested time and energy to explore and experiment with its functionalities in innovative ways beyond what they learned from their training. A user exuded enthusiasm when describing her experience interacting with the system:

> *I really enjoy playing with SAP [inquisitively exploring the system] and trying out many things [trying out new functionalities]. I modified screens [modifying system screens] to better fit with my tasks. I created my favorite menus and shortcuts [adjusting the system to fit particular needs]. I found a better way to do my job, much faster than what they said during the training class [perceiving the potential of the system].* (PR1)

Some users indicated they constantly looked for better ways to engage with the system. For instance, an accounting and finance manager described how she strove to learn more about the system:

> *I spent numerous hours trying out everything in each menu on SAP, using online help, and reading the manual [inquisitively exploring the system]. I called SAP helpdesk many times when I encountered problems or wanted to know new things [trying out new functionalities].* (MN2)

Some other users ventured into discovering the system’s features and functionalities to accomplish their tasks in novel ways as one said:

> *I try to explore new things, new features, and new functions [inquisitively exploring the system]. Now, I can work with the system faster than before. After all, I changed a lot of things in my work. The system really helped me improve my performance [deriving benefits from the system]* (MN4).

Naturally, through continuously exploring the system, users could see its benefits. One user said: "The system is so complex and in a way so powerful that once we understood how it works, we found our own way and better way of using it [deriving benefits from the system]" (NP1). In a similar way, another user explained how SAP benefitted her work: "I discovered that I could use the system to do many more things than what I have been trained for [deriving benefits from the system]" (SO3). Table 3 summarizes the adaptation patterns and their key attributes along with selected participant quotes.

Table 3. Key Attributes of Adaptation Patterns

	Reluctant adaptation	Compliant adaptation	Faithful adaptation	Enthusiastic adaptation
Attitude toward the system	ERP perceived as a burden: *I did not like [SAP] at all. It probably tripled the amount of work necessary to get the job done…. I cannot think of any benefits of the system.* (SO10)	ERP perceived as an obligation: *I still feel that it is too complicated and distracts me from my main job. But the organization forced me to use SAP.* (MN8)	ERP perceived as a necessity: *It is the only system that I use for my job. If I were not able to use it, I could not do my work.* (NP5)	ERP perceived as an enabler: *The system really helped me improve my performance. I am happy with it…. It is very beneficial for the organization in the long run.* (PR4)
Approach to learning how to use the system	Apathetic, delaying or refusing training: *I was too busy to spend time trying to figure out how to use it. (*NP10)	Cursory, just basic functionalities: *I spent little time learning how to use it; only basic things… I do not want to know more. I know how to use SAP but very superficially. (*NP7)	Active, in a true-to-the-letter fashion: *I learned by attending training sessions and reading the manual. After that, it was just a matter of repeating it.* (PR2)	Proactive, exploring functionalities: *I attended training... I also checked the SAP e-learning website quite often in order to keep myself updated about the system.* (SO4)
Level of interaction with the system	Avoiding or delaying system use: *I was just so overwhelmed. So I did not use the system at all. I went to my colleagues for help to create a requisition form in SAP.* (SO11)	Hesitant interaction with the system: *I do not enter all these data into the system right away; I do it when I have to…when my manager needs these data. I am still using Excel concurrently with SAP.* (NP7)	Exactly as instructed use of the system: *Most of us used the system like a robot, we were pushing buttons. We had directions in front of us, that said "push this button, click that button".* (SO7)	Trying new ways to use the system: *I spent hours trying out everything in each menu on SAP. I want to understand how it works and want to know more. If I understand more, I can make more use of it.* (MN2)
Exploration of system features	No exploration: *I do not want to spend time trying to figure out how to use the system and exploring it. (*NP9)	Limited exploration: *I have not used its full functionalities. I understand bits and pieces here and there. (*NP8)	Partial exploration: *The way I know is the way I was told in the training. I have to follow my manual every time that I do something with the system.* (MN9	Active exploration: *I try to explore new things, new features, and new functions … that help me to perform my tasks faster.* (SO1)
Stance toward changing work practices	Unwilling to change work routines: *I have been doing it one way for a long time and do not want to change how I work. (*PR6)	Limited efforts to adjust work routines: *All the data in SAP was managed through my legacy system…. I still use my legacy system concurrently with SAP.* (NP8)	Accepting changes in work routines: *They said, "It is too expensive to customize the system". So, I had to change my own practices.* (PR2)	Actively adapting work routines: *I changed a lot of things in the way I do my work.* (PR1)

4.2 Individual Conditions

Our analysis revealed two individual conditions that shape the adaptation patterns that we present in the previous section: knowledge of the system and understanding of business processes.

4.2.1 Knowledge of the System

Knowledge of the system refers to the extent to which individuals could use the system features proficiently to accomplish work tasks. Although users in all four organizations expressed concerns about the system's complexity, we observed variations in their knowledge. Some viewed SAP as a non-user-friendly system and difficult to use. For instance, a user from the maintenance department lamented: "I do not know how to use half of the functions in this system. I do not know if they pertain to me or not. I know enough to get what I need [incomplete understanding of the system]" (NP10). This lack of knowledge about the system, which, for other users, manifested in their inability to comprehend new terminology and SAP logic and their perceiving multiple screens for data entry as complex, partly contributed to shape a reluctant adaptation pattern. Some other users knew more about the system but still could not exploit its full functionalities due to their limited knowledge. As a user from the maintenance department in the multinational organization, which strongly enforced system use, explained: "I did not really know how to go back to check and see if my purchase requisition went through [limited understanding of the system capability]" (MN10). This expression reveals that the user knew that he could trace back the transaction in the system but did not know how to do it. We found that such limited knowledge about the system often occurred with the compliant adaptation pattern.

Some other users felt more comfortable with their knowledge about the system, which some acquired via participating in the implementation process as an accounting and finance user explained:

> *I took part in the intensive training and system testing, so once the system went live I felt comfortable with the system because I was already knowledgeable about the system features I had to use [knowledgeable about the system]. I was convinced that I would become proficient using it [perceived control over the system] and use it to improve the way I performed my tasks [perceived control over tasks].* (MN1)

This quote reveals that the user had a sufficient level of knowledge about the system, which we generally found to occur with the faithful adaptation pattern. Another group of users who received better training in using SAP learned to even more proficiently use the system in relation to their work activities. We found that users who had sufficient knowledge about the system often demonstrated an enthusiastic adaptation pattern. For instance, a user explained how he became confident in SAP use:

> *The key user offered me one-on-one training and trained me step-by-step until I could do it by myself…. [The training] focused on what I actually needed to do in my tasks [customized training]. I got a better understanding of the system [knowledgeable about the system] and I felt more knowledgeable about the system [perceived control over the system].* (PR11)

4.2.2 Understanding of Business Processes

Understanding of business processes involves knowing not only how and when to perform a particular task but also its effect on other tasks downstream and associated processes. Users cannot effectively use enterprise-wide systems without appropriately understanding business processes' broad perspective. SAP introduced changes in business processes, which spanned across different functional areas. As such, the SAP-induced work processes became different from what they used to be. During the transition period, users had to learn the new work processes embedded in SAP logic. A user from an organization's purchasing department illustrated the importance of business process knowledge in saying:

> *I think when you implement an ERP system, it obviously spans across departments. So, if you do not get the business processes correct, if you do not understand the connection between business processes in your department and those in other departments, I think you will always be lost [need of business process understanding].* (PR5)

Some users who believed that their work tasks became more rigid did not always receive these significant changes in business processes well. They could not circumvent the sequence of tasks or information requirements. A purchasing officer shared her frustration with not understanding the new processes embedded in SAP:

> *I did not really understand what was going on. I was not sure why transactions were failing and why the bill of materials was not correct. We had many process issues. We had several issues with processing purchase order approval [lack of business process understanding].* (PR6)

We found that users who poorly understood business processes often demonstrated a reluctant adaptation pattern.

Some other users slightly better understood the integrated business processes that SAP introduced, though they still understood these processes in a limited way. For instance, a purchasing officer revealed that she knew that what she did had an impact on other tasks downstream, although she did not fully know what implications her actions had: "I just kept entering data into the system until it was enough to finish my task. Sometimes, I got a complaint from my colleagues that I did not enter all data they needed [limited understanding of business process]" (MN5). We found users who understood business processes in this way often demonstrated a compliant adaptation pattern.

Although some other users recognized the importance of understanding integrated business processes well, they admitted that they had somewhat incomplete knowledge about these processes. For instance, a user whose tasks depended highly on the system expressed that she needed to know more about the now cross-functional processes: "SAP integrated every part of the organization together. I need to know other parts as well [need for training in business process]" (PR2). We found that users who had incomplete knowledge about integrated business processes often demonstrated a faithful adaptation pattern.

Some other users who understood SAP-induced business processes well demonstrated an enthusiastic adaptation pattern. They emphasized the importance of understanding the intricate linkage among tasks performed in different organizational units as a user in the human resources department stated:

> *Definitely, you have to see the big picture now with SAP because when releasing your task, it does not really mean you complete all tasks. I mean you cannot assume that you are just sending it to Accounting, and Accounting will take care of it now, because it does not work that way. I mean you have to be responsible for it, so the departments have to coordinate on how they are working collaboratively, and you also have to understand the whole process of how you get the invoice, or even when it started [need of business process understanding].* (MN7)

4.3 Task Conditions

The task conditions that shaped adaptation patterns depended on the importance that users ascribed to the system to accomplish their immediate work tasks, which we label as task-system dependence. Based on our analysis, we discovered that we could broadly classify task-system dependence into two conditions: low task-system dependence and high task-system dependence.

4.3.1 Low Task-system Dependence

Low task-system dependence represents situations in which users believe that they did not often need to use the system to execute work tasks.

In our examination, we found that some users believed that they would be able to complete their work tasks without the system:

> *If the system were taken away, it would help me [complete my tasks] [perceived uselessness of the system]…. [In fact,] my job does not really rely on the system [low importance to task]. I do not use it every day. I just have to fill in a requisition form in the system when I need to request a new material for my task [low frequency of use].* (SO10)

Similarly, some other users perceived that their tasks did not overly rely on the system even though their organization mandated it as a user explained:

> *I do not have to use SAP much. I use it only to approve purchases…. I only know the basic things that I have to do. I am too busy to spend time trying to figure out how to use it. I always forget how to use it [low frequency of use].* (NP9)

In one organization, a user from the human resource department reflected: "Initially, after the system rollout, I did not use SAP at all because it was not important to me. I could still perform my task without the system [low importance to task]" (PR9). We observed that certain individual conditions interacted with how

users perceived the system as a tool that added minimal value for their work tasks helped to shape a reluctant adaptation pattern (see Section 5).

In some cases, users put up with SAP and simultaneously engaged with other systems for completing their work tasks as a user explained: "I did not know much about how to use [SAP] because I felt it was not that important to me [low importance to task]. I used SAP concurrently with my legacy system" (MN10). Another user explained that she seldom needed to use the system to perform her work: "My task is not heavily reliant on SAP…. [If needed,] I have to use SAP's reporting functionality to create reports for my manager [low importance to task]" (SO8). Some users who still remained unconvinced about the benefits that they could derive from the system for their work needs adopted a more cautious approach: "I do not enter all these data into the system right away; I do it when I have to…like when my manager needs these data [feeling obliged to use the system]" (NP7). These examples illustrate how users perceived the system as inadequate for completing their work tasks. In general, users who had this perception tried to avoid the negative consequences of not using the deployed system yet implicitly accepted its need to complete their tasks. In the presence of certain individual conditions, these users often demonstrated a compliant adaptation pattern.

4.3.2 High Task-system Dependence

At the other end of the continuum, we observed high task-system dependence that describes the situation where individuals believe that their work tasks rely on the system to a greater extent.

As we observed in our investigation, some users felt that they needed to use the system and engaged in learning how to do so until they became competent enough to perform their tasks at a satisfactory level. For instance, an accounting and finance manager explained how she had to adapt to SAP to perform her work: "The old system was shut down. If I did not adapt, I could not work [high reliance on the system]" (PR2). Interestingly, other users admitted that the system represented a key tool in their role: "It is the only system that I use…. If I were not able to use it, I could not do my work. I had no choice but to learn how to use it as fast as possible [perceived necessity of the system]" (NP5). Expressions like this one reveal an acquiescent approach that recognizes that the system's performance for performing work tasks. In the presence of certain individual conditions, these users often demonstrated a faithful adaptation pattern (see Section 5).

Some other users went beyond just recognizing the system's importance for completing their work tasks; they actively embraced it. An accounting and finance user reflected how crucially she needed to use the system for her tasks: "After they switched to [SAP], it became the only system I used to perform my tasks. My tasks are highly reliant on the system [high reliance on the system]" (SO3). Another user explained how SAP became the primary system to perform her work: "Now, most of our tasks rely on this system…. All of my tasks have been transferred to the new system. SAP is the only system that I use to do my job [high reliance on the system]" (MN2). Moreover, some users could foresee the benefits that mastering the system could bring for their work. As one explained: "I am able to appreciate what the system is capable of doing when I can drill down into the more detailed aspects of the system [perceived system potential for supporting work tasks]" (MN3). Similarly, the accounting and finance user that we quote above expressed her positive views of the system: "I can complete my tasks much faster than before" [perceived system potential for supporting work tasks]" (SO3). These expressions reflect high reliance on the system. In conjunction with certain individual conditions, we found that such users demonstrated an enthusiastic adaptation pattern (see Section 5).

5 Discussion

The inductive coding procedure, which we explain in Section 4, resulted in our constructing three categories: adaptation patterns, individual conditions, and task conditions. We show the coding procedure that generated a fourth category, organizational initiatives, in Appendix B. We decided not to elaborate on how we inductively constructed this category in this text for two distinct yet interlinked reasons. First, since we have limited space, including quotes to support our coding in a narrative way would have substantially extended the paper's length. Second and most importantly, as we explain next, individual and task conditions supersede organizational initiatives.

Now, we formulate the emergent, substantive theory that presents adaptation patterns that individual conditions, task conditions, and—to a lesser degree—organizational initiatives shape. Moreover, we show that a configuration of five deeply intertwined attributes constitutes adaptation patterns: attitude toward the

system, approach to learning, interaction with the system, exploration of system features, and stance toward changing work practices (see Table 2). Different traits and degrees of these attributes give rise to distinct adaptation patterns. Subsequently, we integrate our emergent, substantive theory with the relevant extant literature.

5.1 Emergent, Substantive Theory: IT Adaptation Patterns Theory

The emergent, substantive theory we present here arose from our examining the categories and their relationships (i.e., theoretical coding) (Charmaz, 2006). Adaptation patterns stand as the most salient category: the "core category [that] resolves a main concern in a substantive area of action" (Glaser, 2007, p. 103). We also explain how the interplay between individual, task conditions, and organizational initiatives influence these adaptation patterns.

The emergent, substantive theory that we name IT adaptation patterns theory presents four adaptation patterns that constitute distinct relational dispositions: reluctant, compliant, faithful, and enthusiastic. The interplay between individual, task conditions, and, to some extent, organizational initiatives invariably shapes these adaptation patterns. Individual conditions emerge according to users' knowledge of the system and understanding of business processes. Task conditions represent the degree to which users rely on the system to perform their work tasks. We formulate IT adaptation patterns theory in the following terms:

1) A reluctant adaptation pattern describes a situation in which users do not wish to learn how to use the system, delay its use for as long as possible, and try to maintain work routines that do not to conform to the routines that the system imposes on them. This pattern likely emerges when users have little knowledge about the system, do not understand the nature of integrated business processes, sense uselessness of the system, and, thus, rely on it to a low extent to perform their work tasks.
2) A compliant adaptation pattern describes a situation in which users superficially learn about and partially use the system and make minimal changes in their existing work practices to avoid the negative consequences of not using it. This pattern likely appears when users have limited knowledge about the system, show an incomplete view of integrated business processes, merely accept the need of the system, and, thus, rely on it to a relatively low level to perform their work tasks.
3) A faithful adaptation pattern describes a situation in which users do not eagerly embrace the system but recognize its importance and consequently put effort into learning how to use it and modify their existing work practices to fit its functionalities. This adaptation pattern likely appears when users have adequate knowledge about the system, a limited understanding of business processes, an appreciation for its necessity, and, thus, rely on it at a relatively high level to perform their work tasks.
4) An enthusiastic adaptation pattern describes a situation in which users eagerly use the system and innovatively explore its functionalities. This pattern likely appears when users have high knowledge about the system, understand integrated business processes well, anticipate the system's potential, and, thus, rely on it at a high level to perform their work tasks.

Note that organizational initiatives such as enforcing employees to phase out legacy systems, introducing key performance indicators associated with system use, special training programs, and customized training (which all focus on encouraging user engagement with the new system) also play a role in the shaping adaptation patterns. However, these organizational initiatives lay in the background. We observed that both individual and task conditions exerted stronger influence than organizational initiatives on adaptation patterns to enterprise-wide systems. The presence of each adaptation patterns in all participating organizations corroborated this observation. For example, we found users who espoused an enthusiastic adaptation pattern even though their organizations implemented a soft mandate tactic in relation to the system (e.g., PR1). In some other cases, users adopted a reluctant adaptation pattern in organizations with a strong mandate tactic (e.g., MN9).

Figure 3 visually represents IT adaptation patterns theory. It shows that individual and task conditions shape the four distinct adaptation patterns while organizational initiatives lay in the background.

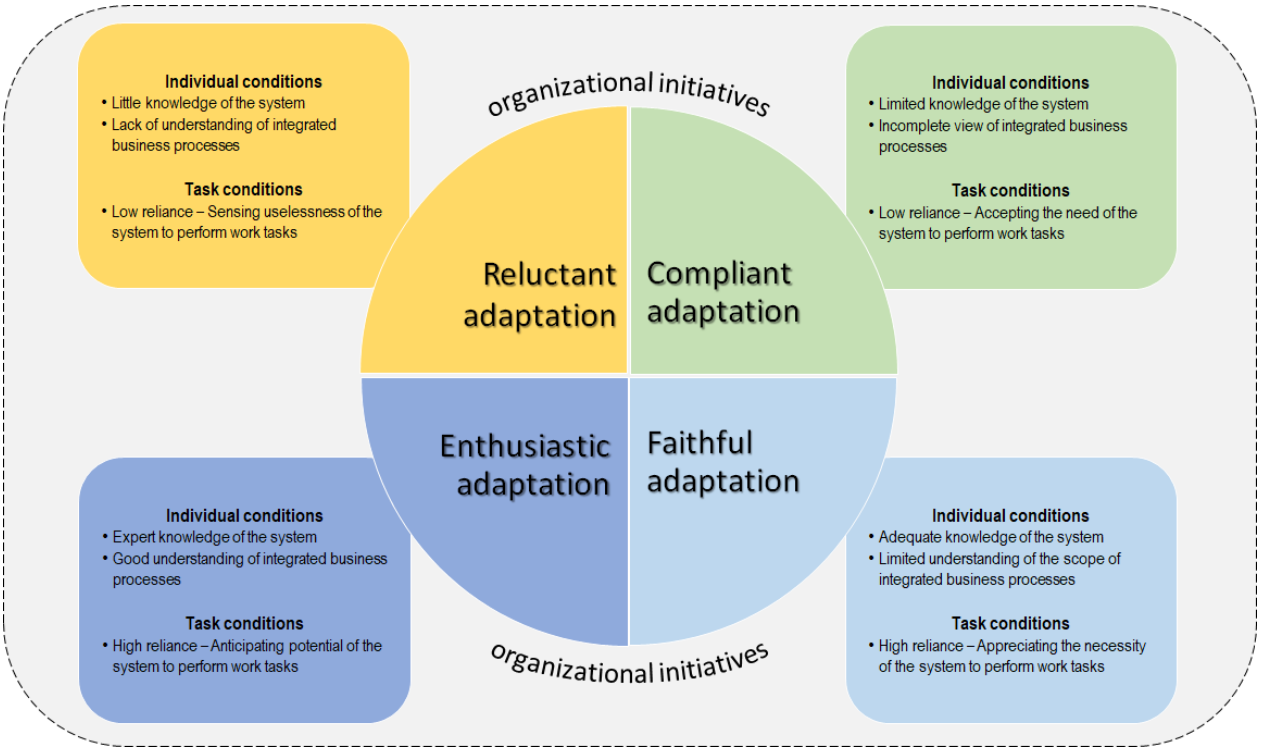

Figure 3. IT Adaptation Patterns Theory

5.2 Theoretical Integration

In this section, we examine the IT adaptation patterns theory vis-à-vis the theoretical perspectives on user interaction with IT and adaptation that we discuss in Section 2.

Our emergent, substantive theory corroborates what previous research has demonstrated: users respond differently to IT events (see Barki et al.'s (2007) user behaviors, Beaudry and Pinsonneault's (2005) coping model of user adaptation, Liu's et al. (2011) understanding of IT and IT use, Ortiz de Guinea and Webster's (2013) patterns of system use, and Stein's et al. (2015) emotional responses). However, our study differs from past research in that it demonstrates that the response to IT events goes beyond the behavioral, visible elements of adaptation associated with changes to tasks and the system and the self-improvements that users make to adapt to the system. We argue that these behavioral, visible elements alone cannot capture the adaptation patterns that users may espouse at a particular time with respect to IT events. Typifying an adaptation pattern (i.e., reluctant, compliant, faithful, or enthusiastic) requires one to recognize the complex, reciprocal interrelation between behavioral and non-behavioral attributes that define them: attitude toward the system, approach to learning, interaction with the system, exploration of system features, and stance toward changing work practices. Furthermore, conceptualizing adaptation patterns as relational dispositions provides the theoretical basis for better understanding effective systems use at the feature level (see Bagayogo et al., 2014; Burton-Jones & Grange, 2013; Haake et al., 2015; Sun, 2012).

Figure 4 depicts the interrelated attributes that configure each adaptation pattern.

Figure 4. Configuration of IT Adaptation Patterns

Besides extending the current literature on user interaction with and adaptation to IT, we present an alternative view on Beaudry and Pinsonneault's (2005) CMUA and Sun's (2012) adaptive system use model. First, CMUA was derived from coping theory, which was originally developed to explain how individuals address stressful situations; however, our inductive analysis shows that users do not always perceive an IT event as a threatening encounter. We found that users sometimes develop a positive relational disposition toward enterprise-wide systems and eagerly engage in using them (i.e., enthusiastic adaptation). This finding concurs with Liu et al.'s (2011) and Stein et al.'s (2015) investigations. In addition, the individual and task conditions that we identify are much broader than the primary appraisal users make on IT as either an opportunity or a threat and the secondary appraisal on their level of control as either high or low control as CMUA describes. Individual conditions encompass users' knowledge about a system and how well they understand business processes. Task conditions reflect the extent to which users perceive the system as important and how much they rely on it to complete their work tasks. Second, while Sun (2012) emphasizes understanding system use at the feature level, we discovered that system exploration constitutes just one attribute of adaptation patterns. Besides system exploration, various factors interdependently contribute to users' adaptation to the system, such as attitude toward the system, approach to learning, interaction with the system, and stance toward changing work practices. Figure 5 schematically represents our theoretical integration.

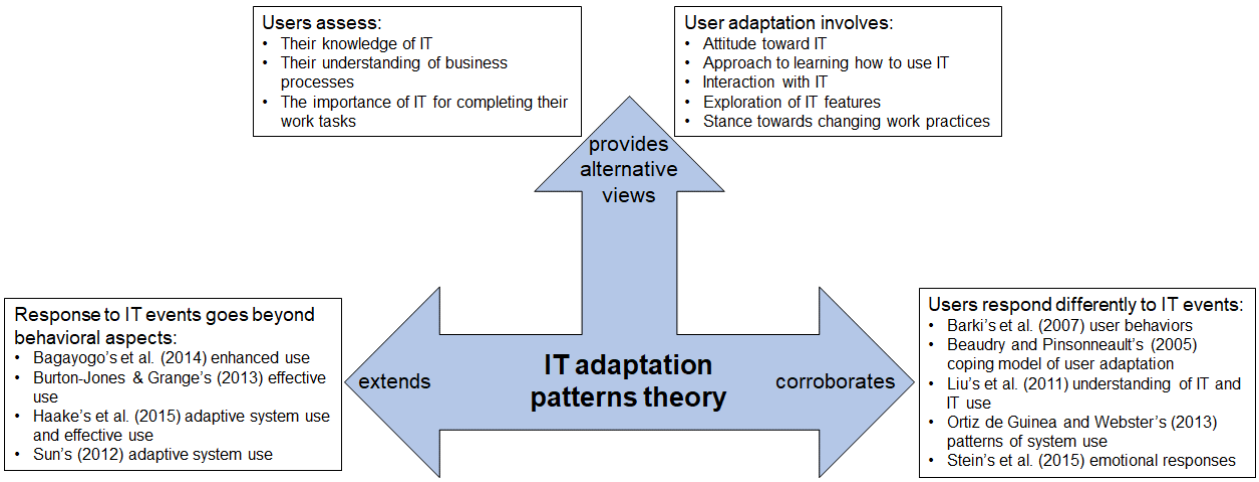

Figure 5. Theoretical Integration

6 Conclusion

In Sections 1 and 2, we argue that, to understand how users adapt to enterprise-wide systems, one needs to go beyond the most conspicuous behavioral aspects of user-IT interaction. Our inductive analysis indicates that the rarely observable dispositions users assume in their engagements with IT serve a key role in fully explaining the adaptation patterns they espouse. Our results have implications for both theory and practice.

Our study makes two contributions to theory. First, similar to previous research, our analysis confirms that IT adaptation patterns have much diversity and complexity. However, unlike other studies on user-IT interaction and adaptation, we provide an integrative view on adaptation as a configuration of interrelated attributes. The novelty of our emergent, substantive theory lies in the fact that each of adaptation pattern (i.e., reluctant, compliant, faithful, and enthusiastic) constitutes a multidimensional arrangement of five interrelated attributes: system exploration, attitude toward the system, approach to learning, interaction with the system, and stance toward changing work practices. Second, our emergent, substantive theory shows the explanatory power that individual and task conditions along with organizational initiatives have on particular IT adaptation patterns. Moreover, our findings show the primary influence that both individual and task conditions exert on adaptation patterns compared to organizational initiatives. Individual conditions (users' knowledge of the system and understanding of business processes) and task conditions (the degree to which users rely on the system to perform their work tasks) play a central role in shaping adaptation patterns, and organizational initiatives play a secondary role.

Besides these theoretical contributions, our study also has practical implications. We emphasize the need for managers to be able to recognize that users will likely espouse different adaptation patterns to IT. Even though we found that organizational initiatives have less influence than individual and task conditions in shaping adaptation patterns, managers may want to consider a proactive approach to prevent users from demonstrating the less desirable adaptation patterns we discovered (typically, reluctant or compliant). This proactive approach involves making users actively participate in the transformation that the system will bring about to the organization. If managers perceive an overall negative response once their organization has deployed the system, they should react quickly and implement initiatives intended to change this situation. These initiatives, which include offering training sessions, train-the-trainer programs, knowledge-sharing gatherings, and user group meetings, may contribute to shifting from the less desirable adaptation patterns to the more desirable (i.e., faithful and enthusiastic) ones. In addition, managers need to identify users whose activities heavily depend on the system and who will likely espouse an enthusiastic or faithful adaptation pattern and design targeted training for them rather than implementing a one-size-fits-all training program. In designing these targeted training, managers should consider both elements of system use and the nature of integrated business processes.

Researchers should consider our study the light of certain limitations. Our study's retrospective nature might have left room for a recall bias from our participants (Singh & Wilkes, 1996). We endeavored to

mitigate this potential issue by using data from different participants to corroborate individual accounts in relation to experiences with the system. Researchers interested in building on our findings may consider conducting a field study soon after system deployment to avoid recall bias. Further, readers should note that we conducted our investigation on a specific type of IT: SAP, an enterprise-wide system. This level of specificity could constrain the inferences that we can make from our findings on enterprise-wide systems to other types of IT. However, researchers can theoretically generalize the IT adaptation patterns theory we offer beyond the domain we studied (Lee & Baskerville, 2003).

Our findings open up at least two interesting research opportunities. First, researchers could analyze the relationship between the user adaptation patterns we identify and performance at both the individual and organizational levels to understand adaptation's downstream implications. Second, researchers could investigate how users who espouse different adaptation patterns explore system features in order to better understand enterprise-wide systems as IT artifacts in organizations. Alternatively, future research could supplement our findings and focus on other aspects of individuals' characteristics that previous research has found to influence how individuals perceive and adapt to new systems, such as computer self-efficacy (Compeau & Higgins, 1995), personal innovativeness (Agarwal & Karahana, 2000), and emotions (Beaudry & Pinsonneault, 2010; Stein et al., 2015). In addition, scholars interested in how users adapt to enterprise-wide systems in organizations could scrutinize the dynamic process of adaptation (cf. Benlian, 2015). We believe that our multidimensional view of adaptation patterns has the potential to better explain the complex user-IT interaction phenomenon.

References

Agarwal, R., & Karahana, E. (2000). Time flies when you're having fun: Cognitive absorption and beliefs about information technology usage. *MIS Quarterly*, *24*(4), 665-694.

Ahuja, M. K., & Thatcher, J. B. (2005). Moving beyond intentions and toward theory of trying: Effects of work environment and gender on post-adoption information technology use. *MIS Quarterly*, *2*9(3), 427-459.

Bagayogo, F. F., Lapointe, L., & Bassellier, G. (2014). Enhanced use of IT: A new perspective on post-adoption. *Journal of the Association for Information Systems*, *15*(7), 361-387.

Barki, H., Titah, R., & Boffo, C. (2007). Information system use-related activity: An expanded behavioral conceptualization of individual-level information system use. *Information Systems Research*, *18*(2), 173-192.

Beaudry, A., & Pinsonneault, A. (2005). Understanding user responses to information technology: A coping model of user adaptation. *MIS Quarterly*, *29*(3), 493-524.

Beaudry, A., & Pinsonneault, A. (2010). The other side of acceptance: Studying the direct and indirect effects of emotions on IT use. *MIS Quarterly*, *34*(1), 689-710.

Benlian, A. (2015). IT feature use over time and its impact on individual task performance. *Journal of the Association for Information Systems*, *16*(3), 144-173.

Bhattacherjee, A., & Hikmet, N. (2007). Phsycians' resistance toward healthcare information technology: A theoretical model and empirical test. *European Journal of Information Systems*, *16*(6), 725-737.

Birbili, M. (2000). Translating from one language to another. *Social Research Update*, 31, 1-7.

Boudreau, M.-C., & Robey, D. (2005). Enacting integrated information technology: A human agency perspective. *Organization Science*, *16*(1), 3-18.

Burton-Jones, A., & Grange, C. (2013). From use to effective use: A representation theory perspective. *Information Systems Research*, *24*(3), 632-658.

Charmaz, K. (2006). *Constructing grounded theory: A practical guide through qualitative analysis.* London, UK: Sage.

Chell, E. (1998). Critical incident technique. In G. Symon & C. Cassell (Eds.), *Qualitative methods and analysis in organizational research: A practical guide* (pp. 51-72). London, UK: Sage.

Compeau, D. R., & Higgins, C. A. (1995). Computer self-efficacy: Development of a measure and initial test. *MIS Quarterly*, *19*(2), 189-211.

Cooper, R. B., & Zmud, R. W. (1990). Information technology implementation research: A technological diffusion approach. *Management Science*, *36*(2), 123-139.

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information. *MIS Quarterly*, *13*(3), 319-340.

Fernández, W. D. (2004). Using the Glaserian approach in grounded studies of emerging business practices. *Electronic Journal of Business Research Methods*, *2*(2), 83-94.

Fernández, W. D., & Lehmann, H. P. (2011). Case studies and grounded theory method in information systems. *Journal of Information Technology Case and Application Research*, *13*(1), 4-15.

Gioia, D. A., Corley, K. G., & Hamilton, A. L. (2012). Seeking qualitative rigor in inductive research: Notes on the Gioia methodology. *Organizational Research Methods*, *16*(1), 15-31.

Glaser, B. G. (1978). *Theoretical sensitivity: Advances in the methodology of grounded theory*. Mill Valley, CA: Sociology Press.

Glaser, B. G. (1992). *Emergence vs. forcing: Basics of grounded theory analysis*. Mill Valley, CA: Sociology Press.

Glaser, B. G. (2007). Doing formal theory. In A. Bryant & K. Charmaz (Eds.), *The Sage handbook of grounded theory* (pp. 97-113). London, UK: Sage.

Glaser, B. G., & Strauss, A. L. (1967). *The discovery of grounded theory: Strategies for qualitative research*. Chicago, IL: Aldine.

Haake, P., Mädche, A., Mueller, B., & Lauterbach, J. (2015). The effect of user adaptation on the effective use of enterprise systems. In *Proceedings of the 36th International Conference on Information Systems.*

Jones, M. C., Zmud, R. W., & Clark, T. D., Jr. (2008). ERP in practice: A snapshot of post-installation perception and behaviors. *Communications of the Association for Information Systems*, *23*, 437-462.

Klein, H. K., & Myers, M. D. (1999). A set of principles for conducting and evaluating interpretive field studies in information systems. *MIS Quarterly*, *23*(1), 67-88.

Kwon, T. H., & Zmud, R. W. (1987). Unifying the fragmented models of information systems implementation. In R. J. Boland, J. Hirschem, & R. A. Hirschem (Eds.), *Critical issues in information systems research* (pp. 227-251). New York, NY: John Wiley & Sons.

Lapointe, L., & Rivard, S. (2005). A multilevel model of resistance to information technology implementation. *MIS Quarterly*, *29*(3), 461-491.

Lauterbach, J., & Mueller, B. (2014). Adopt, adapt, enact or use? A framework and methodology for extracting and integrating conceptual mechanisms of IT adoption and use. In B. Doolin, E. Lamprou, N. Mitev, & L. McLeod (Eds.), *Information systems and global assemblages—(Re)configuring actors, artefacts, organizations.* Berlin, Germany: Springer.

Lazarus, R. S. (1993). Coping theory and research: Past, present, and future. *Psychosomatic Medicine*, *55*(3), 234-247.

Lazarus, R. S., & Folkman, S. (1984). *Stress, appraisal, and coping*. New York, NY: Springer.

Lee, A. S., & Baskerville, R. L. (2003). Generalizing generalizability in information systems research. *Information Systems Research*, *14*(3), 221-243.

Li, Y., Haake, P., & Mueller, B. (2017). Explaining the influence of workarounds on effective use—the case of a supply chain management system. In *Proceedings of the 25th European Conference on Information Systems.*

Liu, L., Feng, Y., Hu, Q., & Huang, X. (2011). From transactional user to VIP: How organizational and cognitive factors affect ERP assimilation at individual level. *European Journal of Information Systems*, *20*(2), 186-200.

Markus, M. L., & Robey, D. (1998). Information technology and organizational change: Causal structure in theory and research. *Management Science*, *34*(5), 583-598.

Meyer, A. D., Tsui, A. S., & Hinings, C. R. (1993). Configurational approaches to organizational analysis. *The Academy of Management Journal*, *36*(6), 1175-1195.

Ortiz de Guinea, A., & Webster, J. (2013). An investigation of information system use patterns: Technological events as triggers, the effects of time, and consequences for performance. *MIS Quarterly*, *37*(4), 1165-1188.

Patrickson, M. (1986). Adaptation by employees to new technology. *Journal of Occupational Psychology & Marketing*, *59*(1), 1-11.

Patton, M. Q. (2002). *Qualitative research & evaluation methods* (3rd ed.). Thousand Oaks, CA: Sage.

Pulakos, E. D., Arad, S., Donovan, M. A., & Plamondon, K. E. (2000). Adaptability in the workplace: Development of a taxonomy of adaptive performance. *Journal of Applied Psychology*, *85*(4), 612-624.

Saga, V. L., & Zmud, R. W. (1994). The nature and determinants of IT acceptance, routinization and infusion. In *Proceedings of the IFIP TC8 Working Conference on Diffusion, Transfer and Implementation of Information Technology.*

Singh, J., & Wilkes, R. E. (1996). When consumers complain: A path analysis of the key antecedents of consumer complaint response estimates. *Journal of the Academy of Marketing Science*, *24*(4), 350-365.

Soh, C., Sia, S. K., Boh, W. F., & Tang, M. (2003). Misalignments in ERP implementation: A dialectic perspective. *International Journal of Human-Computer Interaction*, *16*(1), 81-100.

Stein, M.-K., Newell, S., Wagner, E. L., & Galliers, R. D. (2015). Coping with information technology: Mixed emotions, vacillation, and nonconforming use patterns. *MIS Quarterly*, *39*(2), 367-392.

Suddaby, R. (2006). What grounded theory is not. *Academy of Management Journal*, *49*(4), 633-642.

Sun, H. (2012). Understanding user revisions when using information system features: Adaptive system use and triggers. *MIS Quarterly*, *36*(2), 453-478.

Thach, L., & Woodman, R. W. (1994). Organizational change and information technology: Managing on the edge of cyberspace. *Organizational Dynamics*, *23*(1), 30-46.

Tyre, M. J., & Orlikowski, W. J. (1994). Windows of opportunity: Temporal patterns of technological adaptation in organizations. *Organization Science*, *5*(1), 98-118.

Urquhart, C. (2013). *Grounded theory for qualitative research: A practical guide*. London, UK: Sage.

Urquhart, C., & Fernández, W. D. (2006). Grounded theory method: The researcher as blank slate and other myths. In *Proceedings of the 27th International Conference on Information Systems.*

Urquhart, C., Lehmann, H., & Myers, M. D. (2010). Putting the "theory" back into grounded theory: Guidelines for grounded theory studies in information systems. *Information Systems Journal*, *20*(4), 357-381.

Venkatesh, V., & Davis, F. D. (2000). A theoretical extension of the technology acceptance model: Four longitudinal field studies. *Management Science*, *46*(2), 186-204.

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *MIS Quarterly*, *27*(3), 425-478.

Volkoff, O., Strong, D. A., & Elmes, M. B. (2007). Technological embeddedness and organizational change. *Organization Science*, *18*(5), 832-848.

Appendix A

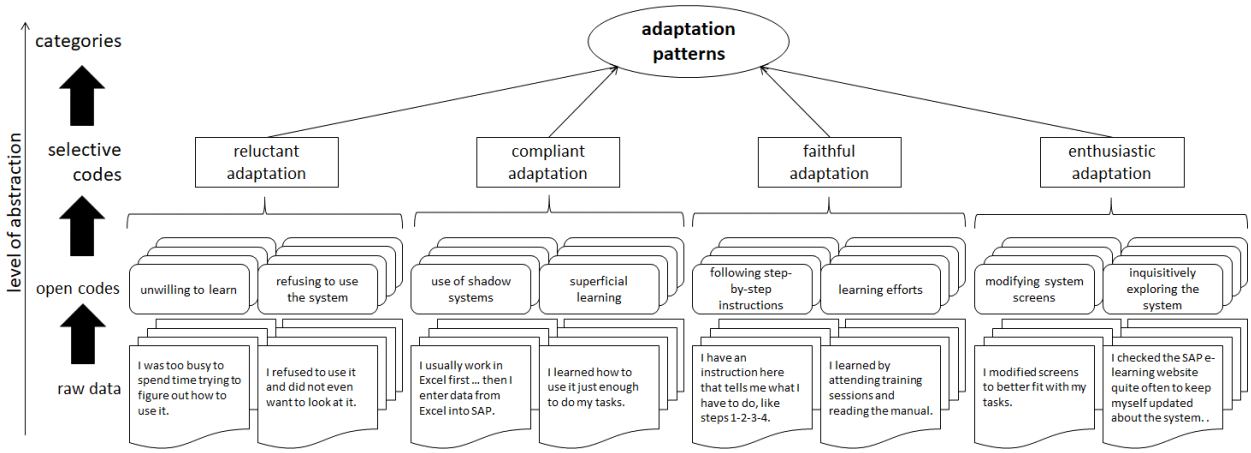

Figure A1. Schematic Representation of the Coding Process

Figure A1 illustrates the coding process through which the "adaptation patterns" category emerged. We constructed this category with four conceptually linked selective codes: reluctant adaptation, compliant adaptation, faithful adaptation, and enthusiastic adaptation. For each of these selective codes, we only show two open codes, which we inductively derived from raw data.

This figure and Table B2 resemble the "data structure" that Gioia, Corley, and Hamilton (2012) depict.

Appendix B

Table B2. Construction of the Categories

Open codes	Selective codes	Categories
Complaining about the system, unwilling to learn, unwilling to change work practices, fear of making mistakes, lack of confidence, comparing the new system with the old system, refusing to use the system, delaying system use, using legacy systems, resistance to change, rejecting the system, persistence of work practices, relying on other people to complete tasks	*Reluctant adaptation*	*Adaptation patterns*
Superficial learning, lack of attention, entering inaccurate data, superficial use, limited understanding of the system capability, printouts for overseeing the process, using shadow systems, duplicating work, making partial use of the system	*Compliance adaptation*	
Learning efforts, adapting work practices, following step-by-step instructions, following instructions faithfully, producing a personal manual, true-to-the-letter use, learning by repetition, routinizing the use of the system	*Faithful adaptation*	
Inquisitively exploring the system, trying out new functionalities, modifying system screens, adjusting the system to fit particular needs, personal/professional gratification, deriving benefits from the system, trying to enhance system utilization, seeking new knowledge, seeking efficiency	*Enthusiastic adaptation*	
Perceived system complexity, perceived additional workload, limited understanding of the system, perceived lack of control over the system, perceived lack of control over tasks, lack of proficiency to use the system, perceived ambiguity of the system, knowledgeable about the system, perceived control over the system, perceived control over tasks, understanding the system capability, customized training, inadequate training	*Knowledge of the system*	*Individual conditions*
Standardization, integrated work environment, lack of business process understanding, limited understanding of business process, need of business process understanding, domino effect, perceived process complexity, understanding the business process, need for training in business process, process visibility	*Understanding of the business processes*	
Low importance to task, low frequency of use, feeling obliged to use the system, feeling unattached to the system, perceived uselessness of the system,	*Low task-system dependence*	*Task conditions*
High reliance on the system, perceived system potential for supporting work tasks, feeling involved in the system, being responsible for the system, feeling of ownership, perceived necessity of the system	*High task-system dependence*	
Perceived encouragement, supportive environment, accepted practices, collaborative learning, enforcing organizational procedures, perceived discouragement, reinforcement	*Support and pressure*	*Organizational initiatives**
Changing policy, introduction of KPIs, one-on-one training, intensive training intervention, phasing-out of legacy systems, knowledge sharing gatherings, user group meeting, train-the-trainer program	*Targeted Interventions*	

* As we explain in Section 5.1, both individual and task conditions exert stronger influence than organizational initiatives.

About the Authors

Paweena Wanchai's research interests are in the use and value of information technology, business–IT alignment, IT strategy, enterprise resource planning system, and strategic management of information systems. Her current research focuses on data science (i.e., big data analytic, business intelligence, data mining, data warehousing, social media analytic, and advanced analytics).

Antonio Díaz Andrade is actively involved with the information and communication technology for development (ICT4D) research community as an author, presenter, lecturer, and reviewer. He has strong research interest in the interplay between the social and the technical, especially in the area of ICT4D, as well as in research methods.

Angsana A. Techatassanasoontorn's research is primarily concerned with theory building and empirical analysis on ICT use, well-being and social inclusion. Her work has appeared in *Decision Support Systems*, *Information and Management*, *Journal of the Association for Information Systems*, *Telecommunications Policy*, among others. Her research has been supported by grants from the Association for Computing Machinery (ACM), the Commonwealth Fund Foundation, Internet New Zealand, Microsoft, the U.S. National Science Foundation, and Qualcomm.