Extracting Value from ERP Investments: A Closer Look at the Integration Process

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EXTRACTING VALUE FROM ERP INVESTMENTS: A CLOSER LOOK AT THE INTEGRATION PROCESS

Completed Research Paper

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Abstract

When managers consider making an investment in Enterprise Resource Planning (ERP), as with any other investment, a major concern is whether this investment will add value to their organization. This paper suggests that performance differences across firms investing in similar ERP systems can be attributed to the way the technology is integrated with the actual IT infrastructure and business processes of the firm. More precisely, it is argued that depending on manager’s perceived gap between the ERP system and actual business processes and their level of alertness to opportunities, four value creation integration processes, namely the imitative, incremental, innovative, and serendipitous, can be identified. This paper describes these four processes and validates them through six case studies. Understandings of the process to integrate ERP investments with existing business processes and IT infrastructure should help explain how and why firms investing in similar ERP may have different outcomes.

Keywords: Business value; ERP; integration process; alertness; gap
**EXTRACTING VALUE FROM ERP INVESTMENTS: A CLOSER LOOK AT THE INTEGRATION PROCESS**

**Introduction**

How do managers go about creating value from enterprise resource planning systems (ERP)? Past research on ERP has demonstrated mixed results regarding the impacts of standard ERP packages on firm performance (Akkermans et al. 2003; Laframboise and Reyes 2005). For instance, some authors found that firms that invest in ERP tend to show higher performance across a wide variety of financial metrics (Cotteller and Bendoly, 2006; Hayes et al. 2001; Hitt et al. 2002; McAffee 2002; Ranganathan and Brown 2006), while others found a modest role of ERP in improving firm effectiveness (Akkermans et al. 2003) or no significant performance differences between ERP adopters and non-adopters (Vemuri and Palvia 2006). In other words, firms buy the same ERP package, but some firms generate significant business value from it while others do not (Ross et al. 1996; Shang and Seddon 2002).

Two main reasons for such difference have been proposed. First, effectiveness gains are quite difficult to measure due to their qualitative nature and intangibility, the length of time it takes to realize, and the different ways in which improvements become manifest (Hayes et al. 2001; Markus et al. 2000; Sadera and Gables 2004; Shang and Seddon 2002). For instance, it can take two to five years to achieve significant return from ERP investments (Davenport 2000; Hayes et al. 2001). Second, ERP systems offer the potential for integrating business processes and IT applications across multiple functions as well as distinct business divisions across multiple geographic locations. However, the fact that ERP systems embed high integrative potentialities does not mean that their physical implementation simply turns these potentialities into reality (Beretta 2002; Davenport et al. 2004; Ranganathan and Brown 2006). More specifically, firms need to adjust their ways of working to obtain value from commercial ERP packages by integrating the systems with the firm’s unique processes and strategy (Miller 2003). Indeed, leading firms work to integrate their ERP internally and with other firms (Davenport et al. 2004). For instance, manufacturing firms are relying on integrated enterprise-wide information systems such as ERP for enhancing operating performance through improved information access and coordination, while other companies have exploited enterprise systems by integrating them with other systems such as CRM and SCM or business intelligence software to expand businesses’ monitoring capabilities, provide levels of control, facilitate data analysis, and gain value (Davenport 2000; Gattiker and Goodhue 2005; Markus et al. 2000; McFee 2006). Thus, the degree to which ERP is integrated into the existing technological infrastructure and business processes of the firm is likely to influence the final results (Barki and Pinsonneault 2005; Ranganathan and Brown 2006). Indeed, it has been shown that the higher the degree of integration, the higher the impact on business value (Cotteleer and Bendoly, 2006; Ranganathan and Brown, 2006).

However, firms adopting ERP have had great difficulty integrating their ERP systems with their existing IT infrastructure, processes, structure, and geographic distribution (Markus 2000). It has been one of the major problems, challenges, and opportunities that ERP adopters faced when implementing an ERP system (Karimi et al. 2007). For instance, it was found that 80% of the firms were confronted to integration problems when attempting to tie up the ERP system with a number of existing applications, 58% of firms did not manage to integrate their ERP with existing systems, and many firms reported integration problems (Themistocleous et al. 2001). As enterprises buy more and more packaged applications, it is estimated that the task of integrating within and between enterprise systems is likely to remain a priority (McGaughey and Gunasekaran 2007). Although there is a growing body of literature on strategic effects of ERP integration on IT business value, the evidence from empirical studies of the process to achieve integration and its antecedents indicates that little is known about the different activities leading to integration and the different types of integration processes. In other words, what seems absent is a rich understanding of the process that links expectations regarding ERP investments with plans for extracting business value through integration.

In an effort to understand the process to achieve integration, which is named here the **value creation integration process**, this study explores theories underlying predictions about value creation and identifies two dimensions and two activities that might help explain the differential impact found in empirical studies. The two dimensions are: (1) manager’s alertness to opportunities and (2) perceived gap between the new ERP system and existing business processes. A conceptual framework is presented that integrates these two dimensions and derives four contingent
value creation integration processes that explain differential degree of integration. More specifically, depending on these two dimensions, two activities, search and design, are performed to various degrees by managers. The main premise of the model is that the value creation integration process, which can be grouped into four types of process, is expected to depend on the degree of managerial alertness and perceived gap, and from which different degrees of integration are likely to be achieved. Here, integration is conceptualized as the extent to which an ERP module is tightly coupled with relevant business processes and IT application that are internal to an organization. Therefore, answers to the following research questions are sought: (1) How to achieve the value creation integration process, and (2) how do different types of value creation integration process influence the degree of integration achieved.

In building the argument, this article first justifies the integration concept in the ERP literature and discusses the role of alertness and perceived gap in shaping the conceptual framework. Then, the value creation integration process is proposed and case studies are applied to provide preliminary support for the framework. After discussing results and implications, the article concludes with a short conclusion.

**Overview of Integration in ERP Research**

ERP systems address issues of organizational integration by bridging traditionally separated organizational functions and geographically dispersed locations through business and technical integration (Gattiker and Goodhue 2005; Ranganathan and Brown 2006). Although integration success in ERP implementations has been questionable (Themistocleous et al. 2001), a growing body of literature suggests that the higher the degree of ERP integration, in term of the extent of the functions to be integrated or the scope of the implementation, the better a firm performs. For instance, past research has shown that ERP projects with greater scope result in positive, higher shareholder returns whereas ERP projects with lesser scope result in negative returns (Karimi et al. 2007). Extent of ERP implementation, or scope, is important not only because it specifies what benefits can be obtained, but also because it defines the changes to managerial autonomy, task coordination, and the degree to which it will change process integration in the business units of the enterprise (Barki et al. 2005; Karimi et al. 2007; Markus et al. 2000). For instance, implementation of only one module of an ERP package in one business unit has the potential for quite different benefits, as less integration should be achieved, than implementation of all ERP modules in every unit and across multiple locations. In this respect, the notion of ERP integration has been defined as functional and physical scope.

Functional scope refers to the range of business functions (accounting, finance, sales, etc.) that share ERP implementation. The functional scope of an ERP system influences the potential value of a firm due to the technical and business integration potential of the ERP. Greater ERP functional scope is achieved through the implementation of multiple ERP modules, which provides data and process integration across multiple functions and more benefits than a single function implementation (Karimi et al. 2007). It allows users to have a more cross-functional overview of the company, i.e. be aware of the traverse character of cross-functional processes and have broader perspective of their department and company (El Amrani et al. 2006). For instance, it has been shown that purchasers of multiple ERP modules have greater financial returns than non-purchasers or purchasers of a single module (Hitt et al. 2002), greater functional scope is directly and significantly associated with business process efficiency, effectiveness, and flexibility (Karimi et al. 2007), and ERP investments with greater functional scope yield significant increases in market value that exceed the average returns from investments in single innovative or transformative IT applications (Ranganathan and Brown 2006). Indeed, by implementing a full range of ERP modules, an organization can not only integrate different functional areas, but also the different stages of a business process and have more tightly coupled processes (Volkoff et al. 2007). ERP modules can also be categorized along different process chain activities, i.e. functional and operational, which results in different and complementary benefits (Barki and Pinsonneault 2005; Ranganathan and Brown 2006). More specifically, investing in operational modules will result in greater organizational efficiency, whereas implementing both types of module will lead to both greater organizational efficiency and effectiveness (Barki and Pinsonneault 2005).

Physical scope refers to the geographic locations that an ERP project envelops. It has been defined by the number of sites that a project can reach or its breadth, such as departments, divisions, entire company, and multiple companies (Barki et al. 2005; Karimi et al. 2007; Parr and Shanks 2000; Ranganathan and Brown 2006), the geographic reach, such as regional, national, and global (Karimi et al. 2007), and the number of employees it affects or the depth of the implementation (Barki et al. 2005; Parr and Shanks 2000). Even though managing a multisite ERP implementation project is challenging, by integrating technology and business activities across multiple locations, firms hope to reduce cost and improve business processes, data integrity, and customer service and as a result, have a greater
potential for benefits than firms that implement ERP for a single location (Karimi et al. 2007; Markus et al. 2000; Ranganathan and Brown 2006). Business value is thus created from integrating technology and business activities across multiple locations. For instance, greater physical scope was found to positively influence process efficiency, effectiveness, and flexibility (Karimi et al. 2007), increase the market value (Ranganathan and Brown 2006), facilitate enterprise-level transactions across worldwide manufacturing/distribution centers (Cotteler and Bendoly 2006), and lead to local level overall benefits through interplant coordination (Gattiker and Goodhue 2005). Further, it was shown that the implementation of SAP in multiple locations turned independent units into an integrated whole by introducing standardized processes and common data, which lead to major benefits such as lower costs, more timely information, and more effective work (Volkoff et al. 2007).

Although previous research has shown that greater integration leads to greater organizational benefits, little is known about the nature and timing of activities that guide the integration. More specifically, a better understanding of what managers do to achieve greater integration and why some managers are better able than other at achieving these activities is needed. Thus, there is much more involved than implementing an ERP system with greater functional and physical scope, i.e. many modules in many locations, in order to achieve better integration and extract business value. Indeed, firms implementing the same modules across the same number of locations may not have the same degree of integration, and subsequently the same outcomes and business value. Accordingly, an interest in the process of integration requires examination of the capability of managers to identify unique opportunity and exploit them and the role of perceived gap in explaining the different degrees of integration achieved.

**Theoretical Background**

The fundamental premise of the model is that what creates value out of ERP investments is the unique and valuable ways in which the ERP system is integrated to the business processes and technological infrastructure of the firm. This uniqueness arises from the personal ability and mental models of the individuals within the firm, who can discover useful and unique ways, or opportunities, and exploit them. In short, it is the firm’s individual members who add the creativity needed to help the firm uniquely create value from ERP investments. Customizable technologies, such as ERP, need local adaptations and ongoing accommodations to particular contexts and situated work practices (Orlikwosi 1996). Thus, how uniquely the technology is integrated might help explain differences observed in the benefits that firms obtain from similar ERP investments. This argument has been supported in previous studies. For instance, it has been argued that organizations are different and by building on these differences, or asymmetries, that in their initial states could not be considered valuable, firms can gain competitive advantage (Miller 2003). For example, off-the-shelf packages used in a unique way in an organization would become an asymmetry. Thus, inimitable differences, not valuable competencies, between firms are likely to create a competitive advantage (Miller 2003). By searching for internal asymmetries on which to build capabilities, organizations are likely to gain competitive advantage and value (Verity 2005).

A complementary stream of research has also looked at how organizations transform resources to create value by building on the concept of capabilities and processes (Helfat and Peteraf 2003; Sirmon 2007). For instance, organizations are likely to create value via net-enabled business practices by achieving fours capabilities: choosing, matching, executing, and assessing (Wheeler 2002). Similarly, the process of managing resources with the intention of creating value includes the structuring, bundling, and leveraging components and subprocesses (Sirmon 2007). Therefore, organizations are required to have unique and difficult-to-replicate capabilities which can be disaggregated into the capacity to sense and shape opportunities and threats, seize opportunities, and maintain competitiveness (Teece 2007). This literature can be organized and integrated into three types of activities: search, design, and implementation, two of which are the focus of the framework presented in Figure 1. Searching for new opportunities is very much like what has been described through variation or discovery (Miller 2003; Zott 2003), while design includes the development of capabilities (Helfat and Peteraf 2003; Miller 2003). The implementation activity is concerned with the value created from the integration, which is the next step to this framework. Thus, managers should view their firm as a system of resources and capabilities that need to be searched and developed to their unique context in order to create value (Miller 2003). In this respect, manager’s capability to identify and exploit opportunities has also important implications in the process to create value (Sirmon 2007).

While the specific activities composing the value creation process have been somewhat identified in previous studies, two particular dimensions have to be considered to apply the process to the ERP context; these are the perceived gap and managers’ alertness to identify and exploit opportunities. Both factors have been shown to be critical in explaining successful ERP implementations. These two factors form the basis for a framework that
enables us to understand the process by which value is created through ERP integration. The framework is presented in Figure 1 and elaborated next.

The first dimension in the framework, the perceived gap, refers to the degree to which the ERP system deviates from the needs of the organization in term of business processes. ERP systems differ from custom system, i.e. that the organization may have to change procedures to work with the system depending on the gap (Lucas et al. 1988). Indeed, existing research has documented that the gap between an ERP’s standard processes and the organization’s business conditions is an important critical success factor and that lower gap was positively associated with successful implementation and higher system quality (Hong and Kim 2002; Luo and Strong 2004, Markus and Tanis 2000; Robey et al. 2002; Soh and Sia 2005; Somers and Nelson 2003; Wang et al. 2006). Indeed, implementing organizations should identify, as early as possible, misalignments, or gaps, between the ERP package and their processes and unique contextual factors since higher gap may influence the implementation process and final results (Soh and Sia 2005). Such gap may stem from the firm, or country-specific, requirements that do not match the capabilities of ERP (Soh et al. 2000; Wang et al. 2006), the conflicting interests of user organization and ERP vendors (Swan et al. 2005), the assumption of universal best practices for information management by ERP vendors (Gattiker and Goodhue 2005), the greater differentiation between plants (Soh et al. 2005), and the organizational structures of the implementing organization (Soh and Sia 2005). Customization may be a response to a greater gap between the organization’s business processes and those envisioned by the ERP system and an attempt to reverse the vendor’s choices, leading to a new closure about how things ought to be done in the user environment (Gattiker and Goodhue 2005; Wang et al. 2006). It may be accomplished by changing the organization’s business processes to fit with the system using the ERP system as a standard (process customization), customizing the ERP system to align it with existing processes (technical customization), or by mutually adapting the ERP systems and organization processes (Laslila and Branchau 1999; Luo and Strong 2004; Soh et al. 2000). Consequently, finding a match between the ERP system and the organization’s business processes by appropriately customizing both the system and the organization is a key factor of the value creation integration process (Luo and Strong 2004).

The second dimension in the framework, the degree of alertness, refers to a unique preparedness to recognize opportunities when they exist and it is a distinctive set of perceptual and information-processing skills that drives the process (Gaglio and Katz 200; Kaish and Gilad 1991). It is a proactive capability that leads to the discovery of new opportunities (Kirzner 1979). Before technological change leads to new processes, managers must discover opportunities in which to exploit the new technology and extract benefits, and without alertness, opportunities remain unnoticed (Shane 2000, Yu 2001). Managers must have the ability to design new or changed business processes and think “outside of the box” to generate many alternative designs (Luo and Strong 2004). Indeed, previous studies have examined the influence of alertness in explaining why some individuals are better than other at identifying opportunities. The process occurs when someone, alert to misfit, recognizes that resources are not being put to their “best use”, obtains the resources, and recombines them. Thus, alert agents recognize opportunities and transform them into value-producing activities, such as higher integration (Minniti 2004). Alertness is distinct, at least to a degree, from the related concept of “mindfulness”, which refers to general tendencies to process incoming
information in a systematic and effortful ways, while alertness refers primarily to receptivity to opportunities and noticing them when they exist (Baron and Ensley 2006).

As can be seen in Figure 1, these two dimensions create four quadrants, each representing a different contingent outcome with respect to the impact of an ERP module on the degree of integration. Perceived gaps and alertness, being continuous rather than dichotomous constructs, can be expected to result in various forms of value creation integration processes. For the purpose of simplicity, four forms of value creation integration process, which are derived by combining the two extreme cases of the degree of alertness and perceived gap, are presented (high or low perceived gap and alertness). More specifically, after recognizing that a new ERP system is being implemented in their business unit, managers involved in the implementation determine the gap between the actual business processes, or functionalities, and what is offered by the new system. Two outcomes are possible. First, the business unit may have unique processes and/or features of existing business processes and the unit will need to adapt the system to take advantage of this uniqueness. Second, they may notice new ways to improve their existing business processes and they need to modify them using the best practices embedded in the system. Therefore, after identifying the gap, alert managers are more likely to search for opportunities and/or solution to exploit these opportunities and achieve higher integration (cell 1). For example, they may talk with other business units or divisions about how they implemented similar systems/processes. They may detect potential value by reconceptualizing their non-productive processes, mostly because of a new way of thinking or new understanding of the business process (Miller 2003). They can also recognize a fit between particular organizational needs and the technology because of a context of weakness and disadvantages such as inadequate communication across departments and divisions and discovering some advantages that the technology can produce (Montealegre 2002). Finally, they can create a new match between the technology and the organizational needs and deliver value superior to what is currently available (Ardichivili et al. 2003). Following the search activity, the exploitation of the new opportunities is developed through the design activity. Business managers may first design a solution that imitates what already exists in another division or unit (Helfat and Peteraf 2003; Sirmon 2007). Thus, there are minor incremental improvements in existing integration (cell 3). However, alert to new possibilities and opportunities, managers may turn to design a modified or custom-made solution and achieve greater integration (cell 1 and 2).

The Four Value Creation Integration Processes

As discussed in the previous section, the creation of value through integration includes two activities, search and design, which are influenced by the degree of manager’s alertness and perceived gap. The framework shows the value creation integration processes that are feasible for various levels of alertness and perceived gap. The impact of ERP investments on the degree of integration achieved is expected to be most pronounced and significant in the quadrant (cell 1) where the degrees of alertness and perceived gap are high and less pronounced in the quadrant (cell 4) where the degrees of alertness and perceived gap are low. The four value creation integration processes, namely the innovative, serendipitous, incremental, and imitative are described next with appropriate propositions regarding the extent of search and design activities and the impact on the degree of integration achieved.

Innovative VCIP

In an instance where the gap perceived between the actual way of working and the new system is high, and managers are highly alert to new opportunities, integration process will likely be innovative and oriented toward taking the full advantage of the opportunities offered by the new system. Because of the high gap, managers are likely to focus on major or radical improvements and innovations with the system and/or their business processes (Fichman 2004; Ranganathan and Brown 2006). There, greater perceived gap is an opportunity to higher potential value and may require higher search and design activities in order to fit together dissimilar components and independent business processes by conforming to a uniform standard (Luo and Strong 2004; Markus and Tanis 2000). Thus, managers are likely to search actively how to modify their business processes, customize the technology, or both to achieve greater coordination, communication, and a central overview of business processes. Additionally, managers who are highly alert perceive and reason in different ways from other low alert business people and these differences lead to the identification of opportunities (Gaglio, 2004). Because of their complex and adaptive schemas, alert individuals are better able to recognize quickly any anomalies that arise from changes, identify more accurately the patterns among unrelated events, and think outside the box (Baron 2004; Gaglio and Katz 2001). They are most likely to accept a solution that completely fit their needs because they are aware of the value and benefits they can gain from the system and its integration, which may require many iterations and high design activity. Indeed, they are expected to be aware of the tradeoff between customization efforts and integration
benefits and understand the costs and risks associated with high customization (Davenport 1998). The more customized an ERP system becomes, the less able it will be to communicate seamlessly with the systems of suppliers and customers for instance.

Proposition 1a: When perceived gap is high and managers are highly alert, they will engage in an innovative process, which will be characterized by high search and high design activities.

Additionally, drawing on the option value lens, the high interpretive flexibility of ERP system creates the opportunity for managers to appropriate, through high search and design activities, the ERP system in a way that is most suited to their organizational specifics (Fichman 2004). In turn, this should create additional opportunities to achieve greater integration. Further, managers who engage with ERP systems in a substantive manner to explore opportunities for process-enhancement and assess the relevance of the processes are likely to achieve greater integration (Shang and Seddon 2007). Therefore, higher integration may be accomplished by either modifying the business processes using the best practices embedded with the ERP system and/or customizing the ERP system to align it with existing processes. This type of process is likely to result in higher degree of integration and performance improvements because the system and/or business processes are adapted to the uniqueness of the organization and opportunities are sensed and seized through managerial alertness (Teece 2007).

Proposition 1b: High search and high design activities will lead to a high degree of integration.

Serendipitous VCIP

By contrast, in some situations, managers may perceive a low gap between the new ERP system and actual way of working but they may be highly alert to new opportunities with the ERP system and make unexpected discoveries. In such situation, the search activity is not highly needed since actual processes and technology have a great fit, but new opportunities may be discovered and the system and/or processes may need modifications through some design activity to accommodate these unexpected findings. Similar to improvisation, managers are expected to explore and innovate to enhance the original way of working (Orlikowski 1996). Even though ERP system is considered a highly rigid and structured technology, it was found that ERP implementation can also be an emergent process that follows an improvisation pattern and mixes seeing and doing (Elbanna 2006; Stoddard and Jarvenpaa 1995). Therefore, technological changes or implementation strategies may emerge as a consequence of activities with a different purpose rather than as an intended outcome of a deliberate search process (Denrell et al. 2003; McGann and Lyytinen 2008; Orlikowski 1996; Orlikowski and Hoffman 1997). For instance, managers may discover a new functionality with the system that was not found first through the blueprint or proposed by the consultants and modifications to the system and/or processes are needed (design). Similarly, a unique business process that was previously done manually can now be done with the new ERP system, and changes to the system are required. In such situation, alert managers are promoting the realization of serendipitous value by identifying opportunities for unexpected resource reconfiguration (Graebner 2004). Sources of value are likely to emerge from opportunities to discover new paths to creating value and designing an appropriate solution (Graebner 2004). This process is similar to the opportunity-based change where changes are not anticipated ahead of time but are introduced purposefully and intentionally in response to an unexpected opportunity (Orlikowski 1997).

Proposition 2a: When perceived gap is low and managers are highly alert, they will engage in a serendipitous process, which will be characterized by low search and medium design activities.

Finally, because managers engage in low search and medium design activities, the potential degree of integration is also likely to be somewhat limited. The actual way of working is already similar to what it is proposed by the system and some changes are likely to be accomplished through unexpected discoveries. Thus, the serendipitous value creation integration process refers to windfalls that were not anticipated by managers prior to the implementation of the ERP system. That is, integration is a consequence of effort and luck joined by alertness and flexibility, where the effort was not initially directed to the specific end realized and alertness was required to recognize the lucky appearance of new opportunities (Denrell et al. 2003).

Proposition 2b: Low search and medium design activities will lead to a medium degree of integration.

Incremental VCIP

In a situation where managers perceived a high gap but their degree of alertness for this particular IT implementation is low, integration process is likely to be incremental and results in medium degree of integration.
Managers with low level of alertness may not detect that their ways of managing resources and IT may not be appropriated anymore. They do not perceive the signals of change or misinterpret their meaning and implications and therefore, do not search for innovative opportunities early enough to capitalize on them (Gaglio 2004). Individuals with low level of alertness will extract little business value from ERP investments because they do not detect or they discount important information cues about how the technology can be deployed in their units (Gaglio and Katz 2001). They believe that there are no more concrete opportunities to be discovered, therefore, there will be medium level of search (Kaish and Gilad 1991). Consequently, their behavioral requirements consist of allocating existing resources in ways that historically have had the highest probability of maximized returns or have been congruent with previous institutional responses (Gaglio and Katz 2001). Thus, managers are more likely to focus on designing solutions that follow previous implementations or other divisions that implemented the same module, which is likely to result in moderate improvements of their processes through moderate search and limited design activities (Smith et al. 2009). Managers still have to search for possible solutions to reduce the gap between the system and actual processes but they may accept the first plausible ones, even if it does not completely satisfy the need of the business unit. Thus, when alertness is low, managers make highly suboptimal choices, limiting their search activity to knowledgeable sources and minimizing the design activity.

**Proposition 3a:** When perceived gap is high and managers are weakly alert, they will engage in an incremental process, which will be characterized by medium search and low design activities.

The built-in out-of-the-box functionality in ERP may fit some companies but will not be ideal for all. Thus, if process-change opportunities are ignored, existing process inefficiencies will perpetuate and lower integration will be achieved (Shang and Seddon 2007). Although the high gap provides opportunities to achieve higher integration, managers are not likely to appropriate the technology in a way that is most suited to their business needs by engaging in medium search and low design activities. Therefore, managers that engage in exploitation to the exclusion of exploration are likely to find incremental opportunities with the ERP system and achieve suboptimal integration (March 1991).

**Proposition 3b:** Medium search and low design activities will lead to a medium degree of integration.

**Imitative VCIP**

When managers perceived low gap between the new system and actual way of working and their degree of alertness is low, imitative integration process is expected. This process is similar to the process replication which uses the software to duplicate or automate existing business processes. Managers feel that existing processes and that the software adequately support business objectives and managers may have limited time to explore the new process options the software offers. Therefore, exploitation efforts are likely to be characterized by low search and design activities. Managers are unable to take the ERP system further than installation and are happy when their operations are as reliable as they were with the old systems (Kalling 2003). For instance, vanilla implementation is more likely to be chosen, i.e. no modifications to either the system or business processes (Soh and Sia 2005). Managers are attracted by the option of implementing the ‘best practice’ embedded in ERP systems and devote few resources to identifying contextual differences and new opportunities (Newell et al. 2001; Wagner and Newell 2004). However, it may raise significant challenges in practice as it assumes that the organization, or business unit, can adapt itself to the package (Soh and Sia 2005). Additionally, managers are not likely to be alert at possible cross-functional benefits and opportunities of the ERP system and are not searching for new opportunities with the system. The ERP system may be poorly understood, the goals ambiguous, or the environment creates uncertainty, and managers design’s activity is limited and models other organizations perceived to be legitimate or successful (Liang et al. 2007). Companies that have the biggest problems are those that install ERP without looking at its full business implications and searching for opportunities. Managers may view an ERP as a silver bullet and search for a quick fix (Davenport 1998). Faced with problems with uncertain solutions, managers may succumb to mimetic pressures from the environment to economize on the search costs, dealing with the system by imitating the choices of other organizations, through low search and design activity.

**Proposition 4a:** When perceived gap is low and managers are weakly alert, they will engage in an imitative process, which will be characterized by low search and low design activities.

The organization may still benefits from automation, but old business processes problems are likely to persist limiting the integration (Seddon and Shang 2002). For example in a case study of an ERP implementation, it was found that an organization implemented the system as an imitation of the previous process and more problems occurred (Shang and Seddon 2007). Additionally, lower integration may be influenced by organizations that allow
each of its business units to configure the same ERP however they see fit, with the result that it is not possible to obtain integration benefits from better decision making for instance, and/or implementation of the system as-is (Soh et al. 2000). The result is a naïve adoption of the ERP system with limited integration and value, i.e. corresponding to the level of performance they had with the old system (Kalling 2003).

**Proposition 4b: Low search and low design activities will lead to a low degree of integration.**

**Framework Application: Case Studies**

**Research Setting**

In order to provide a preliminary test of the model, multiple case studies were conducted. The unit of analysis is a single module of an ERP implementation. Each case study describes an ERP module and its related integration process. The multiple-case design follows theoretical replication and literal replication logic (Yin 2003). A total of six modules and related integration processes were studied across four organizations in North America. The selection of ERP project was intentional, limiting the study to one type of IT implementation to control for variance and to allow for more accurate comparisons and conclusions (Yin 2003). Furthermore, the selection of multiple organizations ensures that the research identifies the variety of IT integration processes that may exist within a single type of IT project. Multiple research sites were selected to enhance case depth, comparability, and data quality. More specifically, four organizations were selected from which six cases were chosen according to the degree of perceived gap, alertness, and the date of go-live of the ERP project, i.e. less than 2 years. The alertness characteristic was measured by asking managers involved in the ERP implementation the extent to which they were searching for new opportunities with the system, trying to take advantage of the system to facilitate their work, alert to the possibilities with the system, bringing new ideas to improve the system, and if this project was done differently than other project. The perceived gap was measured by asking managers the percentage of business processes that fitted with the new system, the percentage and number of changes that were made to the system and the percentage and number of business processes that needed to be made. Perceive gap was defined as “high” when it was over 20% as previous study of SAP users reported that in average at least 20% of their need functionality was missing from the package (Scott and Kaindl 2000). Table 1 shows the cases based on the research framework and a brief description of each case, grouped by organization, is presented next.

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<th><strong>Table 1. Research Setting</strong></th>
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<td><strong>Innovative</strong> (high gap and high alertness)</td>
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<td>Finance (PharmaCo ML)</td>
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<td>CRM (ConsCo)</td>
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The first organization, PharmaCo, is a US-based $22.4 billion producer of pharmaceuticals, consumer, and animal health care products with nearly 48 000 employees at more than 145 sales and 100 manufacturing sites worldwide. Two of the divisions were used for this study: PharmaCo ML and PharmaCo MS. PharmaCo decided to implement a single instance of SAP across all its divisions worldwide and PharmaCo ML and MS were part of the first wave. The project started in September 2006 with a Big Bang approach of SAP and went live in February 2008. The PharmaCo ML’s division implemented 13 modules and add-ons. Three modules in three distinct business units were studied. The finance module was classified as innovative since the gap was high (50%) and the manager was alert and always looking to challenge what was proposed to the department. The sales and distribution module (S&D) module was categorized under the serendipitous process, where the gap perceived was low (20%) and degree of alertness high. For instance, the manager was looking for new opportunities and was alert to the uniqueness of the

1 All names have been changed to preserve the anonymity of the company.
department. Finally, the maintenance module was grouped under the imitative process where there was low perceived gap (5%) and low alertness.

The PharmaCo MS division has about 200 employees and 100 of them are sales employees who do not use the ERP system. The scope of the implementation included 3 modules and 3 add-ons. The finance module was used for this study, which was classified under the serendipitous process. The perceived gap was low (20%) and alertness high.

The third organization, ConsCo, is part of the consumer products industry and employs about 50 peoples. The project of implementing the full scope of SAP Business One, an ERP system for SME, started in December 2005 and went live February 2006. 20 peoples are using the ERP system for their daily activities. The implementation team consisted of two super-users that were involved in the project, one of them was interviewed, and five members of the management teams that were involved at certain points during the project. The module studied was the CRM, which the gap was perceived as high (35%) and the manager was highly alert.

The last company, SteelCo, is an integrated steel company, which employs over 7, 400 people. In September 2006, the company started an ERP implementation project of 5 SAP modules. The project went live in May 2007 and the new system was implemented to deal with only a portion of their business. Now, 13 employees are using the system. The rest of the company is using another system, which is different than the one used by the other division. The implementation of the material management module was perceived as having a high gap (40-50%) and managers had low alertness.

**Data Collection**

To investigate the value creation integration process, appropriate respondents in the organization were identified for each ERP module. More specifically, interviews were conducted with business managers from different business units involved in the ERP implementation. Additionally, higher executives such as CEO, president, IT Director were also interviewed to gather additional information on the ERP project. The data collection of this study started in August 2008 and concluded in December 2008. A total of 6 modules were studied and a retrospective approach was applied. All of the 6 modules were investigated by gathering data from multiple sources including semi-structured interviews, and organizational documents.

The value creation integration process was measured by the activities (search and design) done by the managers involved in the ERP implementation. Respondents were asked to provide a narrative about the different activities leading to integrating the new module to existing business process and IT infrastructure, i.e. before the actual implementation of the system. The perceived degree of integration was measured by delta integration. More specifically, the extent to which managers perceive that there is greater integration, i.e. the information is shared more effectively and in greater volume, different types of information are exchanged, and the business processes are more tied with other departments. All names and locations have been disguised at the request of the organizations. Quotes that express many informants’ point of view are reported by presenting one indicative quote without a reference to the source.

**Data Analysis**

A multistep analysis process was used. First, interview transcripts were read several times by the author to become immersed in the data, which is a critical stop in the analysis process (Eisenhardt 1989). An extensive case description, which included geography and setting of the site, project specifications, and key actors and their relationships, was documented. In the next phase, within-case analysis was performed to allow the unique pattern of each case to emerge and provide researchers with an understanding of each case, and hence, accelerating cross-cases analysis. Thus, the information regarding each value creation integration process was put in a text file and coded using a coding scheme. For each value creation integration process, the different activities were identified to depict the value creation integration. Third, chains of evidence describing the search, design, and degree of integration for each type of value creation integration process were constructed. Fourth, cross-case analysis was conducted grouping the value creation integration processes that were similar according to the degree of alertness and perceived gap. In addition, the chains of evidence developed in the within-case analyses helped build a general explanation that could be applied to each individual case, while simultaneously taking into account differences between cases. Finally, following Eisenhardt (1989), an iterative approach to validate relationships between alertness, perceived gap and value creation integration processes (level of search and design activities) and degree of integration was taken.
Findings

Type 1 – Innovative

The integration process for the finance module, which was implemented in the finance department at PharmaCo ML, was characterized by extensive search and design efforts and oriented toward enhancing the benefits of the system through greater integration. For instance, the managers involved in the implementation were searching to find solutions to reduce the gap between the ERP system and their unique processes by trying to understand how other sites do similar processes, searching for opportunities, talking with other divisions similar to them, and brainstorming with other people knowledgeable about the finance processes. They discovered how to modify the new system to make it as efficient as possible and did not accept the first solution proposed to modify the system. Instead, they tried to push solutions that were more effective and allowed them to exchange information more effectively.

“The first step was, “how does another site close their months, and how do they run what they call the Profit Center Assessment Cycle…The current one that was on the table from a different division would not work for Pharmaco ML... it was unique to Pharmaco ML, people were just trying to understand ‘Why are you unique? Why can’t you just take what works for all my other sites...we had to do was kind of brainstorm, and with their knowledge of SAP and our requirements worked together, and seek other people who may not have necessarily been on the team, but these were finance people and we searched for solution. So, our challenge was to say, “Well what person X gave us sounds great, but it’s going to take me two days to do, versus, you know, option B, which gets us to the same point, but it can take me half the time, so what we tried to work on was, once we had what looked like a solution ‘how can I automate...areas where we saw an opportunity to say, “I can cut it from a day to two hours”, I’m going to push it, and we had full support of our management team to do that”.

As one of the manager indicated, they system now empowers the department to be more tied up with other departments inside and outside the division and allows them to communicate a lot more now with the other departments and divisions, have processes more automated, and information more accurate. Finally, this division is now integrated with other divisions around the world.

Yes, we are more integrated. I think there’s more...We probably talk a lot more now than we ever did before. Yeah, I think people can spot things because we’re so integrated, they’re running reports, and saying “Hey, you guys, you still have to balance somewhere.’” Oh, well, you know, they can see it now. You catch things quicker.”

Managers involved at ConsCo, which implemented SAP business one for SME and more specifically the CRM module, were highly alert to new opportunities with the system during the implementation. Indeed, they are still looking at opportunities. They did not implement the system as-is because the perceived gap was high. Between 30-35% of the system did not fit the current processes and modifications to the system was done. They were highly involved with the partner to find solutions and opportunities with the system and achieved high design activity to customize the system. For instance, one of the main changes made to the system was to allow automatic reporting conversion to keep track of customer information. The search activity was necessary to look for ideas about how to approach the problem and then, the partner design different solutions and the best one was evaluated and chosen.

“The beauty about the software is there were things the software could do out of the box that we weren’t doing which was a great benefit for us when we started to do that, to harness that knowledge...and the customization was to add on business theories and concepts, things that we wanted to do. So the customization of the software has really been a benefit to us, to grow our business and to maintain all the information. Generally, if we engaged our partner, they would be briefed on what we were trying to achieve, we generally would give them an idea of how we think it could be possible and they always either agree with the approach or they may come back to us with two-three different suggestions based on their knowledge of the software”.

Finally, the perceived degree of integration achieved is now really high. The new ERP system is replacing three systems that were not communicating with each other.

“I would say there was some integration before between the departments, probably in the neighbourhood of 70% integration, 30 % was done manually or that sort of thing...but with the SAP system we got maybe like 120%”.

The value creation integration process used by PharmaCo ML and ConsCO, illustrate the innovative process described in the framework (Figure 1) and support propositions #1. The managers were alert to opportunities to integrate the new ERP system with existing IT infrastructure and business processes and the gap between actual
processes and system was high. The manager performed extensive search and design activities, which resulted in a higher degree of integration.

**Type 2 – Serendipitous**

Like the finance department at PharmaCo ML, the logistic department, which implemented the sales and distribution (S&D) module, was looking for new opportunities and managers were alert to the uniqueness of the department. The team went to see other PharmaCo divisions to understand how they worked, but they were aware that this plant was a little different than the other divisions. One of the managers involved in the implementation was convinced that the system could be modified to take into consideration their distinctive way of working, even though 80% of the global model fitted their actual processes (low gap).

“We wanted more tomorrow with SAP…so we said it, right away, we need that process…This step in the global model you present it this way but we don’t want it this way…we want it that way”.

The search activity was relatively low since managers knew which changes needed to be done, but they spent time on designing appropriate solutions to fit their needs. They now considered the integration associated with the system to be somewhat better than what they had before, consisting of greater volume of information exchange and tighter links with other departments.

“After the design of the blueprint, we found unexpectedly a way that we wanted to do the process and we said “you can show us a way to do this process but we are unique and we have to develop here at PharmaCo ML”…. it existed in SAP but the people didn’t have the expertise, there were no other sites that had it, but it existed in SAP…yes definitively some integration, I mean, for the inventory, we have greater visibility and we work more with the other departments…everything is related, all the links between the processes are reinforced.

The finance department at PharmaCo MS implemented the finance module but differently than the PharmaCo ML division since they are not similar division in term of processes. Indeed, one of the managers in charge of this department was highly alert to opportunities with the system.

“Yeah, we had a very different mindset in finance compared to the rest of the company...Top management, which is my boss, VP of finance, he basically was saying, “Well why don’t we do it the same old way. Don’t waste your time doing it this way” and my whole argument was that if you don’t get the efficiencies in early, you’re never going to do them later on... Because SAP can do a lot of things for you”.

Perceived gap was low, i.e approximately 20% of their processes did not fit to the corporate global model and the search activity was also low. However, the finance department was a little different than the other department and they had to do more design activity since they identified unique opportunity with the system that they did not first expect. For example, the lockbox process, i.e. the process by which customers send in their payments to the bank, to what they call the lockbox, was not automated. Then, managers followed the global model but had to design a new solution to fit their need. Finally, greater integration was achieved through greater tightness within the departments.

“Absolutely, so we did a little bit of search, it wasn’t totally just take what was there and try to clone it in SAP, we did more design and...I think we are more integrated. It’s really forcing the group to talk to each other and even actually across teams”.

The case of the sales and distribution module at PharmaCo ML and finance module at PharmaCo MS illustrate the serendipitous process of the model and provides support for propositions 2. The managers initially perceived the new system as highly fitting the actual processes but were alert that some processes were unique to this division and that the system needed to be adjusted to achieve greater integration. The search activity was performed to a low degree while the design activity to a medium degree, which lead to medium integration.

**Type 3 – Incremental**

The procurement department at SteelCo implemented the material management (MM) module and the managers involved in the implementation were weakly alert since they were not necessary looking for new opportunities with the system but achieved what they set to do. However, the perceived gap was fairly high with about 40-50% of the processes that did not fit the system.
The managers involved in the implementation were to some degree searching for new opportunities by talking with other companies before and also to the consultant to reduce the gap. However, limited design activity was performed primarily because they had a vision about what the system could achieve and worked in that direction.

“No, I would not say that we were searching for new opportunities with this system or searching for new possibilities. I think our vision was to be able to manage the inventory, manage the details, manage the validity of the information, verifying the information. I believe we’ve done everything we set out to do…Well we talked to the consultant. Other companies… no. Well I did talk to other companies before, but not about the service entry sheet…I was offering the option, and I said “if you can think of any other options…” because I would prefer the consultant to come up with some options also. If they can think of any other options, please let me know. Because I came up with the three and each one didn’t meet the needs”.

Finally, there is some integration achieved now with the new system through better information exchange and greater volume of information.

“I’d say it’s about 75% better in information exchange and the ability to track the actual details of the information is exactly – it’s been a huge benefit for profitability, for inventory management, for verifying pricing and payment, collecting and receiving payments from our customer…I would say for procurement alone you’re probably exchanging 80% more information”.

The case demonstrates the incremental value creation integration process of the framework and provides support for propositions 3. More specifically, medium search and low design activities were performed, which resulted in medium integration.

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<tr>
<th>VCIP</th>
<th>Company</th>
<th>Module</th>
<th>Search</th>
<th>Design</th>
<th>Integration</th>
<th>Propositions</th>
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<tbody>
<tr>
<td>Innovative</td>
<td>PharmaCo ML</td>
<td>Finance</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>1a &amp; 2b Supported</td>
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<td></td>
<td>ConsCo</td>
<td>CRM</td>
<td>High</td>
<td>High</td>
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<td>Serendipitous</td>
<td>PharmaCo ML</td>
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<td>Maintenance</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>4a &amp; 2b Supported</td>
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Type 4 – Imitative

The engineering department at PharmaCo ML implemented the maintenance module, which is similar to what was described in the imitative process of the framework. At first, the managers identified that the module needed only one or two modifications. They were preoccupied by implementing the system as is and concentrating on change management instead of looking for new opportunities. Managers knew that there were possible opportunities with the system but mostly wanted to follow the global model. They performed low search and design activities. For instance, one of the processes that needed modifications was tested using three different options. They did not think about talking to other divisions or search for ways to improve the business processes.

“We know that there are still some opportunities with the system but we mostly concentrated on the global model and how we can use the system as is…of course we could look to modify the system, to have the information we are missing, but we don’t tend to do that, we are waiting on the global model…so for us, it was the base, we implemented the system as-is and we concentrated on change management…but we didn’t have to challenge the system and ask for changes...the approach was more how can we use the system as is”.

The manager’s interview clearly indicates that the degree of integration achieved is low and some of the processes are less efficient as before. Even thought this division is now connected with other divisions around the world, there is less information exchanged and some of the functionalities needed are not there. This is consistent with the framework and supports propositions #4. Managers’ low assessment of the gap between the ERP system and actual
processes and the low level of alertness led them to perform minimal search and design activities, which resulted in limited integration.

“I did not see other divisions and how they work...hum...not more integration, not more efficient...I would said, it is the same but there is a functionality that was there before on the work order, which was their name, and when you printed the work order, you could find in the pile, you know, you were able to see it. Now, they don’t see it”.

**Discussion**

ERP systems constitute a significant area of investment by global firms. They are also a source of integration for the firms that implement them. The literature argues that higher integration should lead to greater business value, but does not provide evidences of the process to achieve such integration. By elaborating the conceptual framework in terms of the degree of alertness and perceived gap, a rich set of results was offered. The case studies provide preliminary support for such process through the validation of the framework proposed and the four propositions. Convergent with the ERP and alertness literature, a given ERP module was integrated differently by managers who performed different integration processes based on their degree of alertness and perceived gap. Broadly, as shown in Table 2, it was found that not all processes are equal in effectively achieving higher integration. The innovative process appears to maximize the potential benefits of an ERP system by greater integration while the incremental and serendipitous processes lead to medium integration and the imitative process to low integration. Results from the cases also suggest that the innovative process is characterized by high level of search and design activity, which are needed to reduce the gap and take the full advantage of the new system. At the opposite, the imitative process is typified by low level of search and design activities, which can be explained by the fact that there is a low gap and managers are not looking for new opportunities. In the middle of these extreme positions, the serendipitous process illustrates the high level of alertness of manager to unexpected opportunities, which require medium level of design activity but low level of search. Finally, the incremental process was illustrated by medium level of search to reduce the gap but a low design activity since managers were not alert to seize new opportunities with the ERP system.

**Implications for Practice and Research**

Several interesting managerial and theoretical implications emerge from our findings. As a first step toward developing an understanding of the process to achieve integration, the decomposition of the process into activities enables the understanding of how value is extracted from ERP investments. More specifically, the different types of value creation integration process provide evidence that the notion of discovering and exploiting unique opportunities is an important factor explaining how to achieve higher integration. Configuring ERP through the standard software templates is not the whole story regarding how organizations are achieving integration (Light and Wagner 2006). This study also extends previous integration studies by providing a measure of integration that extend current way of looking at integration. The findings demonstrate that looking only at physical and functional integration is not the whole story behind the concept of integration. For instance, in some cases, greater physical and functional integration was achieved but the information was not shared more effectively and there were fewer types of information exchanged. Conversely, some organizations with single site implementation and fewer modules and ERP users had better and greater volume of information exchanged. Thus, it cannot always be assumed that greater physical and functional scope will lead to greater integration.

Second, the conventional wisdom in the literature is that organizations should change their business processes to fit the ERP system, which embeds “best practices” and limits the cost of implementation (Luo and Strong 2004). Managers and organizations need better advice from the literature. This framework proposes that most importantly, managers should realize that it is no longer sufficient for them to be passive functional experts as in the traditional system development projects: they have a much bigger role in ERP implementation projects (Soh et al. 2000). More specifically, they need to understand their uniqueness and identify distinctive opportunities with the system and their current ways of working. Thus, managers involved in ERP implementation can contribute to the outcome of the project. More specifically, alertness play an important role in identifying opportunities, or unique ways, to integrate the technology with existing IT infrastructure. Instead of implementing the system as-is, alert manager are looking at opportunities with the system. They apprehend informational cues about the technology, identify the true driving forces and critical factors of the technology, and correctly infer the potential value of the technology. They try to figure out what is going on with the technology and how it is going to affect their unit, the organization, and the industry. For example, managers can enquire about how other companies do similar process. They can also
challenge the solutions proposed and not accept the first one. Finally, managers can mobilize knowledgeable people to get their input about a specific process or a specific part of the ERP system during the implementation.

**Study Limitations and Future Research**

Before discussing the future research, some limitations of the research are recognized, which require that they be interpreted with appropriate caution. First, our understanding of the four ERP projects is largely based on qualitative insights provided by a small set of respondents. While confirmation by multiple respondents helps to increase our confidence in the validity of the findings, personal biases in the construction of the narratives cannot be ruled out. Second, due to the intensive nature of the data collection and analysis, the study is limited to four organizations and six cases, which limits the generalizability of our results across dissimilar settings. Thus, the generalization of the findings to other contexts must be done very cautiously. Thirdly, in focusing on two integration related factors, alertness and perceived gap, other factors that may have played a significant role in impacting the value creation integration process may have been omitted. For instance, managers’ past experience with ERP implementation, success or failure of past IS implementation, and collaboration with external experts and consultants.

The study has significant implications for future research. First, it would be interesting to look at the impact of each process on business value or other outcomes. Identifying the impact of each value creation integration process on different outcomes, such as process efficiency, effectiveness, and flexibility, will provide useful advice to organizations regarding the integration of ERP systems. In the same direction, ERP systems are really about closely integrating different business functions, such as interdepartmental co-operation and communication as one of the main post-ERP implementation benefits could be assessed (Akkermans and van Helden 2002; McAffe 1998).

Second, other types of value creation integration process are likely to emerge, which could be assessed with a study using a survey. For instance, it has been shown that different degrees of alertness exist, but only two types have been found in this study. However, the manager from the finance department at PharmaCo ML argued that another division of PharmaCo implemented the same module with less integration and less benefits, which seems to be influenced by team’s alertness. More specifically, lower level of alertness and lower capacity to challenge what was proposed (implementation as-is) contributed to the results. Indeed, using a survey could help us provide a repertoire of processes, which could then lead to the creation of the taxonomy of the value creation integration process based on the nature of the integration.

Finally, the concept of alertness could be further studied by looking at its antecedents and defining other degree. For instance, competence, experience, and training of team members could be an important critical success factor influencing the degree of alertness in an ERP context. Indeed, it seems there has not been that much research regarding the impact of competence on ERP implementation success (Akkermans and Helden 2002). Also, top management may promote the alertness among managers and it would be interesting to look at how and when it is done. Finally, there is more research to be done to provide a better measure of the different degrees or types of alertness using quantitative analysis. Previous studies have shown that individuals can be categorized as demonstrating four types of alertness namely, non-alert, marginally alert, uselessly alert, and fully alert (Gaglio 2004; Gaglio and Katz 2001).

**Conclusion**

This study investigates value creation integration processes for six ERP modules in four organizations. It has been shown that value creation integration processes are dynamic and also amenable to analysis and structuring. By analyzing six integration processes, the structures and factors that can play a role in integrating new ERP systems with existing IT infrastructure and business processes have been explored. Based on managers’ alertness and perceived gap, four types of integration process were identified: innovative, serendipitous, incremental, and imitative. It was demonstrated how these types influenced the degree of integration achieved, thus providing an enriched understanding of the complex phenomena of integration. Such an understanding suggests that higher integration may occur when managers are highly alert to opportunities and the perceived gap is high. This study contributes to IS research and practice by framing a model that explained substantial integration variance for firm investing in similar technology. While it may be possible for all firms to acquire the same ERP systems, results indicate that not all firms are equally successful in extracting the full potential of these systems.
References


Wagner and Newell


