Linking e-business and operating processes: The role of knowledge management

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The new business landscape ushered in by e-business has revolutionized business operations but, to date, has not integrated well with internal knowledge management initiatives. Through the development of e-business focused knowledge, organizations can accomplish three critical tasks: (1) evaluate what type of work organizations are doing in the e-business environment (know-what); (2) understand how they are doing it (know-how); and (3) determine why certain practices and companies are likely to undergo change for the foreseeable future (know-why). In this paper we take a process perspective and reflect upon the value e-business knowledge contributes in the enhancement of three core operating processes: customer relationship management, supply chain management, and product development management. Understanding how e-business impacts these core processes and the subprocesses within them, and then leveraging that knowledge to enhance these processes, is key to an organization's success in deriving superior marketplace results. In this paper, therefore, we highlight the central role knowledge management plays in diagnosing and managing e-business-driven changes in organizations.

E-business embodies the most pervasive, disruptive, and disconcerting form of change: it leaves no aspect of managing organizations untouched, it challenges long-accepted business models, and organization leaders have little to draw on from their past experience to manage its effects. In particular, its capacity to transform business processes is no longer in dispute. The new technologies at the heart of e-business open up myriad possibilities not just to reconsider the re-engineering of existing processes but also to design, develop, and deploy fundamentally new ways of conceiving and executing business processes. Senior executives in every organization thus confront a central challenge: How should they endeavor to capture, analyze, and project the transformational impact of e-business on their organization's most critical or core processes? In this paper we put forward the thesis that knowledge management (KM) provides one useful vehicle for doing so.

In this paper we pursue two goals: (1) To demonstrate how KM can and should contribute to leading and managing e-business-driven change in business or operating processes, and (2) to indicate the rudiments of an action agenda that executives might deploy in order to build a KM-based approach to transforming their business processes. In the section "KM, e-business, and business processes" that follows, we briefly delineate the three domains that are the focus of this paper—knowledge management, e-business, and operating processes—and posit linkages among them. Then, in the section "E-business-driven operating processes: The case for KM," we demonstrate how KM helps our understanding of the e-business implications for operating processes. Next, in the section "Transforming CRM: Two case studies" we contrast the strategies of two companies and illustrate the e-business transformation of CRM (customer relationship management) and KM's integral role in that transformation. In the final section, "Developing a knowledge-driven action agenda," we con-

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Table 1 KM focal points, questions, and goals

KM Develops and Evaluates . . .	By Addressing Such Questions as . . .	In Order to . . .
. . . knowledge stock	. . . know how	. . . increase external performance
. . . knowledge flow	. . . know what	. . . increase internal performance
. . . knowledge use	. . . know why	. . . increase quality of life

clude the paper by briefly outlining some critical action items.

KM, e-business, and business processes

We begin with a brief delineation of knowledge management, emphasizing a number of key attributes of knowledge in any organizational setting and highlighting some common KM methods. We focus on the *organizational* aspects of KM: how individuals and groups work together to create and deploy knowledge. We then outline some key characteristics of e-business and some business issues they give rise to for any organization. We conclude this section by briefly outlining the scope, types, and levels of business processes.

Knowledge management. KM emerged over the past five years or so as a significant management discipline with its own body of concepts, language, and practices.[1] The research, consulting, and managerial attention devoted to KM indicate a highly visible presence in the efforts of firms to create and sustain winning strategies and to build more efficient and effective organizations. But what is the focus of KM? Although it clearly still has an *emergent* tone and tenor, broadly conceived, KM enables, supports, and encourages the following three interrelated foci:

- The processes of discovering or creating new knowledge and refining existing knowledge (developing knowledge stock)[2]
- The sharing of knowledge among individuals and across all organizational boundaries (managing knowledge flow)[3]
- The continued development and use of knowledge as part of individuals' day-to-day work, and as part of decision-making (putting knowledge to use)[4]

And what is the purpose of endeavoring to systematically manage these three focal points of KM (see Table 1)? Increasingly, theorists and practitioners stress that knowledge is not managed for its own sake.[5] Rather, the intent of KM is to create, share, and leverage increasingly higher quality knowledge in order to achieve three interrelated goals:

1. To attain superior external performance (including marketplace returns and financial results)[6]
2. To attain superior internal operating performance (including operating efficiencies)[7]
3. To enhance the quality of life of each individual member of the organization

An increasingly more sophisticated understanding of the phenomenon of knowledge, embodied in what we might label "knowledge principles," underpins both the discussion and the practice of these KM foci and goals (see Table 2). These principles assert, for example, that KM extends considerably beyond design and use of the tools and technologies involved in gathering, analyzing, and transmitting data. Rather KM centers upon individuals and groups as the creators and users of knowledge. It plays the leading role in developing "deep understanding" from mere data and information. Creating and using knowledge is a human endeavor: it requires individuals to think and to reason—in short, to make sense of the current and emerging world around them.

Many KM methods have been developed and adopted by firms to bring individuals together to create, share, and leverage knowledge (see Table 2 for a sampling of established KM methods).[8] Some KM methods employ well-established means to effect change in how individuals see and understand their organizational and competitive context, such as mentoring and training and development. Others have evolved specifically with knowledge creation and use as the focus, such as communities of practice, storytelling, collaboration, and knowledge mapping. The intent of all the KM methods briefly noted in Table 2 is straightforward: to enable individuals and groups to interact and share with one another as they gather, generate, and interpret data on the current and potential world around them and to use the outcomes in their day-to-day work. Understanding the KM principles and types of KM methods noted in Table 2 un-

Table 2 KM principles and methods

Knowledge Principles	Knowledge Methods
Knowledge Is Not Merely Data • Descriptive data are not enough for purposes of decision-making. • Analysis is required to turn data into patterns (insights) and understanding.	**Mentoring:** Communicates the organization's values, norms, and practices; exposes tacit understanding of how the world works **Training and Development:** Convey explicit knowledge in many different types of settings; expose shared tacit viewpoints Comprise a group of individuals, often from multiple disciplines or silos, who come together to share what they know, to learn together **A Knowledge Project:** Brings a group of individuals together with a declared and visible focus and intent to generate a stock of required knowledge **A Knowledge Repository:** Provides a central location for various knowledge products such as best practices, or analysis of different topics; individual and groups develop products for the repository, and they in turn provide inputs for further discussion and reflection on the part of others. **Communities of Practice:** Make up a group of individuals who share the same values and intent, work on a collective project or endeavor, and share openly and critically with each other. **Intermediary Roles:** Are held by one or more individuals who take responsibility for developing a specific stock of knowledge, a plan to share it with others, etc. **Storytelling:** Is done by developing a story about "how some things happen around here" or "what we did in this project" as a way to communicate a sense of purpose, to espouse shared values, and to get at more implicit forms of knowledge **Collaboration:** Formally gets a set of individuals to come together around a specific task or project so that they can learn from each other **Social Network Analysis:** Identifies and communicates who speaks to whom, how information is transmitted from one individual to another, or from one group or department to another **Scenarios:** Brings individuals both from inside and outside the organization to develop explicit stocks of knowledge about the future (such as how an industry might evolve or how a set of technologies might converge over time) **Knowledge Mapping:** Identifies who knows what, how stocks of knowledge are related to each other, how the information is stored and where, etc. **Experiments:** Allow one or more individuals to do something on a small scale that otherwise would not be done as a means to learn about (for example) how electronic connections might work, what data they might generate, or how customers or others might engage with different forms of electronic connections
Knowledge Needs to Change as the World Changes • Knowledge, as stock, rarely remains stagnant: beliefs and assumptions change over time. • We need to keep what we know in sync with change in the world around us.	
Knowledge Processes Require Reasoning • Transforming data into patterns (insight) requires inferences and judgments—in short, thinking. • There is a need to organize and aid how individuals and groups engage in thinking, etc.	
Knowledge Is Often Implicit or Tacit • We know more about customers, technology, etc., than we can articulate. • A lot of "know-how" remains tacit but is critical to what we do and how we do it.	
Knowledge Cannot Be Separated from the "Knowers" • We cannot separate "what we know" from the individuals who know it. • It is largely impossible to separate what we know from what we do in our day-to-day work and lives. • Knowing and doing are intimately interconnected (to the point that it is terribly difficult to disentangle how they influence each other).	
Knowledge is Difficult and Often Impossible to Manage Directly • We can only manage knowledge through influencing the "knower." • We can manage knowledge indirectly by managing the organization: its culture, people, technologies, structures, and systems, strategies, etc. • By managing these factors, we can indirectly manage knowledge stock (what individuals and groups know) and knowledge flow (how knowledge moves between and among individuals and groups).	

derpins the KM perspective advocated in this paper and its contribution to leading the e-business transformation of operating processes.

E-business. In spite of its pervasiveness, visibility, and impact, e-business often remains a poorly understood phenomenon. What is e-business? In sim-

Table 3 Sample e-business-generated knowledge issues

E-Business-Generated Business and Organization Issues	Leading to (E-Business-Generated) Knowledge Issues and Challenges
Customer solutions	Do we know: • What specific types of new customer solutions or new customer functionality e-business change is giving rise to? • How emerging e-business change will affect future customer solutions? • Why some customers and not others are responding to the e-business-driven solutions of various rivals?
Rivals	Do we know: • Which rivals are successfully leveraging e-business to provide new forms of value for customers? • How e-business is giving rise to new types of rivals? • Why emergent rivals will reshape traditional industry boundaries using e-business platforms?
Marketplace strategy	Do we know: • What new "strategy models" e-business is giving rise to? • How firms might be able to surpass rivals through the use of e-business? • Why some firms seem to be able to integrate e-business into their current or historic marketplace strategies and others have great difficulty in doing so?
Assets	Do we know: • Which assets increase or decrease in importance due to e-business? • How to use e-business to develop and foster critically required assets? • Why e-business affects the content and importance of specific assets?
Business processes	Do we know: • How e-business is reshaping traditional business processes? • How to use e-business to redesign and integrate business processes? • Why e-business is causing such dramatic reconfiguration of business processes?

ple terms, e-business constitutes the ability of a firm to electronically connect, in multiple ways, many organizations, both internal and external, for many different purposes. It allows an organization to execute electronic transactions with any individual entity along the value chain—suppliers, logistics providers, wholesalers, distributors, service providers, and end customers. Increasingly, e-business allows an organization to establish real-time connections simultaneously among numerous entities for some specific purpose, such as optimizing the flow of physical items (raw materials, components, finished products) through the supply chain.

E-business raises a number of critical business issues,[9] each of which in turn generates distinct knowledge issues and challenges specific to the e-business transformation of processes—as shall become evident later in this paper (see Table 3).

First, e-business is transforming the *solutions* available to customers in almost every industry, that is, the breadth of solutions and how the solutions are obtained and experienced. Consumers can now buy books, food, clothing, and a lot of other goods over the Internet in ways that allow distinct forms of customization. Industrial purchasers can now use the Internet to scour the offerings of many providers and procure components and supplies in combinations, prices, and delivery schedules that dramatically lower the costs of search, speed delivery, and reduce prices. These new solutions open up possibilities for customer value creation and delivery that were simply unimaginable a mere three years ago.

Second, the creators and purveyors of the new customer value propositions represent new types of *rivals*. Traditional booksellers are confronted by amazon.com; Merrill Lynch faces E*TRADE. These new entities recast the profile of rivals in many industries and, partly as a consequence, reshape the contours and boundaries of most traditional competitive spaces or industries.

Third, in part due to the competitive context changes just noted, the nature and content of *strategy*, and by implication, the dynamics of marketplace rivalry, are undergoing profound change. No longer can most firms rely on making modest, incremental changes to long-established strategy success formulas. Charles Schwab, in taking its business on line, reduced transaction prices across the board, daring to cut short-term profits in half in the pursuit of e-business leadership. Strategy in product domains as diverse as financial services, household furnishings, computers, automobiles, and industrial components, increasingly revolves around inventing new product solutions, and/or new ways of providing service and support to customers, and/or new ways of interacting with customers in designing, developing, and delivering these solutions. In fact, organizations are adjusting their strategies according to the new notion of "the customer" where customer intimacy, customer relationship management, 1-to-1 marketing, and the concept of the customer as opposed to the product as the new asset of the organization and real carrier of value, dominate.[10] In short, e-business offers the platform for new forms of marketplace strategy models—a significant element of any firm's business model—that will change the competitive rules of the game.

Fourth, e-business requires firms to refocus and reconfigure almost every type of tangible and intangible *asset*. It places an especially heavy premium on developing and leveraging intangible assets, including many different types of new skills, new forms of integrated and intensive relationships with external entities, new sets of perceptions held by customers, channels, and suppliers, and, of course, significant new knowledge. Consider the following example. Many new start-up, e-business-based entities such as Travelocity, E*TRADE, and amazon.com create integrated networks of relationships with channels, end customers, suppliers, providers, and even rivals that would not be possible in the absence of the ever-increasing electronic interconnectivity. These relationships afford the e-business-driven organization the ability to access and leverage the assets of external entities. By connecting the buyers to sellers of travel-related products, Travelocity can now access and leverage the assets of its supplier firms in the car rental, hotel, airline, and insurance industries.

Fifth, e-business is dramatically reshaping every traditional *business process*: from developing new products and managing customer relationships to acquiring human resources and procuring raw materials and components. By enabling major new tasks to be added to individual processes, e-business broadens their scope, content, and value-generating capability. For example, customer relationship management has been essentially reinvented through e-business's ability to access large bodies of heretofore unavailable data, massage and mine such data in radical new ways, and customize the outputs of such analysis to customer segments, and in many cases, to individual customers. And, by integrating traditionally largely separate processes, e-business in effect creates what might well be described as new business processes.

Some knowledge issues and challenges. E-business gives rise to fundamental issues for both knowledge stock and flow. Because of the extensive impact of e-business on such pivotal business domains as solutions, rivals, strategy, assets, and business processes, organizations have little choice but to develop, share, and leverage extensive knowledge about e-business. At a macro level, as described later, such KM efforts might focus on key current, emerging, and potential trends and patterns in e-business and how they affect (or could affect) the firm's competitive context, strategy, and all key facets of its operations including assets and operating processes. E-business-focused knowledge can be systematically delineated and integrated by distinguishing carefully between:

- Know-what (that is, describing current and future e-business change and its implications for strategy, operations, and competitive context)
- Know-how (that is, what an organization does or must do to adapt and leverage e-business for strategic and operational purposes)
- Know-why (that is, why e-business is evolving as it is and what accounts for its impacts on competitive context, strategy, and operations)

These knowledge distinctions will be elaborated upon in the context of business processes, the topic to which we now turn.

Business processes. In order to get work done, every organization creates and aligns specific sequences of tasks to achieve particular purposes. For example, a substantial number of related tasks must be executed in a specific sequence in order to receive and fulfill customers' orders or to purchase and acquire components from suppliers. When a number of tasks cumulate to constitute the execution of some substantial organizational (or business) requirement,

they are commonly referred to as a business or organizational process.[11] In this spirit, Davenport[12] asserts that "processes are the structures by which an organization does what is necessary to produce value for its customers." Business processes share a number of characteristics:

- They involve a specific ordering of work tasks or activities across time and space[13]
- The collection of tasks and activities together transforms inputs into outputs[14]
- Inputs may take many forms including data and information, technology, and people
- They typically manifest an identifiable beginning and end[15]
- The tasks and activities serve as a focal point in bringing individuals together in order to get work done
- How the tasks and activities get sequenced, interrelated, and executed can, and typically does, change significantly over time
- Any single process always connects to multiple other processes

Core operating processes. Yet, it is obvious that all processes are not equally important to organizational success. If we accept Drucker's[16] contention that the fundamental purpose of any business is to create customers, then the central organizational (or business) requirement is to create solutions that attract, win, and retain customers. The processes that *directly* buttress and enable the achievement of this overarching requirement—developing, producing, and delivering winning solutions—are commonly referred to as *operating processes*.

To continually create superior customer value in the form of solutions that customers prefer to those of rivals, an organization must accomplish three central organizational requirements or tasks, and thus three core operating processes:

1. The development of new customer solutions and/or the invigoration of existing solutions (the product development management process)
2. The acquisition of solution inputs (including raw materials, components, knowledge, skills, and so forth) and their transformation into desired customer benefits (the supply chain management process)
3. The creation and leveraging of linkages and relationships to external marketplace entities, especially channels and end users (the customer relationship management process)

Levels of processes. Processes, by definition, represent ways of doing something—accomplishing some task or other. Every task, however, can always be integrated into a more encompassing and comprehensive task or divided into multiple subtasks. As a consequence, any process can always be aggregated into a higher-level process or subdivided into lower-level processes. Organizations thus must be careful not to lock themselves into any categorization and specification of processes.

In-depth insight into the functioning of any process occurs only when it is deaggregated into its constituent subprocesses. Each subprocess illuminates some aspect of how the process functions. For example, each of the core operating processes—product development management (PDM), supply chain management (SCM), and customer relationship management (CRM)—might be divided into a sequence of subprocesses that furnishes considerable detail on how specific subtasks within the process are executed. To cite one illustration, in the case of the supply chain management process, the subprocess, "selecting and qualifying desired suppliers," requires the careful delineation of the subtasks involved in selecting and qualifying desired suppliers. These subtasks might include: identifying the population of candidates; stratifying the population using predetermined criteria; collecting preliminary secondary data on many candidates; collecting primary data from selected candidates; developing choice criteria to assess candidates; collecting supplementary data on candidates that survive the first assessment; assessing candidates' organizations; testing candidates' offerings; choosing preferred suppliers; and so forth. The subprocess, collecting preliminary secondary data, could be further subdivided into more microprocesses around the following tasks: identify potential data sources; categorize data sources; screen data sources; identify data categories; collect aggregate data; collect detailed data; order data into meaningful information.

Interaction among and integration of processes. Subprocesses are frequently linked directly to one another: completion of the task that is the focus of one subprocess leads directly to the task inherent in the next subprocess. Thus, in the case of SCM, the subprocess, "establishing and managing inbound logistics," connects directly to "designing and managing internal logistics." For example, arrivals of trucks at the firm's manufacturing plant carrying raw materials, components, and supplies must be coordinated with the plant's input inventory acquisition, storage,

and allocation. Subprocesses, of course, as this example illustrates, also directly connect to external entities such as suppliers, channels, end customers, technology sources, and governmental agencies.

Implications of e-business. The importance of e-business for processes now becomes clear. It provides the electronic means to enable connections among and between processes to take place in fundamentally new ways and at such speeds that it literally opens up the ability to radically reconfigure each core operating process, to create new subprocesses within each core operating process, and to enable new modes of integration across the operating processes. Indeed, it seems fair to suggest that e-business requires managers to think about core operating processes in fundamentally new ways. The guiding premise underlying this paper is that KM facilitates and guides such thinking by serving as a means to designing, managing, and learning from these new forms of e-business-driven processes.

E-business-driven operating processes: The case for KM

Knowledge in and around organizational settings is never context-free; it is always created, shared, and leveraged within a context shaped by the organization's history, culture, mind-set, preoccupations, and its external competitive milieu. We thus begin by highlighting how a sample of KM methods can be employed by individual and groups of managers to build their understanding of e-business transformation of operating processes. We then highlight how KM can assist in some of the key stages in transforming core operating processes.

General knowledge approaches. The breadth and depth of knowledge—both explicit and tacit—of any concept or phenomenon always varies dramatically across any sample of individuals or organizations. Our collective research, consulting, and teaching experience strongly suggests wildly varying breadth and depth of understanding and insight across and within organizations with regard to the broad knowledge challenges and issues posed by the impact of e-business on core operating processes (see Table 4). In short, managers must develop a general base of knowledge about the current and potential impact of e-business on core operating processes *before* they can do "deep dives" into the details of how e-business might be leveraged to redesign individual processes or to affect linkages across them.

The general knowledge questions posed in Table 4 are intended to encourage a set of managers to engage in critical self-examination of the state of both their own and their organization's understanding of:

- How e-business is affecting or might affect each core operating process (know-what)
- Whether and how the organization is or might be able to use e-business to affect change in the core operating processes (know-how)
- Why e-business is causing the need for change in core operating processes (know-why)

KM offers a number of approaches to developing, sharing, and leveraging the know-what, know-how, and know-why of these (knowledge) challenges (see Table 1). Our purpose here is not to offer an exhaustive listing of KM methods. Rather, it is to illustrate how basic KM methods can enable managers and others to prepare themselves and the organization to lead and manage the unavoidable transformation of operating processes, as a prelude to and integral part of winning in the marketplace and shaping the organization required to do so.

Mentoring. Mentoring serves a critical role in exposing individuals at all levels of the corporate hierarchy to both the explicit and tacit knowledge of individuals with a deep understanding of e-business. For example, the chief executive officer of one well-known large U.S. corporation asked more than 50 top executives to subject themselves to being "taught" about the nuances and details of e-business by "young" managers and others much lower in the hierarchy.

Self-learning. As in so many other substantive domains, many organizations stress the importance of self-learning as a source of understanding critical e-business know-what, know-how, and know-why issues. Such self-learning may be as simple as reading and reflecting on a combination of articles prescribed by experts in the company or external sources such as leading consultants or other thought leaders.

Knowledge repositories. Some firms develop an electronically accessible repository of relevant knowledge. They include descriptions of other firms' electronically enabled operating processes (know-what and know-how), opinions and analyses by outside experts such as consultants and specialty professional firms on why e-business is shaping customer solutions (know-why), or how and why some firms have succeeded and others have failed to integrate their

Table 4 Impact of e-business on operating processes

	Know-What	Know-How	Know-Why
Core questions	What is the current and potential impact of e-business on the firm's operating processes?	How can the firm use e-business to create and leverage desired operating processes?	Why is e-business affecting operating processes in particular ways?
Questions re each core operating process	How is e-business giving rise to: New subprocesses? Reconfiguring traditional subprocesses? Creating new linkages across subprocesses? How will e-business affect subprocesses and linkages among them in the future? How is e-business connecting the firm to external entities?	Does the firm possess the know-how to: Diagnose the impact of e-business on each operating process? Electronically reconfigure each operating process? Electronically integrate across subprocesses? Develop new subprocesses?	Why does the firm need to electronically reconfigure each operating process? Why does it need to build new types of electronic connections to external entities?
Individual subprocesses	How is e-business affecting each process: What specific technologies are involved? What organizations are the source of each technology? How does each technology afford connections to external entities? How does each technology afford connections across units within the firm? What outputs arise from each e-business technology?	Does the firm know how to: Acquire each relevant technology? Apply each technology? Augment each technology? Leverage each technology?	Does the firm know why: Each technology "works"? External entities are willing to be involved in each technology? Each technology leads to specific results or outputs?

operating processes and transform the value they offer customers (know-how and know-why). Such repositories provide the fodder for conversations about the direction and implications of e-business.

Workshops. Some firms have designed workshops involving invited speakers, case studies, and other written materials, to examine the e-business-driven processes of such firms as Dell Computer Corporation, Cisco Systems, Inc., General Electric Company, and IBM. The intent of these workshops is to systematically create and rapidly diffuse through a broad swath of managers a core stock of knowledge (know-what, know-how, and know-why) about the interconnection between e-business and operating processes.

Pockets of expertise. Many firms have now created "deep pockets of expertise" with a pointed focus on e-business. A major division of a large financial services firm established a group of three individuals with significant titles (one a senior vice president, one a director, and one a manager) with the explicit aim of developing as much knowledge as possible "on the implications of e-business for all facets of the business" and to develop mechanisms to share and disseminate the knowledge.

Communities of interest. Another frequent knowledge gambit is to create a transitory group of individuals from across multiple silos, often representing multiple organizational levels,[17] to share ideas and perspectives about e-business, to "talk out loud" about e-business implications for current or potential strategy and organizational issues, and to guide each other to internal and external e-business "resources." Such communities of interest, although they may meet mostly informally (such as in working lunches), may do significant analysis of e-business trends and developments leading to dramatically extended know-what, know-how, and know-why for each individual.

Best practices. Exposure to the "best practices" of other organizations, often in unrelated businesses,

has made many executives aware of the dramatic e-business possibilities for their own organization. Some firms have developed extensive databases, accessible to most individuals in the organization, documenting what other firms did in particular situations such as developing multiple new connections to customers (know-what), or the "how-to" involved in building an e-business-guided supply chain (know-how), as well as analysis of why e-business initiatives failed or succeeded (know-why). Discussion within communities of interest, task forces, or even informal "water-cooler" interactions, enlivened and invigorated by the content of best practices, contributes enormously to developing shared tacit e-business-related knowledge.

Work assignment. Individuals largely learn by doing; application of knowledge in the "practice" of work provides the source and reinforcement for tacit knowledge.[18] Thus, integrating e-business knowledge development into work assignments serves as one of the ultimate ways to generate rapid and extensive understanding of the capacity for e-business to transform operating processes. In one insurance firm, a middle-level manager, with little prior exposure to e-business, was given a three-month assignment to determine how his business unit could exploit electronic technologies to transform customers' experience in seeking, buying, and living with the offerings of the firm. He is now charged with executing the strategy he proposed.

Doing deep dives. The kinds of questions that might guide a knowledge-led "deep dive" into each operating process are noted in Table 5. The intent of these questions is fourfold:

1. To detail the impact of e-business on each operating process as well as integration across the processes
2. To highlight the knowledge stock and flow issues that emanate from the impact of e-business on the operating processes
3. To enable managers to determine specific knowledge needs (know-what, know-how, and know-why) as input to managing the e-business impact on each operating process
4. To facilitate the development over time of knowledge-driven business processes

Among other things, these questions aim to generate a context-rich milieu for managers in which to analyze how e-business might be utilized to transform core processes, and thereby to redefine process efficiency and effectiveness. To illustrate and document the KM contribution to e-business-led process transformation, we emphasize the relevance and use of distinct KM tools and methods to four distinct but related stages of transformation: Understanding the context of process transformation, determining the need for process transformation, developing alternative process designs, and choosing the outlines of preferred operating processes.

Understanding the context of process transformation. Fundamental elements of know-what, know-how, and know-why pertaining to e-business transformation of core operating processes stem from developing a rich and nuanced understanding of the major drivers of change in the firm's competitive context. At a minimum, as we shall discuss later, such knowledge motivates managers to consider radical process change and thus lowers the likelihood that they will miss significant marketplace opportunity afforded by the emergence of new electronic technologies.

Managers can build pockets of *know-what* around specific domains of current, emerging, and potential change in the firm's competitive milieu and interactions among them. Domains particularly germane to e-business include (for example) value networks, how electronic connections alter the value propositions available to customers, and the speed with which different types of rivals are able to develop and introduce new products or variations in product benefits and functionalities. A particular contribution of KM is that it generates knowledge about both the future and the present.

Future context. Scenarios have been used as a knowledge generation methodology by many firms to develop highly intricate and detailed "stories" or plots[19] leading to rich and complex descriptions of potential competitive contexts.[20] For example, scenarios can be used to describe how different entities in a specific value network would be connected to each other, how collectively they could generate new forms of value for distinct customer segments, and the roles that specific entities would play in generating and sustaining customer value.

In either a formal workshop format or a largely informal community of interest, managers and others can tease through the scenario generated descriptions or stories to identify critical *know-how*: how customers could interact electronically with various entities in the value network; how individual firms could

Table 5 Key knowledge issues across the operating processes

Processes	Know-What	Know-How	Know-Why
CRM	• What are your customers' wants and needs? • What "separate" sources of customer knowledge must be united to maximize the effectiveness of your CRM project? • What elements of your existing operations must be integrated into your e-business processes to improve your customer focus? • How are your competitors interacting differently with their customers?	• How can you collect relevant information that can be used to accurately fulfill customer wants and needs? • How is your Web-enabled CRM creating enhanced customer focus and interactive capabilities? • How are you interacting with your customers differently or better as a result? • How has e-business affected your ability to react to changing customer needs? • How has e-business allowed for more effective feedback loops? How is that feedback incorporated into other processes and into learning?	• Why is the CRM process changing? • Why do you need to change the ways in which you interact with your customers? • Why are your competitors changing the ways in which they interact with customers? • Why have customer expectations changed?
SCM	• What changes are needed within the supply chain to lower costs and increase responsiveness? • What significant changes are realigning your vendor or customer relationships (pricing, billing, ordering, processing, etc.)? • What areas of the supply chain can benefit from e-business enablement? • What types of outsourcing relationships within SCM have been successful?	• How do you use supply chain transparency to make more informed operational decisions? • How do you enable communication and collaboration across the supply chain while protecting confidentiality and privacy issues? • How can you leverage our relationships with vendors, partners, and competitors to make SCM processes more effective? • How can you improve your outsourcing relationships? • How have key competitors leveraged collaborative capabilities in your markets? • How can you draw value from the transactions performed across your supply chain?	• Why has the supply chain become an even more important piece of your market intelligence? • Why is it necessary to re-evaluate your SCM processes? • Why are your outsourcing relationships not as efficient and smooth as needed?
PDM	• What level of increased speed and accuracy is necessary to share new product ideas across your organization? • What key product development processes are dependent upon interenterprise or interdepartmental collaboration and knowledge sharing? • What anticipated changes will occur with e-product development? • Have key competitors leveraged collaborative capabilities in your markets?	• How can we share both the content and the context for desired new products? • How have your products changed as a result of e-business? • How can PDM learn what types of products/services are truly in demand? • How can you include customers, vendors, and competitors in the PDM process to yield even greater value to shareholders? • How can your organization respond to individual customer needs in addition to their aggregate demands?	• Why are continual new products and new product enhancements becoming more important to your survival? • Why is e-business affecting product development in a number of ways? • Why will collaboration and communication enhance existing PDM practices?

connect in multiple ways to individual customers; how fast specific types of communications might be affected using different types of mediums; and how customers could interact with vendors to specify and detail their preferred solution configuration. Insight into these types of know-how enlightens managers about the range of *operational* possibilities that might have to be considered as they embark upon transforming core operating processes.

Considerations of know-what and know-why about a competitive context three or five years into the future unavoidably give rise to know-why issues: Why are customers shifting from one form of electronic connection to another? Why are customers seeking specific types of solution functionality? Why are some types of rivals more likely to be successful in building long-lasting customer relationships than others? Why would some traditionally successful strategies

not succeed in particular competitive contexts? Consideration of these types of classic know-why foci in a variety of settings over time—workshops, seminars, task forces, regular committee meetings, or even informal communities of interest—allow managers to articulate and test critical knowledge elements including beliefs, assumptions, and projections that will serve as fundamental inputs to their deliberations about core process transformation.

Embedding themselves in distinctly different alternative competitive futures enables managers to build considerable *tacit* knowledge about the competitive context in which the transformed core operating processes will play out. For example, in one client engagement conducted by one of the authors, individual managers at the end of a scenario workshop were able to think through and articulate supplier-customer relationship issues that had not been identified in the specific scenario they developed and presented to their peers. As they did so, a "mental model"[21] of the nature of the supplier-customer relationship was emerging "between their ears" that was more complex and detailed than they could ever describe and explain.

Current context. It is, of course, easier to develop rich descriptions of a firm's current competitive context—the focus of many strategy analysis tools and techniques.[22] However, a KM perspective insists on developing organizational methods and approaches that allow the data gathered and information generated to become knowledge: to become know-what, know-how, and know-why that is possessed by individuals and groups throughout the organization.

KM, not surprisingly, emphasizes design and interaction among groups to enable the development and sharing of information, ideas, and perspectives (knowledge flow) on how e-business can transform operating processes. An ideal focus for a group (whether as a task force, committee, or community of practice or interest) would be the emergence and evolution of value networks both in the firm's competitive space and in other unrelated industries. The group could develop detailed descriptions of the entities in each value network, how they are connected, how they combine to deliver superior value to customers, as well as the difficulties and problems associated with building, maintaining, and enhancing the network (know-what). Know-how issues would address how the firm might go about developing its own network: who would have to do what and how the tasks would be connected (know-how). Pursuit of know-why would steer the group toward determining why a firm chose to develop a value network, why it evolved in one direction rather than another, and why it is able or unable to deliver particular forms of value to customers.

Let us cite merely one other mode of analysis employed by some firms to create and share competitive context knowledge. A group can take any one of the operating processes as its point of departure and then identify and assess how different firms employ e-business to transform the process. For example, with regard to the PDM process, extensive data and information could be developed and shared pertaining to:

- The stages (or subprocesses) in each firm's current process
- The timing and speed of movement data/ideas through the stages
- Connections between specific internal individuals/groups and external parties in each stage
- Degree of interdepartmental or cross-subunit collaboration in each stage
- The bottlenecks evident throughout the process
- Linkages to SCM and CRM processes

While such analysis often involves third parties (consultants, etc.), the knowledge that is generated enables managers to develop and discuss the e-business transformation of their current operating processes with a degree of insight that otherwise simply would not be possible.

It is necessary to make a final observation here that is often not widely appreciated. It is especially important to note that from a knowledge perspective, an understanding of alternative future competitive contexts provides another, and sometimes, critical lens through which to "see" and assess the current competitive context. For example, it became evident to a set of managers in a large electronics firm as they went through the process of developing and evaluating a set of scenarios for considering the potential convergence of a set of technologies crucial to e-business that their assessment of the firm's *current* e-business capabilities was grossly exaggerated. In particular, the contribution of e-business to the firm's operating processes was largely trivial compared to what it could be in the not too distant future.

Determining the need for process transformation. Determining the extent of desired process transformation requires the careful management of extensive dialog around change in the firm's competitive context as well as change in its internal context. In the absence of such dialog, individuals and groups within the organization are not likely to develop the commitment required to embark upon process transformation—they will not understand why it is required. Without such know-why, any major organizational change effort is most likely to die of its own inertia.[23]

Analysis of the firm's internal context complements understanding of the external context. It requires the development and assessment of extensive know-what, know-how, and know-why pertaining to the current design, functioning, and outcomes of the firm's core operating processes—the focus of many of the issues and questions noted in Table 4. In endeavoring to develop the requisite knowledge, a KM orientation compels a number of questions: Who possesses what knowledge about each core process? How can they be connected or brought together? What means can be utilized to get them to share what they know? How can they be encouraged or enticed to identify critical pockets of ignorance about each process?

It typically becomes necessary to develop a knowledge map: "who knows what about individual processes and connections among them." Such knowledge maps go beyond the functional roles typically identified in process flow diagrams. For example, they can include descriptions of the nature and quality of the relationships (know-what) between internal units involved in executing adjacent tasks, for example, between order takers, order processors, and service deliverers within CRM. They may also describe the history (know-what), nature (know-how), and rationales (know-why) for the interactions between firm subunits and customers and other entities in the value net.

Knowledge intermediary roles also become important as means to capture the more tacit knowledge possessed by those responsible for executing key tasks within current processes.[24] Individuals can be trained to observe key process tasks being executed and to engage with those involved in describing and explaining what they do, how they do it, and why they act in one way rather than another.

Developing alternative process designs. Developing one or more alternative process designs constitutes a central challenge in process transformation. It requires knowledge of potential process design configurations and of the competitive and organizational context issues noted above (know-what), how the processes might work (know-how), and why they might succeed or fail in creating and delivering customer value (know-why). Moreover, directly due to the fundamental nature of the change wrought by e-business, it often requires managers to begin *de novo* new process design or the transformation of existing processes. Starting with the existing processes often inhibits the scope and depth of the transformational change required to create and design truly e-business-driven processes.

Consider, for example, one financial service firm's efforts to redesign its CRM. Rather than merely redesign the existing stages in the process, it began by asking how a customer would focus, that is, they envisioned the customer at the center of every process stage or subprocess and designed a "customer-centric" customer relationship management process as a result. It thus asked two core knowledge questions. What knowledge would it require about customers (their needs, their buying preferences, whether and how they would like to partner with suppliers, etc.)? In which ways would customers prefer to interact electronically with their suppliers or partners (the information technologies they feel comfortable with; the types of data and information they would like to receive)?

Because these questions compel managers and others to develop insights into customers that lie outside the firm's current stock of customer knowledge, developing answers, however tentative, necessitates establishing a community-like group that is willing to come together and invest the time required to develop the requisite data and information. In order to bring the best available knowledge to the group, and perhaps more importantly, in order to bring the knowledge developed back to many different units and levels within the organization, the community-like group should have representatives from many functional areas and disciplines throughout the organization. Such cross-functional groups sometimes morph into genuine communities of interest or even of practice: they share their observations, inferences, and insights so that the customer knowledge that emerges is shaped by and diffused throughout the entire group.

Because these questions pertain to customers, it is often necessary to stage specific "knowledge events" intended to create and share know-what, know-how, and know-why specific to customers. One firm brings in a set of the most demanding customers for an open-ended daylong interaction with managers to discuss emerging e-business issues from the vantage point of the customers. Another firm has created one- or two-day visits to customers for a small set of managers and key functional staff in order to detail the problems and difficulties they currently experience or anticipate in electronically interacting with different suppliers. In each case, explicit know-what, know-how, and know-why is identified, documented, and then later analyzed for its insights into potential process transformation.

A major knowledge consideration often surprisingly neglected even in generating *de novo* process designs concerns the ability of the newly designed process to generate new and useful knowledge for the organization. Electronic connectivity inherently allows and supports two-way flows of data and information. Thus, a knowledge imperative in thinking through potential designs for PDM, SCM, or CRM, and especially interaction across them, is to address how e-business connections can enable collection and analysis of external data, and then how such data and information can be leveraged to enhance and sustain customer value. The ideal outcome of such attention to developing new know-what, know-how, and know-why is that the firm transforms its relationships with customers, and not just the tasks and their interaction within the newly designed process.

Choosing the outlines of preferred operating processes. E-transformation of core processes occurs over time. At its core resides a perspective or vision of how the processes will function to generate and deliver real customer value. Unfortunately, if such perspectives or visions remain largely tacit in the heads of key executives or groups charged with overseeing the e-business transformation of core operating processes, then others cannot reflect on, challenge, and refine the knowledge required both to develop and execute the intended process transformation. It becomes especially necessary to do so because the greater the degree of intended process transformation and the greater the change in desired customer experience, benefits, and involvement, the more likely that the organization is in effect creating a new business model. And, the discussion above highlights the two critical but highly interrelated elements of the business model: a new way of winning and retaining customers (through new forms of customer value generated through electronic connectivity) and a new way of organizing itself to do so (the transformation of core operating processes). The strategic importance of choosing and committing to a preferred e-transformation of core operating processes suggests the need to be especially vigilant in articulating and assessing the knowledge (the know-what, know-how, and know-why) that underpins the acceptance of one process direction rather than others.

Some firms now believe they are well on the road to collaborative planning, forecasting, and replenishment—a projected form of real-time integration of SCM with CRM.

Consider the role and importance of a number of knowledge issues now being tackled by some leading-edge firms as they seek to choose a "preferred direction" with regard to how best to integrate SCM and CRM. They are trying to figure out how to bring the traditional "planning" aspects of SCM—connecting the linkages in the supply chain—into direct contact with steps in the CRM chain and to do so in as close to real time as possible. For example, as CRM influences customers' choices through its connectivity to individual customers, information about desired product characteristics needs to be linked to stages in the supply chain—acquiring raw materials, manufacturing specific products, physical distribution, etc. Part of the promise promulgated about integrating SCM and CRM over the last year or so has been the potential emergence of "real-time visibility" in the form of almost instant transmission of required data throughout the electronically linked world of SCM and CRM. But the real excitement has swirled around the promised emergence of "intelligence response systems" to decide and respond automatically to the changing market conditions conveyed by CRM-generated data. Indeed, some firms now believe they are well on the road to collaborative planning, forecasting, and replenishment (CPFR)—a projected form of real-time integration between SCM and CRM.[25]

While such "self-organizing supply chains" remain as yet more aspiration than reality, they indicate the

importance of the need to identify, clarify, and assess the fundamental know-what, know-how, and know-why associated with their potential emergence. To emphasize merely one facet of know-how, consider the human issues involved in CPFR. The "collaborative" aspects of CPFR raise all the difficulties that organizations traditionally encounter in managing the human side of introducing new technologies, not to mention radically transforming how work gets accomplished as part of core operating processes. Social network analysis can help identify who talks to whom and who should talk to whom, as one means to determine who should be involved in face-to-face interaction to oversee development and deployment of the electronic links mandated by CPFR. As these individuals assess the need for and potential of CPFR, they can create a knowledge repository to enable others (as well as themselves) to access the know-what, know-how, and know-why they create. One element of the repository might be descriptions of best practices (a combination of know-what and know-how) obtained through visits to other firms or through third parties such as consulting firms or technology providers. Their assessment of why different (potential) elements of CPFR do work or might not work (know-why) become essential to understanding judgments and inferences about recommended (or rejected) action plans.

As customers become more and more part of the collaboration at the heart of CPFR, and other e-business-driven process changes, then issues concerned with developing and enriching *human* relationships with individual customers, and not just two-way data and information transactions, must take center stage. The human side of these customer relationships thus begs for attention to "touch" and "trust." KM methods that allow interaction across company boundaries such as many forms of communities, involving different types of interaction, enable a cross-section of employees to deal face-to-face with customer personnel, sometimes over considerable periods. Even with consumer goods firms, such may be the case. One firm has begun to develop communities of consumers around a set of interactive technologies that also allow verbal interactions and get-togethers on special occasions.

Transforming CRM: Two case studies

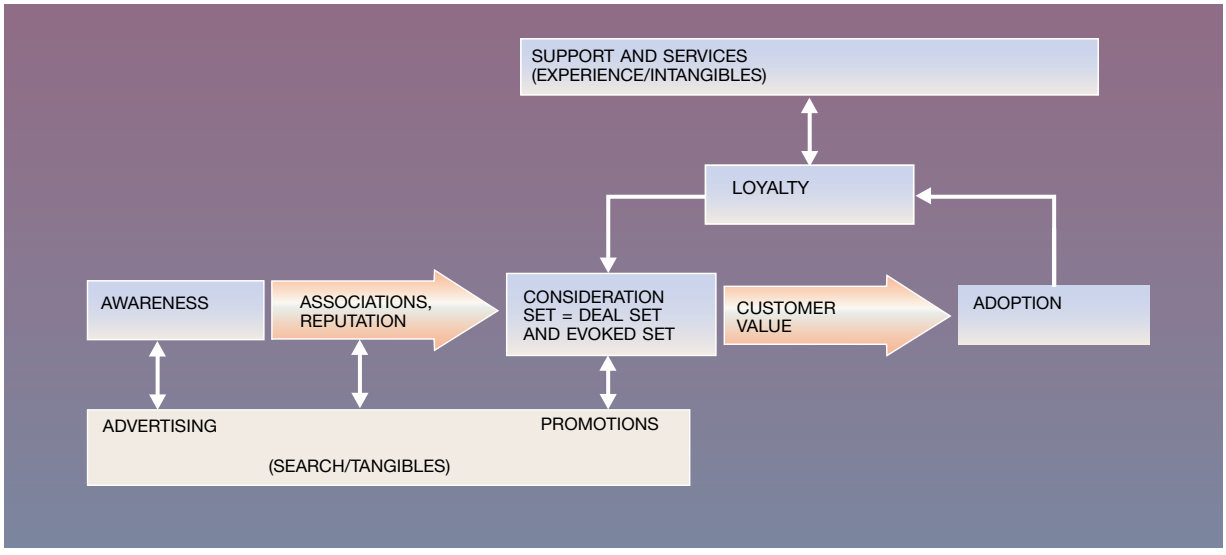
Let us examine how the customer relationship management (CRM) process has changed with the emergence of a networked economy by comparing two very successful companies—Compaq Computer Corporation in the early 1990s and Dell Computer Corporation in the late 1990s. The discussion here illustrates the role and importance of the four central questions noted in the previous section. This discussion of Compaq and Dell marketing and business practices is based on information in the business press. There has been an extensive discussion of Dell's direct business model and the difficulties faced by firms with more traditional models (such as Compaq) in copying and/or responding to Dell's competitive advantage. Finally, the strategy discussed here for each company is for illustration purposes, and may not represent the company's current business strategy.

Traditional CRM. The CRM process has two fundamental objectives: customer acquisition and customer retention. The "traditional" CRM process, emphasizing a sequence of interrelated tasks, is illustrated in Figure 1. Customers initially are attracted through advertising and promotions. These communications activities result in the development of brand awareness and associations. Brands that are successful in these dimensions enter a person's consideration or choice set via two means—top-of-mind awareness (or evoked set) or deals and pricing incentives. Customers choose from among these alternatives based on perceived value determined by a brand's benefits relative to its price. Subsequent repurchase is based on product performance (was the advertised promise delivered?) and support services.

In the case of Compaq, the company positioned itself as an innovative competitor and communicated product quality to prospective customers through superior performance and unique features. Compaq's success was based on both successful branding and channel dominance (the latter afforded point-of-purchase presence and a superior service network). It targeted three major segments in the marketplace: corporate, small business, and home markets. In the late 1980s and early 1990s it gained market share to become a leading manufacturer worldwide.

Compaq's backyard rival Dell followed a direct sales, made-to-order strategy. It developed the Dell brand image based on its own business (process) model. Customers paid only for features they wanted (made-to-order). They got good quality at a reasonable price (value) and they received on-site service. Dell targeted primarily corporate buyers who were service sensitive. The company focused on product quality

Figure 1 Traditional customer relationship management program



to avoid having to service failed products. But, relative to Compaq, its margins were lower.

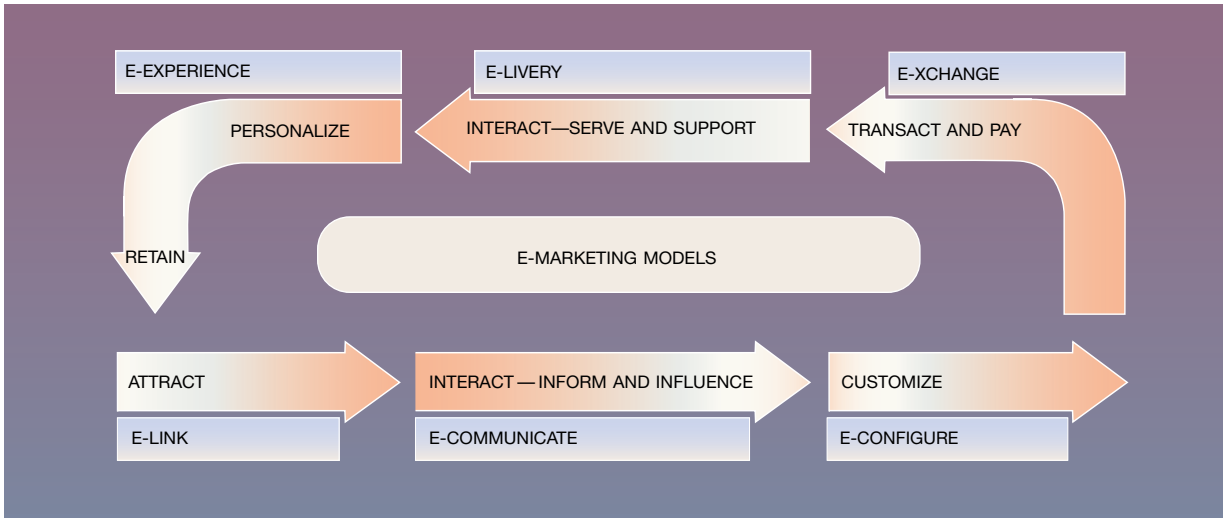
Enter electronic connectivity. The advent of the Internet gave rise to a competitive context that was better suited to more quickly adapting and transforming Dell's made-to-order business model compared to the traditional made-to-plan business model. Electronic connections afforded by the Internet enabled a communications channel as well as a transactions channel. Dell promptly began migrating its call center-based sales to on-line sales. The Dell Online e-marketing model is summarized in Figure 2.

The customer is attracted to the Dell Web site via advertising and Web links to both corporate clients and via affiliates in its value network (e.g., Yahoo!). Potential customers can interact with Dell Online to obtain product information and help in understanding feature benefits and the value (and cost of) options. Subsequently, they have the opportunity to view special offers, and to modify or configure those offers to their own liking. They review and confirm their order in the next step, on-line transaction processing, thereby avoiding any errors and preventing costly disputes that can occur due to human processing errors. They can track their order (via Federal Express) through the assembly and delivery process, where they are assigned a sales representative (e-mail and phone number included) who can assist them through the delivery process. Subsequently, they have around-the-clock help via on-line support services that include answers to frequently asked questions (FAQs), solutions to potential problems, and access to on-line user chat rooms that foster a user community.

E-business-based customer value. How is the Dell Online CRM process different from the traditional CRM approach? It affords a faster and closer relationship between Dell and its suppliers and customers. If problems develop (say) due to defective components, Dell is able to respond quickly. Further, its direct communications links to its suppliers result in problem resolution and prevention of future problems. By virtue of direct contact, Dell has better customer knowledge. This can be leveraged into additional business benefits such as development of cross-selling programs, integration of customer inputs in the design and delivery process, and the like.

Role of KM in transforming Dell's CRM process. Dell has developed several approaches to capture, disseminate and leverage marketplace knowledge to transform CRM and its performance. As we shall see, these approaches rely on development and sharing of knowledge, both internally (with employees across operating units and levels) and externally (with suppliers and customers). Examples include the following.

Figure 2 Customer relationship management in the new economy: The Dell Online e-marketing process



From customer data to insight. The company analyzes customer orders to extract patterns (information) revealing popular combinations of product features. It then advertises and promotes these already popular combinations to morph the made-to-order order-delivery process into one that approximates a more efficient made-to-plan approach with marginal customizations at the last minute. For example, customers modifying advertised special configurations do so at prices that reflect the higher process costs related to features they wish to modify.

From information to relationships. Due in part to its detailed information on each customer, Dell is switching from being a product sales company to one that cross-sells related products and services. The electronic and personal (sales force and service) interactions allow Dell to focus on the lifetime value of multifaceted relationships rather than on pure transactions. Cross-selling and up-selling provide the means to capture a greater "share-of-wallet" of individual customers. Multiple relationships result in higher customer switching costs and therefore loyalty. Dell thus develops distinct know-what (understanding of and insight into each customer), know-how (how to cross-sell and up sell), and know-why (why customers do not switch to rivals) as the basis for establishing and sustaining relationships that go considerably beyond (but are facilitated by) electronic connections.

From individual process knowledge to shared understanding of the business model. The Dell Online business model aims to improve performance in a number of related areas: customizing the offering for customers, minimizing costs and investments, streamlining and speeding operations, and maximizing asset turns. The electronic-enabled transformation toward a build-to-order business model contributes to managing the potential conflicts inherent in these performance goals. However, integrating and coordinating the effort to achieve these goals requires high levels of shared tacit knowledge across the individuals and teams directing core-operating subprocesses. The Dell University, through its training and education programs, ensures that each Dell employee understands the Dell Online business model and his or her own role within that model. Thus, substantive pockets of know-what (e.g., the trade-off between cost and speed and quality), know-how (e.g., how to respond to customer inquiries and complaints), and know-why (why it is important to interact with customers in specified ways in order to nurture customer loyalty) underpin and guide what becomes over time a "natural" way of behaving and acting.

From tacit knowledge to inimitable customer-based advantage. Although the structure and sequence of ma-

jor elements of the Dell Online business model are well known and recognized as advantageous in the new economy, competitors have not been able to copy it. In part, their legacy of distribution channel relationships has prevented a smooth transition to a build-to-order business model. However, the tacit process knowledge shared by Dell employees just discussed is not easily replicated by rivals, and may possess such "causal ambiguity" that is not understandable by rivals, much less available to them. Where such tacit knowledge can be created, nurtured, and protected, sustainable customer-based advantage is more likely.

From internal processes to value net advantage. E-business transformation of core operating processes, as noted previously, opens up possibilities for connectivity with value network members that both extend the reach of the firm's processes to many external entities and enable distinctive new forms of value creation for customers. Instant sharing of customer order data with suppliers enables others in the value network to analyze such data to improve their own forecasting and inventory control processes, thereby enabling Dell to become a better partner and to provide superior customer value. Rapid sharing of accurate and focused information contributed both to faster order-delivery cycle times and reduced working capital requirements (in part due to lower inventory). It also led to outsourcing of subassemblies and therefore reduced investments in fixed costs.

From connectivity to knowledge in use. Dell accumulates data on frequently asked questions (FAQs) and frequently cited customer problems. Again, it transforms such data into shared know-what (common elements in the questions and problems), know-how (how best to deal with the issues surfaced by the questions and problems), and know-why (why providing help to customers is important). Such knowledge in turn informs PDM subprocesses: what aspects of functionality need to be addressed; how reliability might be enhanced; and which features might be added or downplayed. Sharing such knowledge enables Dell's front-line employees in CRM to resolve customer concerns in real time. Moreover, such knowledge serves as a crucial input to multiple forms of electronic interaction with customers: the help desk, discussion forums, access to self-support tools, and troubleshooting flowcharts. These self-help mechanisms take advantage of networked knowledge.

A knowledge-driven action agenda and concluding comments

The foregoing discussion suggests a number of knowledge-driven initiatives or projects that senior managers can direct to enable e-business transformation of operating processes. From a KM perspective, many of these initiatives can, and perhaps should be, executed simultaneously: they become means to generate, share, and leverage e-business-related knowledge throughout the organization.

First, develop a knowledge project to review and assess the extent to which KM, by design or unwittingly, is contributing to the e-business transformation of operating processes. It is usually necessary to develop a community of interest around this type of "high-level" knowledge project. Such projects typically necessitate the guidance of one or more individuals skilled in the art of generating and disseminating knowledge.

A related knowledge initiative involves detailing the data and information flows around ideal or desired operating processes. A group of individuals, preferably with wide representation across the key functional areas and disciplinary silos, literally designs e-business-transformed core operating processes *de novo*. In one company, this knowledge initiative quickly demonstrated that each core operating process had to begin and end with customers: each process would be a series of electronic data flows, often occurring in real time, or close to it. It became clear to the team involved that the traditional notion of a process with clear delineation and distinction between inputs, transformation, and outputs was a relic of pre-electronic times. This learning and its implications, of course, reflected significant new know-what, know-how, and know-why.

One knowledge initiative may be mandatory in organizations that do not yet fully appreciate the opportunities and threats inherent in the electronically connected world. It involves the development of a set of three or four scenarios that lay out in glowing and unambiguous detail how the competitive context of the firm could evolve over a three-to-five-year time period, how e-business might place different roles in these evolutions, and what the strategy and organization implications would be for the firm. Scenarios possess the great merit of allowing external "voices" to be heard: customers, channels, suppliers, technology experts, and others can be involved

in collaborative activities to build the stories at the heart of each scenario.

At the other end of the knowledge spectrum, managers in all functions and disciplines, and at all levels, can design and execute experiments as a means to build and leverage e-business knowledge. Each experiment becomes the means to develop explicit know-what, know-how, and know-why that can then be shared with others in the organization, often through knowledge repositories, best practice exposure, or as part of presentations in ongoing meetings, events, and projects. For example, some companies experiment with individual customers in learning from somewhat customized electronic two-way communications and interactions.[26]

A different form of knowledge initiative finds many firms developing deep pockets of expertise around e-business,[27] examples of which were discussed earlier. Indeed, it is becoming increasingly necessary to develop such expertise in two related ways: expertise relevant to the functional tasks inherent in traditional departments or units (such as marketing, manufacturing, human resources) but also expertise that focuses on the integration of such functions or tasks across traditional operating processes such as PDM, SCM, and CRM. In either case, it has become necessary for many managers and others, both within and outside the pockets of expertise, to embark upon extensive self-learning: to continually develop their own understanding of e-business and its implications for operating processes, their own areas of specialty, and indeed, their day-to-day job.

In summary, KM provides an organizational framework that contributes significantly to understanding and guiding the e-business transformation of operating processes. KM methods offer multiple means to develop the human connections that must not only surround the electronic interconnectivity, but that in turn, enable insights and intelligence to emanate that are fundamental to the unavoidably tough decisions that characterize moving (and many times moving rapidly) to e-business-driven operating processes.

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