Information technology and the management difference: A fusion map

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When every leading firm in an industry has access to the same information technology resource, the management difference determines competitive advantage or disadvantage. The management challenge is to make sure that business processes, people, and technology are meshed, instead of being dealt with as separate elements in planning and implementation. This paper presents a framework for senior executives to use in order to lead the deployment of information technology (I/T) without having to know how it is managed and to ensure the fusion of business processes, people, and technology. The "fusion map" approach that focuses on the steps that precede and enable strategy, has been applied in a number of companies. Factors are identified that make I/T a frequent destabilizer of basic logistics in an industry.

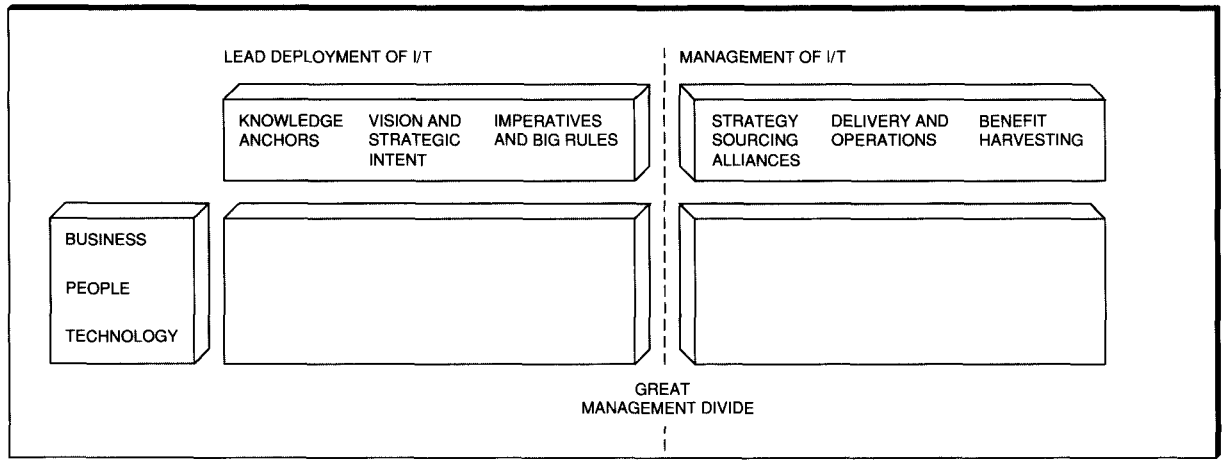
Every leading firm in an industry has access to the same information technology capabilities. All firms can obtain telecommunications, computer hardware, workstations, software development, and information management tools from a wide range of vendors. These capabilities are also subject to continued technological innovation and aggressive price-cutting. The wide difference in competitive organizational and economic benefits that companies gain from this information technology (I/T) thus rests on a management difference and not a technical difference. Some business leaders are somehow able to fit the pieces together better than others. Competitive differences increasingly seem to relate to the quality of the dialog or lack of it between business leaders and their I/T managers. From the 1960s to today, a constant question in the field of information systems has been how to bring together business and technical thinking, experience, and planning. The earliest views suggested that top management commitment was necessary, followed by an information systems (I/S) strategy to support the business. A new style of information services manager was then sought, resulting in the requirement of a chief information officer. Most recently, a far more interdependent alignment between business planning and I/T planning is called for.[1]

The deployment of I/T

The focus of this paper is on the role of senior business managers in that alignment. The thesis is that there is a difference between leading the deployment of I/T and managing the I/T strategy. Managing I/T is a complex activity whose language and methods are of necessity highly specialized. The fusion map presented here shifts the focus of management attention in creating alignment away from strategy, which mainly addresses the "how" of action, to the issues of "what" and "why" that precede and enable strategy. The fusion approach aims at providing a language, a map, and an economic target.

The *language* of I/T professionals is specialized like that of financial planning, medicine, or engi-

Figure 1 The fusion map: Leading and managing I/T



neering. It is jargon-filled and often meaningless to outsiders. The I/T professionals need their language to be able to work together in planning and implementation. Business leaders also need a language that can help them understand the critical elements of I/T without having to know the details. The *fusion approach* defines business networking as the core of I/T, rather than the more traditional focus on computers and information.

Maps provide a base for orientation. The fusion map aims at helping business leaders highlight the overall perspective and to focus on the areas where their own role is critical. In particular, the map focuses management attention on what precedes technical strategy and what provides the drivers for it. Thus the business leader can be sure the priorities for the strategy are clear and need not understand in detail how they are translated into technical plans and implementation.

An *economic target* makes it possible to avoid the major concern about I/T expressed by senior executives, that is, the lack of a convincing economic framework. Study after study concludes that there is no evidence of payoff from often massive investments in I/T over the past decades.[2] The quality profit engineering framework provided later directly relates I/T to a firm's cost and profit structures in a context in which quality and service are no longer options where customers pay a premium, but a basic requirement.

The core logic of the fusion approach is that the key to business and I/T alignment is to make sure that the three core organizational resources of business processes, people, and technology are meshed right from the start of the business dialog, and not brought together later. This alignment also ensures that the catalysts of knowledge anchors and rules by which business management enables an effective I/T strategy are present. Knowledge anchors are the basic assumptions, axioms, and facts that determine the firm's business imperatives. The rules, named "big rules," determine how I/T is coordinated as a business resource. Figure 1 presents a broad picture of the fusion map, although only the left portion is discussed in detail in this paper. The sequence of the transition (from left to right in the figure) from leading to managing I/T is important and helps the reader understand the fusion approach.

I/T is often not part of the knowledge anchors of senior management. In this situation, firms may not spot the business implications of competitors' uses of I/T until it is too late for them to react. This helps explain why, when I/T changes the basics of competition in an industry, 50 percent of the companies in it disappear within ten years.[3]

Business and I/T imperatives and rules

Business imperatives are concrete targets for action that implicitly begin, "Regardless of how we

do it, it is absolutely vital that we . . ." The single most critical contribution the business executive leader can make to enable others to manage is to clarify the firm's business imperatives that are based on knowledge anchors and linked to its vision and strategic intent.[4] The key step in the business and technology dialog is to link business imperatives to I/T imperatives. The linkage is based on the thought process that "if this is a 'must' for the business, it is vital that our I/T strategy . . ." A business imperative may not have a corresponding I/T imperative, but when it does, I/T becomes a business priority, not a technical support function.

I/T imperatives do not in general point to specific applications or systems but highlight where there is a need for shared information or communication resources. These are shared corporate infrastructures, which are here termed the *I/T platform.* If there is no need for such a platform, individual business units can move ahead quickly and independently to match I/T capabilities to business needs. However, where the imperatives point to the I/T platform crossing functional, divisional, and political boundaries, senior managers must ensure that those boundaries do not become barriers. This often depends on big rules. These are policies with the force of organizational law. In an example of business decentralization, there are many organizational blockages to coordination. Integration and standards may be seen as efforts by corporate information services to recreate the old data processing monopoly of the 1970s. Big rules are a response to the question, "If this is our business imperative and this is the corresponding I/T imperative, and the I/T imperatives require a coordinated platform, can we deliver results within existing policies and procedures?" If so, no big rules are needed. If not, they are essential.

Once imperatives and big rules have been identified, the how of strategy can begin. Increasingly, I/T strategy is mainly an issue of sourcing. The spectrum of options for the multisourced I/T portfolio ranges from in-house development and operations of some major systems, joint ventures with vendors, customers or consortia, alliances to share resources, and full outsourcing. Without imperatives and big rules, the business, human resource, and I/T strategies tend to move in isolation. The I/T strategy has no clear business drivers to guide action.

The business and technology fusion map presented here is not a reality, but a guide. Just as a road map abstracts from the details of houses, shops, traffic lights, bends, and signs that mark the physical reality it represents, behind the fusion map there are many complex details of activity and operation. The map puts them into a context that can help firms move from *compartmentalization*, which is the design and management of complex processes through separate functions and discrete stages, to *integration*, which is the coupling and streamlining of stages and crosslinking of functions, to *fusion*.

The key step is to link business imperatives to information technology imperatives.

Fusion means that the processes of planning and implementation are so intertwined that the firm's technology is indistinguishable from the business processes and human elements of service and communication that exploit the technology. There are a relatively small number of firms that have achieved this apex in their industries and in their market growth, reputation, and relative profitability. They do not have a technology strategy independent of their business strategy and "culture."

A good example is the legendary level of service of Federal Express Corp. The company promises that if it cannot tell customers where their packages are within half an hour, it will refund their money. One may ask whether this service is built on people or technology. If it is people, we look to business culture, attitude, training, and management. If it is technology, we look to such things as bar code scanners, mobile communications, and databases. In-between are business processes that reflect few other firms' attitudes toward operations. Federal Express does not promise to *try* to deliver or locate your package; it promises to do so. (Such a disclaimer as "Pro-

vided there is no fog over the Memphis airport" is not in the fine print on their contract.) An anecdote relayed from a financial services firm was that over a three-month period the company's "FedEx" bill in its New York office soared. People had discovered that it was faster to send a memo or file from the thirteenth to the fifth floor by having FedEx pick it up, transport it to Memphis, sort it, and transport it back to the same building than to send a memo through the firm's internal mailroom. This is business networking in action. It is also technology and people too—one is not distinguished from another.

The firm that has the people but not the technology is part of the have-a-nice-day school of service. If it operated on that basis, the Federal Express staff would be able to say only, "Sorry, I don't know. I'm sure we'll find it for you. Sorry. Have a nice day." The firm that has FedEx's I/T capability but not its culture is part of the school of technology and bureaucracy. For example, most banks in the 1960s and 1970s used technology to automate existing processes, thereby forcing the people into patterns of administration, rather than service.

A distinctive feature of other firms renowned for service is how effectively they use I/T and at the same time how little they talk about their I/T strategy. The business leadership brings I/T into its basic business thinking and views it as part of everyday management thinking.[5] The language they use is one of business logistics rather than technology. In retailing, it is a language of merchandising and replenishment; in the airlines it is one of distribution; and in banking it is one of marketing and customer relationships.

Business networking: A language for describing I/T

The term information technology covers a bewildering and rapidly changing variety of technical building blocks in the areas of telecommunications, computers, access tools,[6] and multimedia information resources. Historically, the central concept in the traditional view of I/T is information. The organizing element of I/T is the computer, which initially appeared to be a large room full of complex mathematical machines. These were expensive and off-limits to most staff. More recently, computers appear in the form of decentralized personal computers and are used by all, as part of a technology "glasnost."

Both the computing and information paradigms are less and less useful in explaining I/T and assessing it as a business resource. In the traditional perspective, computing has telecommunications as an add-on, and data are seen as the raw material from which information is refined. The latter distinction derives from the recognition that information must have meaning. The traditional viewpoint deems information a vital corporate asset. This viewpoint equates computers with the information age, which is almost axiomatically the core of a new industrial or postindustrial revolution.

This traditional view, with roots in the early history of computers and database technology, is incomplete now. Computers have had relatively little impact on the basics of business. The office of 1980 looked very much like the office of 1950. Personal computers have been an economic rather than a technical innovation and have had only marginal impacts on core organizational processes. The glut of information in this information age has not prevented the erosion of student test scores or U.S. competitive losses to often less information-intensive nations. The Japanese, in particular, have been high-technology providers and low-technology users of personal computers. Current estimates put the student-personal-computer ratio at 20 to one in the United States and 80 to one in Japan. The primary and radical element in I/T, what is here termed for lack of a suitable and available alternative, *business networking*, is the combination of computers, information stores (resources), and telecommunications. These factors have been used literally to transform the basics of an industry. Some examples include the following.

Airline reservation systems have a core logistic of distribution, with the reservation system becoming the base for marketing, pricing, scheduling, and many aspects of forward planning.

Automated teller machines are cash management and foreign exchange trading systems. ATMs, as they are known, constitute the new core of banking.

Point-of-sale systems are the base in retailing for electronic streamlining of merchandising, order-

ing, distribution, inventory control, and fast management analysis and response to trends and problems.

Customer-supplier order entry systems and electronic data interchange are major elements in supporting just-in-time operations. These operations make it possible for inventory to reside in the transportation pipeline and arrive just in time to be used.

Mobile communications and central databases are the key competitive element in shipping and trucking. Every shipment is tracked across every step, and its location known at any point in time.

In each of these instances, business networking created or reshaped a *core logistic*, which is a business process that is fundamental to the basic operation of firms in an industry. Information, expert systems, local area networks, database management systems, and personal computers are only the visible trappings of business networking in the core logistics that constitute the foundations of organization and competition. Focusing on the individual elements can obscure the radical nature of I/T and the extent to which it must be a central element of a firm's knowledge anchors. The concept of information requires a fresh perspective. Information is not an artifact but a process by which people become informed. It is a product of interaction between a person, a network, and an information store. At its simplest, it is you, your eyes and mind, and a book. It is you engaged in a face-to-face conversation, and it is you in a telephone conversation. Each addition of business networking capability extends the range of sources and vehicles by which you might be informed far more than does the addition of information stores *per se*. Information is created at the point-of-sale, but it does not inform. Information is a product of the telecommunications network that moves the point-of-sale data, the software that filters it, and the screen that displays it in a form that is meaningful in both the eyes and mind of the beholder.

For example, a digital image of a CAT scan (a computer-generated three-dimensional X-ray) is meaningless data to this author, but the same image sent to a consulting physician is information. Moreover, when this image is transmitted to an expert at a distant teaching hospital via NYNEX Corporation's MBS (Media Broadband Services) network, the most expert of consultations become widely accessible because images need no longer be printed on film and transported between facilities for doctors to review them. Small rural hospitals have access at once to skilled specialists.[7] This is not a change in information. It is a change from physical film to data distributed over a business network. The information is the same. What information movement transforms is the process of being informed.

Another anecdote illustrates this concept. Six days spent at an African game reserve while preparing this paper taught me how the same information can constitute very different levels of being informed. Of the many birds I saw, most were unrecognizable. The ranger, on the other hand, could easily distinguish between a chestnut-fronted helmetstrike and a fantailed cisticola. So, too, could I six days later (well, almost). The information remained the same, but my ability to make distinctions had expanded. Information is not a thing. Providing information is not the same as creating information. Creation is an active process.

These points may seem academic. Although they underlie much of academic cognitive psychology, philosophy of language and hermeneutics, and computer science, they do have a practical implication. The I/T professional's almost axiomatic conception of information as an artifact overlooks the importance of meshing information, information movement, and information use. The management issue is less one of the kinds of information we need than that of making sure we are well-informed and thereby act intelligently.

When we think about the means of becoming well-informed, business networking becomes a powerful new force. Networking is important not so much in terms of information, but in terms of core business logistics and the ways business is done. Part of this is being more quickly informed and moving information to people who need it. Telecommunications is the driver, without which the network that informs is limited and slow. Conversely, telecommunications without data is just an open, empty line.

The try again (re-) phenomenon

Together, the data, hardware, software, and telecommunications that comprise business network-

ing change the rules of many business games. Consult the index of any business book that was published more than two years ago, and one finds

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very few terms that begin with "re-," in the sense of "try again." Go to a business conference today or skim through a recent article and the odds are high that re- is pervasive. A few re- examples are the following: restructuring, redesign, renewal, re-engineering, reorganizing, repositioning, and realignment.[8]

A change is occurring. Business networking is closely associated with this, and is fueling many of the changes that are part of the re- phenomenon. Networking is not part of business as usual. This may seem an overstatement, but it is easily justified. Stripped of the technological language and trappings, business networking simply removes barriers of time and location on service and coordination. The basics of organizations and industries have their foundations in constraints of time and location, such as: departments, documents, branches, reporting systems, administrative procedures, managing across time zones, much of division of labor, management hierarchies, and organizational structures. These are all changed by business networking. "Going to work" is complemented by bringing work to people. Business networking makes possible location-independence. One example is the 800 telephone number. You need not know where it is located to call for customer service. Electronic data interchange similarly streamlines time- and location-dependent, paper-dominated processes. Payment systems transform physical currency to symbolic currency. Each system changes the very nature of organization, distribution, service, and the way we become informed.

I/T is thus now intrinsically about basics. That I/T has infiltrated almost every element of basics is obscured by the old language of I/T. This is why we are seeing not only the re- phenomenon, but also an I/T-influenced shift in the very language of business. Examples include the "networked organization," the "learning organization," "knowledge work," and "just-in-time" everything. What is happening is that information technology has moved from being an important but separate element of business management to being at the core of everyday business and social life. What is still lacking is a reliable way of fusing it into everyday management life. The re- words and the new language of organization indicate that we cannot easily fit the things that are happening into our old discourse and set of distinctions.

I/T as a business fundamental

This simple idea of how I/T is intrinsically about the basics of organization and business makes it literally a critical survival factor in more and more industries. As pointed out earlier, business networking has transformed the core logistics of service and operation. In retailing, networking has removed more and more constraints on time and location through point-of-sale, quick response, and electronic data interchange along the entire logistics chain. In the airline industry, computerized reservation systems have done the same for customer access and service, pricing, profit planning, and marketing. In distribution, warehouses and brokers have been disintermediated (bypassed) by the technology, to the extent that 50 percent of middle-position firms have disappeared within ten years. We see the same pattern emerging in financial services. Surely, there is no plausible scenario for 1995 that has the same number of banks and security firms in New York City as there are today. Abetted by bad real estate loans and foreign debt, the massive overcapacity created by I/T, in terms of transaction processing, outlets, products, and commoditization, is rapidly turning New York City's financial district into Rust Belt II.

Occasionally, an oligopolistic industry or its regulators resist the realities of business networking. This is happening on the worldwide stock exchanges. Electronic trading systems have already slashed time to seconds and moved many aspects of operations off the floor of the exchange to the dealing room and computer terminals. Yet in most countries, settlement systems continue to specify a 3- to 30-day period for completing the

details of a trade, including the physical transfer of stock certificates.

Elimination of location-dependent paper operations cut staffing in a Norwegian bank by 82 percent. This occurred because the national stock exchange allows *dematerialization*, or elimination of the need for a paper stock certificate, and *immobilization*, meaning that the record of ownership does not have to be physically transferred. Electronic records substitute for paper records. There is wide agreement in the industry that such trading systems as NASDAQ in the United States, Reuters' GLOBEX and Dealer 2000, and the British TAURUS make it fully practical to reduce time delays in settlement to the same range of seconds they provide in trading. To date, tradition, regulation, oligopoly, and national self-interest or protectionism have slowed the pace of change. But the new agenda for managing the world's individual markets and electronic global exchange market is driven by I/T. Time and location are the basic building blocks of the industry's practices.

Time is the new imperative of competition.[9] Time and concomitant convenience and ease of access are the new differentiators in commodity markets. Time, not product, is the new competitive advantage. For example, if the average time for processing a loan, restocking shelves, filling an order, or any other core industry activity averages 30 days, there is little competitive advantage to be gained by a firm's reducing it to 25 days and little disadvantage incurred for a firm taking 35 days. However, if a leader cuts the time to four hours, the rules of the game change immediately. Citibank N.A. announced in 1991 that it would process a mortgage application in 15 minutes. By 1993, we can also be sure that most of its major competitors will do so. We can probably spot the likely losers well before then, just by looking at their existing I/T base and management leadership.

In retailing, leaders' response times in core logistical chains are less than a week, and sometimes less than a day. Toys "R" Us, Inc., for example, has information on sales sent from each store to headquarters every two hours. Wal-Mart Stores, Inc., uses quick response systems to automate just about every step in the sales-to-reorder-to-delivery cycle. J. C. Penney Company, Inc.'s buyers meet through videoconferencing, and its Far East suppliers send and receive high-resolution photographs of fashion goods specifications electronically. Each of these firms has competitors whose merchandising, replenishment, inventory, costs, and ability to spot and respond to short-term trends are badly hampered by lack of what is now an essential component of business operations. Leading retailers have made technology as much a part of the business fabric as money, materials, and human resources. They have brought technology into the business conversation.

The key issue here is the impact of I/T on core logistics. In some industries, I/T has had little if any impact on logistics and is thus not a redefiner of basics, even though it may be heavily used. In pharmaceuticals, for example, a core logistical chain is time to market, beginning with research and development and ending with certification of a new product. This cycle averages about a decade. Thus far, I/T has reduced this time but little, but the combination of electronic document management technology and changes in procedures for submitting data to the U.S. Food and Drug Administration agency could slash this time. If this happens, I/T will move in from the periphery of management and planning to become part of the basics. This is becoming apparent in one of the pharmaceutical industry's other core logistics, the clinical trials process, which I/T has significantly expedited.

The chief executive officer (CEO) interest, attitudes, attention, and responsibility will shift with the impact of business networking on core logistics. Consider the automotive industry, which lies between the extremes in time frames of retailing and pharmaceuticals. As with pharmaceuticals, time to market is one of its key logistical chains. But, also, as in pharmaceuticals, I/T did little to reduce its seven-year time frame, until recently, when networked computer-aided design and manufacturing, concurrent engineering, computer-aided logistics, and other uses of I/T have begun to make significant cuts. Senior executives in automotive firms are paying far more attention to I/T as a result.

Representative figures that show how the automotive industry's critical success factors have moved from styling and fuel consumption to time to market[10] are the following:

- Vehicle manufacturing takes 14–30 days for a Western and 2–4 days for a Japanese firm.

- Time to market (1990) is 4–6 years for a U.S. and 2.5–3 years for a Japanese firm.
- Average age of a product is 5 years for U.S. versus 3 years for Japanese firms.

The author recalls his failure in management education programs to convince top managers of European and U.S. car makers of the relevance of I/T as a source of competitive opportunity in their industry. The easy explanation is that they did not understand. Perhaps a better explanation is that they understood that I/T is important to aspects of running the business but it is not fundamental to leading the business. Only when I/T transforms a core business logistic and makes time a new form of capital do business managers need to divert their attention from other important business issues to I/T. When it does, it becomes urgent that they attend closely to people who talk to them in appropriate terms. I/T is far higher on the agenda of automotive industry executives now that time-to-market is a core business driver.

Top managers in oil companies or timber firms still pay relatively little attention to I/T as a business fundamental and can afford to do so. Exploration and development of new fields takes decades. I/T has not even hinted how and where it might cut these decades to years. Growing and harvesting trees takes as much as a century for hardwood timber. Information technology is unlikely to change the dynamics of the basics of competition here but biotechnology may cause change. It is not that information technology is unimportant to any of these industries, but it is important in a different way. Pharmaceutical firms invest heavily in I/T to leverage research. Timber companies use I/T for planning, project management, and geographic mapping. In each of these instances, I/T supports existing activities. It does not destabilize the industry status quo.

The same line of analysis applies to location, but the trends are more recent. The most striking trends relate to how cities are using networking to gain geographic advantage, with companies sending work electronically offshore (or, contracting work outside of the continental United States). We are seeing the emergence of the "1-800" number telephone-order organization. Firms are exploiting telecommunications to pursue opportunities to operate in places that offer a combination of skilled labor and low real estate costs.[11]

For timber and mining companies, basic operations are totally location-dependent. Companies must cut trees and mine coal where they find them. But they can put their customer service units where they choose. They can consolidate regional units nationally, as has Consolidated Rail Corporation (Conrail). Its 1991 press announcement stresses that the 90 000-square-foot customer service center incorporates the latest fiber optics and telecommunications technology. I/T makes possible the realization of the advantages of central coordination, while maintaining close ties with local customers, where local means physically remote but as close as next door through the network.[12]

Similarly, airlines must fly their planes from airports, but they can locate their reservation centers anywhere. Banks and insurance firms can put their claims processing in Ireland and customer service in cities such as Omaha or Heathrow, which have first-rate telecommunications infrastructures and labor pools. Data entry can be located in the Caribbean. When they do this, their telecommunications network becomes their effective organization structure, far more than bricks and mortar and boxes on an organization chart. Telecommunications determine operations, communication, work flows and relationships.

When a company builds its business processes afresh and assigns its people to new roles and activities in this way, it is doing so to change its basics of structure, strategy in action, communication, and management. This, not information, is the reason I/T and re- go together and the reason it is increasingly impractical to handle I/T as though it is different and technical. As part of business basics, I/T must be meshed into everyday management. To do so requires a new map—not so much one of re- but of a fresh look, a fresh design, and a fresh structuring. We are rapidly approaching the end of the era of management information systems and rapidly entering an era in which general management includes leading business networking as part of leading just about every other element of business.

Knowledge anchors

Knowledge comes from scanning the range of observable facts to identify inevitabilities, strong probabilities, and likelihoods. Knowledge an-

chors are the key assumptions and interpretations that drive business planning. It makes no sense to ignore observable facts that are likely to have a major impact on business. When that happens, any strategy is at best incomplete and more likely very vulnerable to a competitor whose knowledge anchors take those facts into account.

It is difficult for a firm to challenge the assumptions and principles that have made it successful. Originally, success did not depend on business networking as a fundamental contributor. Now it is difficult to bring I/T into the dialog, when basic assumptions are being scrutinized and defined, tested, or left unchallenged. These thoughts form the core of the principle that the primary benefits from business networking rest more on making I/T part of knowledge anchors than on specifics of strategy. Lack of attention to I/T as part of top management's knowledge anchors accounts for the presence of previous industry leaders among the 50 percent of firms that disappear when business networking changes the basics of competition.

A number of airlines that succeeded in the 1970s prior to deregulation assumed that service and fleet efficiency would continue to be key to that success. They failed to recognize that computerized reservation systems would become key. They also did not recognize that travel agents would be the real decision makers as to which flight a passenger would take. Whoever controlled travel agents' flight selections controlled more and more of the market. The leadership of American Airlines, Inc., in the U.S. market grew out of its early exploitation of I/T and its continued and continuing meshing of I/T into just about every aspect of its business. Its hubbing, yield management, and frequent flyer strategies were distinguished from the services of most of its competitors in the way that I/T was used early to enhance the business capability. Other carriers saw the I/T component mainly as an operational support, whereas American constantly looked for additional business benefits from the use of the information it provided. American also benefited from cross-linking information from different systems. The linking of the frequent flyer program databases and the SABRE** reservation system gained valuable data on passenger preferences for use in marketing, route planning, and pricing. Managers of a major competitive airline describe their own frequent flyer program as an albatross. That carrier saw the costs of the program but missed the advantage of being better informed. The information was in the system, but it was not linked to other systems.

Knowledge anchors are the key assumptions and interpretations that drive business planning.

Many retailers, including Sears, Roebuck and Co., similarly overlooked the potential of point-of-sale and telecommunications to provide a new base for merchandising and backward integration of the entire distribution chain. Toys "R" Us, Wal-Mart, Dillard Department Stores, Inc., Circuit City Stores Inc., and others that were small when Sears was large saw the potential of information systems. Kmart Corp. came to a realization four years later than Wal-Mart. Under leadership of its aggressive I/S manager, Wal-Mart invested over two billion dollars to catch up. Both Sears and Kmart saw massive central buying power as the key to their very successful strategies. Inventory was determined from the center, with promotions and sales as key aspects of marketing. Wal-Mart saw each store as unique, and decentralized point-of-sale as the driver of inventory and logistics.[13]

When I/T does not play a central role in a firm's success, it is reasonable for managers who see other factors driving the business to relegate it to a support role. At a time when I/T meant mainly computers, this was generally a safe approach. Now when business networking may suddenly redefine an industry's core logistic, such relegation is myopic and risks the loss of business degrees of freedom.[14]

Airline reservation systems, point-of-sale technology, on-line customer-supplier links, and electronic health care claims processing and payments are examples of the shifting role of I/T. This progression may be seen to move from operational overhead, to competitive opportunity, to

competitive and operational necessity so that it finally becomes a survival factor. When I/T has become a survival factor, matching the competition may not provide a competitive advantage. Falling too far behind, however, can take a firm out of the competitive game. This is the factor driving Kmart to invest two billion dollars in point-of-sale technology, scanners, and satellite communications. If, however, I/T is not fused with business at the stage at which basic assumptions are created and basic strategic commitments defined, I/T-fueled change in industry competition may work against you.

Given the capacity of I/T to enable companies to use their delivery base to enter the territories of other industries, the comfortably successful firm may not recognize early enough that its real competition will be from outside, not inside, the sector it understands and monitors. This may be why the hotel company Marriott Corporation was preempted by British Airways PLC. British Airways recognized that travelers telephone to make international flight reservations before making hotel reservations, so that airline added this capability to its existing I/T platform at very small cost. Thus, by simply asking whether they could book the traveler's hotel, British Airways is in effect taking away a key part of Marriott's business.

When British Airways did this, major American hotel firms, including Marriott and Hilton International Co., which relied on telex and telephones, spent over $125 million and over four years to catch up. Their CONFIRM system was developed by American Airlines, with 400 staff assigned to it. It was scheduled to be ready for customer use in June 1992, but in mid-May technical problems were uncovered that would take 18 months to fix. At that stage, Marriott announced that it was dropping out of the project, leaving it still well behind British Airways. Here is an example of how I/T can significantly affect a firm's strategic options.

Marriott has a superbly fused business and culture and has become first-rate in terms of service and quality. Its hotel in Portland, Maine, combines staff and processes that make it one of the best hotels in the area. In an industry that is hard-pressed to find capable 18- to 22-year-old employees with high school or GED (general equivalency diploma) qualifications, Marriott has assembled a young and outstanding staff. This is not accidental. Marriott recognized in the mid-1980s that it would soon face a situation in which there were only two qualified applicants for every three jobs. It used this knowledge anchor to establish new incentives and programs, such as rewarding promising staff who had dropped out of high school by sending them back to school to earn their diplomas.

Marriott fused business and culture along the entire chain from knowledge to action. But there had not been the same link between its international business strategy and I/T. Because none of its major competitors in the international hotel industry had a computerized reservation system capability, there was no stimulus for Marriott to move. This left an opening for British Airways, which saw itself as being in the travel-related industry, to capitalize on an opportunity that historically had belonged to the hotel business.

Matching business and I/T imperatives

The Marriott example illustrates that it is not necessarily incompetent or failing firms that neglect I/T as a knowledge anchor or exclude it from their review of business imperatives. Indeed, it has been the author's recent experience as a researcher, educator, and consultant that it is leading firms that are often most frustrated by the management process. Perhaps the explanation is that they are handling the pieces well, but not fitting them together. Business strategy is clear; human resources departments understand their role in facilitating change; the information services strategy is sound and supports the business; and the I/S function delivers on its promises. Yet something is missing.

The fusion map is not only the end product of the author's efforts to help good organizations help themselves, but also the result of efforts to resolve problems with which the author could not previously help. Often, in the role of being a catalyst to either business or I/S, the author found himself unable to transfer understanding across the business/technology divide. Frequently, he saw in the management process roadblocks to action that reflected not resistance to change, politics, poor management, the statement that I/S groups do not listen, or any other such excuse, but a real failure to communicate. *Communication* in this case means hearing and understanding as well as talking. These problems seemed to be

ones of language and mutual understanding, not of competence or goodwill.

The fusion map in Figure 1 shows a great management divide between leading and managing, and between imperatives and strategy. The key to dialog between business and technology is at the imperatives stage. Identifying imperatives relies on (1) suitable scanning of the domain of observable facts to build new knowledge anchors and test old assumptions, particularly the ones that underlie today's success, and (2) vision and strategic intent; these require a clear and focused commitment to long-term direction and priorities, complemented by opportunistic and situational responses that help the firm plan when it cannot predict. The term *vision*, as widely used in the I/S literature, is a useful term for a new style of thinking and ambition. But vision is not contagious and can easily become "motherhood," fog, or fantasy. Vision is least useful when articulated as, "We have a dream" or "Wouldn't it be wonderful if . . .?" Many of us have a vision for ending the government deficit or improving education. The impasse in our political and social systems here seems more one of strategic intent. This paper links vision and strategic intent and, thereby, optimistic thinking and commitment to ambitious action. Imperatives fall out of strategic intent. They are not the same as strategy. For example, a classic statement of strategic intent is President John Kennedy's saying, "We will put a man on the moon." One imperative here is "however we do it, it is absolutely vital that we develop a new generation of launch rockets as quickly as possible." Neither of these statements address the *how* of strategy, but they provide very clear criteria for strategic planners to move ahead.

Too often, business and I/T thinking and action are separated in such a way that there is no clear link between the firm's business imperatives and I/T imperatives, even though the individual elements of business and I/T strategy are well-handled. Consider Figure 2. Here the circles and triangles shown indicate that we are in good shape (circle) or that this is a problem area (triangle). The lines that connect the shapes show whether the relevant processes are well-connected. Each example in Figure 2 represents a real company.

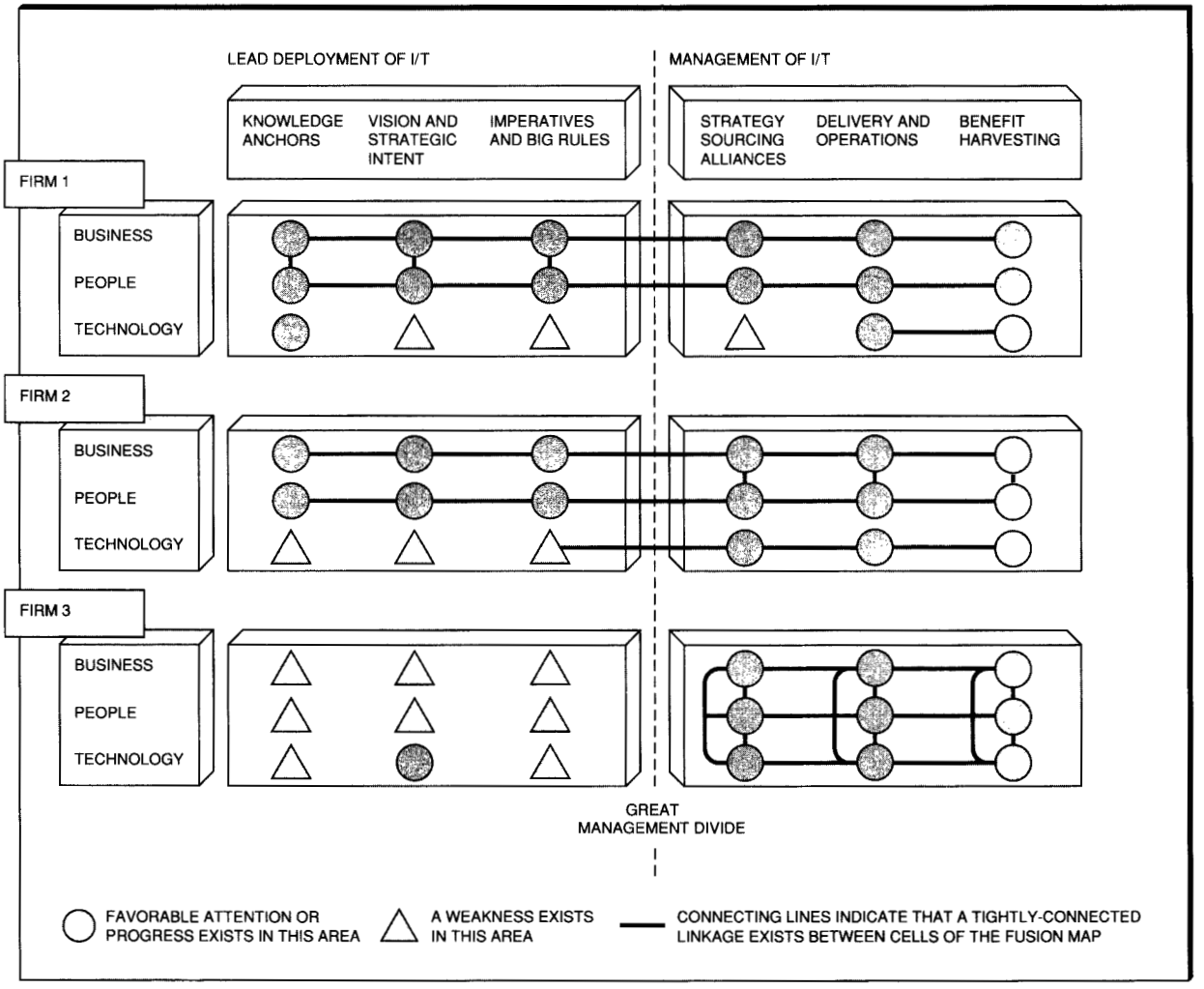
Firm 1 is typical. Its business leaders spend time and imagination scanning its business environment, testing and developing knowledge anchors. The vision is explicit; the strategic intent firm. Management is clear in its business imperatives and links business issues to issues of culture, such as human resource planning, recruitment, management development, and incentives.

However, Firm 1 exhibits no corresponding imperatives for I/T, even though the information services group understands the likely impacts of I/T on business and regularly updates its own knowledge anchors about technology and competition. The technology knowledge anchors are not connected to those for business and culture. The firm is a pharmaceutical company, and its business managers do not know what they do not know. Technology is not part of their own focus. The company is overlooking the importance of electronic data interchange for linking to major health care authorities worldwide and of image processing as a key to faster time to market. The importance has been explained by the chief information officer (CIO), but in terms that do not resonate for the business leaders. It is the language, not the content, that is wrong.

Firm 2, a manufacturing company, is also typical. Its business planning and implementation are aggressive and tightly coupled along the full sequence from leading to managing, from what and why to how. I/T planning and implementation are similarly well coupled but disconnected from business and culture. The firm has a strong chief information officer with a clear technical vision and commitment to providing a competitive edge through I/T. However, the CIO is likely soon to join the many CIOs who, according to a number of surveys, are being fired at twice the rate of other senior executives.[15] Despite many efforts to communicate, the CEO remains, like so many CEOs, an agnostic with respect to I/T. The business units go their own way, and the CIO's corporate vision is seen as the old management information system (MIS) monopoly in disguise.

Firm 3 is also typical. It exhibits a tight linkage across business, technology, and culture from strategy onward. The firm is Mutual Benefit Life Insurance Co., an insurance company that was an early leader in business process re-engineering. The success of Mutual Benefit in cutting the time to issue a life insurance policy from 24 days to four hours is one of the most widely publicized success stories in re-engineering. It fused business, culture, and technology imaginatively and

Figure 2 Examples of lack of fusion



effectively. Mutual Benefit also filed for Chapter 11 bankruptcy soon after re-engineering its policy process. The I/S group has been broken up and reduced in size. Mutual Benefit's problems were ones of knowledge anchors. It misread the implications of the depression in real estate prices and corresponding impacts on public confidence in its financial position.

Strategy in general does not compensate for errors and omissions of knowledge anchors, ambiguity, or incompleteness of vision and intent, or inappropriate or mispositioned imperatives. This is not an attack on strategy, inasmuch as ineffective strategy and implementation make knowledge, vision, and strategic intent irrelevant. The issue is fusion, attention to what precedes strategy and, above all, recognition that I/T has become a part of business basics and must be included, from the start, in the basics of the management process.

Big rules

Imperatives define purpose and establish criteria for priorities. The key next step in the transition

from leading to managing, the leap across the great management divide, is to establish any needed *big rules*. These rules are policy statements that clarify the things that must be coordinated and those that are entirely local options. These rules come into play only when existing processes impede any cross-functional coordination that is needed to ensure that business imperatives are turned into effective action. Almost by definition, business networking implies new cross-functional systems, data stores, and communications. In one major insurance company, business imperatives pointed toward a critical need to build a new integrated customer relationship data resource in an environment of autonomous lines of business, each of which has its own priorities, pressures, and processes.

The I/S group had made many previous efforts to define a corporate data architecture and had developed a strategy for data integration. The logic of decentralized business operations had dominated the logic of customer data coordination. Business units largely went their own way. They later complained about problems caused by the duplication of data, lack of accessibility between systems, and the inconsistency of definitions.

The company brought together a team to explicitly identify business imperatives. That team included senior business managers as well as I/S managers and product and planning specialists. When the imperatives were agreed upon, the next question was simply whether they could meet this imperative within the existing policies and processes or whether they needed a big rule. Business executives and not the I/S staff were the most committed in arguing for several big rules that included the following: (1) Data will be captured once and only once at the point of entry into the company; (2) all cross-divisional initiatives must have a corporate officer as sponsor and a dedicated project manager to be appointed by the division that has most direct customer contact; and (3) all core-customer and risk-management data must conform to the company's enterprise data model. These big rules were defined by the business, not I/S. I/S identified some technical standards and procedures that they designated as essential, including structured query language (SQL) compliance for all database management software. This process led to a corporate data architecture, an understanding of the need for standards, and the importance of integration. The standard is not the big rule, however. Each big rule must have a compelling business reason, it must have a senior sponsor who ensures that it has the force of organizational law and is not just a request or recommendation, and that there is a process for addressing exceptional needs that may violate it. In the insurance company, the business leaders became the spokespeople for the imperatives and big rules. The business leaders encouraged a process of rollout, communication, and debate across the organization.

There can and should be debate about big rules, much of which senior management need not be directly involved in. A suitable oversight committee can fill this role in much the same way that capital investment committees or compensation policy groups do. A big rule should be approved only if it is essential to building the integrated platform that is, in turn, essential to meeting business imperatives. A big rule must have a sound business reason. A standard may fall out of a big rule. If there is no rule, business units are free to make their own choices. There is no need for many little rules and I/T bureaucracy. Within the big rules, units may establish such rules as they see fit. This process may seem simple, and so it should be. In practice, the entire discussion of architecture, infrastructure, and integration has become very complex in most organizations. The reason is that choices of technical standards are inherently complex and will always be so. The bewildering and escalating rate of change in the technology make uncertainty, innovation, acronyms, hype, and technical detail a challenge to the very best I/T professionals. For them to do their work, and for managers to be sure of the business criteria for that work, the management process must change so that the language can change and dialogs replace monologs.

When this is achieved, senior business managers can remove themselves from the process. They do not need to understand or approve the specifics of the technical plan, which mainly addresses multisourcing and alliances. Strategy and sourcing are increasingly interrelated in I/T.

An example of innovation in action

An example study illustrates the way in which the approach recommended in this paper can change the leadership process for I/T. Although it is one of the two largest firms in its industry, the Land-

berg Dairies revenues and profits had remained stagnant for years.[16] Niche competitors had garnered much of the high-profit business. Landberg's production was highly decentralized in 20 separate plants, which had to produce at full capacity and had heavy fixed costs and little flexibility. Large supermarket chains were able to demand substantial price cuts. Distribution costs and daily ordering and delivery have historically made it essential to locate plants close to major customers. A growing variety in specialty goods, however, necessitated trans-shipping at growing expense almost half of each plant's output to other plants. At the time of the study, senior management did not view I/T as capable of providing much actual or even potential help. Several previous I/T strategies had not significantly changed the situation. New systems had merely added cost without creating visible benefit. The new study reported here, however, led to a significant shift in knowledge anchors along the entire temporal chain to implementation, which is currently in progress. The starting point was to ignore the givens and assumptions that underlay existing I/T plans and carry out a "business scan" that included three components:

- Market-centered analysis that focused on Landberg's customers' perspective
- Industry-centered analysis of competitive trends and dynamics
- Company-centered analysis of the firm's own perceptions, concerns, and priorities

The scan, aimed at identifying future inevitabilities, strong probabilities, and possibilities in the business environment employed a wide range of sources. The process checks, tests, and builds knowledge anchors and outputs a list of business imperatives. These were very different from the existing strategic priorities, which reflected old assumptions in a rapidly shifting environment. Among these new imperatives were the following.

- Position Landberg for central distribution instead of plant-by-plant autonomy. The old assumption that plants must be located close to customers will be invalid well before the end of this century. The trends are there to see, if Landberg looks for them. Leading supermarket chains use electronic data interchange and point-of-sale equipment to coordinate merchandising centrally. Supermarket chains are moving toward central warehouses for nonperishable goods. Consumer preferences for specialty goods are changing.

- Position for a two-tier customer base, with the major supermarket chains being handled on an entirely different basis from other customers. Landberg could not afford the cost of providing an ever-increasing level of service, responsiveness, and customized pricing and delivery options to both the 12 chains that provide more than 60 percent of its revenues and the thousands of companies that provide the remainder. Landberg had understood the need to segment products and markets. The need now was to segment service capabilities through I/T. Electronic data interchange, fax, electronic mail, dedicated phone lines, voice mail, voice response, and on-line scheduling and distribution databases were obvious means to this end.

- Remove administration and I/T from the plants. Landberg's expensive decentralized I/T, accounting, and administrative systems reflect location-dependent decentralization and time-dependent operations. The company had overlooked new means of business networking that opened up the opportunity to create a location-independent operations center that could be virtually anywhere to exploit advantages of labor cost and supply, tax incentives, real estate, and so forth. Workstations in the plants could link directly to it, retaining effective decentralization while adding central coordination and economies of expertise. Landberg is considering placing this operations center abroad, on the basis of labor costs, quality, government investment, and tax incentives. This is obviously an option made practical only by business networking. Preliminary estimates indicate that taking I/T and administration out of the plants should improve average plant profits by 20 percent.

- Schedule production and "trunking" (interplant shipments) centrally via the new operations center. This is likely to reduce interplant shipment costs substantially and replace optimization of individual plant production with optimization of the overall manufacturing and distribution system.

- Develop a no-surprise capability for tier 1 customers. Landberg's ordering-to-scheduling-to-

production-to-delivery cycle for fresh dairy goods is less than 12 hours, and it carries no inventory. A stalled delivery truck or two-hour production delay means a furious supermarket replenisher.

Each of these business imperatives implies a potential technology imperative. Positioning for central distribution, for example, points to the technology imperative: Link the plants and head office via telecommunications to a location-independent central point for receipt of orders, scheduling, and trunking. The "develop a no-surprise capability" points to establishing communications links to customers using delivery-truck mobile phones, fax, and electronic mail. Central scheduling and trunking similarly point to the technical imperative of linking plants to the head office through telecommunications.

The different business imperatives thus lead to such basic technical imperatives as a new telecommunications network that links each plant to head office and head office to customers, a comprehensive database management system that cross-references customer and plant information, and delivery vehicles equipped with mobile communications for calling in orders and reporting problems. None of these existed at the time, although Landberg planned to pilot on-truck computers without communications capability. The common pattern of technical imperatives reflects the shared infrastructure needed to implement them, that is, the technology platform. This is now being designed.

The process described above has had radical impacts. The business scan has changed senior management's basic assumptions, with the result that the company's new plans rest on new knowledge anchors, especially concerning trunking and customer expectations and trends. The statement of business imperatives provides the policy driver for I/T. The technical imperatives fall directly out of the business scan and are couched in business language. They define the business functionality of the firm's I/T platform so that the technical strategy falls directly out of it. This provides a business basis for technical design and implementation. The result is that I/T strategy, instead of remaining decoupled from or just supporting business planning, moves with it. The basics of the technology strategy were generated by the business scan. The conclusion was obvious and needed little debate. There is, however, much debate on the details of sourcing and of specific technologies and priorities of development. What will become a complex strategy can begin as a simple, but not simplistic, set of imperatives and resulting policies.

The new big rules in Landberg are in direct conflict with existing practices. They relate to shared and standardized information and a corporate telecommunications infrastructure. The big rules are expressed mainly in terms of I/T standards, but really amount to a political statement of organizational policy. Without the big rules, the momentum of old processes would block, not enable, the creation of the I/T platform that Landberg's business imperatives demand as a business priority. There is little doubt that Landberg could not have arrived at its new strategy without a fresh look at its knowledge anchors or have evolved the proposed technology platform without the CEO's statement and endorsement of the business imperatives and big rules for applying I/T. Landberg's head of information services had a fairly clear picture of what the company needed. He had a broader set of knowledge anchors than most of the senior managers, who were unwilling to question the traditions and history of the company and industry. For him the study offered few surprises, but it radically changed his range of possibilities. The CEO has given a green light to coordinated action. I/T is now driven by business policy and not by technology strategy alone.

The I/T platform: Reach and range

Without big rules, it will be very hard to coordinate the I/T platform.[17] Justifying I/T infrastructures has become one of the major priorities of I/S managers, who see a critical business need for a shared resource, defined through a technical architecture and technical standards. From the perspective of I/S, architecture is strategy. Technology integration is increasingly regarded by leading and informed practitioners and consultants as a cornerstone of *business integration*. Business integration is the linking of previously independent services and operations.

Very few business managers see this as a priority. By and large, they are not hearing a compelling business message about the need for a coordinated I/T platform. They are not being told, in

terms they can understand, why independent technical systems and applications are no longer sufficient. Increased management awareness of the business importance of I/T leads to increased delegation and pressures toward systems disintegration. The process is fueled by a shift from centralized mainframe computers to distributed computing, based on personal computers and local area networks. The process is further characterized by the downsizing or tailoring of the I/S organizations and the outsourcing of more and more aspects of development and operations. Roughly one sixth of top executives in large firms see a need for a coordinated corporate I/T platform.[18]

The paradigm that sees information technology as essentially equivalent to computers—because one trend in computing favors small versus large and distributed versus centralized—encourages senior corporate executives to allow individual business functions, operating units, subsidiaries, and national operations to make their own choices about I/T. This makes business sense and organizational sense. A decentralized business philosophy demands decentralized I/T planning and implementation. This translates into the decentralized technology of personal computers, workstations, local area networks, departmental systems, and the like, which support decentralized operations.

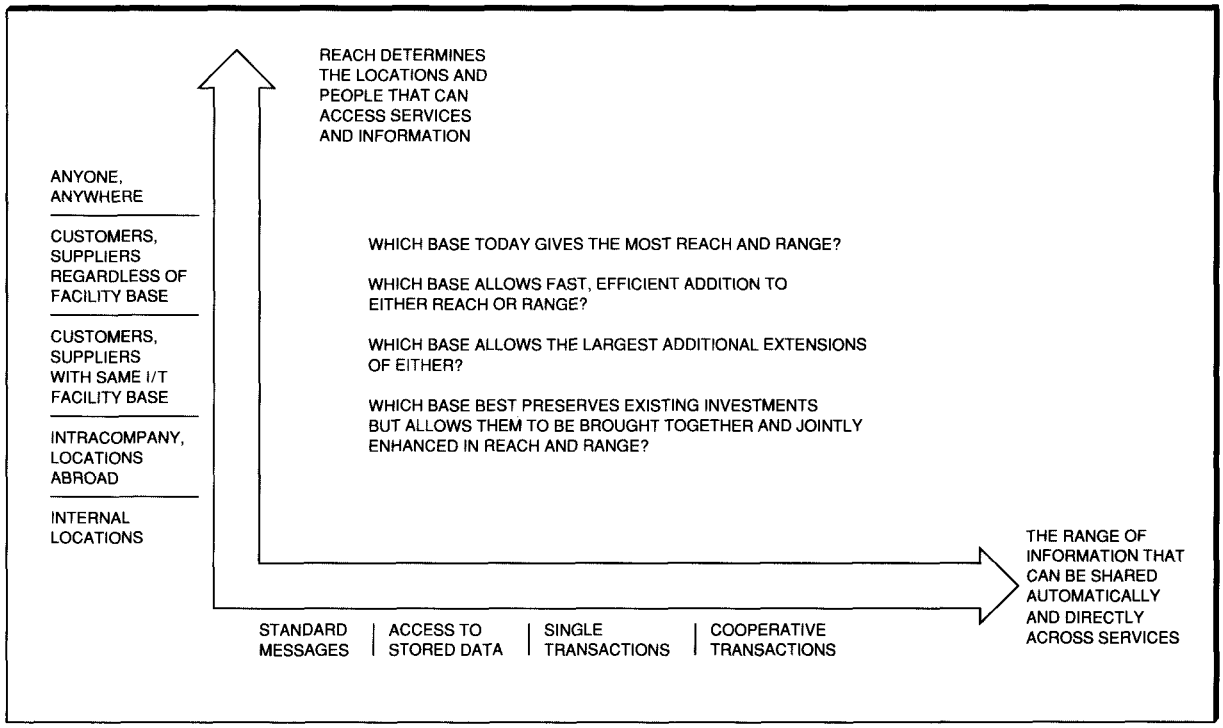
The argument is attractive. It is also deceptive. It overlooks the business trends generated, stimulated, or supported by business networking. Decentralization overlooks the importance of sharing data across products, services, locations, companies, and countries. There is also a shift from largely independent business functions to interdependent functions, and from product- to relationship-based services and cross-selling. There is also the expectation that information will move as fast as goods and transactions. In this context, the decision about the need for a coordinated versus local view of I/T must rest on the firm's business imperatives. If these do not point to technical imperatives that require a shared platform, decentralization makes sense. If, however, they do point that way, the lack of a corporate platform becomes a business issue in the era of business networking that very few firms can afford to ignore. The I/T platform is a shared business resource and services-delivery base whose business functionality is defined in terms of two dimensions, reach and range.

- *Reach* determines the locations to which the platform can link from workstations and computers in the same department to domestic customers and suppliers. This includes international locations, to anyone anywhere.
- *Range* determines the information that can be shared directly and automatically across services and systems. At one extreme, only systems built on exactly the same software, hardware, and telecommunications can process messages and share data with one another. Not yet practical, but a highly desired target of vendors and users, is the capability for any computer-generated transaction, document, or telephone message to be accessed and used by any other system regardless of its technical base. Figure 3 summarizes the reach and range framework.

Common sense calls for senior managers to ensure that there is no contradiction between business imperatives and the I/T base, if I/T is critical to turning those imperatives into actions. Many business managers have not even thought about the link. There are firms whose imperatives relate to international distribution and coordination but also lack international reach in their telecommunications networks. Consider financial-services firms committed to relationship management and cross-selling, whose databases and processing systems cannot interlink. There are manufacturers whose systems are built on so many different hardware, software, and telecommunications bases that they cannot share information. This greatly constrains opportunities to improve quality, costs, and lead times. The financial services firm knows neither its customers nor the products they use. The international firm has to run a just-in-time business across multiple time zones without adequate alerting systems or just-in-time communication.

It makes no sense to create such a contradiction between business needs and technical resources. When the CEO of a leading company increases the gap instead of narrowing it, there has to be a reason. Usually it is simply that the logic of decentralization dominates considerations of coordination. In 1991, the recently-appointed head of a major international petrochemical company dismantled the firm's corporate I/S group and made I/T decisions totally decentralized. He is a vocal public enthusiast for I/T as an application but not as a platform. The consequences are already apparent. There are significant problems in interna-

Figure 3 Reach and range: Explaining integration



tional coordination. Major difficulties are appearing in developing manufacturing and procurement systems. There is frustration about poor information across countries and business units. I/T costs are rapidly escalating everywhere. The reason is that this company's I/S organization did not have a strong corporate executive as advocate. Consequently, the links between business and technical imperatives have been overlooked. What is happening has its cause in the compartmentalization of business and I/T thinking and strategy. This is not a defense of centralization. Like the electrical utility, the I/T platform must balance coordination and devolution, shared capability and independent use. The electrical utility is a useful analogy here. Its architecture permits autonomy on both sides of the household interface. A wall plug has a standard voltage and permits a two- or three-pin connector. Users have full freedom of choice of electrical appliances, and designers have a wide range of options of features and functions. Conversely, on the other side of the interface, the centralized provider can substitute sources of power without affecting the users.

The technical features of the I/T platform are defined through its architecture and standards. As for the utility, this is an immensely complex task, involving many tradeoffs, uncertainties, and problems of meshing new components with the existing base. There are also vendor relationships and details of operation to be considered. The logic of the fusion approach is to ensure that business imperatives are clearly stated and equally clearly related to technical imperatives. The translation of those imperatives into needs for reach and range in a shared platform provide the basis for translating business functionality to technical strategy. That platform can be justified only in terms of corporate imperatives that show that the platform is a corresponding imperative, and through the definition of the big rules that ensure coordination of platform with decentralization of use.

From action back to knowledge

The Landberg Dairies example illustrates the link of knowledge to action. The link from action back

to knowledge is the one that so many firms lack, including Mutual Benefit Life Insurance Co., which boldly and imaginatively re-engineered business processes. Mutual Benefit, however, failed to make a fresh scan of its environment early enough. Inattention to the knowledge-action linkage is the reason so many former leaders are among the firms that lose out in the electronics marketplace where time and location independence are the new competitive currency. In the 1970s, Sears, Trans World Airlines, Inc., and Philips' Gloeilampenfabrieken N.V. were industry leaders and highly innovative in particular uses of I/T. Sears' telecommunications group is among the most respected in the *Fortune* 100. The TWA computerized reservation system was the most technically advanced design. Philips expended immense sums of money on research and development to create such innovations as the laser disc. But all of these companies drifted from their places of eminence because they failed to put the pieces together.

Information technology itself is not the key ingredient, but managing it is.

Perhaps success is part of the problem. It is very difficult for a firm that has tamed a technology, built a strong and loyal culture, and made its business processes effective to question the basics that enabled it to do so. In a stable environment, strategy and forecasting dominate the management process. In an environment characterized by discontinuity and the reordering of everything, strategy is not enough, and can even lead to efficient implementation of ineffective aims.

Because networking disturbs the business *status quo* and upsets the basics of time and location, the very processes of design and implementation can invalidate the strategy that preceded them. Success changes the rules. One of the leading international automotive manufacturers, for example, has developed a new technology capability that dramatically improves communication with its dealers. The services include access to inventory data, software for pricing, on-line financing analyses and processing, back-office administrative support, management information systems, and other key processes.

This complex and costly system was developed within the context of a bold business vision that has made quality and the time to market core competitive priorities. The resulting strategy has been to streamline the procedures and relationships with manufacturing and sales operations and the dealers. But the very process of introducing the new technical system challenged many existing assumptions about the dealer business network. Also, the downturn in car sales during the 1990–1992 recession raises the question of what the dealer network will be like in the mid-1990s, in terms of consolidation and customer relationships with the dealers. The new system, for example, includes many facilities for helping customers choose among models and financing plans, with on-line product information easily accessible. This information can be used as administrative and selling tools. The same information can be used to streamline the dealer's existing operations, transform the dealership from a showroom to a shop, sell a car to a customer who comes in, or to target marketing to bring that customer in.

The more the company's information services planners look at the implementation and operation of the new dealer system, the more they wonder whether the assumptions on which it is built need fundamental re-examination. In particular, they question whether there will still be 12 000 dealers by 1997. They wonder whether the system may itself promote consolidation. They also see opportunities to use the system to create a new vision of the dealer network as a competitive differentiator. Thus the system would create a new strategy for exploiting what is being put in place.

The I/S planners have a broader view than the firm's sales department planners, who take the system's assumptions about the dealer system as given. The sales planners may have simply not asked the same business questions as the technical planners. Their reaction has been one of indifference and annoyance that technical people are questioning their business assumptions.

The knowledge-to-action drive is a natural one for business. We must learn to think before we act. Beginning with the business environment, we move from strategy to action. The emergence of re- words is a reminder that looking back has become a new business priority. In the case of the automotive manufacturer, tradition, functional organization, and attitude impeded rethinking. Without rethinking, I/T can support only the status quo, even as it may be transforming it.

One of the implications of business networking is that there is no revolution in information technology. Information technology itself is not the key ingredient, but managing it is. Leading in information technology is well within the experience and ability of any senior executive. One requirement is to have an aggressive technology plan coupled with an organizational plan. Another approach would be to create a business strategy that depends on fast and easy coordination, cross-selling of products, and globalization of operations, at the same time ensuring that the firm has a coordinated technology base.

The economic target: Quality profit engineering

The fusion map or any methodology for aligning the thinking of business leaders and I/T managers must address the issue of economics. Expenditures on I/T now amount to almost half of large firms' incremental capital investment, with no convincing evidence of economic payoff.[19] The expansionary economy of the early to mid-1980s made competitive advantage an acceptable justification for many major I/T expenditures. The present harsh business environment plus business executives' insistence that I/T pay its way make competitive advantage a less convincing argument. We are living in a time when companies face continued and new challenges from aggressive domestic and foreign competition. Profitable industries like insurance, local telephone companies, insurance, publishing, and banking no longer have a growing market and high profit margins. Many business leaders approved I/T investments in good times, even though they were uncertain about the payoff. Now they do not accept uncertainty and point to the growing burden of I/T costs and of I/S staff. As companies are downsizing middle managers and frontline workers, they are not pleased by proposals to maintain large I/S units and to raise the I/S budget when all others are being slashed. For I/T to be a true business resource that merits senior managers leading it instead of delegating it, it must be shown to make a significant contribution to the firm's profitability. Without a convincing economic model for assessing I/T, there will be no alignment between business and I/T managers.

Quality profit engineering is a framework and starting point for this. It aims at showing where and how I/T contributes to the firm's profit and cost structures by identifying five areas of economic opportunity:

- *Improvement of unit profit margins* rather than revenue growth is the economic imperative of the 1990s. Profit is the top line not the bottom line of management concern.
- *Reduction of costs* of inventory, labor, real estate, and also I/T is needed. The latter is now the third or fourth largest business cost for most firms.
- *Provision of premium service without premium cost* is an objective for which there are three practical approaches: (1) Charge for the service, although this is not an option except in special cases. (2) Add people, even though overstaffing is a major reason that the competitive strength of American business eroded in the past two decades. (3) Use I/T. I/T does not guarantee a premium service without a premium cost, but the facilities of electronic data interchange, customer relationship databases, image processing, and the like offer the best opportunity of the three suggestions.
- *Provision of a similar premium quality.* As with the premium service, electronic customer-supplier links, computer-aided design and computer-aided manufacturing (CAD/CAM), and other uses of I/T are a potential means of ensuring quality without increasing the cost and reducing the profit margins.
- *Improvement of revenues* by using I/T. This opportunity offers the chance to add services to an existing platform without proportionately increasing costs. Just as British Airways added international hotel reservations to its customer service offerings, McKesson Corporation became the third largest insurance claims processor in the United States by adding this service to the order entry system used by pharmacists.

The logic of the quality profit engineering framework is described in more detail elsewhere.[20] The

key point to make here is that alignment demands an economic model that is convincing to business executives. One economic reality of the 1990s is the erosion of profit margins in many industries. This is being driven by a combination of deregulation, globalization, and overcapacity, much of which has been created by information technology. Customers insist on quality and service as basic requirements and not as premium items for which a firm can charge extra. Businesses now have to dramatically and quickly improve their cost structures as a survival issue.

Just as I/T imperatives must relate to business imperatives, I/T investments must be justified in relation to these economic imperatives. Areas of major and proven opportunity here are:

- *Improve margins* by streamlining operations through business networking and generating and moving information that allows managers to make fast decisions in response to market trends and events. Top airlines and retailers fine-tune their pricing and distribution literally in real time. Manufacturers similarly fine-tune their inventory and operations via just-in-time information for a world of just-in-time competition.
- *Reduce overhead costs* by location-independence, which allows the electronic movement of work overseas to regions that provide well-educated staff at a lower cost. Shift back-office work out of the United States northeast to Dublin, for example. This reduces the need to locate functions in cities where real estate costs are high. Electronic data interchange and image processing cut administrative staff and layers by factors of 10 or 20.[21]
- *Provide quality and service premiums* by I/T. A few of the time-tested tools are: electronic data interchange (EDI), image processing, computer-integrated manufacturing, customer service databases, and new forms of telephone access.
- *Improve revenues* by way of an I/T platform with extensive reach and range. This provides many opportunities to add revenues and services. The major part of the investment is already paid for.

As a core element in realizing payoff from I/T, the topic warrants close scrutiny by I/S managers, business leaders, researchers, teachers, and consultants. Getting real payoff from I/T is the single greatest hurdle of business executives. Quality profit engineering is a framework for thinking creatively and practically about increasing the contributions of I/T to profitability. The phrase *quality profit engineering* has come to mean the following.

- Quality profits are not the same as profits nor are profits the natural bottom line outcome of revenue growth. I/S must focus on helping to resolve the dilemma of quality and service as essential in an era of eroding margins. Revenue growth no longer necessarily means profit growth. The term *downsizing* means that the increasing costs of increasing revenues are reducing profits.
- Profits are the main issue and the competitive advantage model for justifying I/T has largely missed this point.[22]
- This is not a re-engineering task since engineering was never done in the first place. I/S as a field of research and practice has focused on technology, development methods, project management, and most recently, competitive advantage. It has largely neglected the practical economics of managing I/T capital.
- Engineering is the discipline I/S must aim at because it is a profession with a clear tradition and body of knowledge. Its core is project design and management. Engineers must keep abreast of new technology, while operating and updating existing technology. To be viewed as a profession, I/S must shift its perspective and build the new disciplines and principles senior executives are demanding. The application of these principles ensures that I/T is contributing directly and reliably to profit, which is the top line of management concern.

Conclusions: Applying the fusion map

The fusion approach has been applied in a number of public and private sector organizations. It is partly a diagnostic tool. Figure 2 illustrates examples of firms' assessments of their own strengths and weaknesses in individual cells and in the linkages across rows and columns of the fusion map. A typical finding is that strategy is stronger than what precedes it. I/T is largely overlooked in the processes of business scanning that create and test knowledge anchors. There is a frequent ambiguity about business imperatives and corresponding I/T imperatives. The big rules needed to ensure effective development and operation of the I/T platform are missing. Con-

versely, the simple conception of imperatives and big rules appears genuinely to help business leaders focus on the key areas where they themselves can most contribute to the business and I/T dialog. Big rules ensure movement across the great management divide. The conception of business networking similarly helps these leaders focus on just where and how I/T may transform the basics of business and competition. This conception and language helps clarify the vital need to review knowledge anchors from a perspective that includes I/T as a central element.

The fusion map includes a number of cells that address strategy and sourcing, implementation and operations. These are the other side of the divide and are not so directly the responsibility of business leaders, and they are not reviewed in this paper. Experiences to date in applying the fusion map suggest that the clearer the imperatives and big rules, the more strategy seems to become primarily an issue of sourcing. That is, the clearer the "what" and "why" that drive strategy, the more the "how" relates to multisourcing, to a mix of choices about in-house development, to selective outsourcing, to joint ventures with vendors, to customers and other allies, and to industry cooperation.

Several other conclusions emerge from experiences in evolving and applying the fusion map. The first is the entirely different nature of each case. This point is not as obvious as it may seem. The technical strategies and even technical architectures in these firms were fairly similar. Indeed, knowing the industry and a few aspects of the business plan, one can generally predict the architectural blueprint. The sensible range of technical choices is relatively narrow. In most of these companies, the focus had been on strategy. That focus did not adequately clarify internal priorities, which is what imperatives do. These priorities deal not with detailed applications, but with the degree of urgency, the issues of big rules versus local decisions, with the question of corporate-wide I/T platform needs, and with the priority that senior business management places on factoring I/T into its discussions early in business innovation.

The second lesson is that language is key. The author's field notes and detailed notes from interviews are full of top managers' comments about relevance and about how the I/S people try to get their message understood, even though their management has totally different priorities and concerns. This was true in every company, even those in which the I/S group was very business-focused and had credibility with the business leadership. The two groups want to work together and try to do so, but results are not achieved. The third conclusion is that senior managers are urgently concerned about how to assess the economic payoff from I/T. This continually enters the discussions of competitive positioning or business opportunity.

The fusion map, as applied in a number of organizations, seems to work. It makes sense to business executives and has led to some radical initiatives. The fusion map has helped make I/T a more central and recognized part of business dialog. One overriding issue I/T addresses is that of providing the guidance to those who will manage the business. This is both critical and practical. One of the main lessons learned from developing, testing, and applying the fusion approach is that applying I/T does not have to be unnecessarily complex.

The principles of applying I/T revolve around the vital need to include I/T in the process of building and applying knowledge anchors, and clarifying business and technical imperatives. Another principle is that of having a convincing economic framework for I/T. Finally, we recognize that in the end, leadership, including leadership of I/T, is a human quality, and leadership in business is the executive's responsibility.

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Cited references and notes

1. The classic early reference on the need for top management commitment is a report by the McKinsey Corporation, NY, *Unlocking the Computer's Profit Potential* (1968). J. Rockart, "Chief Executives Define Their Own Data Needs," remains the equally classic statement of the problem of creating business/technology alignment in a context of ubiquitous misalignment; *Harvard Business Review*, 81–93 (March–April 1979). J. Rofthreder and L. Driscoll summarize the disappointments that have resulted from the overexpectations of what CIOs can do in an environment of lack of dialog and executive frustration about the payoff from I/T: "CIO Is Starting to Stand for 'Career Is Over'," *Business Week*, 76–80 (February 26, 1990).
2. See P. A. Strassman, *Information Payoff*, The Free Press, New York (1985), and "Management Productivity as an

I/T Measure," *Measuring Business Value of Information Technologies*, ICIT Press, Washington, D.C. (1988). P. Weill demonstrates a significant conversion effectiveness factor in the widely different outcomes from I/T investments made by manufacturing companies. This factor is attributed directly to management experience and commitment; see P. Weill, *Do Computers Pay Off?*, ICIT Press, Washington, D.C. (1990). S. S. Roach has demonstrated that white-collar workers' productivity in 1989 was almost the exactly the same as in 1979, during which time I/T investment per worker almost doubled; see *Technology Imperatives*, Morgan Stanley and Co., Inc., report (January 1991). (This report may be obtained from Morgan Stanley and Co., Inc.)

3. This number comes from a range of press sources, some anecdotal and informal, that said any observer can identify that there are many fewer major airlines, medical goods distributors, and department store chains in 1992 than there were in 1982. More specific numbers are available for retailing, where the link between I/T and business success or failure is well documented. For a summary of the 1980s, see "The New Champs in Retailing," *Fortune*, p. 85 (September 24, 1990).
4. The term *strategic intent* comes from an article by G. Hamel and C. K. Prahalad, "Strategic Intent," *Harvard Business Review* **66** (May–June, 1989). "Strategic intent implies a sizeable stretch for an organization . . . [it] is like a marathon run in 400-meter sprints. No one knows what the terrain will look like at mile 26, so the role of top management is to focus the organization's attention on the ground to be covered in the next 400 meters."
5. Dillard Department Stores, Inc., is a department store that provides an instance of the use of information technology. "A Quiet Superstar Rises in Retailing," *Fortune* (October 9, 1989). Also, William Dillard, Jr., CEO of Dillard, commented to this author that the company does not regard itself as a leader in I/T. Dillard is not interested in technology, only in being first-rate in its business. That attitude has made it a leader in the use of point-of-sale technology, electronic data interchange, and bar coding.
6. Access tools here include personal computers, bar code readers, ATMs, and telephones. The resurgence of the ubiquitous POTS (plain old telephone system) in the past few years has made it as important an access tool to computer-based services as personal computers. Bellcore's ADSL standard, for instance, enables the local telephone company to send digital data at 1.5 million bits per second down the existing copper wire telephone line. This is sufficient bandwidth to carry full motion video and films. Telephone exchanges 800 and 900, voice messaging, and emerging voice recognition techniques extend the capability of POTS, making it a core tool for business networking.
7. Teleradiology is rapidly emerging as a major application for high-bandwidth telecommunications transmission. The Makati Medical Center, Manila, Philippine Islands, holds on-line conferences with radiologists at the Stanford Medical Center in California. X-ray images are displayed and manipulated in real time on personal computer screens at each end of the link. See A. Buelva, "Hospital relies on international net to feed images to doctors," *Network World*, p. 1 (February 3, 1992).
8. Rudy Puryear of Anderson Consulting brought the "re-" phenomenon to the author's attention.
9. For a review of the impacts of telecommunications on time-based competition, see P. G. W. Keen, *Competing in Time*, Ballinger Publishing Company, Cambridge, MA (1986). G. Stalk, Jr., and T. M. Hout, *Competing Against Time*, The Free Press, New York (1990), provides many examples of time shifts in core logistics, but largely ignores information technology. See also, S. Davis and W. Davidson, *20/20 Vision*, Simon and Schuster, New York (1991) for a discussion of how computers and telecommunications are reshaping the basic structure of American enterprise.
10. See Reference 9, Stalk and Hout, p. 29.
11. For a fuller discussion of how cities compete through business networking see D. W. Edwards, J. Elam, and R. O. Mason, *Securing an Urban Advantage*, ICIT Press Briefing Paper, Washington, D.C. (1989) and P. G. W. Keen, "Planning Globally: Practical Strategies for Information Technology in the Transnational Firm," *The Global Issues of Information Technology Management*, S. Palvia, P. Palvia, and R. M. Zigli, Editors, Idea Group Publishing, Harrisburg, PA (1992).
12. One of the leading exemplars of business networking as the cornerstone of highly personalized service is United Services Automobile Association (USSA), an insurance firm. USAA's strategic intent has for many years been "to be easier to deal with than having an insurance agent living next door" and to present a "single company image," a single point of contact for every service, with immediate responsiveness. It is this strategic intent that led it to pioneer large-scale image processing and become the largest user of 800 telephone numbers in the United States. The style of thinking and leadership that produced these results is summarized in "Service Comes First: An Interview with USAA's Robert F. McDermott," *Harvard Business Review* **69**, No. 5, 117–127 (September–October, 1991).
13. This was an early recognition. In his autobiography, Sam Walton discusses how in 1965 he began to realize that every store was unique in its pattern of sales and customers. He disarmingly and casually states that he decided then that he ought to learn something about computers. Now, Wal-Mart is widely recognized as being the industry pacesetter in the use of I/T. "Wal-Mart has taken technology to another level of efficiency. Everyone has that potential but Wal-Mart and Sam's Wholesale Club Div. have perfected the use of technology from the manufacturing to the customer level." ("An Undaunted Industry"), *Supermarket News* (May 4, 1992).
14. "Business degrees of freedom" refers to the practical range of product and service options available to a firm. See P. G. W. Keen, "Positioning the I/T Platform," *Shaping the Future: Business Design Through Information Technology*, Harvard Business School Press, Cambridge MA (1991).
15. Most unemployment surveys are anecdotal but all point to the same general trends that led *Business Week* to define CIO as standing for "Career Is Over." This represents a dramatic shortening of the tenure of the average CIO to about 18 months, an equally dramatic increase in firing rates, and a growing reliance on bringing in people from outside the I/S mainstream to head I/S. See Reference 1.
16. Landberg Dairies is a pseudonym. The company, its country, and its exact industry have been disguised to maintain confidentiality.
17. For a fuller description of the I/T platform and reach and range, see Reference 14, Chapter 7.

18. See Reference 14 for data and discussion.
19. See Reference 2, Strassman, pp. 17–55, and Weill.
20. P. G. W. Keen and M. Cummins, *Networks in Action*, Wadsworth Publishing Company, Belmont, CA (1993).
21. See W. H. Davidson, "Beyond Re-engineering: The Three Phases of Business Transformation," *IBM Systems Journal* **32**, No. 1, 65–79 (1993, this issue).
22. None of the most cited books and articles on this topic provide more than cursory figures on the economic impact of the competitive advantage provided by I/T. The assumption appears to be that the growth in market or market share more than repaid the investment.

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