

Strategic control in the extended enterprise

by B. R. Konsynski

The strategic role of information systems in "extending" the enterprise is examined. A number of issues emerge as essential considerations in the strategic alignment of the investment in information technology and business strategy. Information technologies transform organizational boundaries, interorganizational relations, and marketplace competitive and cooperative practice. The paper presents a framework of strategic control that guides the planning and execution of these investments in information technology for business transformation, seeking increased understanding and influence. Emerging information technologies change the limits of what is possible in the leverage of strategic control through transformation of boundaries, relations, and markets.

The traditional view of the business organization with clear boundaries, limited relationships with other organizations, and a focus on internal efficiency and effectiveness is no longer adequate. Today's organizational boundaries are blurring, partnerships with clients and competitors are commonplace, and quality and efficiency issues extend well beyond the traditional enterprise boundary. The major strategic successes involving information technology in the last two decades have entailed a redesign of interorganizational relations. The now familiar stories in the airline, hospital supply, and banking industries are not anomalies, but merely the tip of an emerging trend in new organization alliances, boundary redefinition, and market structures. New product and service offerings, channel systems capabilities, and target-marketing initiatives are enabled through these partnerships, alliances, and information interchange arrangements. These new or-

ganizational and market relationships are made possible through systems that cross organizational boundaries.

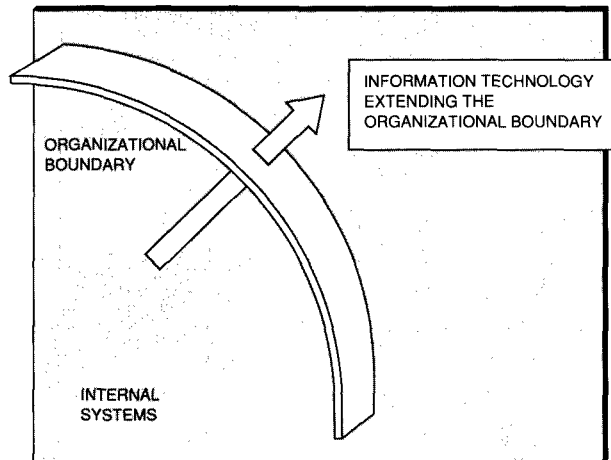
The management challenges are huge, messy, interfunctional, longitudinal, and rich in operational and strategic threats and opportunities. The upside potential lies in the opportunity to effect a changing of the "rules" in the marketplace. The downside risk may even be life-threatening to the enterprise. In either case, inaction is not an option in many industries.

The constraints in leveraging information technologies in the pursuit of "changing the rules" in an industry, or merely in a relationship, are both real and significant to the general manager. The structure of business processes across organizational boundaries is both an academic challenge and a senior management concern. Traditional concepts of organizational boundaries are challenged by these new organizational arrangements that blur distinctions between legal entities and create new opportunities for strategic initiatives. Strategic alignment is an essential tool in designing and managing these new forms of partnership and alliances.

The framework presented in this paper is the result of the author's experience with more than 40 organizations that have pursued information

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Figure 1 Transcending traditional organizational boundaries



technology initiatives that enhanced their strategic control within their organization, at the boundary, in relations and alliances, and in common practice and industry platforms in the marketplace. Obviously, this single lens on the complex issues of strategic alignment is necessarily incomplete. It has been the author's experience, however, that many important opportunities have been missed though the neglect of impacts of information technology (I/T) initiatives on boundary systems (e.g., sales and service representatives), interorganizational relations (e.g., electronic data interchange and data sharing), and marketplace systems (e.g., IVANS in the insurance industry and Transnet in the automotive parts marketplace). The framework permits an examination of derived value through impact on the control systems in I/T projects that "stretch" the enterprise.

Systems that transcend organizational boundaries.

In their quest for operational efficiencies and competitive position, organizations today are more frequently looking beyond their traditional boundaries for cooperative arrangements. New interorganizational arrangements, which variously take the form of strategic alliances, vertical integration, and new business partnerships and associations, are realized through the leverage of unique information interchange relationships—electronic linkages across organizational boundaries. Because their impact on competitive position, market channels, logistics, distribution, and

administrative practices can be profound, attention to these initiatives could be one of the top items on the general manager's agenda for the next few years.

The variety of opportunities managers face in defining their relations, both formal and informal, with other organizations is growing. New technology-based information-sharing support-linkage initiatives that affect cost, time, integration, and operations facilitate a broad set of business activities and relationships designed to foster cooperative and competitive market situations.

Information technologies have a fundamental impact on business relationships among cooperating and competing entities in a market. When properly executed, information technology involvement in business process redesign enables companies to offer novel products, incentives, and services, participate in new marketing programs, take advantage of multiple channels of distribution, or introduce operational efficiencies and realize revenue enhancements. Such arrangements can make small companies look, feel, and act *big*, reaching for customers once beyond their grasp, or they can make big companies feel *small* and close, targeting and servicing custom markets. The information technology function is being called upon to facilitate the design of these complex, interorganizational systems (IOS) by supporting cooperative, intraorganizational and interorganizational, functional teams.

The role of I/T: Boundary spanning and enterprise extension. There is little doubt that a significant real and potential role exists for information technologies in influencing interorganizational relationships. In this view, presented in Figure 1, information technology plays a critical role in "extending" the enterprise well beyond the traditional organizational boundaries.

Applied both within and across organizations, information technologies are having a fundamental impact on the business relationships among traditional industry participants. These technologies, and their applications, support new forms of marketing and distribution channel services that (1) strengthen relationships, (2) create channel "by-pass" opportunities, and (3) alter business relationships in the channel. The growing number of electronic linkages between and among buyers and sellers results in dramatic effects on the inter-

organizational relationships and industry structure. These *interorganizational systems*, IOS, may have significant impact on both cooperative and competitive associations within and across industries. Such systems involve traditional information system elements that *transcend organizational boundaries*, thus *permitting shared applications across legal enterprise boundaries*.

Transforming boundaries, relations, and markets.

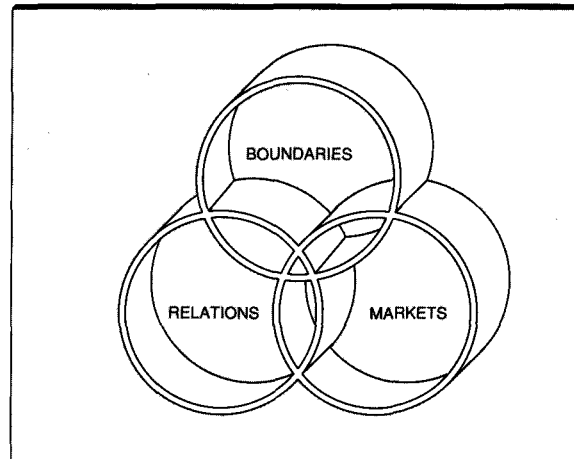
For our purpose we focus on three elements that represent key managerially relevant issues in the consideration of interorganizational relations: *boundaries*, *relations*, and *markets*, depicted in Figure 2.

Boundaries are transformed by the various forms of IOS initiatives. Culture and practice are interdicted. Operations and management practice and procedures are transformed and have a major impact on applications and human resource dynamics. Organizational structure issues may be profoundly impacted: division of labor, conflict resolution, coordination mechanisms, accountability, authorities, and identities are threatened. The boundary can be made "softer" or "harder"—more porous or more impermeable. In fact we can do both at the same time, as we "turn the dial" on the application of our information technologies to open or close the boundary to the ingress or egress of information. Another element is the attention to technologies that change the information access at the boundary. Wireless, hand-held, and portable technologies change what is possible *at* the point of sale, service, or other "limits" of the enterprise.

Relations with parties outside the enterprise that are facilitated by significant information technology are of operational and often strategic concern to the general manager. Relationships with suppliers, customers, competitors, and other forms of partners and affinity groups have earned significant management attention. A wide range of partnerships are made possible by the "linking" technologies that permit new associations, business processes, and "integration" effects that are reshaping organizations and industries. Associations between cooperating and competing corporate entities will never be the same, as information technologies change the nature of these relations.

Market transformations can be profound as market search and coordination mechanisms are transformed by information technologies. In the 18th and

Figure 2 Transforming boundaries, relations, and markets



19th centuries, markets associated with financial and securities trading were transformed by government, international, and industry standards and procedures that were invoked to "rationalize" the markets. The result was a dynamic and flourishing marketplace that was able to grow in the succeeding century in (1) range of products, instruments, and services, (2) channels for marketing and distribution, and (3) target and focus for special niches and interests. This "rationalization" of the fragmented markets in hard goods and services is now made possible by the information technologies. The information intensity required to support this rationalization process has eluded even those that were aware of the potential. The speed and volume-handling capabilities and the coordination potential offered by emerging information technologies present new options.

The manager of tomorrow needs to pay attention to these boundary, relation, and marketplace transforming issues, just as any general manager in a large bank in the last century had to pay attention to banking practices, standards, regulations, and controls. Information technology influence on general management options suggests that few industries can neglect the potential changes that might take place in the next decade. The author's studies have shown that the timing and nature of these transformations are a strategic choice for managers. The ability to promote or inhibit "market rules" changes are profound. Par-

ticipation or anticipation of these rule changes are clear responsibilities of the general manager.

No longer do the decisions associated with information technology *follow* the business strategic planning discussion. In fact, information technology capabilities and initiatives change the strategic options available to the enterprise. Likewise, discussions of business transformation and business process re-engineering require attention to information technology options. Organization design, in general, can no longer ignore the critical role of information technology in changing the nature of choice. It is no longer merely an implementation issue; rather, the exercise of information technology is a critical organization design issue.

Information, organization, and control. Business trends, such as globalization and right-sizing, lead to new organizational strategies that, when executed properly, transform the coordination and control systems, management practice, and organizational structure in the global enterprise. These changes in traditional modes of competition in the emerging global business environment suggest significant opportunity for the leverage of information technologies in transforming business and management processes. The management challenges create an "emotional stress" in the marketplace and in management practice. Coping with this ambiguity is a natural part of the internationalization of business, with its diversity and information intensity. Particular challenges lie in the following areas:

- *Coordination*—To compete effectively at home or globally, firms require significant coordination skills that address value-chain management and relations with public sector entities.
- *Time to market*—Market and product innovation often involve cooperation and partnership across a diverse set of industrial and geographically dispersed entities.
- *Management control*—As time, cost, distance, and other factors undergo radical change, the span of attention and control for decision makers requires significant effort.
- *Organizational learning and talent/skill retention*—Two major challenges to management in the decade of the 1990s is the retention of internal talent (people, skills, core competencies) and the retention of key relationships in the

market (external talent) that provide important scale factors without ownership.

This "emotional stress" often sets the direction and pace of development and assimilation of many emerging information technologies. Factors that influence both the *institutional* and *technical* innovation that are required in business transformation are varied. Directions in evolution of several emerging technologies that deserve attention are being scanned by advanced technology groups in a wide range of organizations. Technologies, including wireless communication, neural networks, multimedia interfaces, electronic linkages, and virtual realities, offer significant potential. The alignment of strategic institutional requirements and emerging "base" technologies is essential for effective execution of both intra- and inter-organizational initiatives. Although the majority of papers in this issue focus on the issues of strategic alignment within the organizational setting, the focus of this paper is on the need for strategic alignment derived from the various forms of boundary, relationship, and market transformations associated with IOS initiatives.

In the past 30 years, the information intensity of an organization's products and services and supporting business processes and management control activities has been rapidly increasing.¹ As a consequence, I/T has had a significant impact on business processes in all areas of the enterprise—from supply, to manufacture, to marketing and distribution. In addition to business processes, management decision processes associated with essential planning, coordination, and control activities are transformed by the increased need for and availability of information. This growth in information intensity will continue, earning software, communication, and other I/T an ever-increasing role in both business processes and management control activities.

Historically, I/T initiatives have focused on individual decision making and small group decision facilitation. Computer-based technologies in support of organizational activities have existed since the advent of centralized computing with remote access and time-sharing. For the most part, these technologies have played a passive role in the organization, providing raw computational capacity and passive communications platforms like electronic mail. Now, new organizational information demands and emerging information technologies

have combined to make company-wide information access an organizational imperative.

Many cases have recently been reported of the explicit design of organization-wide systems that serve business and decision processes across the traditional functional areas in the enterprise. Several firms have taken a team focus, whereas others are restructuring the business processes themselves. For example, Xerox Corp., General Electric Co., and others are experimenting with new "team-based" organizational forms that involve information systems differing radically from historic systems environments. Xerox applied interfunctional team practice to product development and quality control demands,² whereas General Electric in Canada restructured their shared services facilities³ around interfunctional teams. A number of firms, including Hewlett-Packard Co. and AT&T, have also redesigned their business processes to hasten the speed with which they respond to the marketplace. As organizations become "leaner," they have begun to rely more and more on coordination and control mechanisms that are mediated by their information technology infrastructure.

Most strategic planning methods and frameworks, with few exceptions, focus on the role of *information* and *control* "inside" the traditional boundaries of the organization. Indeed, many discussions of the strategic alignment method⁴ focus on the intraorganizational management issues. In this paper we examine the means that a general manager might employ in influencing behavior in the enterprise and its relationship to a competitive position in the marketplace. *Strategic control* in an IOS approach offers the opportunity to examine these business and technology issues in an "extended" view of the enterprise. How might a general manager use an opportunity to leverage information and control mechanisms to influence behavior in the extended enterprise that encompasses, at least, its buyer and supplier communities?

In order to appreciate the essential role that the strategic alignment process plays in the design and management of alliances and partnerships, the general manager should be aware of the critical role of management *control* in governing information flow and use, as well as defining the limits of the "quasi-organization" that emerges in

a partnership or alliance. In the next section, we review the key elements of control.

Control: Support for understanding and influence

Control serves two ends: support for understanding what is taking place in the enterprise and in the market and support for the influence of the actions of participants, both inside and outside the enterprise. *Understanding* refers to the awareness and appreciation of what *has* taken place, *is* taking place, or *could* take place in the environment. *Influence* refers to the ability to communicate, command, persuade, or otherwise induce a particular behavior. It is the author's hypothesis that these two, nonorthogonal measures can be used to examine the purpose and value of a set of controls and information technology investment. The key questions then are as follows: To what extent do the controls contribute to managerial, or organizational, *understanding*? To what extent does the control, or system of controls, create the proper level of *influence* that will lead to the desired behaviors?

What is strategic control? The word "control" has *both* a noun and verb aspect. The *verb* (process dimension) relates to checking, testing, or verifying; exercising restraint or directing influence; reducing the incidence or severity of adverse situations (dictionary uses). The *noun* (authority, ability dimension) relates to a state, condition, authority, ability, or measure of power and influence. It is a tougher dimension to understand. It relates to the possession of the skills needed to use the tools, instruments, and technique of control.

A *strategic* assessment is more than a review of the inventory of processes and mechanisms of control. There is a judgment of the state or condition of control—as "in control." This judgment delineates the boundaries of influence, the limits of an ability to understand and influence what is going on. But, one might ask, what does this have to do with our pursuit of strategic control? Control is basically one system (akin to the nervous system, circulatory system, etc.) that is an important part of the enterprise. In a judgment of strategic alignment, we need to consider the delivery mechanism (information technology, designed) for this critical management process, or responsibility. Those systems that lead to a con-

gruence of the strategic direction of the enterprise are thus key elements of *strategic control*.

The organizing principles, with respect to the leverage of information technology in support of management control, are (1) essentials of strategic control (understanding and influence), (2) systems for the individual (task, function, focus, single objective, etc.), (3) systems for the organization (multiobjective, multifunction, organization-wide, etc.), and (4) systems for the extended enterprise (cross-organizational, boundary crossing, markets, etc.). The "systems" involve, for the most part, the leverage of information technologies in the evolution of information and control.

Organizations in the past have been defined with a focus on the human component. In such a view, information (and other) technologies were viewed as tools in the support of the mission and objectives of the human complement that *was* the organization. Descriptions of organizations were people-oriented ("An organization is a collection of people . . ."). It is the author's belief that we can, and should, challenge that bias and definition. We might say that *an organization is a collection of policies and beliefs, consisting of people and systems that operate in an environment, seek or encounter information, interpret, and respond according to the operative values, beliefs, and policies*. This view does not demote people, nor promote systems; it merely recognizes the parity and opportunity to leverage many varied resources in performing the judgment, decision making, and action of organizations.

This view encompasses both the organizations of the past (run exclusively by people-driven processes) and possible unique organizations of the future (which might be relatively peopleless). These potential organizations are what the author has called employeeless firms, or ELF⁵s. The basic intent is to challenge the assumptions we have held in the past about what organizations are and how they operate. We challenge issues of ownership, sourcing, strategy, mortality (yes, even the data and asset *immortality* assumption⁶), etc.

Information technologies offer the natural tensions of *constraint* and *freedom* that are a critical part of the discussion of control. Controls (and information technology applications) offer the dual dimensions of setting limits on what can be

done, while offering a definition of the degrees of freedom of action. It is a role of the control systems to define (or at least implement and guarantee) limits on authority and initiative. Hence, strategic control, by its nature, makes the case for attention to strategic alignment in partnerships, alliances, and other forms of interenterprise interaction.

Controls and the market. In our strategic initiatives we deal with the *design and implementation of the mechanisms that we might employ to influence patterns of behavior within the organization and within the market*. If that is only partly true, we have to deal with the opportunity to leverage information technologies to create influence in the market. It is said that "once you leave home, you lose almost 100 percent of your ability to influence events." Thus, if we think it is hard to design information and management control systems within the organization, it is much harder to design for, and implement, the means of influencing patterns of behavior beyond the enterprise boundaries. This is the challenge, and the opportunity, in discussing the role that interorganizational systems might play in the institution of controls in the extended enterprise.

It has long been the author's belief that a critical aspect of IOS design includes the decisions around the projection of influence beyond organizational boundaries. The compliance with standards, integration of applications across organizations, and promotion of unique systems (information, logistics, coordination, control, etc.) are essential concerns of general managers. The technology innovations are, almost by necessity, modest (due to the disparate levels of sophistication across organizations), whereas the business innovations lead to the substantial benefits or failures in IOS initiatives.

Design of markets. If most of our strategic initiatives are about issues related to "organization design," this paper offers the opportunity to consider the extent to which information and control issues play a role in the evolution of *markets*. This is an invitation for the application of the frameworks and concepts we have applied to the individual organization in the examination of attributes of the market. We look at the ways of creating new means of "organization" and governance in the market.

Table 1 Strategic control and relationship transformation

	Boundaries	Relations	Markets
UNDERSTANDING	Limits of scanning and interpretation	Shared measures and definitions	Shared values and expectations
INFLUENCE	Communication and measurement	Terms and conditions and escalation	Governance and sanction

Changing the rules in the market. From a competition and strategy standpoint, we deal with the opportunity to *change the rules* in the market: change, or leverage of the basis of competition, increases the "specificity" in the transaction, facilitates "focus," enables a low-cost leadership, etc. Strategic control is an opportunity to make a tighter link with the "competition and strategy" frameworks that are active in the minds of senior managers.

Forms of control in the market. The mechanisms that influence behavior in markets are many and varied. Standards, whether regulated by government or industry forces, are intended to influence the patterns of behavior in the participants in the market. Thus regulation and deregulation are essential elements of the control systems in the market. At the same time, some standards, protocols, service levels, and other behavior determinants are mere guidelines, or "generally accepted procedures."

Complex, messy issues. These scenarios take a long time to play out. Fortunately, we have several industries (including airline and hospital supply industries) that have a considerable history that can offer insight into the management challenges. The myths that these activities serve to introduce simplicity and efficiency in the markets and lead these marketplaces to act as "markets" can be challenged. Commoditization of products, price-based competition, homogenization of products, reduced search costs, and other attributes of a level playing field are not the objectives of most players in these industries. In fact, managed complexity and significant bias are the usual result. So, waiting to jump on board when the efficiencies occur is a "dumb" move. We cross generations of technology, cross vendors, cross management processes, cross cultures of organizations, etc.

The author has found it useful to carefully examine the potential and limitations of the I/T invest-

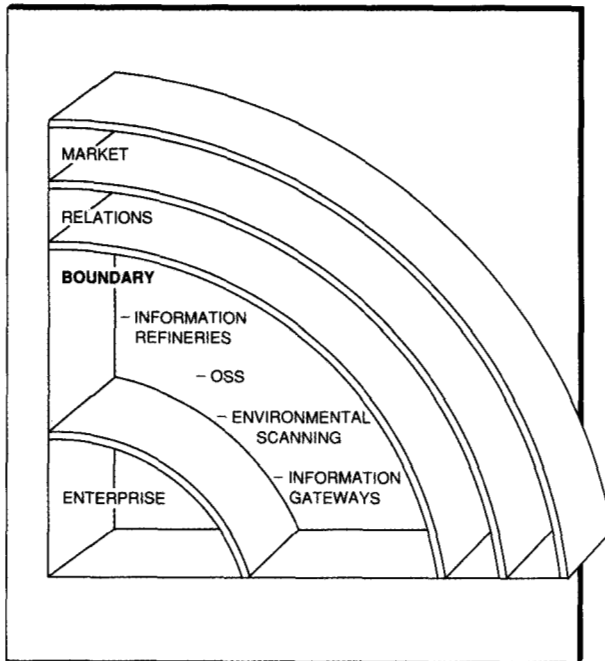
ment on the strategic control environment. The attainment of strategic control is an organization and a market issue. It involves the considerations given in Table 1.

Information intensity: Changing the limits of the possible with I/T. As organizations become more information-based and as information from internal and external sources becomes available on demand, traditional corporate functions such as planning, marketing, technical support, documentation, and publishing will be dramatically transformed or even eliminated. Although it is clear that these trends will increase the importance and visibility of the information technology contribution to the global enterprise, they could do so in a less than desirable way, creating almost unmanageable crises.

Today's enabling technologies and business trends, while allowing a new level of organizational flexibility and functionality, also have the capability of exacerbating information overload and gridlock problems. Some of these enabling (and possible ultimately disabling) trends include the following:

- High capacity and high reliability in scanning and character recognition. What is not in electronic form now, probably will be in the near future. New multipurpose copiers/scanners/facsimile machines act as high-capacity, data-capture, and conversion devices. Today, inexpensive multifont and multicolumn optical character recognition machines achieve impressive and practical levels of performance.
- Availability of external and internal information in electronic form. Most major newspaper, magazine, and book publishers make their publications available in electronic form. Many organizations are providing information that they share beyond their organizational boundaries in an electronic form. Desktop and electronic publishing, groupware, electronic mail, local area networks,

Figure 3 Boundary transforming technologies



and word processors are accelerating the trend toward the availability of internal information in electronic form.

- Document format standards and automated recognition. With the support of virtually all computer vendors and the aggressive endorsement of the U.S. Department of Defense, an International Organization for Standardization standard for the markup of technical documents—the Standard Generic Markup Language (SGML)—has been adopted. Products that automatically scan technical documents and insert the appropriate markup terms will vastly improve the speed and efficiency of technical documentation preparation and facilitate the automated classification and retrieval of complex technical and legal documents.
- Hypertext and hypermedia. Hypertext products link parts of different documents according to content. Such mechanisms exploit the malleability and shareability of text in its electronic form. Challenging old assumptions on linearity of presentation and reuse of content in multimedia forms is possible as these capabilities emerge.
- Knowledge codification. Advances in object-

oriented programming make it possible to encapsulate knowledge and software functions in independent modules that can be “plugged in” and combined with other modules as if they were integrated circuits. These techniques could make it feasible to assemble software applications from standard components. Simple knowledge codification techniques taken from the field of expert systems make it possible to capture and distribute certain forms of routine knowledge as a corporate asset.

- Virtual bandwidth. With the inclusion of inexpensive and high-capacity information distribution channels, methods for distributing information products and services are proliferating in the form of high-capacity public and private networks, inexpensive one- and two-way satellite transmissions, fiber optics, gigabyte compact disk/read-only memory that are approaching gigabyte erasable and writable 3 1/2-inch optical disks, high-capacity removable disks, audiotext, FM broadcast, and high-speed digital telephone lines.
- Bulk pricing of corporate information purchases. Information vendors are beginning to recognize that usage-sensitive pricing and onerous royalty agreements are inhibiting demand for their services and preventing their products from being resold and republished. Customers are demanding the right to reuse and combine external sources.
- On-line and distributed management. The advent of networked organizations, groupware, and other ways of coordinating and directing work in globally distributed organizations will not only increase the volume and velocity of information within an organization but will require new business techniques for managing on-line and distributed data.
- Electronic data interchange. Interorganizational systems for integrating many of the marketing, logistic, and distribution functions of buyers, sellers, manufacturers, and suppliers are growing at an enormous rate.
- High-performance platforms. A respected pioneer in computer architectures estimates that the price-performance ratio of processors is increasing at a rate of 70 percent annually. Reduced instruction set computing architectures and multiprocessing techniques promise to deliver 100 million instructions per second (MIPS) to the desktop shortly, with high I/O capacity servers achieving performance levels in the range of 500 to 1000 MIPS.

Interorganizational systems, groupware, document-based processing, information refineries, executive support systems, and other information technologies and applications will clearly have a fundamental impact on coordination and control. Each of these technologies offers significant potential in catalyzing changes in organization decision and business processes in the global enterprise. There are many opportunities for new I/T initiatives such as these to expand the range of technology options.

Boundaries: Enhancing understanding and influence

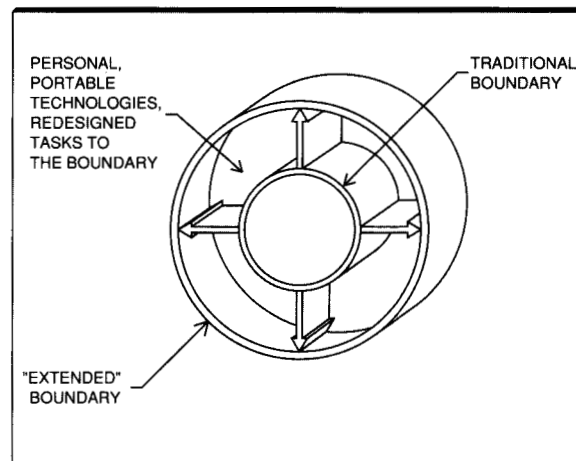
In order to consider the nature of control mechanisms in the interenterprise setting, it is important to assess the range of organizational transformation that is a critical part of the evolution of partnerships and alliances and identify many of the electronic integration effects that result from such arrangements. Figure 3 identifies several boundary transforming technologies.

Several factors are changing the role of organizational entities that serve at the boundary, e.g., sales and service forces. These include:

1. The development of control and coordination systems that permit the allocation of decision rights, while maintaining general management ability to *understand* and *influence* these boundary functions
2. The information requirements of the central authority requiring fast and accurate flow of information on boundary "events"
3. A growing requirement for fast response and decision authority for boundary functions, e.g., sales and service events
4. The emergence of computer and communications technologies that are more accessible (portable, usable, functional, etc.) to individuals that serve "at the boundary" (Figure 4).

Many management issues are associated with the volatile class of technologies that bring portability to the personnel that work at the boundary of the enterprise—laptop, notebook, palmtop, and hand-held computers, radio and cellular communications, etc. The variety of situations we have examined, at Frito-Lay Inc., Brooklyn Union Gas Co., Hanes Hosiery, Inc., Otis Elevator, Inc., and many more,⁷ suggest that the nature of work at the boundary is transformed, relations

Figure 4 Portable technologies extend communications impact

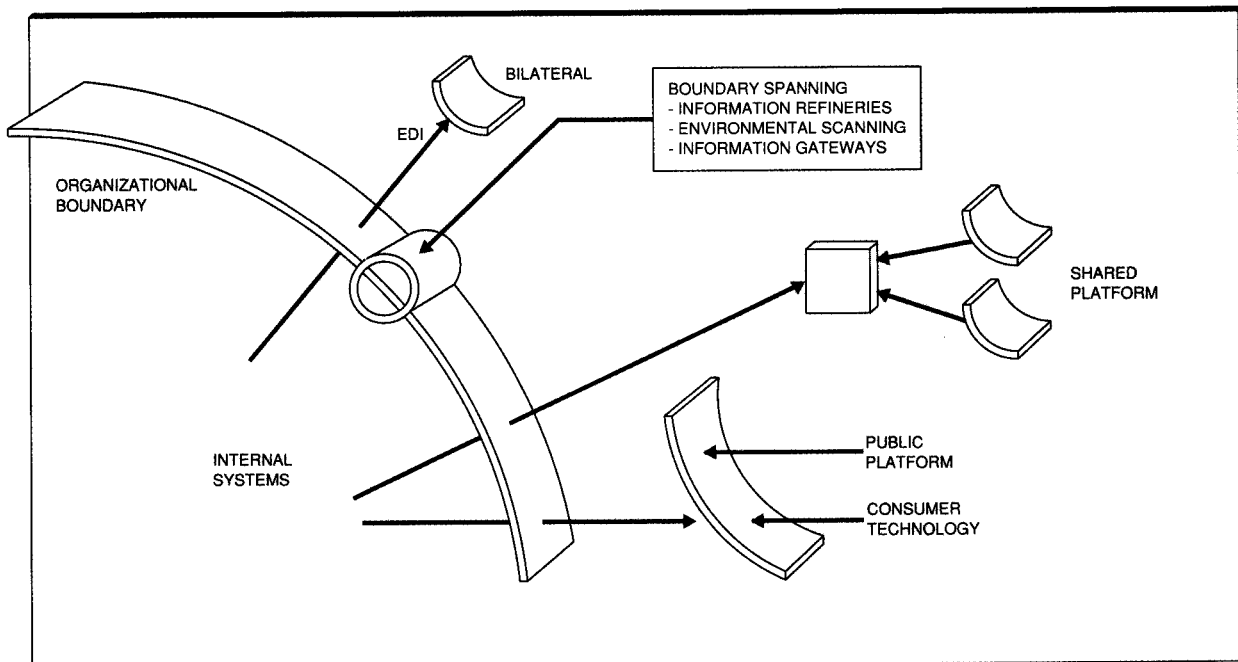


within and outside the enterprise are affected, information flows are significantly impacted, and management control systems are transformed. Of particular interest to general managers are the impacts on division of labor, decision rights, conflict resolution, coordination mechanisms, and measurement and reward systems.

This portion of the paper deals with information technologies that uniquely exist *at* the boundary of the enterprise as indicated in Figure 5 (information refineries and delegation technologies for environmental scanning). We explore the leverage of knowledge-based systems and other technologies to transform the functional and managerial options that define the boundary of the enterprise. The new capabilities help us to re-engineer our boundary systems and should therefore be part of the conscious options explored by general managers.

This section examines new boundary options that are possible as information technologies permit, at the same time, more flexibility and control over information flows, measurement, and decision authorities and new means for the influence of events that span the boundary of the enterprise. Information refineries⁸ deal with the ingress of information: How do we pay attention to the growing volumes of external and internal information and make decisions on what information is relevant to whom? in what form? in what context? etc.

Figure 5 Information technologies at enterprise boundary



Below we also consider the related theme of “delegation technologies” that make use of knowledge-based technologies to permit managers to “delegate” tasks to “intelligent agents” that can efficiently perform many of the cognitive activities associated with environmental scanning (say, for competitive assessment), relevance testing, and reconciliation across information sources.⁹ We briefly examine the opportunity for delegation technologies to support managerial activities that are beginning to elude current management practice as information volume and timeliness issues challenge the span of attention and control that is possible.

These technology-driven capabilities serve to transform the enterprise boundary, enabling a simultaneous increase in accessibility of information from the enterprise to the external environment and the ability to scan and pay attention to events and information that take place in the environment. There is much talk about the “blurring” of organizational responsibilities, but we have yet to see a framework in which to discuss the coordination and control of interorganizational rela-

tions in an information- and technology-rich environment. This segment of the paper will focus on future options for design and management of organizational boundaries.

The role of I/T in organizational transformation.

The application of information technology will either support¹⁰ (therefore *preserve*) or *transform* the business processes and decision processes of an organization. The traditional *results-reporting* function of I/S in organizations does not interfere with, indeed enforces, the current business process structure and its decision processes. *Organization-wide systems*, such as executive information systems, involve information that is cross-functional in scope, supporting new arrangements of management, providing for a forum for integration of traditional functional responsibilities, supporting new business processes, such as product groups or order fulfillment groups, etc. *Spanning systems* involve applications of I/T that are relatively independent of organization structure, but facilitate interaction (as in electronic mail, new forms of interchange, and decision-making patterns), roles, and responsibilities across traditional organiza-

tional boundaries. Certain classes of organization support systems are intended to be *transforming*, enabling change in both the business processes performed by the organization and also the nature of the decision patterns—who makes what decisions, with what information and what authority and considerations? Thus, we need to separate the various forms of organizational support systems (OSS) from the standpoint of the degree to which they serve to *preserve*, or *transform*, the traditional, or existing, roles and responsibilities. This relationship between business and decision process preservation and transformation is depicted in Figure 6.

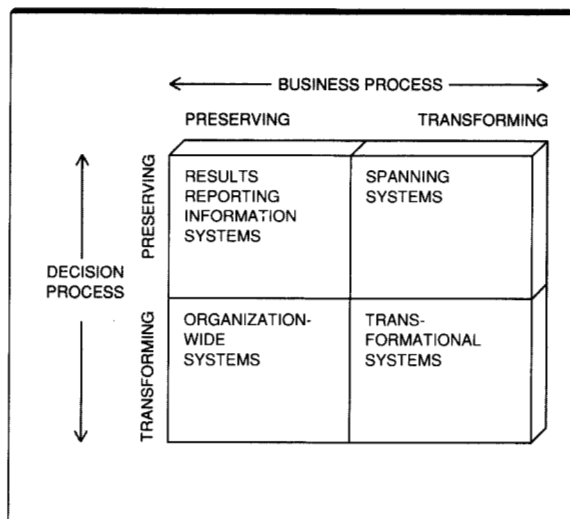
Systems usually involve the integration of many component technologies. The list of information technologies commonly associated with the support of business and decision processes continues to grow. On the communications side, they range from technologies used to maintain interpersonal communications, for example, electronic mail, to technologies supporting interorganizational communications, for example, electronic data interchange. On the information processing side, the span of information technologies reaches from expert systems and relational databases to specialized processors and information storage devices.

These information technologies often limit the information-processing capacity of the organization, inhibiting information sharing through connectivity and access restrictions. Innovative uses of technology will bolster new organizational forms and their corresponding decision processes.

Forms of organizational support systems. Organizational support systems provide an organization-wide platform to enhance, facilitate, and enable the work of the organization members. They are, by their nature, cross-functional. OSS encompass four types of information systems environments:

1. *Results reporting information systems*—Any basic support system within an organization that reinforces traditional norms, often by embedding organization policy in the logic of the system. This is the most subsumptive and most generic of the four types. An example would be the standard reporting and control systems, such as general ledger. Such environments are *structure enforcing*.
2. *Organization-wide systems*—Information tech-

Figure 6 OSS support for business and decision processes

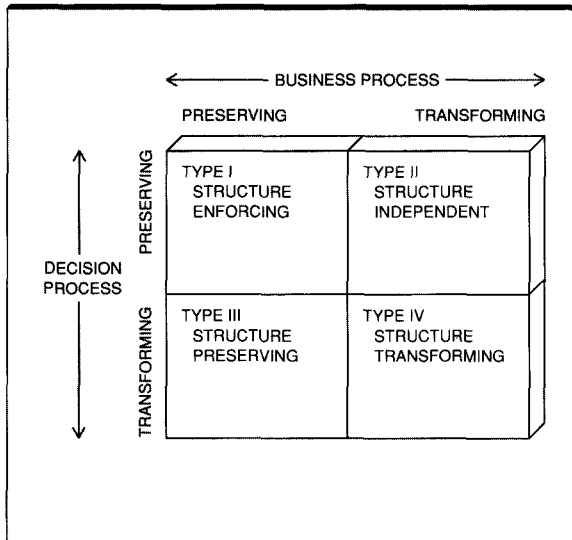


nology used at an organizational, or multifunctional, level. An example is top management use of an executive information system to access or analyze organization-wide data. These systems result in changes to decision processes but do not directly affect business processes. Such environments are *structure preserving*.

3. *Spanning systems*—Technology that spans the organization, in that it is used by individuals across functional or hierarchical boundaries. These technologies transcend organizational structure, neither requiring nor deliberately defying traditional norms. An example is an electronic mail system available to all members of the organization. These environments are *structure independent*.
4. *Transformational systems*—Organizational structures. An example might be special forms of groupware that permit work teams to be formed independently of geographic or traditional hierarchical relationships. Such environments are *structure transforming*.

Each of these types has different impacts upon the business and decision processes of the organization. Figure 7 represents the relationships implied by the taxonomy. As can be seen, each type enables a different set of process transformations, ranging from stability of enforcement to the flexibility of continuous structure transformation.

Figure 7 OSS structural relationships



In the following subsection we move from a view of the internal transformation to a beginning of the extension of the enterprise, the external scanning of the environment that is an essential part of the outreach of the organization.

Spanning the boundaries: Understanding the competitive marketplace. Identification and evaluation of relevant trends and patterns are critical steps in the business environment monitoring of an organization. Whereas the prior section focused on the patterns of internal communications and information interchange, in this section we address the need for understanding the competitive marketplace. The successful organization of the next decade is required to invest a considerable amount of resources in "scanning" the external environment. Not surprisingly, the "experts" that perform this evaluation are seldom skilled in all of the disciplines necessary to accomplish a thorough evaluation of the environmental indicators. Whereas one expert may be skilled at recognizing the potential for political turmoil in a foreign nation, another is skilled at recognizing how Japanese government deregulation is meant to complement the development of new products. Moreover, these experts often benefit from one another's skills and knowledge in assessing activity in the environment of the organization. Often the interchange among vari-

ously skilled analysts becomes a distributed problem-solving activity that creates the quality and interdisciplinary analysis that is essential for an effective environmental-monitoring activity.

Problems in the environmental-monitoring process often occur when a particular expertise, an agent in the problem-solving network, is unavailable, and knowledge from that domain does not play a role in the analysis. The focus of this section is on the distribution of expertise and the sharing of knowledge in the critical process of environmental monitoring. A technical approach is adapted in this effort—an architecture and a prototype are described that provide the capability of capturing, organizing, and distributing knowledge that may be used by experts in classifying patterns of qualitative indicators in the business environment.

U.S. corporations known to collect business intelligence include Ford Motor Co., Westinghouse Electric Corp., General Electric Co., Emerson Electric Co., Rockwell International Corp., Hoechst Celanese Corporation, Union Carbide Corp., and Gillette Co. Also, Digital Equipment Corp. and Wang Laboratories, Inc., both have environmental-monitoring groups. The list of organizations goes on to include (not exhaustively) Chemical Bank, the USV Laboratory subsidiary of Revlon, Del Monte Foods Inc., General Foods Inc., Kraft General Foods, Inc., and J. C. Penney Company, Inc.¹¹ At Westinghouse, for example, environmental-monitoring personnel act as information consultants and are involved in all phases of monitoring projects, ranging from defining intelligence objectives to ensuring effective dissemination and utilization of results. At General Mills, Inc., all members of the organization have been given basic training in recognizing and tapping the sources of competitor intelligence.¹²

The first step an organization takes in monitoring the external business environment for threats and opportunities often entails identifying and evaluating patterns of qualitative indicators.^{13,14} From a multiplicity of sources such as on-line databases, Freedom of Information Act sources,¹⁵ news clippings, financial reports, etc., experts and senior managers from a variety of backgrounds scan and evaluate information that, taken together, may suggest an early warning of threats or opportunities. For example, Berry Cash, vice president of semiconductor producer Mostek Corporation, says the following: "It's up

to each product manager to keep up with what the competition is doing . . . [for example] personnel looks at what kind of engineers they're hiring. You start seeing aggressive quotations for parts. We talk about these things every Monday at staff meetings. It's almost a form of gossip." Such tasks form a continuous activity performed by organizations but often draw on little support from the information technology of the organization.

Not surprisingly, the experts that make these assessments are not equally adept across all disciplines, and often they benefit from "comparing notes." For example, an expert may notice that a competitor has recently severed long-standing relations with foreign distributors, as well as having acquired a sizable interest in a foreign manufacturing facility. This competitor appears to be making aggressive moves, preparing to enter new and perhaps sensitive markets. With the help of another expert, one familiar with the geopolitical makeup of the area in question, the fact that the foreign government in question is making serious efforts at economic expansion—requiring foreign business to increase participation in the development of the country—may serve to explain the competitor's activities.

The director of a well-developed environmental-monitoring unit summed up the activities of his department in the following way: "It's like putting together a puzzle . . . my people contribute pieces, and after awhile a pattern of what's going on out there starts to form." Within his department, insights and conclusions are shared among others. But, as with many activities that require expert assistance, work stops when the expert is unavailable and cannot share his or her knowledge. This knowledge extends to questions asked, as well as determining and interpreting the answers given. Also, the expert or senior manager may leave the firm—in which case the continuity of aggregate knowledge or expertise available to the firm is interrupted. At other times, the expert may be unavailable to others requiring assistance, simply because the expert is on the phone, at lunch, or in a meeting, making communication difficult if not impossible.

The emerging extended enterprise involves the use of multiple agents to facilitate the sharing of knowledge in the distributed problem-solving activity of monitoring the business environment.

Here, the knowledge to be distributed is not only that which an expert or senior manager uses to identify a pattern of indicators suggesting a threat or opportunity to the organization, but also the knowledge of exactly what indicators are particularly pertinent to the classification problem of current concern. Not only is it important to provide an assessment of information once the right questions have been asked, but it is also useful to know just what those "right questions" are.

Transforming environmental monitoring through I/T. Environmental monitoring falls under the aegis of *organizational attention*—the process of perceiving and interpreting both the internal and external environment for the purpose of making appropriate operational, tactical, and strategic decisions that help to ensure the success of the firm. From these three points of concern (strategic, tactical, and operational) there are issues pertaining to individual, group, and organizational performance. Instances of these issues include the following:

- *Bounded rationality and cognitive reapportionment*—Are there methods available for reducing the limited capacity of individuals in assessing environmental queues and reapportioning them to a technology platform?
- *The phenomenology of enactment*—Can technology be used to shape the expectations of individuals in recognizing threats and opportunities in both crisis and noncrisis situations?
- *Span of control*—Can advanced technology provide greater span of control without information loss?
- *Organizational learning, vigilance, and design*—How can technology and design aid levels of vigilance and learning in the organization?
- *Boundary-spanning technologies*—Can shared technological platforms be used as sources of meaningful information?
- *Information refineries*—How can the organization better channel and harness the ocean of data and information in which it finds itself?

Environmental monitoring typically matches the capabilities of individuals and groups in identifying strategically relevant events external to the organization. In a series of discussions with personnel from several environmental monitoring units, we found that monitoring in large organizations often requires the cooperative effort of many individuals. Additionally, these individuals

fall into two broad skill categories: (1) those who are adept at finding and evaluating singular pieces of information, and (2) those who are adept at

In evaluating the competitive position of another firm, the area specialist may look for patterns over attributes.

looking at patterns of indicators and recognizing whether those patterns represent relevant threats or opportunities to the organization. The first group of individuals fall under the rubric of "intelligence analysts." The second group, the experts in some aspect of the external environment such as political events, regulatory measures, competitor financial status, etc., are "area specialists."

Based on the current goals of the organization, the area specialists decide upon the monitoring of a set of qualitative indicators that might provide insight into various threats and opportunities to the organization. Once the indicators are chosen, the area specialists request estimates from the intelligence analysts of the values of the indicators. The intelligence analysts have the role of locating and interpreting information that will shed light on the disposition of the indicators in question.

In continually evaluating the competitive position of another firm, the area specialist may look for patterns over attributes such as bidding behavior, research and development expenditures or hiring, new manufacturing methods, suppliers, etc. The area specialist may use his or her expertise to infer that a very low bid on the competitor's part may indicate several conditions: (1) the competitor's backlog is very low, (2) the competitor has made a leap in manufacturing methods and can reasonably meet their bid, (3) the competitor has made a gross error in judgment, or (4) the competitor has linked with a new supplier that, itself, can provide materials at a much lower cost.¹⁶ If research and development hiring has recently increased, and the competitor has invested in a new manufacturing site, it may be that technological

innovation is the best explanation for the very low bid. Conversely, if it is known that research and development expenditures have recently been cut and that there has been a hiring freeze, then the area specialist will likely infer that either the competitor's backlog is low or there was a gross error in judgment.

Historically, the scope of these activities represents a distinct departure from the 1960s and early 1970s, when environmental monitoring was largely an informal activity in corporations that relied on personal contacts to capture market- and sales-related information.¹⁷ Somewhat more recently (by the mid-1970s), work being produced in the area reflected increased organizational awareness of environmental factors in strategic planning. And, with the advent of the 1980s, interest in environmental monitoring has grown along with the vastly increasing amount of publicly available information about the competitive environment.¹⁸

Still, although research has been done to aid planners in enumerating potential threats and opportunities,¹⁴ analyzing the results of monitoring and disseminating environmental-monitoring conclusions, less attention has been devoted to monitoring patterns of indicators in the external environment. Although El Sawy¹⁹ discussed the activities of CEOs who do their own environmental monitoring, specifically for small-to-medium-sized firms, a literature search into the application of information technology in support of the monitoring activity has revealed that there has been little activity beyond providing an electronic mail facility to simplify some communication tasks.

Environmental monitoring and distributed problem solving. Environmental monitoring entails recognizing that many aspects of distributed problem solving are evident in this process. This subsection discusses the nature of distributed problem solving and how it relates to environmental monitoring.

Durfee, Lesser, and Corkill²⁰ describe distributed problem solving as the outcome of several agents communicating with one another, providing solutions to subproblems, and integrating these subproblem solutions into an overall solution. Generally, each agent has some kind of problem-solving skill at which it is most adept (as well as other, less-refined, skills). Moreover, these agents typi-

cally share solutions in their endeavor to solve both subproblems and "larger problems."

Generally, there are three dominant approaches to distributed problem solving: (1) multiagent planning, (2) negotiation, and (3) the functionally oriented, cooperative approach. Multiagent planning entails the selection of a central planning agent who is given all pertinent information from which to generate a plan. In this scenario, the chosen agent forms a multiagent plan and distributes the plan to the remaining agents in the problem-solving network. Here, a global view of the problem is available and allows activities among agents to be predicted and synchronized.

The negotiation approach accounts for the decomposition of a task into subtasks and the delegation of these subtasks to other agents through some kind of negotiation or bidding protocol. Here, bidding allows specialization in that agents choose subtasks that are best matched to their capabilities. The subtasks are offered for evaluation to the agents sequentially, making it possible for an agent to commit to a subtask prematurely. (A subtask offered later might suit the agent's abilities better, but having already committed to another subtask, the agent cannot take up the current one for which he or she is better suited.)

In a functionally accurate, cooperative approach, agents cooperate by exchanging tentative, partial solutions based on their limited view of the problem-solving network. By exchanging their sometimes inconsistent and inaccurate partial solutions, they converge on a solution. For improved cooperation, these agents need to be made aware of what partial solutions must be exchanged in the future to allow them to alter problem-solving activities to form compatible partial solutions in a timely fashion.

Distributed problem-solving activities like those described above frequently occur in organizations. For example, in keeping with activities that involve the exchange of knowledge and information, the business planning group at Stanford Research Institute has weekly meetings where the individuals doing business intelligence work exchange information and conclusions with their peers (in addition to holding informal meetings as an ongoing process). In a similar vein, the environmental-monitoring groups at NCR Corp. have recently joined activities under one department

head in order to better coordinate their efforts in putting together the environmental "puzzle."

These organizational efforts suggest a tacit confirmation of the theoretical characterization of distributed problem solving. That is, according to Durfee, "better predictions [i.e., plans] in these [distributed problem-solving] approaches have been achieved through organization: by providing nodes with organizational information (the general capabilities and responsibilities of other nodes, the communication patterns between nodes), the agents have a general understanding of each other and can therefore make better predictions."

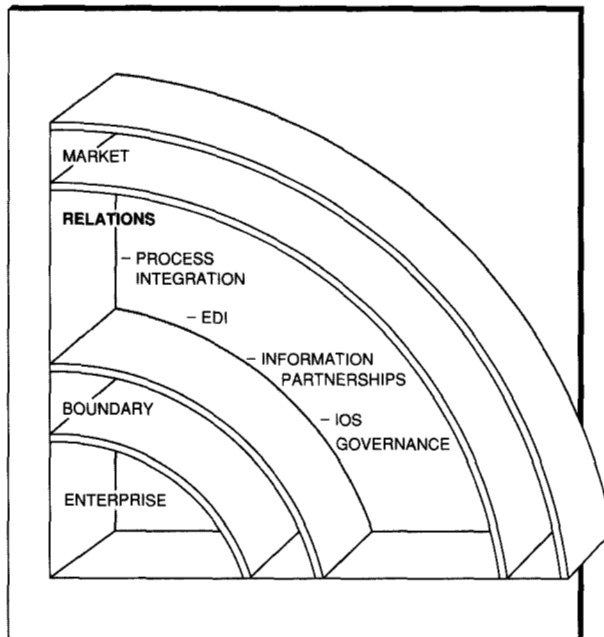
As distributed problem solvers, intelligence analysts and area specialists interact to contribute environmental monitoring information to the organization. Intelligence analysts have to be fully connected to one another in the process of finding information for the area specialists. Additionally, they interact with every area specialist inasmuch as they are all ostensibly available for the purpose of answering information requests. Likewise, the area specialists are fully connected with one another during the process of detecting threats and opportunities to the organization. Additionally, once a threat or opportunity has been detected, the information is reported by the area specialists to the strategic planning function. This work by the author is being extended to the special cases of "weak signal" detection and "amplification."

Relations and partnerships

Linking organizations—Using I/T to cross boundaries. There is an accelerating trend toward the application of computer and communications technologies in the establishment of connections between independent organizations to achieve efficiencies in their routine interactions (Figure 8). Streams of electrons traveling over the telecommunications networks of the country replace the flow of paper through the mail. These organizational interconnections often grow from a need to share information, controls, and protocols. The rationale for such communication links include efficiencies, performance increases, and competitive benefits.

The majority of current activities in IOS are related to the establishment of bilateral (dyadic) linkages and other forms of simple, information-based alliances that leverage information technologies. Electronic data interchange,²¹ quick response, Uniform

Figure 8 Technologies transform relationships between organizations



Communications Standards (UCS) protocols, and other forms of standardization to support interorganizational relations are emerging in a wide range of industries. The evolution of these, relatively, technically and organizationally simple, phenomena needs to be examined in the context of overall IOS evolution and impact.

The use of computer and communications technology to support the information exchanges needed to carry out day-to-day business activities is generally referred to as *electronic data interchange* (EDI). Today, EDI is a major information technology and communications issue in many U.S. industries. Accounts in the business and trade press and reports at trade conferences suggest the level of activity and potential benefits of widespread adoption of EDI:

- The U.S. Treasury Department makes over 150 000 electronic payments per month to vendors. The cost of an electronic check is estimated at 4 cents per check compared with the 30 cents needed for a paper check.
- The Electronic Data Interchange Association

estimated that over 6000 companies in 70 different industries were using EDI in 1988.

- Kmart Corp. transmits over 60 percent of its freight bills electronically, amounting to more than two million transactions in 1990.

What is EDI? At its simplest, EDI automates existing paper flows between organizations in much the same way as paper flows within organizations have been automated. EDI can also represent the opportunity to rethink and restructure the relationships between organizations. Although the benefits are significant, so too are the pitfalls that can derail EDI initiatives, or their business impacts.

Masses of paper documents support the routine interaction between most business organizations. The simplest purchase of office supplies can involve requisitions, purchase orders, sales orders, invoices, packing slips, receiving reports, and checks. Besides the two organizations engaged in this simple exchange, banks and delivery services may be involved. The purchase of raw materials and parts for use in manufacturing or the sale of finished goods for distribution may involve an exchange of even more information based on paper documents.

Many businesses have long since automated these activities within the boundaries of their own organizations. Transactions are captured at the point of entry into the organization, converted into machine-readable form, and managed thereafter with the support of computer-based information systems. Inventory control systems determine when new materials should be ordered. Order entry systems record customer orders received in the mail or over the phone. Accounts receivable systems record payments received from customers.

From the standpoint of the general manager, EDI, as it is currently known, involves:

- *Cross organization* information interchange
- *Application-to-application* communications (system to system)
- *Forms-oriented messages* (transaction sets)
- *Information and commitment exchange* (protocols for timing and interpretation)
- *Few new associations* (traditional business functions)

EDI as an extension of internal transaction processing systems. All of these transaction processing

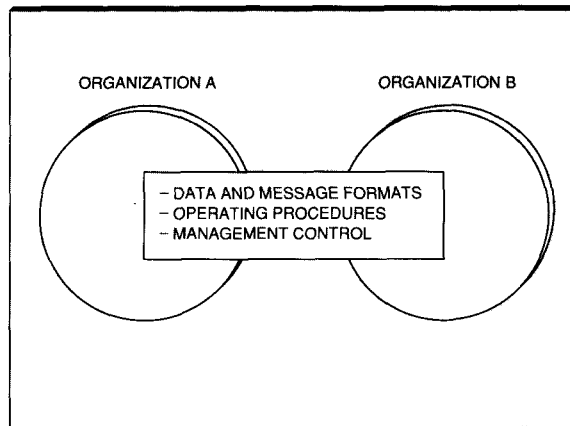
systems have traditionally stopped at the boundary of the organization. The machine-readable data maintained within these systems were transcribed onto purchase orders, invoices, or shipping notices and then mailed off to another organization for action. On reaching the appropriate destination, the information on these paper forms was converted back into machine-readable form for entry into and processing by the transaction processing systems of the receiving organization. If transaction processing systems reduced clerical costs, improved accuracy, and improved processing speed within the organization, why are the same benefits not obtained between organizations?

This information distribution is the fundamental logic of EDI. The transaction processing systems of the organization would be extended beyond the boundaries of the organization and linked electronically with the business and information systems of other organizations (Figure 9). Instead of paper documents linking the organizations, electronic equivalents of the documents would be transmitted. This substitution requires efforts in three broad areas. First, each organization must replace the manual interpretation of incoming documents with computer software. Second, the two organizations must replace the functions of the postal service with an agreement on a telecommunications link. Finally, the two organizations must establish the terms and conditions governing electronically placed orders and agree on the operational details of an electronic link. Often, pressures associated with inventory carrying costs play a role.

EDI as a partnership arrangement. Three levels of interdependencies occur in decisions involving linkages. Decisions on the technical interconnection, business process (application) dependencies, and management practice (multiple business applications) integration may require evaluation. Each aspect may be facilitated by industry, or cross-industry, standards. The likelihood of the emergence of standards, or the opportunity to influence standards development, often set competing or cooperating organizations to work together in formulating shared business practices.

EDI done poorly is simply "speeding up the mess." Simply providing automation of company-border-to-company-border data transport offers little real benefit to the organizations. Speeding the installation of information links with little

Figure 9 Multiple levels of interchange



thought given to restructuring associated business processes may be more costly than beneficial. The systems in and across organizations have "settled" into certain operating assumptions, and often, major changes in one portion of the relationship necessitates a significant review of many other internal systems. For example, if a major retailer sends orders to a packaged goods supplier, who takes a printed copy of the transmission and rekeys the information into its own order-processing activity, little benefit accrues to either party without further integration through application sharing.

Recently, a supplier for a large retail department store chain initiated an EDI linkage for order transmission. The process targeted the speed of order transmission, and little thought was given to the internal impact on the order-processing system, which was designed around traditional order-handling mechanisms. As a result, the two partners found that neither side could fully benefit from merely automating the order transmission, without a redesign of their respective order-handling processes.

Alliances and information partnerships. Partnerships that leverage forms of electronic "integration" can change the dynamics in the industry. As stated earlier, small companies can look, feel, and act "big," and large companies can target market and service to look "small" and close. The rules of time, distance, and complexity are changed. For better or worse, distinction in responsibilities and authorities is blurred. These blurred distinc-

tions offer challenges and opportunities. To the customer, the blurred distinction between Citibank N.A. and American Airlines, Inc., in asso-

Firms now use data linkages to establish combined marketing programs to a common customer database.

ciating purchases and frequent flyer program mileage credits is unimportant, as long as the benefit is derived. To the partnering organizations, responsibilities, authorities, and coordination need to be clearly identified.

Firms now use data linkages to establish combined marketing programs reaching across traditional industry boundaries to a common customer database. This type of marketing has been accelerated by dramatic reductions in data storage and transmission costs, for example, airlines, hotels, rental cars, and bank credit cards are now being woven together in a single combined marketing effort. These joint alliances often unevenly benefit the different parties, create barriers for non-participants in the industry, and represent a new dimension of competition.

In order to operate effectively, both general management and the information technology function often make a number of simplifying assumptions about the environment in which they operate. Periodically, however, it is useful to re-examine the validity of these assumptions. One frequent assumption is that the firm is the appropriate unit of analysis for the leverage of information technology applications. In tomorrow's business environment, few organizations will be immune from having to interact with information technologies outside the organization. Issues of design, capitalization, and control become obvious considerations as these shifting organizational competitive positions arise.

Current views focus on the concept of a centralized administrative control over the information assets of the organization. This concept fre-

quently includes discussing the role of chief information officer (CIO): managing relationships inside the firm, developing appropriate planning and control systems, identifying emerging information technologies, etc. Today, the notion of the firm as a stand-alone unit of analysis is more suspect than in previous times. The establishment of strategic alliances among organizations is a rapidly emerging phenomenon and has been given inadequate attention in many boardrooms. Many strategic alliances involve, and are predicated on, the availability of information technology that gives structure to these arrangements. Many forms of these strategic alliances exist. Information technologies offer the opportunity to consider more complex relationships between organizations than has been the case in the past.

It is clearly impossible in today's business climate to ignore those aspects of the organization that extend beyond the traditional, or legal, boundaries of the organization. The volatility in the marketplace often comes as a shock to those who have too long held onto beliefs that: (1) the competitors we have today will be tomorrow's competition; (2) the rules by which we conduct business tomorrow will be the same as those of today; and (3) we will grow along the traditional lines of growth that have served us since the business began. Although it is difficult to recognize and challenge these beliefs, it is clear that general managers need to be cognizant of these radical changes.

It is no longer possible to look strictly inside when dealing with a restructuring or reorganization. Reducing the size of the organization by downsizing, delayering, and downscaling involve consideration of outsourcing business functions, possibly purchasing services on a usage-sensitive basis. No business processes are immune from a review that asks the question, "Why are we doing this in-house with this overhead associated with retention of this capability?"

The role of I/T in building and sustaining partnerships. In today's volatile, competitive world, the effective use of information technology is both an element of a competitive strategy and often a core competency required in the emerging competitive arena.²² Cash and Konsynski²³ and others cite examples of many organizations that have made use of information technology to build and sustain new relationships with suppliers or customers

and achieve significant competitive advantage. A common theme in these examples is the use of information technology to improve the *coordination* activities across organizations that are critical to developing and delivering products and services to a market. However, it is often noted that these organizations did not gain their advantage by virtue of the information technology in and of itself. Johnston and Lawrence²⁴ point out that Foremost McKesson radically changed both its internal operations and its working relationships with customers in its efforts to build and sustain a competitive advantage over large, integrated pharmaceutical companies. Rockart and Short²⁵ discuss the need for effective internal integration across value-added functions as a critical aspect of effective execution of interorganizational information systems. Konsynski and Warbelow²⁶ argue that the use of information technology linkages between organizations will only "speed up the mess" unless fundamental restructuring of the nature of work in organizations is achieved.

Further, whereas there are many examples of how investments in technology have yielded significant competitive advantage, there are also many examples where such investments have resulted in no measurable impact. In many cases, this failure appears to stem not from an inappropriate vision but from the inability of the organization to effectively integrate the use and the management of the technology into the mainstream of the firm. Successful partnership and the process of building partnership is a management strategy. Regardless of the level of decentralization of the U.S. function, a critical need still remains to build an effective working relationship between organizations. While some may envision the day in which information systems specialists are not required, trends in technology and the increasing complexity of the technology infrastructure (such as telecommunications, database systems, and large transaction or application systems) suggest that this functional area of the business will not soon disappear.

Corporate strategy researchers have focused on the concept of alliances and partnership as a general management strategy. Although their focus is often external, i.e., understanding the working relationships across organizational boundaries, the term "partnership" is used to describe a working relationship that reflects a long-term commitment,

a sense of mutual cooperation, shared risk and benefits, and other aspects that are consistent with concepts and theories of participatory decision making. Among the key elements are:

- Stability of the relationship
- Sustained over time (no explicit end point)
- Self-maximizing behavior not optimal
- Opportunistic behavior controlled through processes rather than contracts
- Significant contract ambiguity
- Interdependence of the relationship
- Stream of highly interdependent exchanges
- Joint acceptance of costs/burdens/risks
- Flexibility of the relationship
- Willingness to invest in relationship
- Mechanism for adapting to uncertain events
- Mechanisms of the process
- Influence relationship
- Operational exchange of key information
- Economic relationship
- Social and political networks

Forms of partnership. Many forms of partnership arise in the business environment. The stated purpose does not always reveal the true nature of, or motivation for, the arrangement. Among the various forms are intraindustry coalitions, customer-vendor relationships, customer-supplier linkages, and other market-transforming relationships that are intended to change the balance of power and create new patterns of behavior in the marketplace.

Intraindustry coalitions. The economies of scale associated with certain kinds of hardware and software configurations have facilitated a very different method of operations. In the airline industry, for example, the economies of scale in developing and managing a reservation system are now beyond the capacities of the medium-sized airlines. In Europe, two major coalitions have been created: the Amadeus Coalition and the Galileo Coalition. Amadeus is built around the United Air Lines, Inc., software, and Galileo around the Continental Airlines, Inc., software. Even some of the largest carriers have acknowledged their inability to handle this problem by themselves and have joined coalitions.

Customer-vendor relationship. The establishment of joint research projects on new technologies through beta (test) sites can provide advantages to both parties. For the vendors, this relationship

gives valuable insight into the practical basis of field problems associated with their technology. Further, the ability to resolve these problems in prestige accounts gives vendors highly visible reference sales. For the customer, the relationship is a cost-effective way to learn and participate in new technology developments that may be beyond individual skill and financial resource levels. On both sides, considerable care must be taken to select the right partners to ensure good relationships.

Customer-supplier linkages. These joint efforts potentially provide better service to both parties, enabling them to better control investments in inventory, storage facilities, and operating costs. Sensibly structured, these linkages can give both parties a competitive advantage. If the two firms are of unequal size, however, a risk exists that the larger party can force its standards upon the smaller party. Such a major power transfer can potentially destabilize the relationship.

What is shared in partnership? Three dimensions of the application of technology play a role in the managerial confidence that new partnerships and arrangements are now feasible—control and coordination, information sharing, and business application sharing. It is only because of our increased ability to share capabilities along these dimensions that these new arrangements are made possible.

- *Information sharing* involves the capability to organize information in ways that will serve all participating organizations efficiently. This factor involves joint design and sharing of data definitions, data formats, data relationships, and search patterns. Shared and common dictionary and directory functions offer improved capability to jointly use shared databases.
- *Business applications sharing* refers to the joint design of business processes that can be held common across organizations. This often involves coordination on business policy, definition of common procedures, standards on systems development and maintenance, and periodic review of systems and procedures.
- *Controls and coordination* cooperation are essential to the new relationships. Information technologies enable the institution of internal controls that govern the new associations and offer confidence in the integrity and fairness of the systems and transactions.

Partnership: Control over key integration factors.

In addition to the business agreement, partnering organizations seek control over the key forms of integration across their organizations—technical, business process, and business practice. The least of these, technical, involves the sharing of technology standards (data, communications, etc.) that facilitate an interconnectivity, or ability to exchange information. There is no shared knowledge of an application, say order processing. At this level, there may be little more than door-to-door shipment of data. Many electronic data interchange arrangements involve agreements on data formats, key product or other codes, and basic communications protocols. For example, a retailer sends orders to a supplier, who takes a printed copy of the transmission and re-keys the information into their order-processing activity.

At the business process level, common procedures and common applications mark a higher dependence on coordinated activities across one, or a small number, of business applications. In these situations, there is a reason to have coordination meetings involving members from each of the partners. The credit card and airline scenarios involve shared business processes.

Business practices refers to arrangements involving a major renegotiation of the business relationship, in which impacting multiple systems in participating organizations builds a significant amount of dependence. When an auto maker establishes a relationship with a supplier to support a “just-in-time” operation, significant commitments in technology, business process, and common strategy need to be accommodated. The negotiation for, and management of, such arrangements is not a simple matter. Although major issues of business policy can be shared, so do the rules of fair competition need to be addressed. To avoid litigation, the parties need to be aware of not only the internal impacts among the participants, but also antitrust issues that may arise.

A retailer, a major regional department store chain, is renegotiating its relationships with certain suppliers. For one of its suppliers of ladies’ garments, the retailer provides point-of-sale information and allows the supplier to make all merchandising decisions for the fixed display area. Several other department stores are creating such

arrangements, which significantly reduce the buying costs of the retailer.

A regional food retailer is centralizing its buying force to create a direct product costing management strategy with a centralized buying organization that integrates decisions on advertising, warehousing, and other commitments that affect product costs. The single buying point has a significant impact on the operations of the organization from supplier relations, to shipment and warehousing, to regional and in-store merchandising and marketing support. Yet another parallel group is concerned with the profitability of the products. It is expected that, once these two functions are integrated, a full direct product profitability (DPP) program will have a significant effect on the various arrangements that will develop with suppliers.

Bringing something to the technological table. Partnering arrangements, whether to leverage or acquire a technical competence, involve the review of both the organizational and technical cultures. In addition to the normal factors that a general manager considers, the compatibility of the technical architecture plays a significant role in the partnering decision. Arrangements often involve the need to share:

- Capital infrastructure
- Technical architecture
- Information resources
- Established software
- Technical expertise

The sharing of information technologies requires considerable thought and planning. Those organizations that are ill-prepared to provide the connectivity and openness needed to make the connections across technical cultures should carefully evaluate the potential benefits of a partnering initiative, as the organizational investments in time and resources is no guarantee of success in the partnering arrangement.

Markets and industry platforms: Public and private

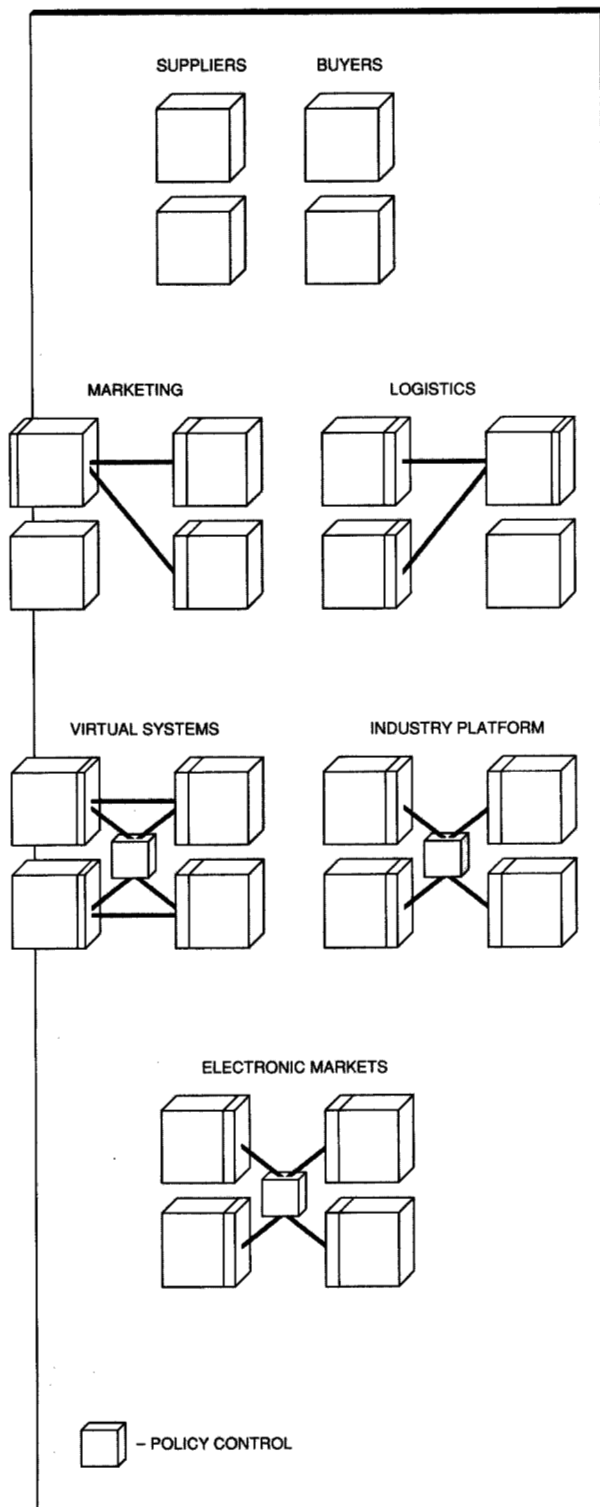
Rationalizing fragmented markets. The role of information technologies in the rationalization of the many fragmented markets is the theme of this next section. Fragmented markets are those that

involve many buyers and sellers, often governed or supported by trade associations. Whether in insurance or automobile parts, a significant portion of transaction costs has to do with identification of trading partners and coordination of transaction execution and settlement. The class of IOS I call *virtual system* is the most primitive form of these shared platforms, involving agreement only on data interchange protocols and basic operations procedures. However, other shared platforms involve direct support for transactions, introducing new economies and discipline to the market.

Several individual, or groups of, stakeholders (trade participants, trade or industry associations, vendors, etc.) may take the initiative to influence the direction of rules changes in the market through the leverage of information technologies to create integration effects, build dependence, and otherwise impact the pattern of exchange practice in an industry. Internal and external market forces trigger these unilateral or collaborative initiatives.

- *Individual initiatives*—A market leader or innovator seizes the initiative and establishes a climate for participation in alliances. The airline initiatives of American Airlines and United Air Lines illustrate such unilateral initiatives that resulted in a shared platform.
- *Competitive response*—In response to a significant move in a market, an organization creates, in the name of defense, a partnered environment. Johnson & Johnson developed the COACT system, partially in response to previous initiatives by American Hospital Supply.
- *Collaborative effort*—A coalition of medium-sized players collects the capital and skills required to create the technology infrastructure for an industry. Several cases in the automated teller machine (ATM) arena illustrate such coalitions.
- *Professional organization*—Trade organization serves as a fair broker in specification and management of a shared platform. IVANS was an initiative of ACORD in the insurance industry, whereas Transnet resulted from actions by MEMA in the motor equipment sales market.
- *Distribution channel consolidation*—Intermediaries collect to defend their distribution status. Efforts in the travel agency arena in the 1970s illustrate a failed attempt at a consolidation for creation of a shared reservations platform.

Figure 10 Forms of interorganizational systems



- **New entrant**—A new entrant to a market may lay the groundwork for IOS initiatives. The Sears, Roebuck and Co. move into new markets, leveraging its distribution channel services, is one example validated by the recent creation of the IBM and Sears arrangement in their jointly owned communications company, Advantis. A technology vendor may bring its technology to a market and provide a market platform, say General Electric Information Services Co. and Automatic Data Processing, which provide electronic data interchange platforms in specific industries.

Where the intermediary attempts merely to create a level playing field and reduce transaction costs for all parties, I call these situations *industry platforms*. Where the intermediary defines market rules for buyers and sellers and performs more and more significant market activities, I call these *electronic market access forums*, or EMAFs. Although both involve shared technology platforms, the EMAF involves a major intervention into the practice of the market. These classes of IOS initiatives can now be summarized in Table 2. Forms of the systems are shown in Figure 10.

The unique phenomenon of EMAF involves an intermediary that defines market rules and governs transactions. It is important to distinguish EMAFs from "electronic markets" as the economists use the term.²⁷ Indeed, most EMAFs serve very poorly as "markets." Most fragmented markets are susceptible to the intervention of a participant, or third party, intermediary to provide market management functions. These functions include identification of buyers and sellers, matching buyers and sellers, negotiation, product and substitution identification, settlement, insurance and trust brokering, market history management, and product and service valuation. Figure 11 depicts the transformation of market process and practice by technologies.

Linkage and industrial policy. As we have discussed earlier, vertical market electronic data interchange systems that tie together the production systems of organizations in particular industries, such as EDI between manufacturing companies and their suppliers, are relatively uncomplicated socially and politically. Such linkages can be built through agreements among the parties involved without much controversy. This is especially true when these information linkages serve to enhance current bilateral arrangements through operations cost reductions and improved

Table 2 Classes of IOS initiatives

Marketing and logistics systems	Involve bilateral linkages of buyers and suppliers, often using proprietary protocols (communications, product identifiers, data formats, etc.). Such linkages offer significant product or service differentiation (marketing, e.g., Levi Strauss LeviLink**, Hagggar HOTS**) or influence inventory and ordering procedures (logistics, e.g., many EDI initiatives like Kmart). The intent of these forms of IOS linkages is <i>cooptive</i> .
Virtual systems	Arise when national, or international, standards are selected by a community of market participants. The "policy" for selecting the appropriate protocols is owned by the community, and each individual entity (supplier or buyer) is responsible for its own systems that implement those standards. For example: UCS codes, X12 or EDIFACT standards, IBM's IIN, GEIS value-added network services, etc., might be adopted by an industry to prevent the dominance of one or more proprietary standards. Pressures for this approach often arise from the emergence of multiple proprietary standards that reduce the overall efficiency of the participants. Several industries have undertaken such initiatives, for example, WINS (warehousing) and TALC (textile). Such forms of IOS linkages are <i>collective</i> .
Industry platforms	Represent the initiative of one, or more, players in a market to provide a common "platform" for the industry. Often these platforms emerge from trade associations that wish to leverage the transaction economics of the collection of participants to bring economies of scale to reduce the costs for all participants. Thus, standards are set to raise the level of efficiency of the industry (e.g., Transnet in auto parts and IVANS in insurance). The intent is to establish a relatively level playing field to benefit the entire participating community. Further, the information-sharing opportunity may offer coordination that is essential to the operation of the market (e.g., airlines reservation systems). Such IOS linkage arrangements are <i>collaborative</i> .
Electronic market access forums	Refer to environments where the intermediary offers more than transaction economics, actually performing many essential market functions. These functions include seller and buyer identification, matching, negotiation, settlement, etc. In these trading environments, the third-party intermediary sets and enforces the rules of the trading environment. The Electronic Market Access Forum (EMAF) facilitator has the responsibility to reduce the risk of participants in the market. Horizontal market trading is often enhanced in these environments. Examples include: American Gem Market System (gemstones), Telcot** (cotton), Inventory Locator Service (airplane parts), Autoinfo (auto dismantlers), and Reuter's INSTINET. The intent is often the promotion of fair, competitive markets. These IOS arrangements are <i>competitive</i> .

**Trademark or registered trademark of Levi Strauss & Co., Hagggar Apparel Co., or Plains Cotton Cooperative Assn.

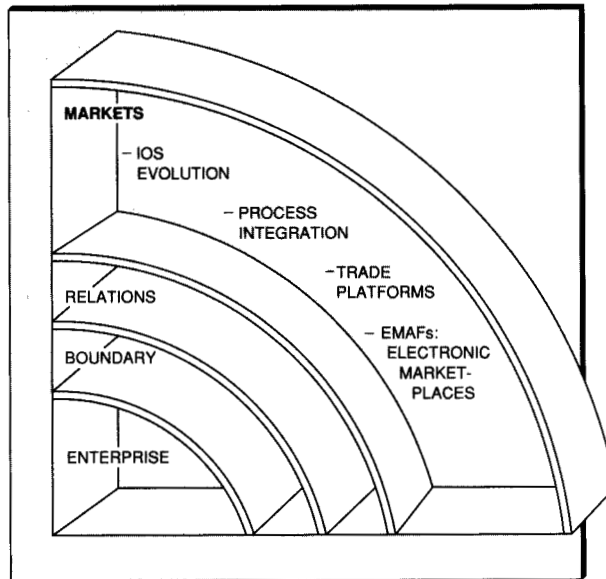
coordination. With the exception of situations in which buyers leverage extraordinary power to reduce logistics costs, such arrangements are frequently the result of amicable agreement and expectations of mutual benefits.

However, EDI systems that cut across industries, especially industries characterized by strong competition, are much more difficult to construct and usually never get started, nor advance, by simply leaving things "to the market." Often government and quasi-governmental entities can and do play a key role in facilitating the development of such EDI systems. Examples in the trading sector in Norway, Singapore, the United States, and Hong Kong highlight the range of possibilities and opportunities for government to play a significant role in the evolution of EDI across industry boundaries.

The situation reflects the significant role that government policy influencing the application of in-

formation technologies can play in the establishment of unique industry relationships. Whether for the leverage of a product portfolio, technology or service capabilities, unique skills, or market presence, new forms of alliances and partnerships are forming. In the cited cases, government is contributing through a range of interventions from declaration of standards to operation of the facilitating market information mechanisms. Government-proscribed information technology (standards and protocols) is playing a critical role in the formation of these new arrangements. Through a review of some of the factors that contributed to the governmental arrangements in the Singapore TradeNet and Hong Kong Tradelink situations we can examine some of the issues in the formation of these arrangements. Issues of partnership, benefits, fairness, and control arise in an examination of the challenge faced by government in the determination of an appropriate role in defining its level of influence in market practice.

Figure 11 Technologies transform market process and practice



Vertical EDI systems tie together the production systems of particular industries. Examples include EDI between manufacturing companies and their suppliers. These arrangements are relatively uncomplicated socially and politically. They can be built through agreements among the parties involved without much controversy, especially when these information linkages serve to enhance current bilateral arrangements through operations cost reductions and improved coordination. With the exception of situations in which buyers leverage extraordinary power to reduce logistics costs, such arrangements are frequently the result of amicable agreement and expectations of mutual benefits.

Horizontal EDI systems that cut across industries, especially industries characterized by strong competition, are much more difficult to construct. When they do get started, they grow with difficulty. Building successful horizontal EDI systems cannot be done simply by leaving things "to the market." They require the leadership and control structures of large social institutions, particularly government and quasi-governmental organizations. The examples of EDI efforts from Singapore, Hong Kong, and Norway illustrate the important role that government and quasi-governmental organizations can

play in the evolution of EDI across industry boundaries. The studies discussed below on EDI and trade documentation processing are being conducted by the author with John L. King and Espen Andersen, who contributed to this next section.

Participants and the process of alignment. At the extreme, an interindustry partnership may be actively led by government. Consider the TradeNet system of Singapore, which plays a role in the management of one of the world's largest ports. The Singapore government has spent a significant amount to link trade agents with relevant government agencies at the port, that is, linking freight forwarders, shipping companies, banks, and insurance companies with customs officials and immigration officials. Clearing the port, which used to take a vessel two to four days, now may take as little as ten minutes. This startling reduction has more than halved the time any ship has to remain in port and is believed to be a key to ensuring that Singapore remains a port of choice in the Far East, where the competition is clearly growing.

The Singapore TradeNet situation demonstrates the role that government sponsorship of information technologies can play in the competitive position of the nation. The story represents the issues behind the development of a transportation industry information-technology-based platform to facilitate trade documentation processing. The system is important for the competitive posture of the transportation industry in Singapore and is therefore important for the economic health of the entire nation. TradeNet itself involves the partnership of a unique assortment of government agencies, bureaus, statutory boards, private agencies, and companies involved in all aspects of the shipment of goods. The apparent success of the effort invites a review of the factors that contributed to the initiative. In the Singapore situation we see the development of a critical system in an industry that is vital to the future of the Singapore economy. The effort not only served the core industry, but was used to develop, exercise, and demonstrate the growing "computerization" skills deemed important to the future of the city state. It was an important application in a critical area and served to demonstrate the developing systems integration skills that it hopes to leverage in a variety of areas.

The TradeNet initiative illustrates a contrast to the initiatives of the Finnmap/Finnboard (paper

and wood products associations) effort in Finland. The role of the government in the Singapore initiative was significant and was probably critical to the success of the endeavor. The broad range of stakeholders required an incentive to coordinate and cooperate. The trading environment for Finland in international wood and paper products was no less significant. However, in the Finland situation, the government opted to play no significant role in the coordination of 18 midsize paper companies. The paper companies jointly developed a global electronic information system to link themselves with hundreds of key customers and international sales offices. The system is costing over \$50 million to develop and is meant to provide a speed and quality of response that would have been technically and financially unattainable by any of the individual participants acting in their own behalf.

The paper companies, whose sales amount to nearly four billion dollars, came to feel that to compete effectively in a service-oriented business such as paper products, they had to provide online, global data interchange with key customers. They wanted to provide customers a virtually instantaneous means of placing status inquiries or new orders—in contrast with the 12 days that had become the industry norm. Moreover, considering their size, they were all uneasy about joining one of the proprietary information networks of their big, global competitors; they had seen what had happened to midsize airlines. Yet in spite of the critical contribution to the manufacturing Gross Domestic Product of the country, the government played no significant role in the formation of standards and the investment in and establishment of the system.

In the Singapore situation there was total commitment with the government playing a critical role in setting deadlines and coordinating resource allocation. One factor was the technology infrastructure, the one they had and the one they were building. Another factor was the leverage of interlocking directorates that are important to the patterns of public-private business practice in Singapore, contributing also to a knowledge transfer that is associated with the rotation across the various directorates. In addition, the initiative did not just “speed up the mess,” rather they redesigned the forms and procedures that make up the trade document processing. Other factors such as the strict change-control processes and

unique accounting arrangements contributed to the effort.

Singapore TradeNet. Singapore is an island nation of only 625 square kilometers with a population of 2.7 million.²⁸ It has one major port and

The TradeNet initiative illustrates a contrast to the initiatives of the Finnpap/Finnboard effort.

a large international airport. It is located at the tip of the Malay peninsula, along centuries-old trade routes between the Indian Ocean and the Pacific. Trade is important to Singapore—it is the country's biggest industry. In 1989 Singapore switched on its TradeNet EDI system, the most comprehensive trade-related EDI system in the world. It serves many different organizations and interests in the trade sector, including government departments such as customs, the port and airport authorities, cargo companies, freight forwarders, shipping and airline companies, banks, and insurance companies. Most export and import declarations are done through TradeNet at this time, and all will be done through the system within a year. The system has greatly decreased the time and trouble of trade documentation. Approval for declarations, which used to be a time-consuming process involving much paperwork and as long as four days, can now be done in as little as ten minutes. Errors are reduced, labor costs are cut, and handlers can make more efficient use of their staff and equipment. TradeNet promises to be an important factor in Singapore's maintaining a competitive position among the major ports of the region.

TradeNet is owned by a private firm, Singapore Network Services, Ltd., and it was built by a partnership of two companies, IBM and Computer Systems Advisers, Ltd. On the surface it looks like a private-sector EDI success story. But the system would never have materialized without direct and critical government leadership. The government of Singapore was instrumental in the

creation of TradeNet in at least four ways. The government initiated and underwrote the build-up of information technology infrastructure in the country between 1979 and 1989, increasing by tenfold the number of I/T professionals and greatly expanding computerization of key government agencies. This role of the government was essential because it provided the means by which the system could be created and sustained by Singapore itself and not merely "leased" from some external supplier. The government also provided authoritative leadership and assigned key, high-ranking personnel from government agencies and statutory boards to organize the social architecture for the project and oversee the technical development of the system. The social architecture was very important because all the parties involved in the trade sector had to agree on the procedures around which the EDI system would be built. Finally, the government underwrote the project through the four statutory boards that together own Singapore Network Services (the Trade Development Board, the Port of Singapore Authority, the Civil Aviation Authority of Singapore, and Singapore Telecoms).

One might argue that the role of the government in the TradeNet case was important, but that the same results would have been possible if the various private companies involved in the trade sector had agreed among themselves to create a horizontal EDI for trade, and then involved the government. The following story of the Hong Kong Hotline and Tradelink experiences shows this to be incorrect.

Hong Kong: Hotline and Tradelink. Like Singapore, Hong Kong is a trading center that depends greatly on the vitality of its trading companies for its welfare. And like Singapore, visionary leaders in the trade sector saw early-on that EDI offered promise for improving trade. In fact, Hong Kong got started on a project to create EDI for trade *before* Singapore did. Yet today there is no EDI system for trade in Hong Kong. What happened?

In 1983, the Hong Kong government helped sponsor the creation of a special council to improve trade. This council was made up of representatives of the government plus major trading companies and financial institutions. The council, after some deliberation, proposed the creation of an EDI system—a database of consignments, actually—to facilitate trade. The proposed system,

called Hotline, looked promising. At this time, the Singapore government became aware of the Hong Kong efforts and redoubled their efforts to create what became TradeNet. As promising as Hotline looked, however, the council did not have the means or the charter to pay for the system. The council took the project to the Hong Kong government, suggesting that the government build the system. The government replied that such a system would be of benefit mainly to business, and therefore business should pay to build it. A survey of trading companies done by the council provided another argument for government sponsorship, noting that most trade business people said they would feel uneasy if competitively sensitive trade data were stored by any organization other than the government. Again, the government argued that it was not in the business of providing information processing services that could well be done by other value-added network suppliers.

The unwillingness of the government to take the lead on Hotline resulted in a hiatus in EDI for trade in Hong Kong. For many months, nothing happened. Still, the belief that EDI was needed for trade was alive, and several companies that had participated in the council started their own firm, Tradelink, in order to support a consultancy study investigating the commercial viability of a trade-related EDI system. The resulting report indicated that such a system would probably not be a money maker from a strictly business point of view and further obscured what roles should be played by the government and the private sector in creating such a capability in Hong Kong. At about the time the consultancy report came out, TradeNet was turned on in Singapore. Suddenly it was clear that such a system could be built, that it had real advantages, and that some kind of partnership between government and private businesses would be required to make it happen. The Special Project on EDI, SPEDI, was created as a result of this realization. The job of SPEDI is to come up with a framework and a general plan for building a trade-related EDI system in Hong Kong. This process continues.

Norway: The TVINN system. EDI projects for trade are not limited to the Far East. Norway has successfully implemented the TVINN system for automated clearance and control in the Norwegian customs department. This system is significant in two respects. First, it was a very early arrival on the trade-related EDI scene. It came on line in August of

1988, four months before TradeNet. Second, since it is not a comprehensive trade-related system, and focuses only on customs, it represents an intermediate solution to the trade documentation problem.

The customs department took the lead on this project. The decision to build an EDI system was made in 1985. The project was managed by the Norwegian computer consulting and design firm Avenir, and the TVINN system was built in about two years (similar to TradeNet). Unlike TradeNet, which is essentially fully automatic, with rare human intervention, TVINN was designed to allow routine intervention by customs officers to watch the documentation process and modify the process as necessary. Like TradeNet, the project has been very successful, and the Norwegian customs department claims significant labor savings, improved accuracy, and faster turnaround time. TVINN is a trade-related EDI system that serves only the customs function of trading. But this area is often a bottleneck, and the system alleviates that bottleneck.

Public policy and strategic control. Generally speaking, competition through the private sector is likely to result in more innovative and effective systems than will the monopoly function of government. However, there are times when the public sector might take the lead in order to move the creation of an EDI system forward in a timely manner. When should the public sector take the initiative and influence events through policy and regulation? Under the following conditions:

1. When cross-industry conflicts develop due to incompatible business procedures that could be standardized, but that no one business wants to bear the costs for standardizing. The public sector usually intervenes to find ways to facilitate standardization and to ensure that the costs of coming into compliance are fairly borne by the various parties that will benefit.
2. When the competitive posture of the nation or region is threatened (e.g., a competitor installs a capability that puts one at a genuine disadvantage, and a response in kind is called for), or when particular windows of opportunity exist that might be exploited quickly
3. When key elements of an EDI capability require construction or use of "natural monopolies" such as the local telephone network or specialized government data resources

4. When key functions to be served by the EDI network require the actions of a government agency

There can be little doubt that use of EDI in areas like the trade sector will grow rapidly in the coming years. There is also little doubt that government can take an active, and often leading, role in the creation of trade-related EDI systems. The inevitable involvement of customs and possibly other government agencies in the trade process make this a certainty. But what about other cross-cutting EDI systems that do not necessarily involve government agencies. Can we expect the government to play major roles there as well? Yes, because the government has an abiding interest in ensuring that systems built to facilitate business among competing companies are not designed or used in ways that give any business unfair competitive advantage. This principle has been enforced with much controversy in the United States, where the airline companies that own and operate computerized reservation systems have come under government orders to alter the ways their systems perform in order to eliminate systematic unfair competitive practices that were facilitated by the designs. We can expect similar concerns to arise with respect to horizontal EDI systems, and in many cases, government agencies are likely to look upon such systems as analogs of "common carrier" networks such as the telephone system. Although such systems can be privatized, as is the Singapore TradeNet system, the government will probably be required to have an ongoing role, ensuring that key social objectives are upheld in the actual functioning of the systems.

Conclusion

We have taken an ambitious sweep in review of the information technology role in extending the enterprise and the strategic control implications. We have moved from a discussion of the key elements of control—understanding and influence—to a review of the internal and boundary-spanning role of information technologies, to an overview of relations in multinational and global enterprise, including a review of elements of relations and partnerships. This sweep of internal employment, boundary transformation, relationship and partnership, and market transformation was intended to underscore the need assessment of strategic align-

Table 3 Information technologies transform control options

	Boundaries	Relations	Markets
UNDERSTANDING	Personal/portable Information refineries	Electronic data interchange	Information partnership
INFLUENCE	Intelligent agents Information gateways	Shared databases	Interorganizational systems

Table 4 Examples of organizations deploying technology to transform strategic control

	Boundaries	Relations	Markets
UNDERSTANDING	Gillette Statoil	Kmart Levi Strauss	TradeNet TVINN
INFLUENCE	Frito-Lay Hanes	Aetna Gemini Baxter's ASAP	IVANS Transnet

ment at all levels of organizational and interorganizational relations.

In this paper, it has been the author's intention to challenge the traditional view of the organization with clear boundaries, limited relationships with other organizations, and a focus on internal efficiency and effectiveness as no longer adequate. Today's organizational boundaries are blurring, partnerships with clients and competitors are becoming commonplace, and quality and efficiency issues extend well beyond the traditional enterprise boundary. A trend is emerging in new organizational alliances, boundary redefinition, and market structures. New product and service offerings, channel systems capabilities, and target marketing initiatives are enabled through these partnerships, alliances, and information interchange arrangements. The effective employment of these information technologies requires an effort along the lines of the internal strategic alignment analysis discussed in several papers in this issue.

In this paper, we have looked at the internal structure of the enterprise and have made the case that *boundaries* are transformed often through employment of these information technologies. Culture and practice are interdicted. Operations and management practice and procedures are transformed and have a major impact on applications and human resource dynamics. Organizational structure issues may be profoundly impacted; division of labor, con-

flict resolution, coordination mechanisms, accountability, authorities, and identities are threatened.

We explored new forms of *relationships* with parties outside the enterprise that are of operational and often strategic concern to the general manager. Relations with suppliers, customers, competitors, and other forms of partners and affinity groups have earned significant management attention. Many forms of partnership arise in the business environment, including intraindustry coalitions, customer-vendor relationships, customer-supplier linkages, and other market-transforming relationships. These alliances, when properly executed, change the balance of power and create new patterns of behavior in the marketplace.

Table 3 lists the information technologies that we have considered.

Table 4 lists some of the organizational initiatives that represent each of the issues.

Organization boundaries are being transformed by these new linkage relationships. Where one company ends and another begins is no longer an easy question, if it ever was. Distinctions associated with legal definitions and formal authorities and responsibilities are being challenged as the new arrangements defy traditional boundary tests. A supplier of parts to a major automotive manufacturer recently told the author, "I don't know where

my company ends and my customer begins. Day-to-day decisions that were traditionally made in my organization seem now to be made by my major buyer. These electronic linkages are messing up the old relations."

The internal structure of the organization is not immune to impacts associated with these linkages. An interesting emerging phenomenon is the recognition that the *entire transaction set* of an organization is potentially subject to EDI. Therefore, they need to establish and design a new architecture. They are going to treat a lot of their internal, interdivisional transactions as if they were cross-organizational. As a result, they will create what I call the organizational *agility* to make decisions on the location of processing, even outside the organization. They may be introducing some near-term inefficiencies in the process to set up the infrastructure for future *tactical flexibility*.

Management needs to play a significant role in the development and maintenance of policy that relates to electronic linkages involved in relationships with suppliers, customers, and competitors. These initiatives have a high potential for radically transforming the organization, its market position, and its overall market practice and balance of power. When senior managers "think" about "linking," there is a higher potential for the enterprise when they recognize that these issues involve *more of a business innovation than a technical innovation*.

The management challenges are significant and rich in operational and strategic threats and opportunities. The constraints in leveraging information technologies in the the pursuit of "changing the rules" in an industry, or merely in a relationship, are both real and significant to the general manager. Strategic alignment is an essential tool in designing and managing these new forms of partnership and alliances.

Acknowledgment

This work was partially supported by a grant from the IBM Consulting Group.

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27. It is interesting to note that many of my own cases and studies have been used to argue the case for "electronic markets"—IVANS, Transnet, Telcot, American Gem Market Service, etc. Simply interconnecting fragmented buyers and suppliers does not engender "market" behavior. Indeed, most of the EMAs carry extraordinary discipline and bias that can significantly inhibit "market" behavior.
28. For further information on public and private sector cooperation in information technology policy and trade see "Government Playing a Critical Role in the Business Cycle" by J. King and B. Konsynski. See also the Harvard cases on TradeNet, Tradelink, and TVINN by B. Konsynski, J. King, and E. Andersen.

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Accepted for publication October 6, 1992.

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Reprint Order No. G321-5506.