Competitive Advantage

Creating Competitive Advantage With Interorganizational Information Systems

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Abstract

Many well-known examples of the use of information technology for competitive advantage involve systems that link an organization to suppliers, distribution channels, or customers. In general, these systems use information or processing capabilities in one organization to improve the performance of another or to improve relationships among organizations.

Declining costs of capturing and using information have joined with increasing competitive pressures to spur numerous innovations in use of information to create value. This article draws on concepts of competitive advantage and on experience gained from successful innovations to generate classifications and a framework to guide the search for opportunities. The ideas do not constitute a procedure leading inexorably to competitive advantage. However, they have been of value when combined with an appreciation of the competitive dynamics of specific industries and a grasp of the power of information.

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ACM Categories: H.4, J.1, K.6

Introduction

The notion that information systems can be used to achieve competitive advantage has passed from concept to cliché. The dramatic successes of United Airlines’ Apollo reservations system, American Hospital Supply’s ASAP, and other large computer and communications systems have been publicized in the business press and analyzed in academic journals (Business Week, 1985; Fortune, 1985; Porter and Millar, 1985). Managers in many companies look to these examples as indications of what might be accomplished in their own organizations.

Many of the best known and most successful examples of competitively advantageous information systems are those that link a company to its suppliers, distributors, or customers. Such systems, called interorganizational systems (IOS), enable the movement of information across organizational boundaries. Apollo and ASAP are interorganizational systems, as are networks of automated teller machines, the Econo- most electronic order entry system sponsored by McKesson Drug Company, and General Motors’ computer-to-computer links with its primary suppliers.

It is not entirely clear whether IOS provides the best opportunities for the strategic use of information systems, or whether the public nature of these systems has simply made them better known. What is clear is that IOS can bring significant competitive advantages, including lower costs, tighter links to customers, and increased product differentiation. These benefits are sometimes shared among industry participants at several levels. In many cases, however, the first company to build an IOS in a given industry achieves a long-term, sustainable advantage.

This article first defines and describes IOS, categorizing them both technologically and organizationally. An explanatory framework for the competitive advantages achieved through IOSs is presented next, followed by some process steps for finding new IOSs. The article concludes with a list of important questions for top management to consider before embarking on IOS development.

What is an Interorganizational System?

The essential characteristics of an IOS are both
technological and organizational. Cash and Konsynski (1985) give a simple, useful definition of an IOS as “an automated information system shared by two or more companies” (p. 134). An IOS is built around information technology, i.e., around computer and communications technology that facilitates the creation, storage, transformation, and transmission of information. An IOS differs from an internal, distributed information system by allowing information to be sent across organizational boundaries. Access to stored data and applications programs is shared, sometimes to varying degrees, by the participants in an IOS.

This spread across organizational boundaries has several implications. First, IOS must provide incentives for use to all intended participants. Unlike some in-house systems, an IOS will rarely be implemented by fiat. Thus, the search for competitive opportunity must consider the payoffs for multiple organizations, not just one organization. Second, since the participants typically have different goals and interests, an IOS must include provisions for reliability, data security, user privacy, and system integrity that exceed what might be built into an internal system. Third, it is not sufficient for an IOS to improve the overall efficiency of an industry; it must provide some positive return to its sponsor. On the other hand, because IOS can improve the situation of several companies simultaneously, they may provide more strategic leverage than traditional systems.

IOSs are not new. Apollo and ASAP became available more than ten years ago and have been replicated by competitors in the industry. In other industries order entry systems that have similar types of transactions between organizations have appeared with less fanfare. However, recent changes in technology and economics, as well as increased competitiveness in many industries, are leading to further growth in the number, variety, and scope of IOSs. Both information systems professionals and line managers are becoming more aware of the opportunities for using IOS and of the barriers, both internal and external, to increased use. As management teams begin to understand and carry out the adaptations necessary for effective use of IOS, as the potential of IOS continues to push firms toward agreement on standards and protocols for data transmission, and as information technology becomes even less expensive, the rapid pace of IOS development is certain to continue.

**Categorizing IOS**

In order to understand strategic opportunities for the use of IOS, it is helpful to categorize IOS in a number of ways. This article proposes classifications based on the **business purpose** of the system, on the **relationship** between the sponsoring organization and the other participants, and on the **information function** in the system.

**Why utilize an IOS?**

First, let us look at **business purpose**. Although an IOS by definition crosses organizational boundaries, in some cases the IOS is designed as a means to gain advantage over competitors in a basic business of the sponsor. In other cases, the IOS itself is the basic business. In both scenarios, the sponsoring company is responsible for making decisions about who can participate in the system, which participants can have access to what data, how much each participant must pay, and so on.

American Hospital Supply’s ASAP system is a paradigm for the IOS as a means of doing business competitively. The terminals and other devices used to access ASAP are owned by the hospitals themselves, and the communications lines are largely leased. But American Hospital Supply has ultimate control over participation, data protocols, access to information, and other conditions of ASAP use. American also has complete responsibility for planning, developing, maintaining, and managing ASAP. Another type of IOS is controlled by an organization that provides nothing to IOS participants that is not very closely related to the interorganizational system. The sponsoring organization is essentially in the IOS business. For example, NewsNet offers almost 300 online services, including access to newsletters provided by independent publishers, airline reservations, stock quotations, sports scores, and seminar registrations. NewsNet essentially acts as a facilitator, allowing organizations to communicate through a network established and maintained by NewsNet. Similarly, Cirrus System Inc., a network of more than 10,000 automated teller machines (ATMs) from financial institutions in the U.S. and Canada, is owned by five large commercial banks. Custom-
ers of any bank that participates in Cirrus can use an ATM owned by another participant; Cirrus System, Inc. is responsible for the network that moves information among the banks but provides no other services.

There is little doubt that the IOS arena offers plentiful opportunities for building systems of this second type. Moreover, such systems raise important questions of cost and access that must be considered before customers agree to participate. In order to focus this article on more traditional organizations, however, only IOSs that are controlled by organizations having other goods or services to sell and are seeking to use an IOS as part of a more inclusive strategy are considered here.

Who will participate in the IOS?

IOS can be further categorized on the basis of the relationship between the controlling organization and other participants. Customers, dealers, suppliers, and even competitors are all potential participants, as are customers' customers, suppliers' suppliers, and other members of the distribution chain. It is possible that participants will be of several types: TWA's PARS reservation system, for example, is used by the airline's own clerks, by travel agents, by employees of other airlines, and by travelers themselves. Developing a clear understanding of how the IOS will produce improved performance for each type of participant is an important step toward gaining competitive advantage. The first key question is, "How will the IOS help this potential participant succeed in accomplishing valued goals?"

For the IOS to provide competitive advantage to its sponsor, it must provide valued and significant benefits to each participating organization in proportion to its use of the system. The requirement that the system provide benefits to participants applies both to participating organizations and to individuals within those organizations who will be directly involved in using the IOS.

The best known examples involve an electronic connection between a company and its customers. McKesson, Singer, General Electric, Inland Steel, and Eastman Kodak, among others, have implemented systems of this type. Connections with suppliers have been built by General Motors and American Hospital Supply. IOSs linking a company to its dealers or agents were built first by the airlines, and more recently by insurers such as CIGNA and State Farm, by financial service companies including Security Pacific, and by Ford and Chevrolet (Business Week, 1984). First Boston's Shelternet is an IOS available to customers' customers — in this case home buyers who are customers of real estate brokerage firms. Shelternet provides information on loan products available to the home buyer and initiates a mortgage application (PC Week, 1984). First Boston provides qualified real estate firms with a line of credit, enabling them to close approved loan applications locally. First Boston then buys the loans and resells them to secondary-market investors.

As information technology becomes less expensive and better able to communicate, it is expected that IOSs will grow to include an ever wider variety of participants. The ultimate user may not, in fact, always know or care who actually controls a given IOS. The sponsoring organization, however, must clearly understand its relationship with potential participants, since this relationship is an important determinant of the levels of availability, security, and privacy required in the IOS.

What functions will the IOS perform?

A description of the participants and their relationship to the sponsoring organization addresses one major aspect of an IOS. The other important aspect is revealed by a categorization according to the information function of the system. The simplest IOSs handle only boundary transactions — for example, order-entry systems. These may provide a limited "shopping" capability, but basically such systems accept orders from participants and confirm them. More advanced systems have some sales characteristics as well: they may suggest one product over another, offer delivery options, or promote special items. The sponsors of such systems have established the start of a two-way electronic dialogue with the other participants.

Other IOSs allow participants to retrieve and analyze data as well as execute boundary transactions. Both the Inland Steel system and freight-tracking systems such as those installed by Emery Air Freight and American President Lines, allow customers to check on the progress of their orders, thereby reducing the customer's uncer-
tainty and allowing customers to measure the sponsor’s performance. CIGNA allows its casualty insurance customers to examine their own data stored on the insurer’s computers in order to find ways of reducing their insurance bills. A system developed by Eastman Kodak for small film developing laboratories allows the labs to obtain advice on pricing and work schedules as well as order Kodak paper, chemicals, and other supplies.

Finally, some IOSs allow participants to enter, store, and manipulate information that is not transmitted to the sponsor. These systems provide information power within the boundaries of the user organization. Examples include systems that perform “back office” chores for travel agencies, insurance offices, pharmacies, and other small businesses as part of their overall role. This additional capability can be important in increasing acceptance of the system.

**Using the categorization scheme**

The three functions discussed form a continuum in the extent to which they are integral to the operations of participants. This continuum is important for several reasons.

1. The continuum parallels to a significant degree the complexity of securing participation in the IOS and implementing a system that successfully meets the needs of participants. It is relatively simple to devise a system to improve handling of administrative transactions that already take place between two organizations. It is more complex to provide information to a wide range of users that allows them to more effectively manage their relationships with the sponsor. It is even more ambitious to provide capabilities through an IOS that enable users to manage broader aspects of their business more effectively.

Some successful IOSs have evolved along this continuum from boundary transactions toward integration into core aspects of the participants’ business. McKesson’s Economost system provides a well known example of this development pattern. Economost began as a simple order-entry system, was expanded to include related functions like inventory management and pricing, and eventually had features such as store design and layout, and preparation of income statements and balance sheets for retail customers.

2. Moving along the continuum in developing and implementing an IOS is a logical way for the sponsor to develop a depth of understanding of the other participants’ business. Such movement also generates confidence in the ability and integrity of the sponsor as a partner in the participant’s business.

3. As the relationship with the sponsor moves from periphery to core of the participant’s business, the relationship becomes more significant to the participant. As a consequence, it becomes more difficult for a competitor to displace the sponsor.

The suggested categorization along the dimensions of business purpose, participation, and information function is certainly not the only possible, nor are the individual categories mutually exclusive. The value of the categorization scheme arises from its utility in structuring the many combinations of possibilities for gaining advantage through use of an IOS. The scheme discussed above suggests three dimensions that can be labeled simplistically as “why, who, and what.” The material discussed in the next section presents a conceptual framework to guide the search for competitive advantage and can be thought of as “how.”

**Competitive Advantages to Sponsoring an IOS**

The proliferation of interorganizational systems certainly suggests that many companies are finding IOSs to be important sources of competitive advantage. What can be said about the original of this competitive advantage? Bakos and Treacy (1986) argue that competitive advantage stems fundamentally from two factors: comparative efficiency, which allows an organization to produce its goods or services more cheaply than its competitors; and bargaining power, which allows a firm to resolve bargaining situations with its customers and suppliers to its own advantage. The strength of these factors is determined by even more fundamental issues — comparative efficiency by both internal efficiency and interorganizational efficiency, and bargaining power by unique product features, switching costs, and search-related costs (see Figure 1).
The IOS examples given above fit neatly into the Bakos and Treacy framework; it is easy to see why some of them have been of such remarkable strategic importance. More generic sources of competitive advantage from IOSs are described in the next section.

**Comparative efficiency**

**Internal Efficiency**
- Lower inventory costs by allowing “just-in-time” delivery
- Encourage standardization of data representation, making data easier to manipulate and analyze internally
- Capture data more quickly, leading to faster analysis and shorter response time

**Interorganizational Efficiency**
- “Export work” by getting customers or suppliers to do data entry and editing
- Allow customers to “shop” and check order status electronically, without tying up customer service representatives
- Provide benefits of vertical integration (more control, coordination, lower costs) without requiring actual ownership of other organizations
- Facilitate cross-selling of additional or higher margin products
- Permit inexpensive, rapid electronic transmission of sales and service messages
- Increase sales of company products, due to ease and efficiency of ordering and to favorable display on order-entry screens
- Remove a level of the distribution chain by going direct to customer or user rather than through an intermediary
- Capture more precise, timely usage data, allowing production scheduling according to use rather than according to sale or shipment
- Evaluate quickly and economically the effects of advertising, rebates, and other marketing programs
- Extend market reach to customers who could not be economically served by conventional field sales calls
- Relate sales message, including price and other terms, to buyer’s previous experience with seller and with product
- Ship in more economical lots and be prepared to receive incoming goods by communicating with transportation companies

**Source:** Bakos and Treacy, 1986.
— Deliver products or services (e.g., software or financial advice) electronically, monitor compliance with policies related to customers, dealers, etc.

— Observe ordering pattern for, and usage of, competitors' products

**Bargaining power**

**Raising Switching Costs**

— Raise users' need to retrain personnel, to modify operating procedures, or to invest in new or additional hardware or software if they change to a different system

— Threaten change in status of personnel if automated system is replaced by nonautomated system

**Unique Product Features**

— Make product easier or less expensive to select, order, handle, use, or account for

— Enhance product image as state-of-the-art

— Improve customer service by identifying and reporting problems more quickly, allowing more accurate diagnosis and faster response

— Provide immediate feedback on product availability and price

— Lower required inventory levels

**Search-Related Costs**

— Lower cost of "shopping" via links to suppliers; control, observe, or profit from shopping via links to customers

— Improve customers' ability to shop for a third-party product that generates fee income or additional sales of primary product

— Suggest alternative product specifications that reduce customers' costs or improve customers' performance

— Get the best available prices on purchased commodity materials

— Alert customers to opportunities to obtain volume discounts by altering order patterns slightly

These generic uses of interorganizational systems address each of the theoretical sources of competitive advantage identified by Bakos and Treacy (1986). Beyond recognizing the explanatory power of their framework, it is useful in locating attractive opportunities for new IOSs.

**Looking for IOS Opportunities**

The search for IOS opportunities can utilize the categorization scheme and the framework for competitive advantage together as guides for the search process. Figure 2 is a schematic example of this approach, depicting the search as a branching process. As mentioned earlier, the search is complex because of the large number of combinations that can be evaluated — particularly when the search is extended to include investigation of second-level relationships such as those between dealers and their customers. In practice, the search is bounded by exercise of judgment about

— the fit of search directions with the sponsor's strategic interests and capabilities, and

— insights from information technology professionals about relationships between industry structure and practices and potential IOS payoffs.

Some of the background analysis is best carried out through interviews and data gathering by company employees or outside consultants. It is important to involve a sample of potential participants — customers, suppliers, distributors, etc. — in the process. In fact, once the principle objectives and broad design parameters have been established by the sponsoring organization, it is critical to involve people from other organizations in the resolution of functionality and human engineering issues for those subsystems that impact their organizations. As happens with intraorganizational systems, involving users slows the design but pays off during implementation. It is also important to involve a cross-section of company employees, including representatives from the information systems group as well as the group(s) that might be affected by a new IOS. Such participation both helps develop new ideas and builds support for the system that is ultimately developed.

**Comparative efficiency**

The attempt to improve comparative efficiency
through an IOS should begin by examining existing flows of information across organizational boundaries: orders, invoices, specifications, bids, inquiries, confirmations, notices, claims, and so on. The goal is not so much to automate what exists as to uncover the source, content, and destination of each flow. Could the flow be captured closer to its origin or delivered closer to its destination, perhaps by cutting out an intermediary?

For example, if a food manufacturer could economically capture orders directly from custom-

ers, would the food broker be necessary? If a large farm could save money by placing its order for pesticides directly with a distributor, would it continue to buy from a dealer?

In some situations, direct computer-to-computer links can eliminate the embarrassing inefficiency of situations in which the buyer’s computer produces a printed list of items to be ordered that is mailed to the supplier and then re-entered into another computer. As data formats and transmission protocols become more standardized, the ability to accept and transmit orders elec-

Figure 2. A Schematic Diagram of the Opportunity Search
tronically may move from a competitive advantage to a business necessity.

A complete analysis of information flows should uncover not just what does flow, but what could flow. What other information — instructions, assistance, parts and supplies ordering, etc. — could be supplied to customers via an IOS? What informal links might be strengthened, improving the long-term relationship with customers or suppliers? For example, a medical supplier equipped its sales force with portable computers that could access an electronic mail system. The sales representatives soon began acting as an informal job referral network for the specialty they served, thereby tightening the connection between the representatives and their customers.

There is an instructive analogy with the early development of information processing systems within an organization. Systems developers must move beyond the question, “How do I automate what is being done?” to the more creative question, “Given existing information technologies, how could our firm’s objectives best be accomplished?”

Bargaining power

Consider ways to improve the product purchasing and usage processes, both for the organization and its customers and suppliers (lves and Learmonth, 1984). What is the search process? What unique product features are important? What are the switching costs, and how important are they?

An IOS may be particularly useful if a product is complicated to specify or order. An intelligent order-entry system, for example, could assure that the buyer has considered all the options and has supplied all the necessary information. Companies in industries where competitors offer broad product lines with many similar products, where the same products are ordered routinely, or where products are sometimes needed urgently, may also find significant advantage by sponsoring an IOS.

Providing unique product features with an IOS can be done most easily for products that are complicated or expensive to use. The Kodak and CIGNA systems described above are in this category. In other cases, an IOS becomes the delivery mechanism (home banking, corporate cash management). Products that are otherwise relatively undifferentiated can be distinguished by the ability to order or use them electronically.

Switching costs are more significant when the ordering task is complex, when the user’s start-up costs are high (e.g., home banking), and when the system can be built into the product (e.g., travel agents make the boarding passes provided by an airline reservation system part of their overall “product”).

Management Issues

The preceding sections have described the types of advantages that can be gained through the use of IOS and have suggested ways to look for IOS opportunities. Once a potentially significant system has been identified, a series of questions should be posed before embarking on system development. These questions should evaluate the impacts and opportunities from several management perspectives. For example:

Questions for general managers:

— What would the system do for my business? What are the costs, the benefits, and the organizational impacts?

— What would the system do for the other participants? Why should they use it? What barriers will there be to their usage and how can we overcome them?

— What effects would the system have on industry structure? Are there threats or further opportunities associated with these changes? Do we have the resources and the strategic position to respond quickly and effectively to emerging threats or opportunities?

Questions for functional managers:

— What impacts would the system have on tactics and operations of this function? What new opportunities and challenges will it present? What skills, knowledge, and other capabilities will be needed to respond? Do we have sufficient time, authority, and resources to develop or acquire the capabilities?

Questions for information systems managers:

— Will our present backbone systems support the information and processing requirements for the proposed IOS without major revisions?
Do we have or can we develop or acquire the resources necessary to make later revisions and additions?

— What new capabilities will be needed in the IS function to ensure sufficient grasp of not only our own business situation but that of other participants as well, so that we will be able to design and execute a system that will add value for all anticipated participants?

— How can the IS function be linked to other functions and to general management processes so that it can be a full and valuable partner in both the initial development process and the evolution of the IOS over time?

— What adaptations will be required of system users in our organization and in other participating organizations, and can we provide that support?

Managers in each participating organization will face a similar but somewhat “mirror image” set of questions which they should ask about their own organization and the capabilities of the proposed sponsor.

Costs, Benefits, and Organizational Impacts

Estimating the cost of developing an IOS is not significantly more difficult than performing the same task for other information systems. Making such an estimate is often as much an art as a science, and the result should include a margin for uncertainty. Development costs will generally be higher than for an internal system of the same size due to increased requirements for data privacy, security, and integrity. IOS operating costs are also subject to uncertainty, due to changes in transaction volume, usage characteristics, and telecommunications rates.

Quantifying the benefits of an IOS can also be difficult, since the system is primarily intended to increase revenue rather than to decrease costs. Even so, a benefit analysis should be undertaken. Attempts at quantification can be valuable in gaining support for an IOS development project and in monitoring its progress, in addition to improving understanding of the potential benefits.

The most obvious, and most easily quantified, benefits come from cost reductions, at both internal and interorganizational levels. For instance, McKesson Drug was able to eliminate 250 clerks who took orders and typed up purchase forms; American Hospital Supply was able to triple its sales volume with virtually no increase in its customer support staff. Such savings arise largely from exporting the work-order entry and editing to customers.

A second easily quantified benefit is fee revenue from other IOS participants. Such revenue can be significant; in 1985 American Airlines’ Sabre system generated nearly $340 million in fees, mostly from other airlines, and $116 million in after-tax profits (Johnston and Carrico, 1988). Of course, questions may arise about participants’ willingness to pay for the use of the system. Controversy over aggressive and/or unequal pricing may increase the risk of government intervention, as has occurred in the airline reservation systems area.

An even larger source of revenue may be increased sales of the sponsoring company’s products. Such an increase can result from:

— Enlarged scope, e.g., national sales via an IOS

— New kinds of customers, reachable economically through an IOS

— Larger product line made possible by improved ability to process sales and inventory data

— Increased customer awareness, due to favorable display position, substitution for competitors’ products, or cross-selling

— “Halo effect”: customers may be more willing to deal with IOS sponsor due to image, favorable impact of system on customer’s business, etc.

Increased sales due to an IOS are difficult to quantify in advance and nearly impossible to identify precisely in retrospect, since typically the sponsoring organization will have made other changes simultaneously. Moreover, most organizations are accustomed to justifying new applications of information technology only through cost reductions, never on the basis of increased revenues. The same skills used in making new product decisions must be used in making IOS decisions if an organization is ever to reap the competitive advantages of this type of system.
Another set of benefits is even more difficult to quantify, yet must be considered. These benefits include reducing overhead, raising switching costs and other barriers to entry, and increasing product differentiation. As yet, few theoretical tools are available for measuring the strength or importance of such benefits. Perhaps the best way to consider these factors in an IOS cost/benefit analysis is to perform the analysis first without them. If the new system can be justified using only the other, more quantifiable costs and benefits, then management can feel comfortable in proceeding to an analysis of industry impact (described further below). If, however, discounted cash flow analysis using a reasonable hurdle rate and time horizon does not show a positive return from the quantifiable costs and benefits, then management should ask what additional cash flow is needed in order to achieve a positive result. Management can then use their judgment to determine whether the “nonquantifiable” competitive benefits are worth the amount required. (For example, will the new IOS raise switching costs enough to bring the company an additional $500,000 in after-tax profits in each of the next three years?) Most organizations are not accustomed to making decisions about information systems in this way, but the skills are not unique. Management is constantly expected to make similar judgments regarding advertising and promotion, product quality, customer service, and other activities. Generally only the cost side of these activities can be known in advance, and yet companies routinely undertake them, relying largely on management judgment to determine the appropriate level of spending.

Management judgment is also needed to understand the potential internal impacts of a new IOS on its sponsoring organization. Often the system will require a change in employee skills and sophistication in order for it to be used effectively. The customer service representative must be able to help the technophobic customer, as well as explain the product line. The sales agent must be skilled at the keyboard, and the purchasing agent must be as adept at shopping by computer as by telephone. Training personnel whose jobs will be affected by an IOS is an obvious, but often neglected, step towards assuring the system’s success. Internal procedures will also be affected, and should be redesigned to fit effectively with the IOS. A large impact will be felt in the information systems department, which typically now has a more immediate and more obvious impact on the company’s bottom line than in the past. This group may be faced with new technological challenges as well. They must design and implement a system for use by people outside the organization who may have different objectives and intentions than company employees. Education on both business and technical topics should be provided before any new IOS is undertaken.

On a more global level, sponsorship of an IOS may expose a company to completely new opportunities for close relationships with its customers or suppliers and to new business possibilities based on IOS technology. It is important for management to establish channels for systematically tracking these opportunities, communicating the ones that look promising for the organization, and taking appropriate action. Again, since many companies typically do not perceive information systems of any kind as likely to influence structure or strategy, procedures should be initiated during system development to raise consciousness about the potential impacts of the IOS on strategy and on tactics at the functional level. Cross functional meetings can pose evocative questions as to how the new system and the information it provides can be used to produce added value or benefits within internal operations and in relationships with other planned or potential participants. A question such as, “Will this system provide an opportunity to improve our physical distribution system or to redirect and retrain our field sales resources to increase their effectiveness?” may trigger changes that both lever the immediate benefits of the IOS and provide a stream of secondary impacts that keep competitors off balance while initial gains are consolidated and system enhancements are introduced.

Another benefit observed in some organizations that have operated IOSs for several years is a heightened awareness by managers and professionals throughout the sponsoring organization of market and competitive conditions. The increased flow of data between the sponsor and users of the IOS provides a basis for earlier detection of shifts in market requirements, more accurate assessment of competitor capabilities and intentions, and improved ability to predict reactions of customers, channels, and competitors to competitive initiatives by an player in the industry. Information gleaned from IOS data can raise the competitive savvy of the management team in ways that enhance both operation efficiency and market responsiveness.
The other participants

The previous material addressed the IOS decision from the sponsoring organization's point of view, at which this article is aimed. Nevertheless, it is helpful to consider the point of view of the other participants, who will be asked to use the IOS and perhaps pay for such use. Understanding the costs and benefits to these other participants will be helpful to the sponsoring organization in designing the IOS, in promoting its use, and in modifying it for the future. If system capacity is limited, this awareness will also be useful in selecting users.

The potential IOS participant faces the same set of issues — costs, benefits, and organizational impacts — as the IOS sponsor, but may view them quite differently. Some participants will be able to reduce direct costs of order entry or receipt, for example. Others will be able to reduce indirect costs such as holding and managing inventory. By sharing information with the IOS sponsor, participants may be able to highly tune products and services for their own business situations; the pharmacy customers of McKesson Drug Company, for example, receive restocking orders that are not only of the exact quantity they desire, but are also arranged in the shipping cartons in the same order as the stores' shelves. Price labels for the shelves and for the individual items are also included.

Other IOSs allow participants to increase their sales by better serving customers. The airline reservations systems used by travel agents, for example, make it much easier for the agent to provide a combination of convenience and price that will satisfy an individual traveler or a corporate travel department. Hotel and rental car reservations can be made through the same system, increasing customer satisfaction and commissions for the agent (and for the sponsor). Such systems also reduce costs by speeding up customer service and by performing bookkeeping, billing, and similar back-office tasks. Some reservations systems even allow travel agents to arrange theater reservations for their clients, and to order their own office stationery and other supplies directly from the terminal.

By simplifying order entry and giving immediate feedback on order acceptance and delivery data, some IOSs allow participants to reduce inventory levels, thereby bringing them closer to the "just in time" systems used in some manufacturing plants. Some IOSs may also suggest less expensive or more readily available alternative products with the same characteristics. More advanced systems can even analyze usage patterns and customer trends to provide advice on what, how much, and when to order. The supplier linked to a customer via an IOS may have longer advance notice on orders as well as receiving the order in a standardized format.

Beyond reduced costs and improved performance, IOS participants may benefit from the "high-tech" image conferred through the use of a system they could never afford to develop on their own. It is common, for example, for travel agents to advertise that they use a computerized reservations system, or perhaps several such systems. The employees of an IOS participant may be enthusiastic about both the image and the content of a job done via a computer terminal rather than with paper, pencil, and phone.

The other side of the benefits question is, of course, the costs imposed on IOS participants. Like the benefits, the costs are both direct and indirect. Participants may pay the sponsor for equipment, communications, and system usage. For example, other airlines pay American $1.75 per seat booked through Sabre. Direct IOS costs may not seem onerous at first, particularly when measured against potential savings in staff time. Once an IOS is established, however, the usage fees may be subject to increase because: use of the system has become a virtual necessity; the system has been developed to the point that duplicating it is economically impossible; and the system has raised significant switching costs.

IOS participants want to achieve most cost and performance benefits possible without becoming completely tied to the system. Equally obvious, smart IOS sponsors will do their best to provide significant benefits that can be obtained only by investing in equipment or training that is specific to a single system. Sponsors will make it as attractive as possible for participants to build the IOS into their own internal system for inventory tracking, pricing, customer service, etc. Earlier this article acknowledged that the benefits to be achieved through raising switching costs are difficult to measure. The costs of being closely tied to a single supplier or customer is even more difficult to determine. The same sort of analysis proposed for the potential sponsor is appropriate for the potential participant, who must determine whether a probable increase in switching costs is worth the benefits that can
be achieved. Participants, in fact, probably need to work harder than sponsors to ensure that IOS decisions are made appropriately. A potential sponsor typically considers making a fairly large initial investment, automatically raising the level of consideration given to the decision. A potential participant, however, may be asked to invest only a small amount up front; indeed, some airlines are reputed to have paid travel agents to accept their reservations systems. Because little expense is involved, the danger is that the decision to participate may be made by lower level staff who may not adequately consider the current and future organizational and competitive impacts. There is a clear need for management policies regarding IOS decisions whether they concern sponsorship or participation.

Structural impacts
A third important IOS question relates to the system’s potential impact on industry structure. We have discussed the ability of an IOS to raise switching costs and other entry barriers, presumably both positive developments from the sponsoring organization’s point of view. Requiring suppliers or customers to use an IOS link may force smaller players out of the market if they cannot or will not adapt to the standards imposed by the system.

A large investment in an IOS may deter potential new entrants who are unwilling or unable to match an incumbent’s investment. Similarly, a successful IOS may force some traditional rivals to leave the industry or at least to retreat to a market segment that can be served without an IOS. The exit of numerous small operators from drug distribution after aggressive introduction of IOSs by both Bergen Brunswig and McKesson illustrates this effect. The IOS investment may look particularly unattractive to a second or third player if the first mover is able to install a system in the best locations. The first mover may also have an opportunity to establish de facto standards for data representation and transmission, further solidifying its position in the industry. If an IOS can be made practically obligatory, would-be providers of substitute products will be forced to develop a system of their own or to find a new way to compete.

The industry impacts described thus far are largely positive for the sponsoring organization. Potential rivals may be deterred, current rivals may leave the industry or begin using the sponsor as a distributor, buyers and/or suppliers may have increased switching costs, and substitute products may be harder to develop and introduce. Some of these advantages will accrue largely to the sponsors of the first IOSs in a given industry. Even these initial sponsors should be aware that an IOS commitment must be long-term if it is to be effective. A system that is not maintained and upgraded risks being replaced by a new system, perhaps based on a different technology. Moreover, establishing an IOS as an important basis for competition opens the industry to entry by completely new players who will lever their information systems skills. Would it be hard to imagine, for example, a successful videotex company buying an airline, or at least becoming a travel agent so large that it had significant bargaining power with the carriers?

In some situations technological and industry factors seem to point to the inevitable development and use of IOSs, and in these cases it may very well be better to be first than wait to see what the competition does. In other circumstances, however, companies have a larger measure of control of the pace of IOS development, and these companies need to consider carefully the long-term impact on their industry before they rush into IOS development.

These questions for management are intended to lead to serious consideration of the costs and benefits of IOS usage, both for the sponsor and for the other participants. These questions should also focus IOS design on those areas that are most likely to bring the sponsor long-term competitive advantage. The necessarily public nature of IOSs makes their development a more serious matter than the development of an internal information system: if an initial sponsor goes public with an ineffective system, the outcome may not be just wasted time, but the formation of another IOS sponsored by a competitor.

Summary
The steady increase in the potential use of IOS to improve the joint performance of company networks makes the search for opportunities both important and complex. A set of categories or frameworks can guide exploration of choosing
appropriate organizations, deciding what functions the system will perform, and determining how these functions will provide sustainable advantage.

An effective structure for the search process helps to achieve clarity about the fundamental objectives of the IOS and the prospective costs and benefits to all participants. Experience with IOS development has shown that clarity on these issues is an important prerequisite to system success. The proposed structure can also assist in evaluating the potential impacts to all participants of proposed systems operations, of tactics and strategies of participating companies and their competitors, and in anticipating key implementation issues.

Perhaps the most significant outcome of an effective search and planning process should be the recognition that the electronic link between separate organizations is a part of a major change in the relationship between the parties. The most successful users of IOS have recognized that the increased familiarity with their customers, dealers, or suppliers afforded by their joint systems was an avenue to collaboration on a widening range of initiatives that improved the economic performance of each partner. Aggressive pursuit of new possibilities for joint performance improvement has proven to be a source of sustainable advantage that far exceeds the impact of initial processing of boundary transactions.

References


About the Authors

H. Russell Johnston is associate professor of management at Boston University. He returned to academia in the fall of 1986 to conduct research into emerging impacts of information and information technologies on the structure and processes of diversified and vertically integrated organizations. Much of his research stems from experience with consulting clients.

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