# Information Technology Changes the Way You Compete

by **F. Warren McFarlan**

New electronics systems can add value to your product and throw your competition off balance

As it moves from a strictly supporting role in the back office, computer-based technology offers new competitive opportunities. A company can use this technology, for example, to build a barrier to entry, to build in switching costs, and even, sometimes, to completely change the basis of competition. This author shows how some companies have seized the advantage, while others, more complacent, have ended up playing the difficult and expensive game of catch-up ball. He also points out that it is important for executives to make this competitive analysis in assessing where IS fits in their companies, since in some cases it appropriately plays a support role and can add only modestly to the value of a company's products, while in other settings it is at the core of their competitive survival. Understanding where a company fits on this spectrum can help the CEO determine both the proper level of expenditures and the proper management structure for IS.

- To solve customer service problems, a major distributor installs an on-line network to its key customers so that they can directly enter orders into its computer. The computer's main purpose is to cut order-entry costs and to provide more flexibility to customers in the time and process of order submission. The system yields a larger competitive advantage, adding value for customers and a substantial rise in their sales. The resulting sharp increase in the company's market share forces a primary competitor into a corporate reorganization and a massive systems development effort to contain the damage, but these corrective actions have gained only partial success.

- A regional airline testifies before the U.S. Congress that it has been badly hurt by the reservation system of a national carrier. It claims that the larger airline, through access to the reservation levels on every one of the smaller line's flights, can pinpoint all mutually competitive routes where the regional is performing well and take competitive pricing and service action. Since the regional airline lacks access to the bigger carrier's data, it allegedly is at decided competitive disadvantage.

- A large aerospace company has required major suppliers to acquire CAD (computer-aided design) equipment to link directly to its CAD installation. It claims this has dramatically reduced total cost and time of design changes, parts acquisition, and inventory, making it more competitive.

These examples are not unusual. With great speed, the sharp reduction in the cost of information systems (IS) technology (i.e., computers, remote devices, and telecommunications[1]) has allowed computer systems to move from applications for back-office support to those offering significant competitive advantage. Particularly outstanding are systems that link customer and supplier. Though such links offer an opportunity for a competitive edge, they also bring a risk of strategic vulnerability. In the case of the aerospace manufacturer, operating procedures have shown much improvement, but this has been at the cost of vastly greater dependence, since it is now much harder for the manufacturer to change suppliers.

In many cases, the new technology has opened up a singular, one-time opportunity for a company to redeploy its assets and rethink its strategy. The technology has given the organization the potential for forging sharp new tools that can produce lasting gains in market share.

Of course, such opportunities vary widely from one company to another just as the intensity and the rules of competition vary widely from one industry to another. Similarly, a company's location, size, and basic product technology also shape potential IS technology applications. Computer advances have affected even the

smallest companies. (Recently, for example, a $6 million manufacturer of electronic components profitably acquired CAD technology.) Further, in different situations, a company may appropriately attempt to be either a leader or an alert follower. The stakes can be so high, however, that this must be an explicit, well-planned decision.

## Search for Opportunity

In assessing the ultimate impact of IS technology, companies must address the five questions that follows. If their answer to one or more of these questions is yes, information technology represents a strategic resource that requires attention at the highest level.

### Can IS technology build barriers to entry?

In the example of the distributor, the company was able to open up a new electronic channel to its customers. Not only was the move highly successful but other companies could not replicate it. Customers did not want devices from different vendors on their premises.

A successful entry barrier offers not only a new service to appeal to customers but also features that keep the customers “hooked.” The harder the service is to emulate, the higher the barrier for the competition. An example of such a defensible barrier is the development of a complex software package that adds value and is capable of evolution and refinement. A large financial service large financial service firm used this approach to launch a different and highly attractive financial product, depending on sophisticated software. Because of the complexity of the concept and its software, competitors lagged behind, giving the firm valuable time to establish market position. Further, the firm has been able to enhance its original product significantly, thus making itself a moving target.

The payoff from value-added features that increase both sales and market share is particularly noteworthy for industries in which there are great economies of scale and price is important to the customer. By moving first down the learning curve, a company can gain a cost advantage that enables it to put great pressure on its competitors.

Electronic tools for salespeople that increase the scope and speed of price quotes represent another kind of barrier. By permitting the sales force to prepare complex quotations on the customer’s premises, portable microcomputers not only give better support but also make the sales force feel more confident (whether or not they have any reason to) and hence sell more aggressively. The sophisticated financial planning packages being used by sales forces of major insurance companies build similar barriers.

The flip side of course, is the large capital investments these projects require and the uncertainty of their ultimate benefits. Further, in difficult economic times, investment in these electronic systems may create both serious cost rigidity and exit barriers against an orderly withdrawal from the industry. It is difficult, for example, for a large airline to scale its computing activity down sharply to deal with reduced operations or great cost pressures.

While a company may have difficulty in maintaining an individual advantage, it can parlay a series of innovations into a valuable image; it can be seen as a company that is at the leading edge. For example, Merrill Lynch has consistently improved the features of its cash management account. This image can help maintain market position, especially in periods when a line of products is not successfully competitive.

### Can IS technology build in switching costs?

Are there ways to encourage customers to rely increasingly on the supplier's electronic support, building it into their operations so that increased operational dependence and normal human inertia make switching to a competitor unattractive? In the ideal case, the electronic support system is simple to use. It also contains, however, a series of increasingly complex and useful procedures that insinuate themselves into the customer's routines. Finally, the customer will have to spend too much time and money to change suppliers. Electronic home banking is a good example of this. When a customer has learned to use such a system and has coded all monthly creditors for the system, he or she will be much more reluctant to change banks than before.

A heavy machine manufacturer provides another example of electronic services and features that add value to and support a company's basic product line while increasing the switching cost. The company has attached electronic devices to its machinery installed on customer premises. In case of mechanical failure, the device signals a computer program at corporate headquarters and the program analyzes the data, diagnoses the problem, and either suggests changes in the machine's control settings or pinpoints the cause of the failure and identifies the defective parts. In the same vein, another manufacturer has supplemented such a service with immediate dispatching of spare parts.

## Can the technology change the basis of competition?

One revealing way to characterize competitive strategies is by means of Michael E. Porter's analysis.[2] He discusses three types, each with different ground rules. One is cost based, when a company can produce at a much lower cost than its competition. Companies selling commodities and high-technology products can use such strategies. A second type is based on product differentiation, when a company offers a different mix of product features such as service and quality. The third type is specialization in only one niche of a market, distinguishing itself by unusual cost or product features. Its strategies may be called focused.

In some industries dominated by cost-based competition, IS technology has permitted development of product features that are so different that they cause the basis of competition to change radically. For example, in the mid-1970s, a major distributor of magazines to newsstands and stores was in an industry segment dominated by cost-based competition. For years it had used electronic technology to drive costs down by developing cheaper methods of sorting and distributing magazines. While using less staff and lower inventory, it had achieved the position of low-cost producer.

In 1977, however, the distributor decided to build on the fact that its customers were small, unsophisticated, and unaware of their profit structures. By using its records of weekly shipments and returns from a newsstand, the distributor could identify what was selling on the newsstand. It developed programs that calculated profit per square foot for every magazine and compared these data with information from newsstands in economically and ethnically similar neighborhoods that often carried very different mixes of merchandise. The distributor could thus tell each newsstand every month how it could improve the product mix. Instead of just distributing magazines, the company has used technology to add a valuable inventory management feature that has-permitted it to raise prices substantially and has changed the basis of competition from cost to product differentiation.

Other companies have used IS technology to change the basis of competition from product differentiation to low cost. For example, the suppliers to the aerospace manufacturer described earlier used to compete on the basis of quality, speedy handling of rush orders, and ability to meet customized requests as well as cost. The CAD-to-CAD link and the move to numerically controlled machine tools has negated the value of many of these elements of differentiation and made overall cost more important.

Dramatic cost reduction can significantly alter the old ground rules of competition. In a low-cost competitive environment, companies should look for a strategic opportunity from IS technology either through sharp cost

reduction (for example, staff reduction or ability to grow without hiring staff, improved material use, increased machine efficiency through better scheduling or more cost-effective maintenance, and lower inventories) or by adding value to their products that will permit a change to competing on the basis of product differentiation. In the airline industry in the 1960s, American Airlines pioneered a new kind of reservation service, which brought a large increase in market share and competition. Today in the industry, airlines are fighting to get their on-line reservation systems into travel agencies and, through positioning of flight recommendations on a CRT screen, to influence the travel agent's purchase recommendation. In another example, relentless competition is taking place in the diversified financial services industry as insurance companies, banks, and brokerage houses merge, and companies jockey for position.

A large insurance carrier recently identified systems development as its biggest bottleneck in the introduction of new insurance products. It is, therefore, heavily investing in software packages and outside staff to complement its large (500-person) development organization. A cost-cutting activity in the 1960s and 1970s, the IS organization has become vital to the implementation of a product differentiation strategy in the 1980s. This company, which is cutting staff and financial expenditures overall, is increasing IS expenditures and staff as a strategic investment.

Just ahead are the risks and opportunities that will come with the timing and packaging of videotex and cable services as a new way of retailing, particularly to the upscale market. In many cases in a short time these changes could dramatically alter old processes and structures. No example is more striking than the situation confronting libraries. They have a 1,000-year-plus tradition of storing books made of parchment and wood pulp. Soaring materials costs, the advent of cheap microfiche and microfilm, expansion of computer data bases, and electronic links between libraries will make the research facility of the year 2000 unrecognizable from the large library of today. Those libraries that persist in spending 65% of their budget to keep aged wood pulp warm (and cool) will-be irrelevant to the needs of their readers.

Though in the early stages it is difficult to distinguish the intriguing but ephemeral from an important structural innovation, if managers misread the issues in either direction the consequences can be devastating.

## Can IS change the balance of power in supplier relationships?

The development of interorganizational systems can be a powerful asset; for example, just-in-time delivery systems can drastically reduce inventory levels in the automotive and other industries, thus permitting big cost savings. Similarly, electronic CAD links from one organization to another permit faster response, smaller inventory, and better service to the final consumer. In one case, a large retailer has linked his materials-ordering system electronically to his suppliers' order-entry system. If he wants 100 sofas for a particular region, his computer automatically checks the order-entry system of his primary sofa suppliers, and the one with the lowest cost gets the order.

Equally important, the retailer's computer continually monitors the suppliers' finished-goods inventories, factory scheduling, and commitments against his schedule to make sure enough inventory will be available to meet unexpected demand by the retailer. If inventories are inadequate, the retailer alerts the supplier. If suppliers are unwilling to go along with this system they may find their overall share of business dropping until they are replaced by others.

Such interorganizational systems can redistribute power between buyer and supplier. In the case of the aerospace manufacturer, the CAD-CAD systems increased dependence on an individual supplier, became hard to replace, and left the company vulnerable to major price increases. The retailer, on the other hand, was in a much stronger position to dictate the terms of its relationship to its suppliers.

### Can IS technology generate new products?

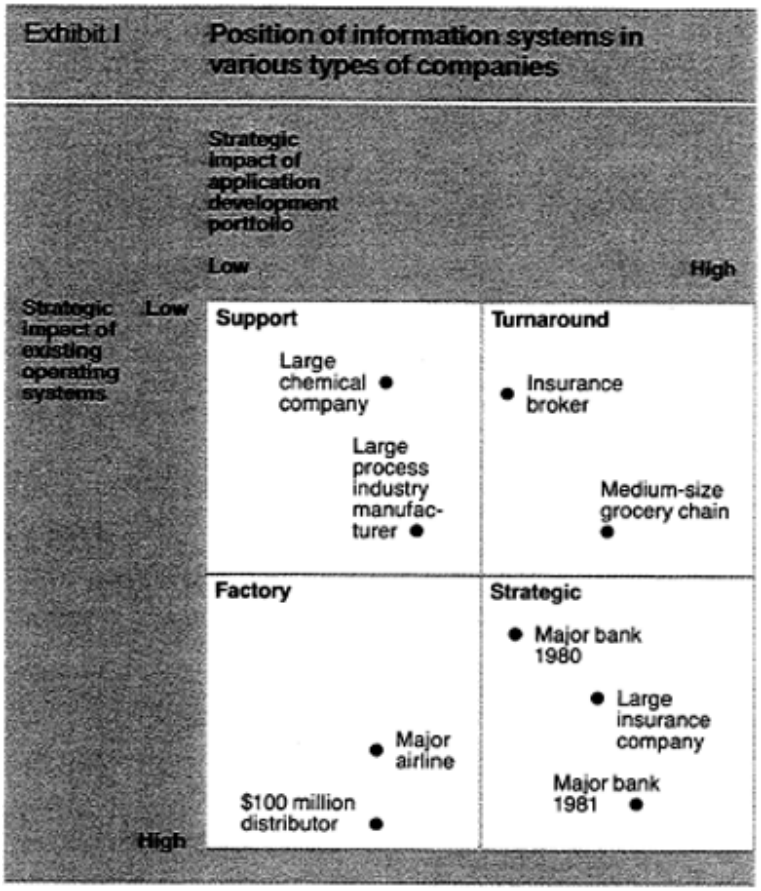
As described earlier, IS can lead to products that are of higher quality, that can be delivered faster, or that are cheaper. Similarly, at little extra cost, existing products can be tailored to customers' needs. Some companies may be able to combine one or more of these advantages. They should ask themselves if they can join an electronic support service with a product to increase the value in the consumer's eyes. Sometimes this can be done at little additional cost, as in the case of the on-line diagnostic system for machine failure described earlier.

Sometimes the data a company already has can be bundled or packaged to generate revenue. For example, Data Resources, Inc., the large econometrics subsidiary of McGraw-Hill, introduced a new product called Visilink that for the first time permitted owners of personal computers to use DRI's econometrics data base and to extract desired information. This service significantly broadened DRI's appeal and allowed it to reach many small companies and individuals who either were unaware of DRI or who previously could not afford DRI's service. Similarly the software developed to support a product may have commercial value.

## The Challenge

Achieving advantages requires broad IS management and user dialogue plus imagination. The process is complicated by the fact that many IS products are strategic though the potential benefits are very subjective and not easily verified. Often a strict ROI focus by senior management may turn attention toward narrow, well-defined targets as opposed to broader strategic opportunities that are harder to analyze.

Visualizing their systems in terms of a strategic grid,[3] senior and IS management in a number of organizations have concluded that their company or business unit is located in either the support or the factory quadrant (see Exhibit I). They have set up staffing, organization, and planning activities accordingly. As a result of both the sharp change in IS technology performance and the evolution of competitive conditions, this categorization may be wrong. For the new conditions, for example, the competitor of the distributor described in the opening paragraph was complacent about its position in the support box. The company never realized what had happened until it was too late. Playing catch-up ball is difficult and expensive in this area.




A number of companies and industry groups are and will remain appropriately in the support and factory boxes. Technical changes, however, have been so sudden in the past several years that the role of a company's IS function needs reexamination to ensure its placement is still appropriate.

## A New Point of View

Addressing the issues raised here requires management to change the way it operates.

1. The CEO must insist that the end products of IS planning clearly communicate the true competitive impact of the expenditures involved. Exhibit II shows how to accomplish this by identifying priorities for the allocation of financial and staff resources. In this connection, managers should realize that an embarrassingly large amount of development effort must be devoted to repair worn-out systems and to maintain them to meet changed business conditions.[4] Also, a vital but often unrecognized need exist for research and development to keep up with IS technology and to ensure that the company knows the full range of possibilities (for appropriate investments in the early phases).[5] Distinctly separate are the areas where a company spends money to obtain pure competitive advantage (very exciting) or to regain or maintain competitive parity (not so exciting because the company is trying to recover from its shortsightedness). Finally, projects where the investment is defined for measurable ROI are also separate.

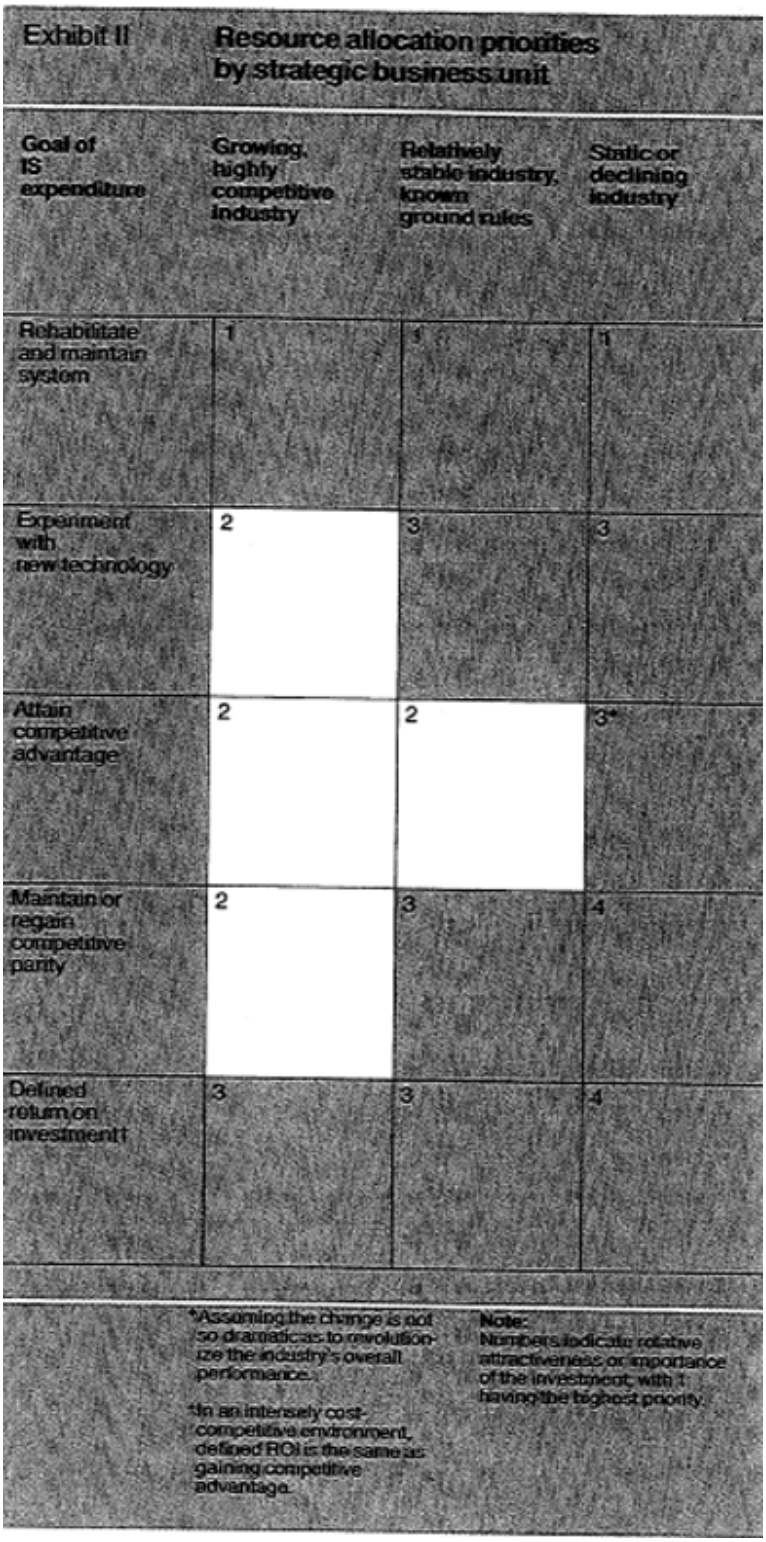


**Exhibit II** Resource allocation priorities by strategic business unit

| Goal of IS expenditure | Growing, highly competitive industry | Relatively stable industry, known ground rules | Static or declining industry |
|---|---|---|---|
| Rehabilitate and maintain system | 1 | 1 | 1 |
| Experiment with new technology | 2 | 3 | 3 |
| Attain competitive advantage | 2 | 2 | 3* |
| Maintain or regain competitive parity | 2 | 3 | 4 |
| Defined return on investment† | 3 | 3 | 4 |

*Assuming the change is not so dramatic as to revolutionize the industry's overall performance.

†In an intensely cost-competitive environment, defined ROI is the same as gaining competitive advantage.

Note: Numbers indicate relative attractiveness or importance of the investment, with 1 having the highest priority.

The aim of underlying the ranking process in Exhibit II is to allocate resources to areas with the most growth potential. Each company should have a summary of the IS plan of about three pages that vividly communicates to the CEO the data derived from Exhibit II, why IS expenditure are allocated as they are, and

what explicit types of competitive business benefits the company might expect from its IS expenditures. Today, many companies fall short of this goal.

2. Till now, it has been the industry norm for organizations and individuals to share data widely about information systems technology and plans, on the ground that no lasting competitive advantage would emerge from IS and that collaboration would allow all to reduce administrative headaches. But today, managers should take appropriate steps to ensure the confidentiality of strategic IS plans and thinking. Great care should be taken in choosing the attendees at industry meetings and in determining what they can talk about and what information they can share with vendors and competitors.

3. Executives should not permit the use of simplistic rules to calculate desirable IS expense levels. Judging an IS budget as a percentage of something, such as sales, has always been an easy way to compare the performance of different companies. In today's more volatile competitive arena, such comparisons are very dangerous. I have observed some companies that are spending 6% of their total sales in this area and which are clearly underinvesting. I have seen others making an outlay of 1% of their sales volume that are overspending.

4. Interorganizational IS systems have hidden, second-order effects, that is, repercussions in other parts of the business. Managers should not ignore them. Interorganizational IS systems are not necessarily good in and of themselves just because they work and are technically sound. Both their development and operation pose opportunity for shifts in the balance of power between companies. Sourcing inflexibility, pricing, vulnerability, systems inefficiencies, and excess expense are examples of these secondary effects. Assessing their implication requires careful examination.

5. Managers must not be too efficiency-oriented in IS resource allocation. They must encourage creativity in R&D during this period of technological discontinuity. The support or factory role (see Exhibit 1) is correct for IS in some organizations; however, such a decision should result from careful, creative analysis.