

**A PERSPECTIVE ON  
INFORMATION TECHNOLOGY IN  
THE PROCESS-ORIENTED  
ORGANIZATION**

**John F. Rockart**

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**Center for Information Systems Research  
Sloan School of Management  
Massachusetts Institute of Technology**

## A PERSPECTIVE ON INFORMATION TECHNOLOGY IN THE PROCESS-ORIENTED ORGANIZATION

### *ABSTRACT*

This is a brief, non-academic article written as a "white paper" for the management of a major business organization. The paper points out that we are moving toward customer-oriented organizations whose sub-units are increasingly interdependent. A major key to success in this environment will be the use of information technology to link far-flung sub-units and the organization as a whole with suppliers and customers. To achieve success, companies must focus their efforts on three key *business* processes and three major *managerial* processes. All will require significant changes in current ways of doing business, leaders who empower other members of the organization to achieve the vision, and major improvements in information technology infrastructure.

## A PERSPECTIVE ON INFORMATION TECHNOLOGY IN THE PROCESS-ORIENTED ORGANIZATION

How will the CEO of the year 2000 describe the use of information technology (IT) in his or her company? Let's listen.

"In one sense, IT is the *glue* in my company, binding many interdependent yet still fairly independent subunits and people together through instantly available worldwide information. But IT is more than that. It is the pathway to our customers. Luckily, we recognized this in time and in the 1990s focused IT on key customers-oriented processes. As a result, we have been able to move goods and services to our customers faster, with higher quality, and at lower cost than we ever imagined possible a decade ago. Yes, we have put a lot of money into new information technology; but if we hadn't, we wouldn't be in business today."

From the post WWII period to the present, the focus of information technology has been constantly changing. In the 1950s and 1960s, IT was used primarily to automate paperwork handling functions such as general ledger and order entry. During the 1970s, although paperwork processing automation continued, the new emphasis was on providing information for decision support, which sowed the seeds of today's executive information systems. Throughout the 1980s, the spotlight was on selected "mission critical" applications such as the package tracking systems developed by Federal Express and Otis's elevator maintenance system. Today, the emphasis is on fundamental, IT-enabled redesign of an organization's major operational and managerial processes.

As we move toward the next century, the role of IT will continue to change. And IT will change organizations. They will *act* different and they will *feel* different. Information, today dammed up in functions and departments, will flow around the world instantly and smoothly to where it is needed. Organization structure as a major focus of concern will give way to process.

The path toward this IT-enabled future will not be an easy one organizationally. It will also require significant investments in systems and IT infrastructure. Nevertheless, many organizations have already embarked on this journey.

In this paper, we will explore the evolving role of IT in the organization of the future. First, we will look at the major factors driving the need for a changing role in IT. Next, we will examine the six processes that companies should target for IT investments. Finally, we will talk about five ingredients needed to integrate IT successfully into business processes.

## **TWO MAJOR FACTORS**

Two major business considerations are driving the current need for strategic investments in information technology. First, in an exceedingly short period of time, low-cost, quality-conscious Pacific Rim competitors have forced U.S. companies to eliminate many of the buffers that had previously facilitated a simpler management style. Second, we have entered the "era of the customer." We will look at both of these, for they form the basis of a major new managerial world that is information technology intensive.

### **Where Have All The Buffers Gone?**

In the four decades following World War II, U.S. management has worked toward a common objective: decentralization. The emphasis was on moving decision making as low in the organization as possible. Companies were divisionalized. Strategic business units were formed and then multiplied. Where overseas operations were established, country-centered organizations with almost total control over prices, packaging, and even products were the rule.

The fundamental idea behind the development of these essentially independent subunits was to give each manager greater responsibility and the opportunity to experience running his or her own organization. This, it was believed, would enhance managerial

motivation, prevent stifling bureaucracy, and move decision making to where the action was -- at the sub-unit level. An exemplar of this idea, Johnson and Johnson created more than 180 separate companies. Citibank, under Walter Wriston, splintered itself into multiple small business units (SBUs). As a result, in most organizations functions such as sales and manufacturing were managed and measured only on the basis of their individual efficiency.

What made the relative independence of these sub-organizations possible were two key factors: a far less competitive world and the presence of five key "buffers." In the past, the buffers (inventory, excess staff, time, distance, and low quality) provided a lubricating effect, allowing subunits to act relatively independently without clashing. Closer examination of the five buffers reveals how this worked.

- **Inventory.** Warehouses with weeks of finished good inventory often saved the day for companies whose sales personnel failed to effectively communicate customer needs to manufacturing. Likewise, several days' accumulation of raw materials smoothed the manufacturing flow when purchasing was out of touch with suppliers. Today, clear recognition of the high cost of assets has forced Just-in-Time processes, thereby eliminating the need for this key buffer.
- **Excess staff.** In the past companies often carried additional staff for emergency manufacturing activities, special studies, or other activities. Because organizations must cut costs to compete today, they can no longer afford the expense of excess personnel.
- **Time.** In the early 1980s, Xerox learned that its new product development time was almost twice that of the Japanese. Taking a closer look, they quickly discovered the primary cause. Design, manufacturing engineering, purchasing, and manufacturing acted as totally independent functions. As a result, products thrown "over the wall" from function to function were bouncing back repeatedly, significantly extending the product development cycle.

Recognizing that faster response time is a crucial element for business success, Xerox and many other companies are now "designing for manufacturability." This means all functions must work together (versus independently), typically with the support of a computer aided design system.

- **Distance.** Prior to globalization, many country-centered sub-organization of worldwide U.S.-based companies "ran their own show." This relative independence was logical based on different geographic locations, customer needs, economic conditions, and cultural expectations of business. Today, global customers are demanding product consistency worldwide. And faster communications are facilitating the exploitation of price differences from country to country. Clearly, as a buffer, distance has diminished in effectiveness.
- **Quality.** Up to the 1980s, when focus shifted to quality, quality was a key buffer. For example, if the sales department failed to effectively communicate customer demands, manufacturing could rush an order through at lower quality. In today's quality-conscious world, such output is no longer acceptable and hence this buffer has become almost extinct.

To compete in the 1990s, organizations must eliminate these buffers or radically alter them to reduce their size and impact. Such change will in turn require organizations to modify their approach to doing business. Subunits must shed their independence and recognize their interdependence on other functions. Equally important, companies must understand their interdependence upon customers and suppliers.

### **The Era Of The Customer**

The second factor behind the new imperative to exploit the capabilities of IT is the emergence of the "Era of the Customer." In the past decade, most companies have gradually awakened to the realization that however large and complex an organization

becomes, its primary focus must be customer needs. Today we see almost all operations, from customer service to quality to information systems, being rethought and reconfigured with the customer in mind.

Although such change is never easy, realigning information systems may be the biggest challenge. The basic problem facing companies is that, until recently, systems development mirrored the decentralized organization. Built primarily to support functional, product, or geographic organizations, these systems gave little attention to organization-wide data standards, coding systems, and hardware and software connectability. As a result, information could not be easily accessed to support customer needs; it was also extremely difficult for management to retrieve information across functional or divisional boundaries.

Today new systems are being developed to support customer-oriented processes. These process-oriented systems cut through and across functions, product lines, and geographies. But they are not easy to construct. And they are not cheap. Any organization with a sizable investment in existing systems is obviously very reluctant to jettison established programs and invest in new systems. Compounding the problem are organizational issues, which become even more important as the independence of individual functions, product lines, etc. is challenged.

Yet, the exigencies of serving the customer are paramount. As the following examples illustrate, some leading companies are indeed implementing the needed organizational changes and systems investments that are critical to success.

- At Johnson & Johnson, long-held beliefs in the independence of divisions have recently been modified. The company has reorganized from many relatively independent companies into three sectors, each serving a major customer base: hospitals, pharmacies, and consumer businesses. Common systems, such as an order entry system used by all J&J companies serving the U.S. hospital industry, are now receiving increasing attention.

- Lithonia Lighting, a leader in the industrial lighting industry, developed systems in the early 1980s to allow Lithonia's independent sales agents, architects and engineers, distributors, and contractors to interact directly with the company. These systems facilitate engineering calculations, order entry, order status inquiries, and other customer-helpful functions. More recently, Lithonia has redesigned and rebuilt its internal systems to ensure that customers have ready access to information and to speed product delivery.

## **WHAT ARE THE IT PRIORITIES?**

Removal of the buffers and the increasing emphasis on the customer are leading to major changes in organizational structures and causing companies to rethink the role of IT in their operations. The direction of change is obvious. But where should corporate leaders target their information systems efforts?

The most promising areas for IT cluster around six major business processes. Three of these are customer-oriented; the other three involve the flow of information within a firm.

### **Operational, Customer-oriented Processes**

The following key processes are *operational* in nature. For example, they are used to record transactions and track status. Their primary objective is to enable first-line managers to carry out their roles and responsibilities.

- Product Development
- Product Delivery
- Customer Support

In most organizations, these processes represent a firm's three major activities. They cut across multiple functions and span major segments of the organization's value chain (see graphic below). Although somewhat interactive (maintenance problems can trigger ideas



for improving product development), these activities are also separable and can be treated as three major processes.

*Product development.* Most companies clearly understand the imperative to accelerate and improve new product development. IT plays a significant role in helping to coordinate the many activities among the multiple and diverse functions involved in developing new products. Manufacturing organizations, for example, are using CAD/CAM to link the design, manufacturing, engineering, and purchasing functions as well as to bring suppliers into the process. Moving along a similar path, insurance companies are beginning to introduce computer systems that enable marketing personnel, actuaries, and system personnel to cooperate in the design of new products.

*Product delivery.* This is the most difficult of the six processes to implement successfully. The following example illustrates why. In a manufacturing organization, product delivery is comprised of a host of systems whose overall goal is to move orders from purchasing to distribution. In most companies today, multiple systems are required to complete the various activities involved in the process. Coordinating these systems to track orders and speed throughput, therefore, is an enormously large and complex task.

The vice-president for manufacturing of a large computer company sees such linkage as vital to his firm. He believes that unless he can communicate "transparently" and immediately to his suppliers -- tracking an order, then electronically following the progress of the needed parts, subassemblies, and ultimately, the customized computer through any or all of his plants, the distribution system, and, finally, through final test (*testing, tests,...*?) at the customer site -- he will not be delivering the type of customer service demanded in the coming years.

A large European chemical manufacturer is convinced that in the near future, customers will want instant access to inventory availability worldwide through a *single* point of contact. Knowing that IT is essential to accomplishing this goal, the company has already

begun work on a multiple-division, multiple-function system for product delivery of standard chemicals.

As the demand for efficient product delivery systems increases, the systems themselves are growing beyond the borders of individual companies. Today we are beginning to see machine-readable links from suppliers to manufacturers to wholesalers to retailers throughout the value chain of entire industries. The grocery industry was the first to make progress in this area, and many industries are following its lead. One of the better-known examples of this trend is the textile industry's "Textile America" campaign.

*Customer support.* Information systems are key to the success of the customer support process. They help maintain customer equipment records, feed the maintenance function, and provide sales personnel with essential data. The benefits of such system-based management are evident at Otis Elevator.

Otis, which oversees thousands of elevators throughout North America, uses an on-line dispatching system that speeds maintenance service. The system's effectiveness is based on a central computer system that links all of Otis' branch offices, which formerly worked in relative isolation from one another. It provides up-to-date records on elevator breakdowns and component problems and enables Otis to conduct comprehensive studies of maintenance patterns. As a result, Otis can better control as well as anticipate maintenance needs, thereby enhancing its overall customer support process.

### **Managerially-Oriented Processes**

The following three key cross-subunit processes are also vital in today's environment. Managerial in nature, they are all based on improving information analysis and use within an organization.

- Team Support Systems
- Functional Support Systems
- Management Support Systems

*Team support systems.* Now that the buffers that facilitated the independence of sub-units are on the way out, people must learn to work in interfunctional teams. This means interacting at each step of a process. Although information systems that connect people from different locations have been around for over a decade, using IT to effectively support multi-function teams is still in its infancy. For those who believe in the "empowerment of the individual" and "team-based organizations," IT can provide access to the data and documents people need to do their jobs effectively. It also provides the communication links, through electronic mail and computer conferencing, to facilitate the necessary sharing of information among individuals and teams.

*Functional support systems.* The ability to manage a function across time and space will be essential to tomorrow's businesses. For example, the loan department of a bank must have access to information about customers all over the globe. And marketing personnel need up-to-date information about world-wide sales. IT can help organizations to coordinate all operations of a particular function no matter what their location, and several leading companies are already taking advantage of this valuable resource. At Frito-Lay, route salesmen use hand-held terminals to report sales data on a daily basis and to help management to pinpoint and analyze trends from coast to coast. Digital Equipment Corporation uses information systems to coordinate the manufacture of a single computer as the components are being assembled at up to a dozen locations on different continents. And Digital has implemented standardized systems that facilitate communications between plants, provide data about job status, and enhance worldwide management of each function.

*Management support systems.* Executives and managers at all levels are increasingly aware of the need for timely information to manage in a business world that grows ever more complex. Executive Support Systems (ESS) are currently the fastest growing IT application, according to International Data Corporation. Yet an ESS that provides information only to the executive level cannot meet the needs of all of today's managers.

Many organizations are finding that they can gain major value by extending ESSs through all layers of management. At Phillips Petroleum, for example, ESS is available to all levels -- from key executives to terminal managers. These managers are thus able to combine local and global pricing data for decision-making purposes. With such changes underway, a more appropriate name for ESSs might be MSSs or Management Support Systems.

## MANAGEMENT IMPLICATIONS

All the processes described above cut across functions, product organizations, or geographical units. Sometimes, they cut across all three. Clearly, major organizational change is required to ensure that new systems are effectively designed and implemented. But what is needed to make this happen? Five ingredients are crucial to the change process, and we will discuss each one in detail.

*Vision.* This ingredient could be called "the development of a strategic direction" or simply the devising of a "strategic intent," as Hamel, Doz, and Prahalad described it.<sup>1</sup> Whatever it is called, there is a need to visualize an information-technology-enabled, process-robust organizational future and then to develop an action plan to move toward it. The vision need not be (and typically is not) very detailed. But it must exist. Frito-Lay, Otis, and Lithonia all have effective visions of an information-technology-assisted future. Most other companies do not.

*A first-rate information technology executive.* The emphasis here is on the word *executive*. Visions of an information-technology-enabled organization do not often spring clearly into the heads of senior executives whose IT knowledge is limited. What is needed, therefore, is a business-oriented IT executive who can educate his colleagues at the executive

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<sup>1</sup> G. Hamel, Y. Doz, and C. Prahalad *Harvard Business Review* (89:1), pp. 133-139.

level about the future potential of this technology. Although there are many other jobs that must be performed by the IT executive, vision-building and communicating are key roles.

*Line leadership in systems implementation.* Although the information technology executive can assist greatly by educating management about the potential of emerging technologies, only line managers can effectively determine and prioritize the key strategic uses of IT. This is because it is the *line's* strategy(ies) that must be implemented. Whereas in the past, line managers have too often turned all information technology conceptualization, design, and implementation over to the CIO, they must now take responsibility for determining ways in which IT can be used to support their key strategies.

Line managers must also ensure the effective implementation of IT systems. Only they can ensure that the organizational and cultural changes (in people's roles, allied processes, and organizational structure) required to make the new systems work effectively are actually carried out. The CIO does not have the authority needed to make this happen.

The IT resource today plays as significant a role in implementing major strategies as do the three other key resources: people, money, and equipment. Today *all four* resources must be orchestrated to ensure success, and line leadership is an essential ingredient in the process.

*Commitment to process improvement as well as product improvement.* New products are exciting and can provide major profit opportunities. New processes can, however, often provide even greater benefits. But because they often appear very difficult to implement, process improvements have almost always had a secondary role. Lester Thurow, Dean of the MIT Sloan School of Management, points out that 70 percent of U.S. investment is product centered, with only 30 percent spent on process. In Japan, the investment percentages are exactly the opposite, 70 percent being devoted to process improvement. Europe splits the difference at a 50-50 ratio.

As Robert Horton, CEO of British Petroleum, noted in a recent speech at MIT, rethinking the way in which the organization is designed and operations are performed in the light of rapidly evolving information and other technologies is perhaps the key task of today's senior executives.

*Attention to the firm's information infrastructure.* No one wants to spend money on roads and bridges. The productivity-enhancing capability of these infrastructure elements for an economy is well understood, but difficult to define and often hard to justify. The same thing is true of IT infrastructure. Therefore it is no surprise to find the infrastructures of today's organizations to be very weak. Many computer systems are two or three decades old, patched, and fragile. Computer hardware and software as well as the data stored are often incompatible and incapable of providing the type of information access and flow that will be necessary in the corporation of the twenty-first century.

Effecting the needed improvements will cost significant amounts of money. But if tomorrow's operational and managerial process-oriented systems are to become a reality, this infrastructure investment must be made.

### **IT As A Major Key To Success**

Business conditions are steadily moving us toward increasingly interdependent, customer-oriented organizations. A major key to success in managing as we approach the twenty-first century will be the employment of IT to support the six major business processes noted above. But this will not happen in the usual course of things. It will take visionary, technically literate, process-oriented management.