Chapter 3
Achieving Competitive Advantage with Information Systems

Learning Track 2: International Information Systems

Outline
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   Developing an International Information Systems Architecture
   The Global Environment: Business Drivers and Challenges
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(2) Organizing International Information Systems
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   Opportunities
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Objectives
After completing this chapter, you will be able to:

1. Identify the major factors driving the internationalization of business.
2. Compare strategies for developing global businesses.
3. Demonstrate how information systems can support different global business strategies.
4. Evaluate the issues and technical alternatives to be considered when developing international information systems.
5. Identify the challenges posed by global information systems and management solutions.
Opening Case: Dräger Safety Creates a Global Supply Chain

Dräger Safety, based in Luebeck, Germany, develops and sells a wide range of safety products, including protective suits, breathing equipment, and gas detection systems. The company mushroomed from a two-person shop in 1889 to a network of more than 40 subsidiaries and is considered one of the world’s most innovative safety-product companies.

As the number of Dräger subsidiaries grew during the last decade, the company was losing revenue and facing higher costs. Dräger could not rapidly take and fulfill orders among 40 companies spread across Europe, Asia, and North America. Every order had to be handled manually because each Dräger subsidiary maintained its own set of information systems. Dräger had no way to link sales, production, storage, and shipping automatically across all of its units worldwide.

For example, the company might take an order in Canada, generate a purchase order in Germany, source the product in the United States, and then ship it to Canada. The salesperson taking the order would create a purchase order on paper and mail it to a production hub. There the order would be input, assembled, stored, and shipped back to the originating sales office, which would then ship it out to the customer. This cumbersome manual system created delays and poorly managed inventory.

For a solution, Dräger selected Oracle9i Database and Oracle 9i Application Server (Oracle9iAS) Interconnect Adapter with standardized enterprise resource planning (ERP) interfaces. The Interconnect Adapter middleware enabled Dräger to link the systems from all its subsidiaries easily because it did not require programming point-to-point connections between the various systems and could connect a broad range of enterprise systems to the same data platform.

Dräger did have to standardize intercompany processes, including planning, reporting, and product and inventory management to use the common database effectively. The company also had to create a single worldwide data model with standard codes and definitions for customer items, vendor items, production orders, and bills of materials. A software program called PointOut developed by Munich software firm mSE
provides a desktop data interface with the same look and functionality at each company.

Today, Dräger’s entire order process is fully automated and can track orders worldwide. Dräger can centralize inventory in each region and ship products directly to customers from the closest regional warehouse. Orders that used to take weeks to fulfill can now be processed in minutes. Dräger has been able to reduce its global inventory by 40 percent, slash inventory at sales locations by 95 percent, and lower process costs by 30 percent.


Dräger Safety’s efforts to create global supply chain processes are some of the changes in international information systems architecture—the basic systems needed to coordinate worldwide trade and other activities—that organizations need to consider if they want to operate across the globe.

As a manager, you’ll want to know what special issues must be addressed when developing and managing international information systems. To be effective, you’ll need a global perspective on business and an understanding of the information systems needed to conduct business on an international scale. This chapter shows you how to organize, manage, and control the development of international information systems.

1 The Growth of International Information Systems

In earlier chapters we describe the emergence of a global economic system and global world order driven by advanced networks and information systems. The new world order is sweeping away many national corporations, national industries, and national economies controlled by domestic politicians. Many localized firms will be replaced by fast-moving networked corporations that transcend national boundaries. The growth of international trade has radically altered domestic economies around the globe. Over $1 trillion worth of goods, services, and financial instruments changes hands each day in global trade.

Today, the production and design of many high-end electronic products is parceled out to a number of different countries. Consider the path to market for Hewlett-Packard’s ProLiant ML150 server, which is illustrated in Figure 3-1. The idea for the product was hatched in Singapore, which did the initial design work. HP headquarters in Houston approved the concept. Contractors in Taiwan did the machine’s engineering design and initial manufacture. Final assembly of the server takes place in Singapore, China, India, and Australia (Buckman, 2004). None of this would be possible without powerful international information and communication systems.

Developing an International Information Systems Architecture

This chapter describes how to go about building an international information systems architecture suitable for your international strategy. An international information systems architecture consists of the basic information systems required by organizations to coordinate worldwide trade and other activities. Figure 3-2 illustrates the reasoning we follow throughout the chapter and depicts the major dimensions of an international information systems architecture.

The basic strategy to follow when building an international system is to understand the global environment in which your firm is operating. This means understanding the
FIGURE 3-1  Global product development and production.

Hewlett-Packard and other electronics companies assign distribution and production of high-end products to a number of different countries.


FIGURE 3-2  International information systems architecture.

The major dimensions for developing an international information systems architecture are the global environment, the corporate global strategies, the structure of the organization, the management and business processes, and the technology platform.
overall market forces, or business drivers, that are pushing your industry toward global competition. A business driver is a force in the environment to which businesses must respond and that influences the direction of the business. Likewise, examine carefully the inhibitors or negative factors that create management challenges—factors that could scuttle the development of a global business. Once you have examined the global environment, you will need to consider a corporate strategy for competing in that environment. How will your firm respond? You could ignore the global market and focus on domestic competition only, sell to the globe from a domestic base, or organize production and distribution around the globe. There are many in-between choices.

After you have developed a strategy, it is time to consider how to structure your organization so it can pursue the strategy. How will you accomplish a division of labor across a global environment? Where will production, administration, accounting, marketing, and human resource functions be located? Who will handle the systems function?

Next, you must consider the management issues in implementing your strategy and making the organization design come alive. Key here will be the design of business processes. How can you discover and manage user requirements? How can you induce change in local units to conform to international requirements? How can you reengineer on a global scale, and how can you coordinate systems development?

The last issue to consider is the technology platform. Although changing technology is a key driving factor leading toward global markets, you need to have a corporate strategy and structure before you can rationally choose the right technology.

After you have completed this process of reasoning, you will be well on your way toward an appropriate international information systems architecture capable of achieving your corporate goals. Let’s begin by looking at the overall global environment.

The Global Environment: Business Drivers and Challenges

Table 3-1 lists the business drivers in the global environment that are leading all industries toward global markets and competition.

The global business drivers can be divided into two groups: general cultural factors and specific business factors. Easily recognized general cultural factors have driven internationalization since World War II. Information, communication, and transportation technologies have created a global village in which communication (by telephone, television, radio, or computer network) around the globe is no more difficult and not much more expensive than communication down the block. The cost of moving goods and services to and from geographically dispersed locations has fallen dramatically.

### Table 3-1 Global Business Drivers

<table>
<thead>
<tr>
<th>General Cultural Factors</th>
<th>Specific Business Factors</th>
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<tbody>
<tr>
<td>Global communication and transportation technologies</td>
<td>Global markets</td>
</tr>
<tr>
<td>Development of global culture</td>
<td>Global production and operations</td>
</tr>
<tr>
<td>Emergence of global social norms</td>
<td>Global coordination</td>
</tr>
<tr>
<td>Political stability</td>
<td>Global workforce</td>
</tr>
<tr>
<td>Global knowledge base</td>
<td>Global economies of scale</td>
</tr>
</tbody>
</table>

CHAPTER 3: Learning Track 2
The development of global communications has created a global village in a second sense: A global culture created by television and other globally shared media such as movies now permits different cultures and peoples to develop common expectations about right and wrong, desirable and undesirable, heroic and cowardly. The collapse of the Eastern bloc has speeded the growth of a world culture enormously, increased support for capitalism and business, and reduced the level of cultural conflict considerably.

A last factor to consider is the growth of a global knowledge base. At the end of World War II, knowledge, education, science, and industrial skills were highly concentrated in North America, western Europe, and Japan, with the rest of the world euphemistically called the Third World. This is no longer true. Latin America, China, southern Asia, and eastern Europe have developed powerful educational, industrial, and scientific centers, resulting in a much more democratically and widely dispersed knowledge base.

These general cultural factors leading toward internationalization result in specific business globalization factors that affect most industries. The growth of powerful communications technologies and the emergence of world cultures create the condition for global markets—global consumers interested in consuming similar products that are culturally approved. Coca-Cola, American sneakers (made in Korea but designed in Los Angeles), and Cable News Network (CNN) programming can now be sold in Latin America, Africa, and Asia.

Responding to this demand, global production and operations have emerged with precise online coordination between far-flung production facilities and central headquarters thousands of miles away. At Sealand Transportation, a major global shipping company based in Newark, New Jersey, shipping managers in Newark can watch the loading of ships in Rotterdam online, check trim and ballast, and trace packages to specific ship locations as the activity proceeds. This is all possible through an international satellite link.

The new global markets and pressure toward global production and operation have called forth whole new capabilities for global coordination of all factors of production. Not only production but also accounting, marketing and sales, human resources, and systems development (all the major business functions) can be coordinated on a global scale.

Frito Lay, for instance, can develop a marketing sales force automation system in the United States and, once provided, may try the same techniques and technologies in Spain. Micromarketing—marketing to very small geographic and social units—no longer means marketing to neighborhoods in the United States, but to neighborhoods throughout the world! These new levels of global coordination permit for the first time in history the location of business activity according to comparative advantage. Design should be located where it is best accomplished, as should marketing, production, and finance.

Finally, global markets, production, and administration create the conditions for powerful, sustained global economies of scale. Production driven by worldwide global demand can be concentrated where it can best be accomplished, fixed resources can be allocated over larger production runs, and production runs in larger plants can be scheduled more efficiently and precisely estimated. Lower cost factors of production can be exploited wherever they emerge. The result is a powerful strategic advantage to firms that can organize globally. These general and specific business drivers have greatly enlarged world trade and commerce.

Not all industries are similarly affected by these trends. Clearly, manufacturing has been much more affected than services that still tend to be domestic and highly inefficient. However, the localism of services is breaking down in telecommunications, entertainment, transportation, financial services, and general business services including law. Clearly, those firms within an industry that can understand the internationalization of the industry and respond appropriately will reap enormous gains in productivity and stability.
Although the possibilities of globalization for business success are significant, fundamental forces are operating to inhibit a global economy and to disrupt international business. Table 3-2 lists the most common and powerful challenges to the development of global systems.

At a cultural level, particularism, making judgments and taking action on the basis of narrow or personal characteristics, in all its forms (religious, nationalistic, ethnic, regionalism, geopolitical position) rejects the very concept of a shared global culture and rejects the penetration of domestic markets by foreign goods and services. Differences among cultures produce differences in social expectations, politics, and ultimately legal rules. In certain countries, such as the United States, consumers expect domestic name-brand products to be built domestically and are disappointed to learn that much of what they thought of as domestically produced is in fact foreign made.

Different cultures produce different political regimes. Among the many different countries of the world are different laws governing the movement of information, information privacy of their citizens, origins of software and hardware in systems, and radio and satellite telecommunications. Even the hours of business and the terms of business trade vary greatly across political cultures. These different legal regimes complicate global business and must be considered when building global systems.

For instance, European countries have very strict laws concerning transborder data flow and privacy. Transborder data flow is defined as the movement of information across international boundaries in any form. Some European countries prohibit the processing of financial information outside their boundaries or the movement of personal information to foreign countries. The European Union Data Protection Directive, which went into effect in October 1998, restricts the flow of any information to countries (such as the United States) that do not meet strict European laws on personal information. Financial services, travel, and health care companies could be directly affected. In response, most multinational firms develop information systems within each European country to avoid the cost and uncertainty of moving information across national boundaries.

Cultural and political differences profoundly affect organizations’ business processes and applications of information technology. A host of specific barriers arise from the general cultural differences, everything from different reliability of phone networks to the shortage of skilled consultants (see Steinbart and Nath, 1992).

National laws and traditions have created disparate accounting practices in various countries, which impact the ways profits and losses are analyzed. German companies generally do not recognize the profit from a venture until the project is completely finished and they have been paid. Conversely, British firms begin posting profits before a project is completed, when they are reasonably certain they will get the money.
These accounting practices are tightly intertwined with each country’s legal system, business philosophy, and tax code. British, U.S., and Dutch firms share a predominantly Anglo-Saxon outlook that separates tax calculations from reports to shareholders to focus on showing shareholders how fast profits are growing. Continental European accounting practices are less oriented toward impressing investors, focusing rather on demonstrating compliance with strict rules and minimizing tax liabilities. These diverging accounting practices make it difficult for large international companies with units in different countries to evaluate their performance.

Language remains a significant barrier. Although English has become a kind of standard business language, this is truer at higher levels of companies and not throughout the middle and lower ranks. Software may have to be built with local language interfaces before a new information system can be successfully implemented.

Currency fluctuations can play havoc with planning models and projections. A product that appears profitable in Mexico or Japan may actually produce a loss because of changes in foreign exchange rates. Some of these problems will diminish in parts of the world where the euro becomes more widely used.

These inhibiting factors must be taken into account when you are designing and building international systems for your business. For example, companies trying to implement “lean production” systems spanning national boundaries typically underestimate the time, expense, and logistical difficulties of making goods and information flow freely across different countries.

State of the Art

One might think, given the opportunities for achieving competitive advantages as outlined previously and the interest in future applications, that most international companies have rationally developed marvelous international systems architectures. Nothing could be further from the truth. Most companies have inherited patchwork international systems from the distant past, often based on concepts of information processing developed in the 1960s—batch-oriented reporting from independent foreign divisions to corporate headquarters, with little online control and communication. Corporations in this situation increasingly face powerful competitive challenges in the marketplace from firms that have rationally designed truly international systems. Still other companies have recently built technology platforms for international systems but have nowhere to go because they lack global strategy.

As it turns out, there are significant difficulties in building appropriate international architectures. The difficulties involve planning a system appropriate to the firm’s global strategy, structuring the organization of systems and business units, solving implementation issues, and choosing the right technical platform. Let us examine these problems in greater detail.

(2) Organizing International Information Systems

Three organizational issues face corporations seeking a global position: choosing a strategy, organizing the business, and organizing the systems management area. The first two are closely connected, so we discuss them together.

Global Strategies and Business Organization

Four main global strategies form the basis for global firms’ organizational structure. These are domestic exporter, multinational, franchiser, and transnational. Each of these strategies is pursued with a specific business organizational structure (see Table 3-3). For
simplicity’s sake, we describe three kinds of organizational structure or governance: centralized (in the home country), decentralized (to local foreign units), and coordinated (all units participate as equals). Other types of governance patterns can be observed in specific companies (e.g., authoritarian dominance by one unit, a confederacy of equals, a federal structure balancing power among strategic units, and so forth; see Keen, 1991).

The domestic exporter strategy is characterized by heavy centralization of corporate activities in the home country of origin. Nearly all international companies begin this way, and some move on to other forms. Production, finance/accounting, sales/marketing, human resources, and strategic management are set up to optimize resources in the home country. International sales are sometimes dispersed using agency agreements or subsidiaries, but even here foreign marketing is totally reliant on the domestic home base for marketing themes and strategies. Caterpillar Corporation and other heavy capital-equipment manufacturers fall into this category of firm.

The multinational strategy concentrates financial management and control out of a central home base while decentralizing production, sales, and marketing operations to units in other countries. The products and services on sale in different countries are adapted to suit local market conditions. The organization becomes a far-flung confederation of production and marketing facilities in different countries. Many financial service firms, along with a host of manufacturers, such as General Motors, Chrysler, and Intel, fit this pattern.

Franchisers are an interesting mix of old and new. On the one hand, the product is created, designed, financed, and initially produced in the home country, but for product-specific reasons must rely heavily on foreign personnel for further production, marketing, and human resources. Food franchisers such as McDonald’s, Mrs. Fields Cookies, and KFC fit this pattern. McDonald’s created a new form of fast-food chain in the United States and continues to rely largely on the United States for inspiration of new products, strategic management, and financing. Nevertheless, because the product must be produced locally—it is perishable—extensive coordination and dispersal of production, local marketing, and local recruitment of personnel are required.

Generally, foreign franchisees are clones of the mother country units, but fully coordinated worldwide production that could optimize factors of production is not possible. For instance, potatoes and beef can generally not be bought where they are cheapest on world markets but must be produced reasonably close to the area of consumption.

Transnational firms are the stateless, truly globally managed firms that may represent a larger part of international business in the future. Transnational firms have no single national headquarters but instead have many regional headquarters and perhaps a world headquarters. In a transnational strategy, nearly all the value-adding activities are managed from a global perspective without reference to national borders, optimizing sources of supply and demand wherever they appear, and taking advantage of any local competitive advantages. Transnational firms take the globe, not the home country, as their management frame of reference. The governance of these firms has been likened to a federal structure in which there is a strong central management core of decision making, but considerable dispersal of power and financial muscle throughout the global divisions.

### TABLE 3-3 Global Business Strategy and Structure

<table>
<thead>
<tr>
<th>Business Function</th>
<th>Domestic Exporter</th>
<th>Multinational</th>
<th>Franchiser</th>
<th>Transnational</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production</td>
<td>Centralized</td>
<td>Dispersed</td>
<td>Coordinated</td>
<td>Coordinated</td>
</tr>
<tr>
<td>Finance/Accounting</td>
<td>Centralized</td>
<td>Centralized</td>
<td>Centralized</td>
<td>Coordinated</td>
</tr>
<tr>
<td>Sales/Marketing</td>
<td>Mixed</td>
<td>Dispersed</td>
<td>Coordinated</td>
<td>Coordinated</td>
</tr>
<tr>
<td>Human Resources</td>
<td>Centralized</td>
<td>Centralized</td>
<td>Coordinated</td>
<td>Coordinated</td>
</tr>
<tr>
<td>Strategic Management</td>
<td>Centralized</td>
<td>Centralized</td>
<td>Coordinated</td>
<td>Coordinated</td>
</tr>
</tbody>
</table>
Few companies have actually attained transnational status, but Citicorp, Sony, Ford, and others are attempting this transition.

Information technology and improvements in global telecommunications are giving international firms more flexibility to shape their global strategies. Protectionism and a need to serve local markets better encourage companies to disperse production facilities and at least become multinational. At the same time, the drive to achieve economies of scale across national boundaries moves transnationals toward a global management perspective and a concentration of power and authority. Hence, there are forces of decentralization and dispersal, as well as forces of centralization and global coordination.

**Global Systems to Fit the Strategy**

Information technology and improvements in global telecommunications are giving international firms more flexibility to shape their global strategies. The configuration, management, and development of systems tend to follow the global strategy chosen (Roche, 1992; Ives and Jarvenpaa, 1991). Figure 3-3 depicts the typical arrangements. By systems we mean the full range of activities involved in building information systems: conception and alignment with the strategic business plan, systems development, and ongoing operation. For the sake of simplicity, we consider four types of systems configuration. Centralized systems are those in which systems development and operation occur totally at the domestic home base. Duplicated systems are those in which development occurs at the home base but operations are handed over to autonomous units in foreign locations. Decentralized systems are those in which each foreign unit designs its own unique solutions and systems. Networked systems are those in which development and operations occur in an integrated and coordinated fashion across all units.

As can be seen in Figure 16-3, domestic exporters tend to have highly centralized systems in which a single domestic systems development staff develops worldwide applications. Multinationals offer a direct and striking contrast: Here, foreign units devise their own systems solutions based on local needs with few if any applications in common with headquarters (the exceptions being financial reporting and some telecommunications applications). Franchisers have the simplest systems structure: Like the products they sell, franchisers develop a single system usually at the home base and then replicate it around the world. Each unit, no matter where it is located, has identical applications. Last, the most ambitious form of systems development is found in the transnational: Networked systems are those in which there is a solid, singular global environment for developing and operating systems. This usually presupposes a powerful telecommunications backbone, a culture of shared applications development, and a shared management culture that crosses cultural barriers. The networked systems structure is the most visible in financial services where the homogeneity of the product—money and money instruments—seems to overcome cultural barriers.

### FIGURE 3-3  Global strategy and systems configurations.

<table>
<thead>
<tr>
<th>SYSTEM CONFIGURATION</th>
<th>Domestic Exporter</th>
<th>Multinational</th>
<th>Franchiser</th>
<th>Transnational</th>
</tr>
</thead>
<tbody>
<tr>
<td>Centralized</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Duplicated</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Decentralized</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Networked</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
</tbody>
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The large Xs show the dominant patterns, and the small Xs show the emerging patterns. For instance, domestic exporters rely predominantly on centralized systems, but there is continual pressure and some development of decentralized systems in local marketing regions.
Reorganizing the Business

How should a firm organize itself for doing business on an international scale? To develop a global company and information systems support structure, a firm needs to follow these principles:

1. Organize value-adding activities along lines of comparative advantage. For instance, marketing/sales functions should be located where they can best be performed, for least cost and maximum impact; likewise with production, finance, human resources, and information systems.

2. Develop and operate systems units at each level of corporate activity—regional, national, and international. To serve local needs, there should be host country systems units of some magnitude. Regional systems units should handle telecommunications and systems development across national boundaries that take place within major geographic regions (European, Asian, American). Transnational systems units should be established to create the linkages across major regional areas and coordinate the development and operation of international telecommunications and systems development (Roche, 1992).

3. Establish at world headquarters a single office responsible for development of international systems, a global chief information officer (CIO) position.

Many successful companies have devised organizational systems structures along these principles. The success of these companies relies not only on the proper organization of activities, but also on a key ingredient—a management team that can understand the risks and benefits of international systems and that can devise strategies for overcoming the risks. We turn to these management topics next.

TABLE 3-4 Management Challenges in Developing Global Systems

<table>
<thead>
<tr>
<th>Challenge</th>
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<tbody>
<tr>
<td>Agreeing on common user requirements</td>
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<tr>
<td>Introducing changes in business processes</td>
</tr>
<tr>
<td>Coordinating applications development</td>
</tr>
<tr>
<td>Coordinating software releases</td>
</tr>
<tr>
<td>Encouraging local users to support global systems</td>
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</tbody>
</table>
The result is a hodgepodge of hardware, software, and telecommunications. The e-mail systems between Europe and the United States are incompatible. Each production facility uses a different manufacturing resources planning system (or a different version with local variations) and different marketing, sales, and human resource systems. Hardware and database platforms are wildly different. Communications between different sites are poor, given the high cost and low quality of European intercountry communications. The central systems group at headquarters recently was decimated and dispersed to the U.S. local sites in the hope of serving local needs better and reducing costs.

What do you recommend to the senior management leaders of this company, who now want to pursue a transnational strategy and develop an information systems architecture to support a highly coordinated global systems environment? Consider the problems you face by reexamining Table 3-4. The foreign divisions will resist efforts to agree on common user requirements; they have never thought about much other than their own units’ needs. The systems groups in American local sites, which have been enlarged recently and told to focus on local needs, will not easily accept guidance from anyone recommending a transnational strategy. It will be difficult to convince local managers anywhere in the world that they should change their business processes to align with other units in the world, especially if this might interfere with their local performance. After all, local managers are rewarded in this company for meeting local objectives of their division or plant. Finally, it will be difficult to coordinate development of projects around the world in the absence of a powerful telecommunications network and, therefore, difficult to encourage local users to take on ownership in the systems developed.

**Global Systems Strategy**

Figure 3-4 lays out the main dimensions of a solution. First, consider that not all systems should be coordinated on a transnational basis; only some core systems are truly worth sharing from a cost and feasibility point of view. Core systems are systems that support functions that are absolutely critical to the organization. Other systems should be partially coordinated because they share key elements, but they do not have to be totally common across national boundaries. For such systems, a good deal of local variation is possible and desirable. A final group of systems is peripheral, truly provincial, and needed to suit local requirements only.

**FIGURE 3-4** Local, regional, and global systems.
**Define the Core Business Processes**

How do you identify core systems? The first step is to define a short list of critical core business processes. Briefly, business processes are sets of logically related tasks to produce specific business results, such as shipping out correct orders to customers or delivering innovative products to the market. Each business process typically involves many functional areas, communicating and coordinating work, information, and knowledge.

The way to identify these core business processes is to conduct a work-flow analysis. How are customer orders taken, what happens to them once they are taken, who fills the orders, how are they shipped to the customers? What about suppliers? Do they have access to manufacturing and production systems so that supply is automatic? You should be able to identify and set priorities in a short list of 10 business processes that are absolutely critical for the firm.

Next, can you identify centers of excellence for these processes? Is the customer order fulfillment superior in the United States, manufacturing process control superior in Germany, and human resources superior in Asia? You should be able to identify some areas of the company, for some lines of business, where a division or unit stands out in the performance of one or several business functions.

When you understand the business processes of a firm, you can rank-order them. You then can decide which processes should be core applications, centrally coordinated, designed, and implemented around the globe, and which should be regional and local. At the same time, by identifying the critical business processes, the really important ones, you have gone a long way to defining a vision of the future that you should be working toward.

**Identify the Core Systems to Coordinate Centrally**

By identifying the critical core business processes, you begin to see opportunities for transnational systems. The second strategic step is to conquer the core systems and define these systems as truly transnational. The financial and political costs of defining and implementing transnational systems are extremely high. Therefore, keep the list to an absolute minimum, letting experience be the guide and erring on the side of minimalism. By dividing off a small group of systems as absolutely critical, you divide opposition to a transnational strategy. At the same time, you can appease those who oppose the central worldwide coordination implied by transnational systems by permitting peripheral systems development to progress unabated, with the exception of some technical platform requirements.

**Choose an Approach: Incremental, Grand Design, Evolutionary**

A third step is to choose an approach. Avoid piecemeal approaches. These surely will fail for lack of visibility, opposition from all who stand to lose from transnational development, and lack of power to convince senior management that the transnational systems are worth it. Likewise, avoid grand design approaches that try to do everything at once. These also tend to fail, because of an inability to focus resources. Nothing gets done properly, and opposition to organizational change is needlessly strengthened because the effort requires huge resources. An alternative approach is to evolve transnational applications from existing applications with a precise and clear vision of the transnational capabilities the organization should have in five years.

**Make the Benefits Clear**

What is in it for the company? One of the worst situations to avoid is to build global systems for the sake of building global systems. From the beginning, it is crucial that senior management at headquarters and foreign division managers clearly understand the benefits that will come to the company as well as to individual units. Although each system offers unique benefits to a particular budget, the overall contribution of global systems lies in four areas.
Global systems—truly integrated, distributed, and transnational systems—contribute to superior management and coordination. A simple price tag cannot be put on the value of this contribution, and the benefit will not show up in any capital budgeting model. It is the ability to switch suppliers on a moment’s notice from one region to another in a crisis, the ability to move production in response to natural disasters, and the ability to use excess capacity in one region to meet raging demand in another.

A second major contribution is vast improvement in production, operation, and supply and distribution. Imagine a global value chain, with global suppliers and a global distribution network. For the first time, senior managers can locate value-adding activities in regions where they are most economically performed.

Third, global systems mean global customers and global marketing. Fixed costs around the world can be amortized over a much larger customer base. This will unleash new economies of scale at production facilities.

Last, global systems mean the ability to optimize the use of corporate funds over a much larger capital base. This means, for instance, that capital in a surplus region can be moved efficiently to expand production of capital-starved regions; that cash can be managed more effectively within the company and put to use more effectively.

These strategies will not by themselves create global systems. You will have to implement what you strategize. The following two sections describe the challenges in implementing a global strategy.

(4) **Technology Issues and Opportunities for Global Value Chains**

Once firms have defined a global business model and systems strategy they must select hardware, software, and networking standards along with key system applications to support global business processes. Many companies today are using teams in other countries to develop and run their software and hardware, so they’ll need to address the challenges of managing global technology services as well.

**Technology Challenges of Global Systems**

Hardware, software, and networking pose special technical challenges in an international setting. One major challenge is finding some way to standardize a global computing platform when there is so much variation from operating unit to operating unit and from country to country. Another major challenge is finding specific software applications that are user friendly and that truly enhance the productivity of international work teams. The major networking challenge is making data flow seamlessly across networks shaped by disparate national standards. Overcoming these challenges requires systems integration and connectivity on a global basis.

**Computing Platforms and Systems Integration**

The development of a transnational information systems architecture based on the concept of core systems raises questions about how the new core systems will fit in with the existing suite of applications developed around the globe by different divisions, different people, and for different kinds of computing hardware. The goal is to develop global, distributed, and integrated systems to support digital business processes spanning national boundaries. Briefly, these are the same problems faced by any large domestic systems development effort. However, the problems are magnified in an international environment. Just imagine the challenge of integrating systems based on Windows, Linux, Unix, or proprietary operating systems running on IBM, Sun, Hewlett-Packard, and other hardware in many different operating units in many different countries!
Moreover, having all sites use the same hardware and operating system does not guarantee integration. Some central authority in the firm must establish data, as well as other technical standards, with which sites are to comply. For instance, technical accounting terms such as the beginning and end of the fiscal year must be standardized (review the earlier discussion of the cultural challenges to building global businesses), as well as the acceptable interfaces between systems, communication speeds and architectures, and network software.

**CONNECTIVITY**

Truly integrated global systems must have connectivity—the ability to link together the systems and people of a global firm into a single integrated network just like the phone system but capable of voice, data, and image transmissions. However, integrated global networks are extremely difficult to create (Lai and Chung, 2002). For example, many countries cannot fulfill basic business telecommunications needs such as obtaining reliable circuits, coordinating among different carriers and the regional telecommunications authority, obtaining bills in a common currency standard, and obtaining standard agreements for the level of telecommunications service provided. Table 3-5 lists the major challenges posed by international networks.

Despite moves toward economic unity, Europe remains a hodgepodge of disparate national technical standards and service levels. Although most circuits leased by multinational corporations are fault-free more than 99.8 percent of the time, line quality and service vary widely from the north to the south of Europe. Network service is much more unreliable in southern Europe. Existing European standards for networking and Electronic Data Interchange (EDI) are very industry specific and country specific.

Firms can provide international connectivity by building their own international private network using proprietary standards or by using Internet technology. The firm can put together its own private network based on leased lines from each country’s post, telegraph, and telephone (PTT) authorities and services from the major global telecommunications providers. Each country, however, has different restrictions on data exchange, technical standards, and acceptable vendors of equipment. These problems magnify in certain parts of the world.

An increasingly attractive alternative is to create global networks based on the Internet and Internet technology. Companies can create global intranets for internal communication or extranets to exchange information more rapidly with business partners in their supply chains. They can create global networks using virtual private networks (VPNs) from Internet service providers, which provide many features of a private network using the public Internet. However, VPNs may not provide the same level of quick and predictable response as private networks, especially during times of the day when Internet traffic is very congested, and they may not be able to support large numbers of remote users.

Moreover, the Internet is not yet a worldwide tool because many countries lack the communications infrastructure for extensive Internet use. Countries face high costs, gov-
ernment control, or government monitoring. Many countries also do not have the speedy and reliable postal and package delivery services that are essential for electronic commerce.

Western Europe faces both high transmission costs and lack of common technology because it is not politically unified and because European telecommunications systems are still in the process of shedding their government monopolies. The lack of an infrastructure and the high costs of installing one are even more widespread in the rest of the world. Only about one-third of the world’s households has basic telephone services. Low penetration of PCs and widespread illiteracy limit demand for Internet service in India and other developing countries (see Figure 3-5). Where an infrastructure exists in less-developed countries, it is often outdated, lacks digital circuits, and has very noisy lines. The purchasing power of most people in developing countries makes access to Internet services very expensive. Many countries monitor transmissions. Governments in China, Singapore, Tunisia, Iran, and Saudi Arabia monitor Internet traffic and block access to Web sites considered morally or politically offensive (McFarquhar, 2004).

Global networking will benefit as wireless networking services described in Chapter 9 fall in price and gain in power. Communicate and compute any time, anywhere networks based on satellite systems, digital cell phones, and mobile handheld devices will make it even easier to coordinate work and information in many parts of the globe that cannot be reached by existing ground-based systems.

SOFTWARE
The development of core systems poses unique challenges for application software: How will the old systems interface with the new? Entirely new interfaces must be built and tested if old systems are kept in local areas (which is common). These interfaces can be costly and messy to build. If new software must be created, another challenge is to build

FIGURE 3-5  Internet population in selected countries.

The percentage of the total population using the Internet in developing countries is much smaller than in the United States, Canada, and Europe. 

software that can be realistically used by multiple business units from different countries given these business units are accustomed to their unique business processes and definitions of data.

Aside from integrating the new with the old systems, there are problems of human interface design and functionality of systems. For instance, to be truly useful for enhancing productivity of a global workforce, software interfaces must be easily understood and mastered quickly. Graphical user interfaces are ideal for this but presuppose a common language—often English. When international systems involve knowledge workers only, English may be the assumed international standard. But as international systems penetrate deeper into management and clerical groups, a common language may not be assumed and human interfaces must be built to accommodate different languages and even conventions.

What are the most important software applications? Many international systems focus on basic transaction and management reporting systems. Increasingly, firms are turning to supply chain management and enterprise systems to standardize their business processes on a global basis and to create coordinated global supply chains. However, these cross-functional systems are not always compatible with differences in languages, cultural heritages, and business processes in other countries (Martinsons, 2004; Liang et al., 2004; Davison 2002). Company units in countries that are not technically sophisticated may also encounter problems trying to manage the technical complexities of enterprise applications.

Electronic Data Interchange (EDI) systems and supply chain management systems are widely used by manufacturing and distribution firms to connect to suppliers on a global basis. Groupware systems, e-mail, and videoconferencing are especially important worldwide collaboration tools for knowledge- and data-based firms, such as advertising firms, research-based firms in medicine and engineering, and graphics and publishing firms. Internet-based tools will be increasingly employed for such purposes.

The Window on Management describes some of the challenges faced by global companies trying to implement software systems in China. China is a vast country that is modernizing very rapidly, with many growth opportunities for foreign firms. It welcomes advanced technology but it does not always have the appropriate business processes or infrastructure to support leading-edge system applications. Global companies doing business in China are finding that they must spend additional time on training and on helping Chinese companies modernize their business processes.
**GETTING SYSTEMS TO WORK IN CHINA—SLOWLY**

China looks like the world’s hottest market: It has nearly 1 billion consumers between the ages of 15 and 65, with more disposable income than any other time in the country’s history. Economic growth is sizzling. By 2006, it will have more broadband Internet and mobile phone users than any nation on earth. But not so fast. Most of the Chinese population is still poor, and its transportation and technology infrastructures are still undeveloped. Companies seeking to grow their businesses in China must make special efforts to adapt.

General Motors (GM) found this out the hard way when it tried to implement a customer relationship management system using Siebel Systems software at its operational centers in Shanghai. GM is trying to overtake Volkswagen as the leading foreign auto brand in China, hoping to sell 1.3 billion vehicles by 2007. GM sells most of its vehicles in China through its joint venture partner Shanghai Automotive Industry Corporation. The company wanted to use the CRM system to develop a more sophisticated view of Chinese car buyers.

Unfortunately, local dealers had never heard of customer relationship management and had little incentive to provide GM with the sales data it needed to make the system work. To encourage dealer participation, GM built a portal that makes it easier for dealers to order vehicles. To use this portal, dealers must supply the customer data that GM needs. When GM receives a vehicle order, it gets the customer data at the same time.

GM is trying to control costs by replicating key aspects of its global technology platform within Shanghai Automotive. It is using SAP software to coordinate sales and shipping information between its factories and its warehouse and trading unit. GM is helping Shanghai Automotive adopt a consistent PC image of all of GM operations worldwide. GM provided Shanghai Automotive with the specifications, but is relying on its partner’s information systems staff for implementation. Shanghai Automotive has the local knowledge and can implement new systems for GM at a much lower cost. “Moreover,” says Addons Wu, CIO for GM China, “in China, we put more time into getting consensus. . . . You can order people to do things once or twice but you lose your influence after that.”

United Parcel Service (UPS) has been able to profit from China’s poor transportation infrastructure and complicated import and export requirements. Multinational companies operating in China are relying on UPS because it can provide integrated shipping and logistics services to deal with these challenges. UPS focuses on serving multinationals and local businesses partly through Sinotrans, its joint venture partner.

UPS is training its own and Sinotrans drivers to make sure they understand English and that they can upload the correct shipping information into UPS systems using tools such as its handheld Driver Information Acquisition and Delivery (DIAD) system.
Equally important is the need to train Chinese small businesses to use automated shipping technology. According to Edward Choi, UPS marketing director for China, “There’s a huge group of mom-and-pop shops where business is still done by fax and phone.” UPS cannot ignore this market segment because these small businesses supply the big distributors that in turn supply the big multinational companies.

UPS has deployed Chinese language versions of its WorldShip, QuantumVie, and CampusShip shipping-management systems and made them accessible to customers on the Web. UPS installs Web terminals at smaller companies that provide it with a large volume of business. Sometimes UPS even purchases the equipment for these businesses to make sure they will use its systems. UPS also runs seminars and conferences to educate business owners about how the technology works and the benefits it provides.

Making UPS systems work in China requires Chinese businesses to standardize their shipping data. In other countries, business clients might clean up their shipping data to verify addresses and avoid duplicates, but Chinese companies sometimes expect UPS to do this work for them.

Other companies operating in China have also found they must provide extensive training and collaboration to prepare their business partners for effective deployment. MasterCard trains its business partners in e-commerce. China still does not have central credit-rating agencies, but it does have regional credit bureaus that profile the banking and payment histories of residents in metropolitan areas such as Beijing and Guangzhou. MasterCard provides consulting services to regional banks to help them automate processes such as credit scoring and credit reviews.

Although about 60 million Chinese people have MasterCard debit cards, very few actually have true credit cards. MasterCard’s goal is to have 100 million Chinese credit card customers by 2009. To reach this goal, MasterCard needs to persuade small merchants to accept credit cards. (It’s primarily the large hotels and other businesses catering to international travelers that accept MasterCard in China right now.) Small merchants may need to wait years before they have the telecommunications capability and technology to link to MasterCard’s payment network. So, MasterCard offers these small businesses offline transaction processing services. Merchants can send paper receipts to processing centers if they wish to use MasterCard.


To Think About: What management, organization, and technology factors explain why global companies must make special efforts to implement their systems in China? Describe some of the steps companies can take to get their systems to work in China.
Managing Global Software Development

Both global and domestic firms increasingly are managing their hardware and software resources using global teams. Many companies now outsource some of their new systems development work or maintenance of existing systems to external vendors in another country. This practice is called offshore software outsourcing and it’s becoming wildly popular. According to the Gartner Group consultants, by 2004, 8 out of 10 CIOs had already been instructed to outsource at least part of their firm’s technology services offshore.

The reasons for offshore outsourcing are very compelling: A skilled programmer in India or Russia earns about US$10,000 per year, compared to $70,000 per year for a comparable programmer in the United States. The Internet and low-cost communications technology have drastically reduced the expense and difficulty of coordinating the work of global teams in faraway locations. In addition to cost savings, outsourcing provides firms with access to world-class complementary technology assets and skills.

There is a very strong chance that at some point in your career, you’ll be working with offshore outsourcers or global teams. Thus, it’s very important to understand how offshore resources can best be managed. Not all work can be exported, special managerial and organizational issues must be addressed, and the savings are not as great as simple wage comparisons suggest (Krishna, Sahay, and Walsham, 2004).

Your firm is most likely to benefit from outsourcing if it takes the time to evaluate all the risks and to make sure outsourcing is appropriate for its particular needs. Any company that outsources its applications must thoroughly understand the project, including requirements, method of implementation, source of expected benefits, cost components, and metrics for measuring performance.

Offshore outsourcing can reduce software development costs but companies will not save as much as they initially think. There are hidden costs to offshore outsourcing, and these costs can increase the total cost of ownership (TCO) of offshore-developed software by over 50 percent. Here are the major cost components of offshore software development:

1. Contract cost. Most of this cost is for labor required by the project—programmers, software engineers, systems analysts, network specialists, project team managers.

2. Vendor selection costs. With any outsourced service, the expense of selecting a service provider can run from 0.2 percent to 2 percent above the cost of the contract. Companies will need to allocate resources for documenting requirements, sending out requests for proposal (RFPs), travel expenses, negotiating contracts, legal fees, and project management. A project leader may be assigned to work full
time on this, with others contributing, and these are lost labor costs. The entire process can take three to six months to a year.

3. Transition management and knowledge transfer costs. It takes from three months to a full year to completely transfer work to an offshore partner and make sure the vendor thoroughly understands your business. Users should be prepared to spend even more time with the offshore team than an in-house group to make sure the team fully understands their requirements. A certain number of outsourcer staff have to travel to the client company to analyze the client's technology and applications before they can begin the actual work. The client company's systems and specifications have to be thoroughly documented. The offshore employees have to work in parallel with costly in-house employees, and neither can produce very much during the training period. If not included in the outsourcing contract, additional travel costs and visa costs must be figured in. Companies should expect to spend an additional 2 to 3 percent of their contracts on transition costs.

4. Domestic human resources costs. If your company has to lay off domestic employees as a result of the offshore outsourcing, you may have to pay laid-off workers severance pay and retention bonuses to keep them working long enough to share their knowledge with their offshore replacements. Layoffs can also adversely impact employee morale and productivity. The firm's staff may resist working with the outsourcer and resign, taking valuable knowledge with them. Layoffs and related costs can add an extra 3 to 5 percent.

5. Costs of improving software development processes. If a company doesn't have solid in-house processes for software development, it will take much longer to coordinate work with the vendor.

   Both parties should agree on the processes to be used. If the outsourcer has to follow your standards, make sure the offshore team thoroughly understands them.

   U.S. firms often use rather informal methods for documenting and analyzing software projects. They may need to formalize their software development processes and adopt the methodology used by the offshore vendor. (Many Indian companies use the Capability Maturity Model [CMM] developed by Carnegie-Mellon as their software development methodology, and their clients may need to come up to speed in CMM to work effectively with them.) Ability to write clear specifications is critical as well, and creating a good set of specifications is very time consuming.

   Quality assurance testing also must be beefed-up in an offshore arrangement. There must be a dedicated group of people in the client organization who are always available to develop test plans and review results as they are generated by the offshore team. Companies outsourcing software development to external vendors should anticipate spending an additional 1 to 10 percent on improving software development processes.

6. Costs of adjusting to cultural differences. Cultural differences can drain productivity. A seasoned U.S. employee cannot automatically be replaced by an offshore worker. Their values and attitudes are different. American workers tend to feel much more comfortable about speaking up and making suggestions. If something doesn't make sense or does not appear workable, they'll voice concerns. But offshore programmers may keep these feelings to themselves, believing that their aim is to please and this is what the client wants. The work then may take more time and money to complete and require extensive rework. Likewise, an application that makes sense to a U.S. worker such as automating consumer credit cards may be a foreign concept offshore. Lags in productivity can add as much as 20 percent of additional costs to the offshore contract during the first two years. There will probably be a need for more face-to-face interaction than originally anticipated because offshore workers don’t interpret things the same way. Productivity lags and adjustments to cultural differences can add an extra 3 to 27 percent to total project costs.
7. Cost of managing an offshore contract. Managing the offshore relationship requires additional work—invoicing, auditing, additional telecommunications costs, ensuring work is billed correctly, making sure time is properly recorded. Maintaining security merits special attention. Offshoring partners must agree on common procedures for data security, data recovery, protection of intellectual property rights, network security, and access control. The EU Data Protection Directive could prohibit an outsourcing agreement from transferring personal data to non-EU countries unless both parties satisfy EU data protection standards. Companies should expect to pay an additional 6 to 10 percent on managing the offshore contract.

Figure 3-6 shows best- and worst-case scenarios for the total cost of ownership of an outsourcing project. It shows how much hidden costs can affect the total cost of an outsourcing project. The best case reflects the lowest estimates for additional costs and the worst case reflects the highest estimates for these costs. As you can see, hidden costs will increase the total cost of an outsourcing project by an extra 15 to 57 percent.

Even with these extra costs many firms will benefit from offshore outsourcing if they manage the work well. The total cost of doing the same software work in-house might run to $18 million, so even under the worst-case scenario, the firm would still save about 15 percent.

Although offshore software outsourcing might benefit individual firms, its broader social impact is less clear. Companies that outsource their software work may be eliminating jobs of their own employees or employees of the domestic software industry. As the practice becomes widespread, will countries whose jobs are going overseas wind up with mass unemployment or higher productivity and better jobs? The Window on Organizations looks at both sides of the debate.
If you’re a U.S. customer of E-Loan, an Internet company offering online loan services, you have a choice about where your loan application will be processed. You could have the application processed in India, or you can request to have the loan processed domestically in the United States. If you choose processing in India, you’ll have the results two days earlier than if you had the work done in the United States. E-Loan farmed out loan processing work to Wipro Ltd., a giant Indian outsourcing company, because Indian labor costs are so much lower than in the United States.

E-Loan’s contracting loan application processing to India is not an isolated phenomenon. It is part of a swelling movement toward offshore outsourcing, a term designating the movement of white-collar jobs abroad. Many other companies, including Delta Air Lines and American Express, have moved their call centers to India or the Philippines. The consulting firm Accenture doubled its staff in India to 10,000. Procter & Gamble has 7,000 workers handling payroll, travel, benefits administration, accounts payable, and invoice processing in offices in Costa Rica, the Philippines, and the United Kingdom. Mindcrest Incorporated of Chicago maintains a staff of 15 in Bombay to provide legal research for companies and law firms.

Call center jobs, telemarketing jobs, financial analysts, and jobs in banking and insurance have been steadily moving offshore. Also threatened are jobs in medical transcription, insurance applications and claims processing, and typesetting, as well as some jobs in accounting and tax preparation. Low-cost telecommunications networks and the Internet make it possible to communicate and exchange documents with people many thousands of miles away as inexpensively as if they were in the next town.

Forrester Research estimated that 3.3 million white-collar jobs will be transferred from the United States abroad by 2015. The impact of offshore outsourcing in the information technology industry could be especially severe: According to the Gartner Group, 1 out of 10 jobs in U.S. computer services may have already shifted to lower-cost countries such as Russia or India.

In mid-July 2003, IBM set off a firestorm when news of its plans to move more white-collar and programming jobs overseas was leaked to the press. Hewlett-Packard has 5,000 Indian employees in research, software development, and customer support. Many nontechnology companies now use offshore programmers for much of their routine programming work.

Critics claim that offshore outsourcing shifts jobs from high-wage countries to low-wage countries, taking jobs away from U.S. workers or pressuring them to take lower pay to remain working. These critics fear that highly trained and educated workers will be ground down by globalization, just as blue-collar workers were in the 1970s and 1980s. Several state legislatures in the United States are considering bills requiring state agencies and contractors to use employees based in the United States, and U.S. job losses to overseas companies became a hot button during the 2004 presidential campaign.

But other experts point out that offshore outsourcers often provide better quality work at lower costs. Firms also have a better chance of long-term survival if they can keep their prices competitive. Companies can pass these savings from outsourcing on to consumers or use them to expand the business and create new jobs that provide more value than those replaced. A study by the McKinsey Global Institute estimated that every dollar of costs moved from the U.S. to offshore yields a benefit of $1.12 to $1.14 to the U.S. economy.

Another study by economics consulting firm Global Insight commissioned by the pro-outsourcing Information Technology Association of America found that the productivity generated by U.S. companies sending computer services work abroad boosted domestic employment by 90,000 jobs in 2003. This study claimed that outsourcing created twice as many U.S. jobs as it displaced and would lead, by 2008, to the creation of 337,000 new jobs in construction, education, health care, and financial services.

The kinds of jobs that are moving overseas are those that can be most easily reduced to a series of rules and performed overseas by another person—or perhaps by a computer. Jobs that will most likely stay in the United States or that will be newly created in the next decade are those that require human contact or complex analytical skills. In the information systems field, jobs that will remain in the United States are those for high-level software designers and people who can apply technology to solve problems in specific businesses such as banking, retailing, or manufacturing. Most at risk are software jobs that involve straightforward coding of software programs, where technical specifications can be handed off to a programmer. These are exactly the technology jobs where wages have fallen since 2002.


To Think About: Does offshore outsourcing create an ethical dilemma? Why or why not?
(5) Management Opportunities, Challenges, and Solutions

When firms operate in many different countries, creating an appropriate organizational and technology infrastructure for conducting international business is very challenging.

Opportunities

Firms have extraordinary opportunities to lower costs through global scale economies by building international systems that enable them to produce as well as sell goods and services in different regions of the world.

Management Challenges

Building and managing global systems raise challenges about finding the right global business strategy, managing change in a multicultural enterprise, and achieving sufficient connectivity and integration.

Finding the Right Global Business Strategy

If a company wishes to operate internationally, it’s essential to determine the right global business model. Should some or all of the business be managed on a global basis using a transnational model? How much local autonomy should be allowed? Which way of organizing the business best fits the company’s strategic direction? There are some lines of business in which local variations are slight, and the possibility exists to reap large rewards by organizing globally. It is likely that firms with many lines of business will have to maintain a mixed organizational structure.

Difficulties of Managing Change in a Multicultural Firm

Although engineering change in a single corporation in a single nation can be difficult, costly, and long term, bringing about significant change in very large scale global corporations can be daunting. Cultural, political, and language diversity magnifies differences in organizational culture and business processes when companies operate internationally in various countries. These differences create barriers to the development of global information systems that transcend national boundaries.

Difficulties of Achieving Global Connectivity and Integration

Choices of technology, platforms, networks, hardware, and software are the final elements in building transnational information systems infrastructures. The Internet and Internet technology will increasingly be used to provide global connectivity and to serve as a foundation for global systems, but many companies will still need proprietary systems for certain functions, and therefore international standards. Even with the proper organizational structure and appropriate management choices, it is still possible to stumble over technological issues.

Solution Guidelines

We now can reconsider how to handle the most vexing problems facing managers developing the global information systems architectures that were described in Table 3-4.

Agreeing on Common User Requirements

Establishing a short list of the core business processes and core support systems will begin a process of rational comparison across the many divisions of the company, devel-
op a common language for discussing the business, and naturally lead to an understanding of common elements (as well as the unique qualities that must remain local).

**INTRODUCING CHANGES IN BUSINESS PROCESSES**

Your success as a change agent will depend on your legitimacy, your actual raw power, and your ability to involve users in the change design process. Legitimacy is defined as the extent to which your authority is accepted on grounds of competence, vision, or other qualities. The selection of a viable change strategy, which we have defined as evolutionary but with a vision, should assist you in convincing others that change is feasible and desirable. Involving people in change, assuring them that change is in the best interests of the company and their local units, is a key tactic.

**COORDINATING APPLICATIONS DEVELOPMENT**

Choice of change strategy is critical for this problem. At the global level there is far too much complexity to attempt a grand design strategy of change. It is far easier to coordinate change by making small incremental steps toward a larger vision. Imagine a five-year plan of action rather than a two-year plan of action, and reduce the set of transnational systems to a bare minimum to reduce coordination costs.

**COORDINATING SOFTWARE RELEASES**

Firms can institute procedures to ensure that all operating units convert to new software updates at the same time so that everyone’s software is compatible.

**ENCOURAGING LOCAL USERS TO SUPPORT GLOBAL SYSTEMS**

The key to this problem is to involve users in the creation of the design without giving up control over the development of the project to parochial interests. Recruiting a wide range of local individuals to transnational centers of excellence helps send the message that all significant groups are involved in the design and will have an influence. These centers draw heavily from local national units, are based on multinational teams, and must report to worldwide management—their first line of responsibility is to the core applications.

The overall tactic for dealing with resistant local units in a transnational company is cooptation. Cooptation is defined as bringing the opposition into the process of designing and implementing the solution without giving up control over the direction and nature of the change. As much as possible, raw power should be avoided. Minimally, however, local units must agree on a short list of transnational systems, and raw power may be required to solidify the idea that transnational systems of some sort are truly required.
Summary

1. **Identify the major factors driving the internationalization of business.**
   
   There are general cultural factors and specific business factors to consider. The growth of cheap international communication and transportation has created a world culture with stable expectations or norms. Political stability and a growing global knowledge base that is widely shared contribute also to the world culture. These general factors create the conditions for global markets, global production, coordination, distribution, and global economies of scale.

2. **Compare strategies for developing global businesses.**

   There are four basic international strategies: domestic exporter, multinational, franchiser, and transnational. In a transnational strategy, all factors of production are coordinated on a global scale. However, the choice of strategy is a function of the type of business and product.

3. **Demonstrate how information systems can support different global business strategies.**

   There is a connection between firm strategy and information systems design. Transnational firms must develop networked system configurations and permit considerable decentralization of development and operations. Franchisers almost always duplicate systems across many countries and use centralized financial controls. Multinationals typically rely on decentralized independence among foreign units with some movement toward development of networks. Domestic exporters typically are centralized in domestic headquarters with some decentralized operations permitted.
4. Evaluate the issues and technical alternatives to be considered when developing international information systems.

Implementing a global system requires an implementation strategy that considers both business design and technology platforms. Typically, global systems have evolved without a conscious plan. The remedy is to define a small subset of core business processes and focus on building systems that could support these processes. Tactically, you will have to co-opt widely dispersed foreign units to participate in the development and operation of these systems, being careful to maintain overall control.

The main hardware and telecommunications issues are systems integration and connectivity. The choices for integration are to go either with a proprietary architecture or with open systems technology. Global networks are extremely difficult to build and operate. Firms can build their own global networks or they can create global networks based on the Internet (intranets or virtual private networks). The main software issue concerns building interfaces to existing systems and selecting applications that can work with multiple cultural, language, and organizational frameworks.

5. Identify the challenges posed by global information systems and management solutions.

Global information systems pose challenges because cultural, political, and language diversity magnifies differences in organizational culture and business processes and encourages proliferation of disparate local information systems that are difficult to integrate. Businesses may have to struggle to find the right global business strategy. Management solutions include identifying a common set of user requirements for the entire global enterprise; coordinating applications development and software releases; and using legitimacy and cooptation to enlist user support in the change process.

Review Questions

1. What are the five major factors to consider when building an international information systems architecture?
2. Describe the five general cultural factors leading toward growth in global business and the four specific business factors. Describe the interconnection among these factors.
3. What is meant by a global culture?
4. What are the major challenges to the development of global systems?
5. Why have firms not planned for the development of international systems?
6. Describe the four main strategies for global business and organizational structure.
7. Describe the four different system configurations that can be used to support different global strategies.
8. What are the major management issues in developing international systems?
9. What are three principles to follow when organizing the firm for global business?
10. What are three steps of a management strategy for developing and implementing global systems?
11. What is meant by cooptation, and how can it be used in building global systems?
12. Describe the main technical issues facing global systems.
13. What is offshore software outsourcing? What challenges does it pose? What are the cost components of offshore software development?
14. What are the challenges posed by global systems? How can these challenges be addressed?
Discussion Questions

1. If you were a manager in a company that operates in many countries, what criteria would you use to determine whether an application should be developed as a global application or as a local application?

2. Describe ways the Internet can be used in international information systems.

Application Software Exercise:

Database and Web Page Development Tool Exercise:

Building a Job Database and Web Page for an International Consulting Firm

KTP Consulting operates in various locations around the world. KTP specializes in designing, developing, and implementing enterprise systems for medium- to large-size companies. KTP offers its employees opportunities to travel, live, and work in various locations throughout the United States, Europe, and Asia. The firm’s human resources department has a simple database that enables its staff to track job vacancies. When an employee is interested in relocating, she or he contacts the human resources department for a list of KTP job vacancies. KTP also posts its employment opportunities on the company Web site.

What type of data should be included in the KTP job vacancies database? What information should not be included in this database? Based on your answers to these questions, build a job vacancies database for KTP. Populate the database with at least 20 records. You should also build a simple Web page that incorporates job vacancy data from your newly created database. Submit a copy of the KTP database and Web page to your professor.

Expanding International Sales

Software requirements: Web browser software
- Word processing software
- Electronic presentation software (optional)

Management would like to expand international sales for Dirt Bikes. You have been asked to analyze opportunities for global business expansion of the company, using the Web to find the information you need. Prepare a report for management that answers the following questions:

1. Which countries would provide the best markets for Dirt Bikes’s products? Your analysis should consider factors such as the following: In which countries are dirt bikes popular? What is the per capita income of these countries?

2. How could Dirt Bikes use the Web to increase international sales? What features should it place on its Web site to attract buyers from the countries it targets?

3. (Optional) If possible, use electronic presentation software to summarize your findings for management.
Electronic Business Project: Conducting International Marketing and Pricing Research

You are in charge of marketing for a U.S. manufacturer of office furniture that has decided to enter the international market. You have been given the name of Sorin SRL, a major Italian office furniture retailer, but your source had no other information. You want to test the market by contacting this firm to offer it a specific desk chair that you have to sell at about $125. Using the Web, locate the information needed to contact this firm and to find out how many European euros you would need to get for the chair in the current market. One source for locating European companies is the Europages Business Directory (www.europages.com). In addition, consider using the Universal Currency Converter Web site (www.xe.net/ucc/), which determines the value of one currency expressed in other currencies. Obtain both the information needed to contact the firm and the price of your chair in their local currency. Then locate and obtain customs and legal restrictions on the products you will export from the United States and import into Italy. Finally, locate a company that will represent you as a customs agent and gather information on shipping costs.

Group Project: Identifying Information Technology for Global Business Strategies

With a group of students, identify an area of information technology and explore how this technology might be useful for supporting global business strategies. For instance, you might choose an area such as digital telecommunications (e.g., e-mail, wireless communications, value-added networks), enterprise systems, collaborative work group software, or the Internet. It will be necessary to choose a business scenario to discuss the technology. You might choose, for instance, an automobile parts franchise or a clothing franchise, such as the Limited Express, as example businesses. Which applications would you make global, which core business processes would you choose, and how would the technology be helpful? If possible, use electronic presentation software to present your findings to the class.
CASE STUDY
Celanese Recentralizes with a New Enterprise System

At the end of 2003, Celanese AG, a global chemical company, had about $5 billion in annual sales and about 9,500 employees. Celanese is headquartered in Kronberg, Germany, and has 30 facilities in 11 countries on 6 continents, although most of its facilities are located in North America. Celanese had been part of Hoechst AG pharmaceuticals since 1979. However, it was spun off in 1999 when Hoechst merged with Rhône-Poulenc to create a new pharmaceutical company, Aventis.

Celanese is a rather complex multinational organization with five main businesses: Celanese Chemicals, consisting of Acetyl Products, which processes natural gas and ethylene used in products for manufacturing industries, and Chemical Intermediates, which produces specialty chemicals for paints, coatings, agrochemicals, and textiles; Celanese Acetate Products, which manufactures cellulose acetate filament and tow; Ticona Technical Polymers, which makes chemical products for the electronics, telecommunications, automotive, and medical industries; Performance Products, which produces ingredients for food products, such as the Nutrinova sweetener used in Pepsi One; and Celanese Ventures, specializing in research and development, including artificial fibers and alternative energy.

Celanese, like many large corporations, had focused on decentralization during the 1980s and 1990s, and, as a result, its corporate headquarters operated largely like a holding company. Its highly independent units implemented enterprise systems from SAP, the leading enterprise software company. Each unit had its own separate system, and each felt free to modify the SAP package software to meet its own requirements. To complicate matters even further, Celanese had grown during those 20 years partly by purchasing smaller companies, many of which already had their own enterprise systems. Altogether, Celanese enterprise systems totaled 13 in 2000 (reduced to 10 by 2002 when Celanese sold one of its business units) and were in five different computer centers.

By 2000, as the U.S. and world economies began weakening, many companies began looking for ways to reduce their expenses in the face of declining sales. Centralizing these companies became popular as a way to reduce costs once the expenses of centralization had been absorbed. This approach was very popular in the chemical industry, partly because its raw materials costs were rising at the same time that sales were dropping. When Celanese was spun off, its management set a formidable goal of doubling its sales in five years. To enable the company to achieve that goal, some of the increased sales would have to come from acquisitions, and that meant its stock price would have to go higher for it to afford such purchases.

How could centralization help Celanese reduce its costs? There were numerous ways. The most obvious one was to make the various units of Celanese use the same version of SAP. Versions of the software used by Celanese units varied from version 3.1 to version 4.6. It was expensive to obtain so many different versions. However, the expense was even higher when so many of the IT staff had first to learn and then to support all of these versions at different Celanese units. Having only one version running on one computer for the whole company would mean far smaller IT staffs within the various units.

But there also were other less obvious costs that could be significantly reduced. Under the decentralized approach, for corporate managers to collect all the financial information they needed was not only time consuming, and, therefore, expensive, but also it increased the likelihood of errors in that data. In addition, different units used different names for what were really the same pieces of data. For example, price in one system might be cost or purchase price in another. Furthermore, many of the units often failed to take advantage of some of the useful new features of their SAP systems. For example, one new function in SAP in 2003 was its supply chain event management (SCEM), an ERP component that enables a company to better forecast its supply needs and so better manage its supply chain while reducing its inventory costs.

The problem in a decentralized environment is that some units adopt that feature, whereas others will not. And some that do adopt it might use it to benefit their own needs rather than using it to benefit the organization as a whole. Another hidden cost of separate ERP systems was that they prevented the company from obtaining a single companywide view of customers that might indicate opportunities to cross-sell and up-sell customers between business units.

In late 1999, when Hoechst spun off Celanese, the company management initiated a new project to recentralize the company, which it named One Celanese. They then began searching for a new global CIO who could reduce the company’s costs by integrating many of its information systems. Karl Wachs was hired and given a simple instruction—cut costs. Wachs quickly decided to roll up all the units’ disparate enterprise systems into a single system, and he named the project OneSAP. With the aid of 70 people, Wachs began the process of actually initiating the project, saying, “This is not a four-week decision cycle. It should take a year for approval.” In fact, it took 11 months. The project was not cheap. According to Wachs, at the height of the project, it was costing Celanese between $100,000 and $200,000 a day. One of the project managers said the overall
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The cost would be about $60 million. However, Celanese’s management concluded OneSAP would pay for itself in two years once the project was completed.

How did Wachs and the Celanese information systems unit go about rolling up the various SAP systems into one? The technical aspects—installing new SAP software so that the various units could begin to use it—were far from the most difficult. Much greater challenges were posed by the organizational cultures of the disparate Celanese operating units. Employees were comfortable using enterprise systems, and they were not necessarily ready to change their way of working to fit a standard set of business processes. The various units were intensely independent; they were not used to thinking of Celanese first but rather of the needs of their own units. According to the employees’ old way of thinking, if something went wrong with a transaction that was not in their own unit, it was someone else’s responsibility. That thinking had to change.

Moreover, in the past the Celanese culture had been one of building consensus, an approach that cannot work in a situation where people are told to make changes they do not want to make. “If we tolerate business units explaining why their outputs are different so that they don’t have to change their inputs,” Wachs concluded, “then we have lost. The mistake of the past was trying to adapt software to the business.” Now the company would have to adapt the business to the software. To accomplish these cultural changes required a lot of explanation, a lot of education, and also clear and absolute orders from the very top.

The project was divided into seven tracks, including finance, supply chain management, manufacturing, “order-to-cash,” business intelligence reporting, technology, and change management. Each track had several functional stakeholders who were given the responsibility for that track’s progress. Each track also had one person responsible for working at a higher level. For example, the finance track had one person assigned to work with the chief financial officer and the controllers “to design the business processes for that organization,” as Wachs explained. The project leadership also demanded that Celanese employees follow the six sigma philosophy of “total quality management,” which meant that every person was responsible for quality.

The project certainly had its problems. The U.S. and German human resources systems (and several other small systems) were allowed to keep their own SAP systems for “legitimate business reasons.” However, by the end of the project, 7 out of 10 of the old SAP systems, representing 90 percent of the business, were shut off. When OneSAP was ready to install the SCEM software, Wachs learned that SAP did not have the software ready. Another problem was that in early 2003 Celanese spent $150 million to purchase the emulsion businesses from Clariant, a very old Basle, Switzerland, chemistry company. That meant that the Clariant unit had to be included in OneSAP. Another problem the project team had to face was cleaning and integrating the data from the various existing SAP systems into OneSAP so the new system is reliable and accurate.


CASE STUDY QUESTIONS

1. Analyze Celanese using the competitive forces and value chain models.

2. How important is Celanese’s centralized enterprise system to its business strategy? Why? What is its business value to the company?

3. What management, organization, and technology challenges did Celanese face as it tried to implement OneSAP? Which were the most difficult?

4. How successful was Celanese in meeting these challenges? What problems did it solve? How? Which problems remained unsolved?