

Chapter 15

Managing Global Systems

LEARNING OBJECTIVES

After reading this chapter, you will be able to answer the following questions:

1. What major factors are driving the internationalization of business?
2. What are the alternative strategies for developing global businesses?
3. How can information systems support different global business strategies?
4. What are the challenges posed by global information systems and management solutions for these challenges?
5. What are the issues and technical alternatives to be considered when developing international information systems?

CHAPTER OUTLINE

- 15.1 **THE GROWTH OF INTERNATIONAL INFORMATION SYSTEMS**
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State of the Art
- 15.2 **ORGANIZING INTERNATIONAL INFORMATION SYSTEMS**
Global Strategies and Business Organization
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- 15.5 **HANDS-ON MIS PROJECTS**
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3M: STICKY FILM AND SCRATCHY THINGS THAT SELL AROUND THE WORLD

3M is a diversified technology company with a global presence. Its products are available in 200 countries, it has operations in 62 countries, and it produces over 55,000 products. In 2009, the company generated \$23.1 billion in revenue, down from \$25.6 billion (8 percent) in 2008 as the global recession slowed business activity. The company employs 76,000 people. 3M, headquartered in St. Paul, Minnesota, is the poster-child for global American firms: 63 percent of its revenue comes from offshore sales (14.6 billion), and 58 percent of its employees are international.

3M's core competencies historically have been sticky films and scratchy papers (sandpaper), and, since its founding in 1902, has continuously demonstrated through new products just how much the world depends on these competencies. 3M is organized into six largely independent divisions: Industrial and Transportation (tapes, abrasives, and adhesives); Health Care (surgical tapes to dental inserts); Consumer and Office (furnace filters to Post-it notes and Scotchbrite pads); Safety, Security, and Protection Services (respirators to Thinsulate insulation and RFD equipment); Display and Graphics (LCD monitors to highway reflective tape); and Electro and Communications (insulating materials to disk drive lubricants). 3M is among the leading manufacturers of products for many of the markets it serves.

With such a large global presence, with many of its foreign operations the results of purchases, the company was until recently a collection of legacy applications spread across the globe. 3M inherited the hardware and software of acquired companies, from the shop floor, to supply chain, sales, office, and reporting systems. Even where 3M expanded organically by moving into new countries, each of the six divisions, and thousands of their smaller operations, developed their own information and reporting systems with very little corporate, global oversight. As one manager noted, if 3M continued to operate its business with an accumulation of disaggregated solutions, the company would not be able to efficiently operate in the current recession, or support future growth.

In 2008, 3M began a series of restructurings of its operations, including a review of its global systems. In 2010, 3M adopted SAP's Business Suite Applications to replace all of its legacy software around the world. The intent is to transform its business processes on a global scale, and force independent divisions to adopt common software tools and, more importantly, common business processes. The price tag is also global: licensing fees paid to SAP are reported as somewhere between \$35 million to \$75 million.

Business Suite 7 is SAP's brand of enterprise systems. It consists of five integrated modules that can be run on a wide variety of hardware platforms, and which work well with software from other vendors. The core business process and software modules are customer relationship management (CRM), enterprise resource planning (ERP), product lifecycle management, supply chain



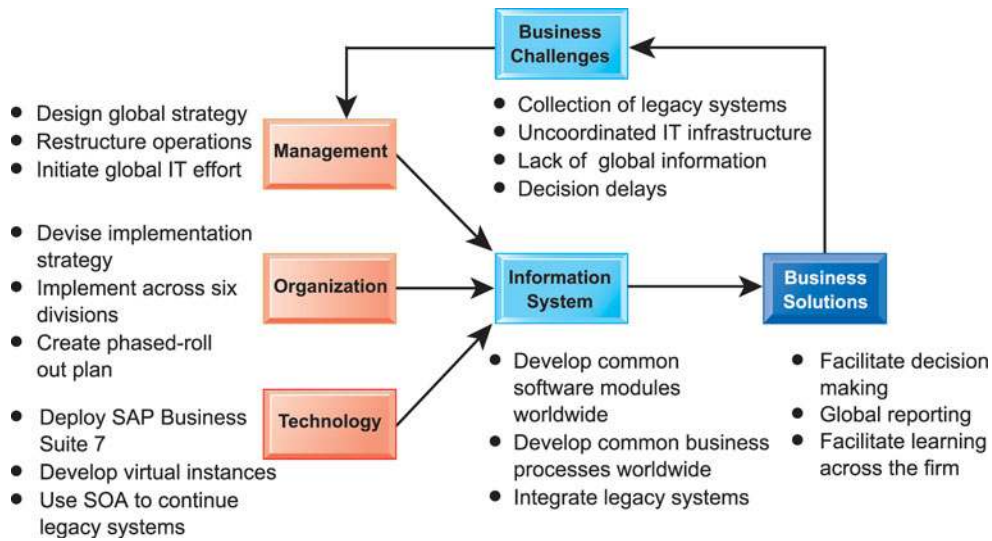
management (SCM), and supplier relationship management. Each module has pre-defined business processes, and the software needed to support these processes. Firms adapt their own business processes to these “industry best-practice modules,” or make changes in the SAP software to fit their business models. Business Suite is built on a service-oriented architecture (SOA), which means it can work well with data from legacy database systems and offers lower implementation costs.

In implementing SAP’s Business Suite, 3M is not following in the footsteps of some ill-fated global system initiatives by other Fortune 500 companies. Rather than do a “rip, burn, replace” of all its old software, 3M is rolling out the SAP enterprise software in phased and modular stages. Following a piecemeal approach, it is rolling out a demand forecasting and supply planning module in Europe first, and then once the concept is validated, additional rollouts will follow around the world. In Asia-Pacific, 3M is implementing its ERP system over the next several years. In the past, executive managers in the United States did not have timely, accurate, or consistent information on how all the firms business units, regions, and products were performing. To a large extent, 3M was not manageable or governable prior to the current effort to rationalize its systems. One solution will be SAP’s business intelligence (BI) software which will enable 3M’s management to access accurate and timely data on business performance across its divisions to support informed decision making. The SAP software agreement enables 3M to integrate the best practices it has gained with its existing BI deployments from the SAP BusinessObject portfolio in the United States and in other regions into the global rollout template. One advantage of having integrated global systems is the ability to transfer what you learn in one region to another region. In a further sign that 3M management has a keen understanding of corporate structure and strategy, the firm plans to maintain a large measure of independence among the six divisions because their histories and products are so different. It will not force the divisions to adopt a single instance of the SAP products but instead will allow substantial variation among divisions, what one wag called “virtual instances” of the software that reflect the needs of customers served by the various divisions.

Sources: Chris Chiappinelli, “3M Selects SAP Business Suite in Effort to Unify Its Core Processes,” *Managing Automation*, April 4, 2010; Doug Henschen, “SAP ERP Software Tapped by 3M,” *Information Week*, March 1, 2010; “SAP Gains 3M as New Customer,” www.sap.com, March 1, 2010; 3M, Form 10K For the Fiscal Year Ended December 31, 2009, filed with the Securities and Exchange Commission February 16, 2010.

3M’s efforts to create a global IT infrastructure identifies some of the issues that truly global organizations need to consider if they want to operate across the globe. Like many large, multinational firms, 3M grew rapidly by purchasing other businesses in foreign countries, as well as through expanding domestic operations to foreign countries. In the process, 3M inherited hundreds of legacy software systems, and developed new systems, few of which could share information with one another, or report consistent information to corporate headquarters. 3M’s legacy information systems simply could not support timely management decision making on a global scale.

The chapter-opening diagram calls attention to important points raised by this case and this chapter. To solve its global management and business challenges, 3M adopted an integrated suite of software applications from SAP, one of the world’s largest software firms. 3M had to devise a flexible, modular implementation strategy that integrated both the existing legacy systems, and preserved some measure of autonomy for the six divisions that are the basis of the company. 3M is now able to respond to changes in business conditions around the globe and around the clock.

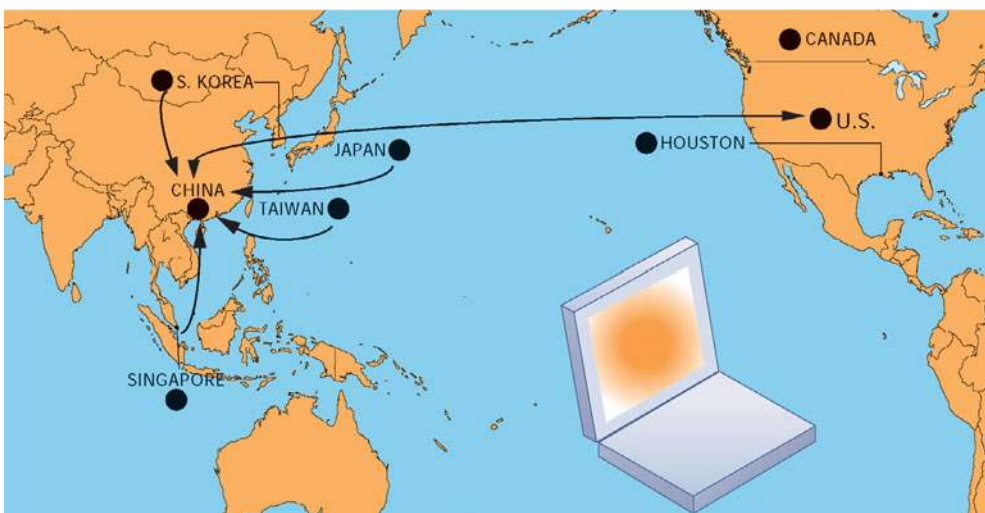


15.1 THE GROWTH OF INTERNATIONAL INFORMATION SYSTEMS

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.

Today, the production and design of many electronic products are parceled out to a number of different countries. Consider the path to market for a Hewlett-Packard (HP) laptop computer, which is illustrated in Figure 15-1.

FIGURE 15-1 AN HP LAPTOP'S PATH TO MARKET



HP and other electronics companies assign distribution and production of their products to a number of different countries.

The idea for the product and initial design came from HP's Laptop Design Team in the United States. HP headquarters in Houston approved the concept. Graphics processors were designed in Canada and manufactured in Taiwan. Taiwan and South Korea provided the liquid-crystal display (LCD) screens and many of the memory chips. The laptop's hard disk drive came from Japan. Sources in China, Japan, Singapore, South Korea, and the United States supplied other components. Laptop assembly took place in China. Contractors in Taiwan did the machine's engineering design and collaborated with the Chinese manufacturers.

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 15-2 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 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 environ-

FIGURE 15-2 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.

ment. 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 portfolio capable of achieving your corporate goals. Let's begin by looking at the overall global environment.

THE GLOBAL ENVIRONMENT: BUSINESS DRIVERS AND CHALLENGES

Table 15-1 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.

The development of global communications has created a global village in a second sense: A **global culture** created by television, the Internet, and other

TABLE 15-1 THE GLOBAL ENVIRONMENT: BUSINESS DRIVERS AND CHALLENGES

GENERAL CULTURAL FACTORS	SPECIFIC BUSINESS FACTORS
Global communication and transportation technologies	Global markets
Development of global culture	Global production and operations
Emergence of global social norms	Global coordination
Political stability	Global workforce
Global knowledge base	Global economies of scale

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, India, 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 lay the groundwork 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. Production, 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, finance, law, and general business. 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.

Business Challenges

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 15-2 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 information laws on personal information. Financial services, travel, and health care companies are often 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.

TABLE 15-2 CHALLENGES AND OBSTACLES TO GLOBAL BUSINESS SYSTEMS

GLOBAL	SPECIFIC
Cultural particularism: Regionalism, nationalism, language differences	Standards: Different Electronic Data Interchange (EDI), e-mail, telecommunications standards
Social expectations: Brand-name expectations, work hours	Reliability: Phone networks not uniformly reliable
Political laws: Transborder data and privacy laws, commercial regulations	Speed: Different data transfer speeds, many slower than United States
	Personnel: Shortages of skilled consultants

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.

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.

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, manual entry of data from one legacy system to another, 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's examine these problems in greater detail.

15.2 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 15-3). 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).

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 relies 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

TABLE 15-3 GLOBAL BUSINESS STRATEGY AND STRUCTURE

BUSINESS FUNCTION	DOMESTIC EXPORTER	MULTINATIONAL	FRANCHISER	TRANSNATIONAL
Production	Centralized	Dispersed	Coordinated	Coordinated
Finance/Accounting	Centralized	Centralized	Centralized	Coordinated
Sales/Marketing	Mixed	Dispersed	Coordinated	Coordinated
Human Resources	Centralized	Centralized	Coordinated	Coordinated
Strategic Management	Centralized	Centralized	Centralized	Coordinated

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. 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 and take advantage of short-term local advantage 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. Figure 15-3 depicts the typical arrangements. By *systems* we mean the full range of activities involved in building and operating information systems: conception and alignment with the strategic business plan, systems development, and ongoing operation and maintenance. 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 systems development and operations occur in an integrated and coordinated fashion across all units.

FIGURE 15-3 GLOBAL STRATEGY AND SYSTEMS CONFIGURATIONS

SYSTEM CONFIGURATION	Strategy			
	Domestic Exporter	Multinational	Franchiser	Transnational
Centralized	X			
Duplicated			X	
Decentralized	x	X	x	
Networked		x		X

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.

As can be seen in Figure 15-3, 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 transnational firms: 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.

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.

15.3 MANAGING GLOBAL SYSTEMS

Table 15-4 lists the principal management problems posed by developing international systems. It is interesting to note that these problems are the chief difficulties managers experience in developing ordinary domestic systems as well. But these are enormously complicated in the international environment.

A TYPICAL SCENARIO: DISORGANIZATION ON A GLOBAL SCALE

Let's look at a common scenario. A traditional multinational consumer-goods company based in the United States and operating in Europe would like to expand into Asian markets and knows that it must develop a transnational strategy and a supportive information systems structure. Like most multinationals, it has dispersed production and marketing to regional and national centers while maintaining a world headquarters and strategic management in the United States. Historically, it has allowed each of the subsidiary foreign divisions to develop its own systems. The only centrally coordinated system is financial controls and reporting. The central systems group in the United States focuses only on domestic functions and production.

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 of the same ERP system), 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 of European intercountry communications. The central systems group at headquarters in the United States recently was decimated and dis-

TABLE 15-4 MANAGEMENT CHALLENGES IN DEVELOPING GLOBAL SYSTEMS

Agreeing on common user requirements
Introducing changes in business processes
Coordinating applications development
Coordinating software releases
Encouraging local users to support global systems.

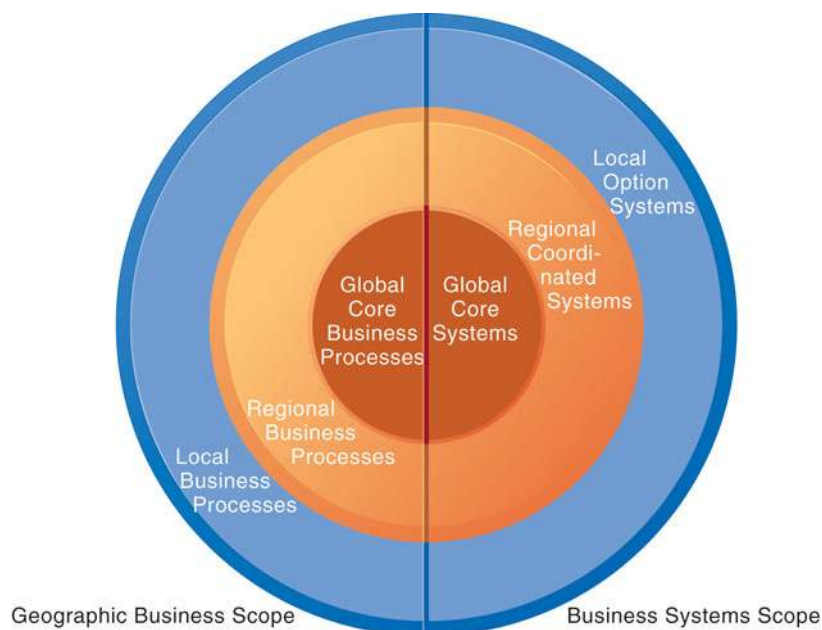
persed to the U.S. local sites in the hope of serving local needs better and reducing costs.

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 15-4. 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 procedures 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 15-4 lays out the main dimensions of a solution. First, consider that not all systems should be coordinated on a transnational basis; only some core

FIGURE 15-4 LOCAL, REGIONAL, AND GLOBAL SYSTEMS



Agency and other coordination costs increase as the firm moves from local option systems toward regional and global systems. However, transaction costs of participating in global markets probably decrease as firms develop global systems. A sensible strategy is to reduce agency costs by developing only a few core global systems that are vital for global operations, leaving other systems in the hands of regional and local units.

Source: From *Managing Information Technology in Multinational Corporations* by Edward M. Roche, © 1993. Adapted by permission of Prentice Hall, Inc., Upper Saddle River, N.J.

systems are truly worth sharing from a cost and feasibility point of view. **Core systems** 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.

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. Business processes are defined and described in Chapter 2, which you should review. 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 business process 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 resource planning 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 incrementally from existing applications with a precise and clear vision of the transnational capabilities the organization should have in five years. This is sometimes referred to as the “salami strategy,” or one slice at a time.

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 MANAGEMENT SOLUTION: IMPLEMENTATION

We now can reconsider how to handle the most vexing problems facing managers developing the global information systems architectures that were described in Table 15-4.

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, develop 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 authority, 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. 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.

How should cooptation proceed? Several alternatives are possible. One alternative is to permit each country unit the opportunity to develop one transnational application first in its home territory, and then throughout the world. In this manner, each major country systems group is given a piece of the action in developing a transnational system, and local units feel a sense of ownership in the transnational effort. On the downside, this assumes the ability to develop high-quality systems is widely distributed, and that, a German team, for example, can successfully implement systems in France and Italy. This will not always be the case.

A second tactic is to develop new transnational centers of excellence, or a single center of excellence. There may be several centers around the globe that focus on specific business processes. These centers draw heavily from local national units, are based on multinational teams, and must report to worldwide management. Centers of excellence perform the initial identification and specification of business processes, define the information requirements, perform the business and systems analysis, and accomplish all design and testing. Implementation, however, and pilot testing are rolled out to other parts of the globe. Recruiting a wide range of local groups to transnational centers of excellence helps send the message that all significant groups are involved in the design and will have an influence.

INTERACTIVE SESSION: MANAGEMENT

FONTERRA: MANAGING THE WORLD'S MILK TRADE

While global trade has expanded at over 9 percent a year in the last 20 years, many international companies still rely on outdated manual processes and paperwork for conducting their international trade business. In 2010, global trade of goods and services will amount to a staggering \$15 trillion. That's a little bigger than the entire United States economy (\$14 trillion). There are many complex challenges that managers face when conducting business on an international scale. Chief among these challenges is managing the import and export business process. Managing an import/export business involves managing three processes: compliance with foreign and domestic laws, customs clearance procedures, and risk management. Each country you export to has different laws governing imported products and different customs procedures. Trading across boundaries raises financial and contractual risks. What if you export to a foreign company and it doesn't pay you? What kinds of credit assessments can you perform in various countries? What if your goods are stalled at a foreign port for lack of proper documents? What are the proper documents? The potential pitfalls are numerous.

In the past, time-consuming and error-prone manual methods were incapable of handling the complex challenges of global trade. To conduct business in other countries, your company must comply with local laws, satisfy trade security measures, meet documentation requirements, understand complicated tariffs and duties, and coordinate the involvement of all parties. Handling these responsibilities manually increases the risk of errors. According to a United Nations study, the inefficient administration of customs regulations and documents accounts for 7 percent of the cost of international trade. That's \$1 trillion lost annually on a global basis to inefficient handling of customs documents. Poor management of compliance and risk accounts for even more losses.

Increasingly, international firms are turning to enterprise software and business intelligence applications to manage their import/export business processes on a global scale. One world, one business, one set of software tools with pre-defined business processes that are the same the world over. That's the dream. Fonterra provides an example of a firm

(actually a cooperative) that is implementing an import/export process control system.

Fonterra is the world's leading exporter of dairy products. Owned by 11,000 New Zealand dairy farmers, Fonterra is a cooperative that exports 95 percent of its products to 140 countries—of all the dairy goods it manufactures, only 5 percent are consumed within its domestic market. Fonterra is primarily an exporting firm. Fonterra has \$10 billion in assets, annual revenues of \$12.1 billion, and produces 3.6 billion gallons of milk each year. If you wonder how that's possible, the answer is Fonterra relies on the contributions of 4.3 million New Zealand cows, and over 15,000 employees. Fonterra accounts for over 25 percent of New Zealand's export trade, and about 30 percent of all global trade in milk and milk products.

Fonterra's operations generate a substantial amount of transactional data. "The volume going through this platform is quite significant in both dollar and transactional terms," says Clyde Fletcher, Documentation Center Manager at Fonterra. "But we don't just rely on New Zealand. We procure our products from multiple countries to try to spread the risk. We also export out of Australia, the United States, Latin America, Europe, and Asia." This data needs to be captured in an enterprise database, then moved into a data warehouse so management can monitor the firm's operations. To handle more complex import/export processes, Fonterra turned to the SAP BusinessObjects Global Trade Services solution.

SAP Global Trade Services (SAP GTS) automates import/export processes, while ensuring that transactions comply with all customs and security regulations. SAP GTS helps companies standardize and streamline trade processes across their entire enterprise and business units. And it fosters use of shared data and shared collaboration knowledge, replacing high-maintenance manual processes.

With SAP GTS, Fonterra has been able to lower the cost, and reduce the risk, of doing business internationally. To date, SAP GTS has helped Fonterra standardize and streamline trade processes across its entire enterprise and business units. And it has fostered the sharing of data, greater collaboration, and sharing of knowledge throughout the firm. SAP GTS manages the complexities of global trade and ensures

full regulatory compliance. The solution helps reduce buffer stock by improving transparency throughout the supply chain—sharing cross-border trade information with all partners, including freight forwarders, insurance agencies, banks, and regulatory entities. SAP GTS has helped Fonterra avoid supply chain bottlenecks, costly production downtime,

and errors that can result in expensive penalties—and even revoked import/export privileges.

Sources: David Barboza, “Supply Chain for iPhone Highlights Costs in China,” *New York Times*, July 5, 2010; Lauren Bonneau, “Mastering Global Trade at Fonterra,” CustomProfiles, SAP.com, July 1, 2010; Kevin Keller, “iPhone Carries Bill of Materials of \$187.51,” *iSuppli.com/Teardowns*, June 28, 2010.

CASE STUDY QUESTIONS

1. Describe the various capabilities of SAP GTS. How does using this software help Fonterra manage its export trade? What quantifiable benefits does this system provide?
2. How would you characterize Fonterra's global business strategy and structure (review Table 15-3). What kind of a global business is it? Has Fonterra's structure and strategy shaped its uses of SAP GTS? Would a transnational company choose a different solution?
3. What influence does the global business environment have on firms like Fonterra, and how does that influence their choice of systems?

MIS IN ACTION

Explore Fonterra's Web site (Fonterra.com) and then answer the following questions:

1. Go the Web site SAP.com and search on “GTS.” Click on the article entitled “SAP GRC Global Trade Services: Streamline and Secure Your Global Supply Chain.” What benefits does SAP promise to deliver for global trading companies? Create a summary table for your class.
2. Visit SAP's largest competitor, Oracle.com, and identify similar applications provided by Oracle. What do you think are the most important management and business considerations in deciding between Oracle and SAP solutions for global projects? Discover one global firm that uses Oracle's global trade offerings, and compare that firm to Fonterra.

Even with the proper organizational structure and appropriate management choices, it is still possible to stumble over technology issues. Choices of technology platforms, networks, hardware, and software are the final element in building transnational information systems architectures.

15.4 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. 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 produc-

tivity of international work teams. The universal acceptance of the Internet around the globe has greatly reduced networking problems. But the mere presence of the Internet does not guarantee that information will flow seamlessly throughout the global organization because not all business units use the same applications, and the quality of Internet service can be highly variable (just as with the telephone service). For instance, German business units may use an open source collaboration tool to share documents and communicate, which is incompatible with American headquarters teams, which use Lotus Notes. 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 the Windows, Linux, Unix, or proprietary operating systems running on IBM, Sun, HP, 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 standards, 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. The Internet has provided an enormously powerful foundation for providing connectivity among the dispersed units of global firms. However, many issues remain. The public Internet does not guarantee any level of service (even in the U.S.). Few global corporations trust the security of the Internet and generally use private networks to communicate sensitive data, and Internet virtual private networks (VPNs) for communications that require less security. Not all countries support even basic Internet service that requires obtaining reliable circuits, coordinating among different carriers and the regional telecommunications authority, and obtaining standard agreements for the level of telecommunications service provided. Table 15-5 lists the major challenges posed by international networks.

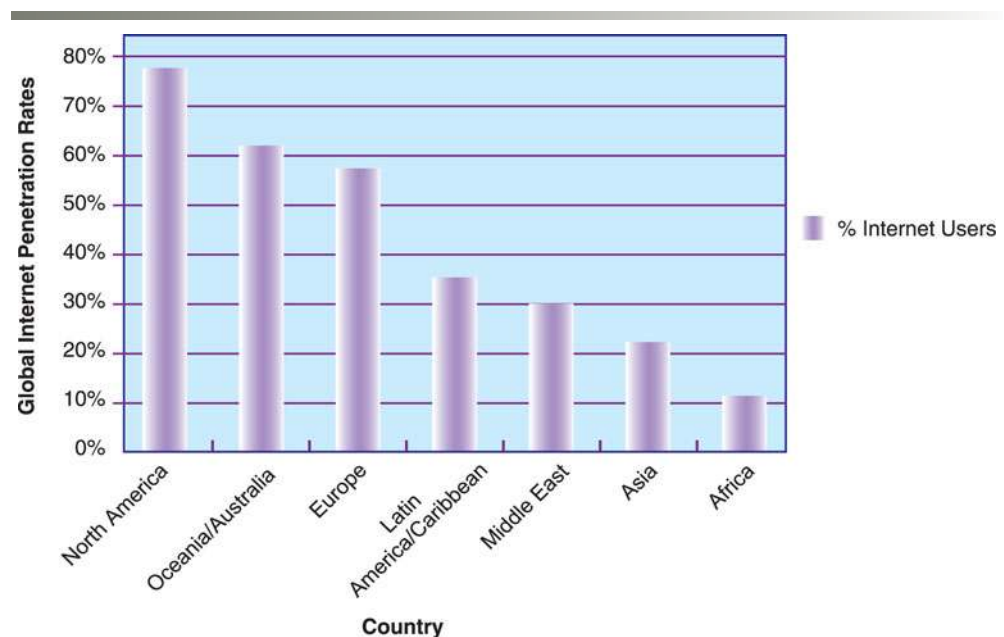
While private networks have guaranteed service levels and better security than the Internet, the Internet is the primary foundation for global corporate networks when lower security and service levels are acceptable. Companies can create global intranets for internal communication or extranets to exchange

TABLE 15-5 PROBLEMS OF INTERNATIONAL NETWORKS

Quality of service
Security
Costs and tariffs
Network management
Installation delays
Poor quality of international service
Regulatory constraints
Network capacity

information more rapidly with business partners in their supply chains. They can use the public Internet to create global networks using VPNs from Internet service providers, which provide many features of a private network using the public Internet (see Chapter 7). 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.

The high cost of PCs, and low incomes, limit access to Internet service in many developing countries (see Figure 15-5). Where an Internet infrastructure exists in less-developed countries, it often lacks bandwidth capacity, and is unreliable in part due to power grid issues. The purchasing power of most people in developing countries makes access to Internet services very expensive in local currencies. In addition, many countries monitor transmis-

FIGURE 15-5 INTERNET PENETRATION BY REGION

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

Source: Internetworldstats.com, 2010.

sions. Governments in China, Singapore, Iran, and Saudi Arabia monitor Internet traffic and block access to Web sites considered morally or politically offensive. On the other hand, the rate of growth in the Internet population is far faster in Asia, Africa, and the Middle East than in North America and Europe, where the Internet population is growing slowly if at all. In 2010, China, for instance, has more than 420 million Internet users compared to the United States with about 221 million. Therefore, in the future, Internet connectivity will be much more widely available and reliable in less-developed regions of the world, and it will play a significant role in integrating these economies with the world economy.

The Interactive Session on Organizations describes how cell phones provide a partial solution to this problem. Their use is mushrooming in developing countries, and they are starting to become engines for economic development.

SOFTWARE LOCALIZATION

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 software that can be realistically used by multiple business units from different countries given that 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

The screenshot shows a web browser window displaying a translated Japanese version of the Pearson Prentice Hall website. The browser's address bar shows the URL 'http://www.prenhall.com/laudon/'. The page features a blue header with the Pearson logo and 'Laudon' text. Below the header, there are several book covers and links to resources, all translated into Japanese. The browser's address bar shows the URL 'http://www.prenhall.com/laudon/'.

This page from the Pearson Prentice Hall Web site was translated into Japanese. Web sites and software interfaces for global systems may have to be translated into multiple languages to accommodate users in other parts of the world.

INTERACTIVE SESSION: ORGANIZATIONS

HOW CELL PHONES SUPPORT ECONOMIC DEVELOPMENT

As cell phones, the Internet, high-speed Internet connections, and other information and communication technologies become increasingly widespread, more and more people are experiencing the benefits each technology has to offer. Many of these technologies have not yet closed the “digital divide” separating the world’s well-developed and underdeveloped nations. Some countries, like the United States, have access to most new technologies, but most residents of poorer countries still struggle with challenges like obtaining reliable electricity and abject poverty. Recent trends in cell phone design and consumer research indicate that cellular phones are crossing the digital divide and are becoming a truly ubiquitous technology (far more so than personal computers), enhancing the quality of life for millions of people while also increasing the strength of the global economy. As in the United States, by 2015, cell phones will be the primary means of access to the Internet in the developing world.

For instance, mobile phone use in Africa is booming. Despite their high costs (the price of a phone in Niger is equal to five days of income), mobile phone subscriptions in Africa have risen from 16 million in 2000, to 376 million in 2008. Sixty-eight percent of the world’s mobile phone subscriptions are in developing countries, compared with 20 percent of the world’s Internet users. Because cell phones combine features of watches, alarm clocks, cameras and video cameras, stereos, televisions, and perhaps even wallets soon due to the growing popularity of mobile banking, they are growing in usefulness even as they decrease in price. Most importantly, cell phones are increasingly becoming the most convenient and affordable way to connect to the Internet and perform other tasks traditionally associated with computers. And cell phones are much less costly than personal computers.

The possession of a cell phone greatly increases efficiency and quality of life, so the global economy would stand to benefit on a proportionally large scale. Many economists believe that widespread cell phone usage in developing countries is having a profound and revolutionary effect on their economic well-being in a way that traditional methods of foreign aid have failed to achieve.

Cellular phone companies such as Nokia are sending what they call “human-behavior researchers” or “user anthropologists” to gather as much useful information as they can about consumer habits and the lives of potential cell phone buyers. They pass on that information to cell phone designers and technology architects. This process represents a new approach to designing phones known as “human-centered design”. Human-centered design is important to high-tech companies trying to build products that people find appealing and easy to use, and are thus more likely to be bought.

Nokia and other companies face significant challenges in marketing their phones to the poorest segment of Africa and Asia’s populations. Barriers include lack of electricity in many areas, incomes too low to afford a cell phone, and potential lack of service in non-urban areas. India currently leads the way in cell phone subscriptions, with an astounding 756 million (63 percent of its total population), but many other countries lag far behind both in cell phone usage and rates of Internet access. For example, Morocco, one of Africa’s leaders in cell phone and Internet usage, boasts 20 million Internet users, or 58 percent of its total population. By comparison, the United States has over 221 million Internet users of all ages, or 79 percent of its total population.

The World Resources Institute published a report detailing how the poor in developing countries allocate their money. Even the poorest families dedicated significant portions of their small budgets to communication technologies such as cell phones. Having a cell phone is a tremendous advantage for members of populations that are constantly on the move due to war, drought, natural disasters, or extreme poverty, primarily because it allows people to remain reachable under practically any circumstances. Cell phones also have implications for medicine in these countries: patients can more easily reach doctors, and doctors can more easily acquire information pertaining to diseases and ailments they may need to treat.

In addition to the benefit of being able to stay in touch with others, cell phones are also useful as a business tool. Evidence suggests that possession of a cell phone increases profits on an individual level,

allowing people to more easily identify and take advantage of business opportunities. A recent study by the Centre for Economic Policy Research also showed that for every additional 10 cellular phones per 100 people a country acquires, that country's gross domestic product (GDP) rises 0.5 percent.

In Niger, millet is a household staple sold in traditional village markets across thousands of square miles. According to economists, the growth of mobile phone coverage reduced grain price differences across markets by 15 percent between 2001 and 2007, with a greater impact on markets isolated by distance and poor-quality roads. Traders could respond to surpluses and shortages in the market, making better decisions about price and delivery. As a result, trader profits rose and prices fell.

Harvard economist Robert Jensen discovered that the introduction of mobile phones in the Indian coastal state of Kerala reduced price differences across fish markets by almost 60 percent between 1997 and 2001, providing an almost-perfect example of the "Law of One Price": when markets work efficiently, identical goods have the same price. In addition, mobile phones almost completely eliminated waste—the catch left unsold at the end of the day—by allowing

fishermen to call around to different markets while at sea, choose the market with the best price, and sell accordingly. Mobile phones resulted in financial improvements for both fishermen and consumers: fishermen's profits increased by 8 percent, and consumer prices declined by 4 percent.

Economists and others who believe that poor countries need to radically change their economic structure in order to develop, and who also discourage reliance on international aid given to failing economies, are enthusiastic about the positive impact that cell phones and other information technologies can have on underdeveloped countries. Access to the Internet via cell phones also promises to bring about societal and political change in developing countries in which repressive governments exert control over all forms of media.

Sources: Worldwide Worx, "Businesses Across Africa Are Expecting a Revolution in Internet Access, Technology and Costs as a Result of the Rush of New Undersea Cables Connecting the Continent," Telecom Trends in Africa Report 2010, September 16, 2010; Jenny C. Aker and Isaac M. Mbiti, "Mobile Phones and Economic Development in Africa," Center for Global Development, June 1, 2010; Jenny Aker and Isaac Mbiti, "Africa Calling: Can Mobile Phones Make a Miracle," *Boston Review*, March/April 2010; "Top 20 Countries—Internet Usage," *Internetworldstats.com*, November 2010.

CASE STUDY QUESTIONS

1. What strategies are cell phone companies using to 'close the digital divide' and market phones to the poorest segment of the world's population?
2. Why do economists predict that widespread cell phone usage in developing countries would have an unprecedented effect on the growth of those countries?
3. What are some examples of how cell phones might increase quality of life for residents of developing countries?
4. Do you believe that cell phones will proliferate widely through Africa and Asia? Why or why not?

MIS IN ACTION

Explore the Web site for One Laptop Per Child (www.laptop.org) and then answer the following questions:

1. What are the capabilities of the XO laptop (especially the latest version, XO-3)? How well-suited is this machine for developing countries?
2. How would use of the XO laptop narrow the global digital divide? Compare the potential impact of this machine to that of cell phones in developing nations.

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. The entire process of converting software to operate in a second language is called **software localization**.

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 (Martinons, 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. Collaboration 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.

15.5 HANDS-ON MIS PROJECTS

The projects in this section give you hands-on experience analyzing international systems issues for an expanding business, conducting international market research, and building a job posting database and Web page for an international company.

Management Decision Problems

1. United Parcel Service (UPS) has been expanding its package delivery and logistics services in China, serving both multinational companies and local businesses. UPS drivers in China need to use UPS systems and tools such as its handheld Driver Information Acquisition Device for capturing package delivery data. UPS wants to make its WorldShip, CampusShip, and other shipping management services accessible to Chinese and multinational customers via the Web. What are some of the international systems issues UPS must consider in order to operate successfully in China?
2. Your company manufactures and sells tennis rackets and would like to start selling outside the United States. You are in charge of developing a global Web strategy, and the first countries you are thinking of targeting are Brazil, China, Germany, Italy, and Japan. Using the statistics in the CIA World Factbook, which of these countries would you target first? What criteria would you use? What other considerations should you address in your Web strategy? What features would you put on your Web site to attract buyers from the countries you target?

Achieving Operational Excellence: Building a Job Database and Web Page for an International Consulting Firm

Software skills: Database and Web page design

Business skills: Human resources internal job postings

Companies with many overseas locations need a way to inform employees about available job openings in these locations. In this project, you'll use database software to design a database for posting internal job openings and a Web page for displaying this information.

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, he or she 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. Send a copy of the KTP database and Web page to your professor.

Improving Decision Making: Conducting International Marketing and Pricing Research

Software skills: Internet-based software

Business skills: International pricing and marketing

When companies sell overseas, it's important to determine whether their products are priced properly for non-domestic markets. In this project, you'll use the Web to research overseas distributors and customs regulations and use Internet-based software to calculate prices in foreign currencies.

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.

Review Summary

1. *What major factors are driving the internationalization of business?*

The growth of inexpensive 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 also contribute to the world culture. These general factors create the conditions for global markets, global production, coordination, distribution, and global economies of scale.

2. *What are the alternative 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. *How can information systems 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. *What are the challenges posed by global information systems and management solutions for these challenges?*

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. Typically, international systems have evolved without a conscious plan. The remedy is to define a small subset of core business processes and focus on building systems to support these processes. Tactically, managers will have to coopt widely dispersed foreign units to participate in the development and operation of these systems, being careful to maintain overall control.

5. *What are 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. 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 issues concern building interfaces to existing systems and selecting applications that can work with multiple cultural, language, and organizational frameworks.

Key Terms

Business driver, 562

Cooptation, 574

Core systems, 572

Domestic exporter, 567

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Global culture, 563

International information systems architecture, 562

Legitimacy, 574

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Software localization, 581

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Review Questions

- What major factors are driving the internationalization of business?
 - List and describe the five major dimensions for developing an international information systems architecture.
 - Describe the five general cultural factors leading toward growth in global business and the four specific business factors. Describe the interconnection among these factors.
 - List and describe the major challenges to the development of global systems.
 - Explain why some firms have not planned for the development of international systems.
- What are the alternative strategies for developing global businesses?
 - Describe the four main strategies for global business and organizational structure.
- How can information systems support different global business strategies?
 - Describe the four different system configurations that can be used to support different global strategies.
- What are the challenges posed by global information systems and management solutions for these challenges?
 - List and describe the major management issues in developing international systems.
 - Identify and describe three principles to follow when organizing the firm for global business.
 - Identify and describe three steps of a management strategy for developing and implementing global systems.
 - Define cooptation and explain how can it be used in building global systems.
- What are the issues and technical alternatives to be considered when developing international information systems?
 - Describe the main technical issues facing global systems.
 - Identify some technologies that will help firms develop global systems.

Discussion Questions

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

Video Cases

You will find Video Cases illustrating some of the concepts in this chapter on the Laudon Web site along with questions to help you analyze the cases.

Collaboration and Teamwork: Identifying Technologies 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, virtual private networks), enterprise systems, collaboration software, or the Web. It will be necessary to choose a business scenario to discuss the technology. You might choose an automobile parts franchise or a

clothing franchise, such as 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 Google Sites to post links to Web pages, team communication announcements, and work assignments; to brainstorm; and to work collaboratively on project documents. Try to use Google Docs to develop a presentation of your findings for the class.

WR Grace Consolidates its General Ledger System

CASE STUDY

WR Grace is a chemical manufacturer headquartered in Columbia, Maryland. Founded in 1854, the company develops and sells specialty chemicals and construction products and has been a worldwide leader in those fields. Grace has over 6,300 employees and earned \$2.8 billion in revenues in 2009. The company has two operating segments: Grace Davison, which focuses on specialty chemicals and formulation technologies, and Grace Construction Products, which focuses on specialty construction materials, systems, and services. Between these two divisions, there are over 200 separate subsidiaries and several different legal entities that comprise the full company. Grace has operations in 45 countries around the world.

Though Grace is a strong and successful company, global companies with separate divisions often struggle to unify their information systems. Grace is not a single, cohesive business unit—it's an amalgam of many operating divisions, subsidiaries, and business units, all of which use different financial data, reports, and reconciliation methods. Though this "fractured" structure is common to most global companies, it created problems for the company's general ledger. The general ledger of a business is its main accounting record. General ledgers use double-entry bookkeeping, which means that all of the transactions made by a company are entered into two different accounts, debits and credits. General ledgers include accounts for current assets, fixed assets, liabilities, revenues and expense items, gains, and losses.

It's no surprise that a global company that earns several billion dollars in revenues would have a complicated ledger system, but Grace's general ledger setup was more than just complicated. It was a disorganized tangle of multiple ledgers, redundant data, and inefficiency processes. The company had three separate ledger systems from SAP: one for its legal reporting requirements team, and two more for each of its two major operating segments, Grace Davison and Grace Construction Products. But each of the three implementations for these systems occurred several years apart, so the differences between the ledgers were substantial. All three ledgers had different configurations and different levels of granularity within the reporting functional-

ity, and all three of the ledgers were driven by separate data sources.

The "classic" general ledger is used for reporting revenues and expenditures for all subsidiaries, accounts, and business areas. The Grace Davison ledger stored information on company codes (subsidiary ID numbers), accounts, profit centers, plants, and trading partners. The Grace Construction Products management ledger stored information on company codes, accounts, business areas, profit centers, trading partners, and destination countries. Grace Davison used profit-center accounting for its management reporting, and Grace Construction Products used special-purpose ledgers to gather the same financial information. If this sounds like a confusing arrangement, that's because it was.

Consolidating this data across the two divisions and across its many subdivisions proved difficult, and compiling company financial reports was a painstaking and time-consuming task. Reconciling the financial data from each of the three reporting sources resulted in lengthy financial close cycles and consumed excessive amounts of employee time and resources. Michael Brown, director of finance productivity at Grace, said that "from a financial point of view, we were basically three different companies." Grace management decided that the company needed to eliminate the financial reporting 'silos' and create a system that served all parts of Grace's business.

WR Grace hoped to create a global financial standard for its financial reporting system, using the slogan "one Grace" to rally the company to work towards that standard. SAP General Ledger was the most important factor in Grace's ability to accomplish its goal. SAP General Ledger was attractive to Grace because of its many unique and useful features. It has the ability to automatically and simultaneously post all sub-ledger items in the appropriate general accounts, simultaneously update general ledger and cost accounting areas, and evaluate and report on current accounting data in real time. Grace also liked SAP's centralized approach to general ledger, up-to-date references for the rendering of accounts across all of its divisions.

Consolidating multiple ledgers is a difficult task. SAP General Ledger helped Grace to simplify the

process. SAP Consulting and an SAP General Ledger migration team assisted the company along the way. SAP implementations feature an SAP team leader and project manager as well as a migration cockpit. The migration cockpit is a feature of SAP implementations that offers a graphical representation and overview of the general ledger migration process. The cockpit displays steps of the migration in sequence and manages logs, attachments, and other materials important to the general ledger. The migration cockpit helps to ensure that sufficient planning goes into the general ledger consolidation process, and that the necessary business process changes accompany the technical changes of implementing a unified general ledger.

SAP and Grace split the project into two main components: General Ledger Data Migration, and Business Process Testing. General Ledger Data Migration involved acquiring all of the relevant data from Grace's three separate ledgers, combining it and eliminating redundancies, and supplying it to the SAP General Ledger. A small team executed this half of the project. Grace decided to standardize its reporting processes around profit-center accounting and built its general ledger design with that standard in mind. Business Process Testing was completed by a global SAP team performing multiple full-cycle tests. In other words, SAP testers accessed the system remotely and tested all of the functions of SAP General Ledger to ensure that the system would work as planned. The SAP General Ledger project manager oversaw both components of the project.

During the testing process, SAP testers used a technique called "unit testing," common to many system upgrades of this type. The testers set up a "dummy" system with a prototype version of the general ledger and used it to test different types of accounting documents. Grace wanted to modify the configuration of the general ledger to conform to the company's unique needs and circumstances, and made sure that the people who knew what was needed were building the system and designing its specifications. Because of these adjustments, unit testing was critical to ensure that configuration changes had not affected the overall integrity of the system.

SAP testers also performed basic scenario tests, complex scenario tests, and tests on special accounting document types in an effort to ensure that the general ledger was equipped to handle all of the tasks Grace expected it to perform. They also tested inbound finance interfaces, such as the HR interface, bank statements, and upload programs, as well as

special document types used by those interfaces. SAP and Grace both knew that a significant effort would be required to properly test the general ledger, and SAP's experience with similar upgrades in the past was helpful in ensuring that SAP performed the proper amount of tests.

After the data migration was completed, Grace still had to decommission its old ledgers, which were still pivotal sources for many of the custom reports that the company was generating on a regular basis. For example, reports are automatically generated from the special-purpose ledger, or reports that group all the transactions that took place within a particular country in the past year, and so on. To decommission its old ledgers, Grace had to eliminate as many of those custom reports as it could, and move the essential ones over to the new general ledger. Grace recruited employees from all areas of their financial division to identify the most critical reports.

With the general ledger migration completed, all of WR Grace shares a common accounting infrastructure, management can quickly develop an overall picture of the company's financial status, and most of the ledger can be accessed or updated in real time. The financial reconciliation processes at the end of each reporting period were totally eliminated, allowing Grace to devote less energy on managing its ledgers and more on actually running its business. The eventual savings in all areas of the business figure to pay for the installation in short order. Grace's accountants and financial planners will be much more efficient. Managers will spend less time getting the information they need. IT costs for maintaining a single ledger will total far less than the costs for maintaining three, and fewer errors will make their way into the general ledger system. Best of all for Grace, the implementation was completed on time and under budget.

Grace hopes to use the General Ledger platform to continue making other improvements with SAP. Grace plans to upgrade its consolidation systems, financial planning, and analytics functions to SAP systems. Grace already had a strong relationship with SAP. In 1997, Grace installed SAP software for the first time, and prior to the general ledger migration, Grace was already using SAP Business Information Warehouse and NetWeaver Portal globally. This pre-existing relationship made the process of implementing SAP General Ledger much easier. It's also the reason why Grace is so optimistic that it will achieve similar gains in other areas of its business by switching to SAP solutions.

Sources: Christ Maxcer, "Global Enterprise Unites as One: W.R. Grace Migrates to SAP General Ledger," *insiderPROFILES* 5, no. 1, January 2, 2009; SAP AG, "One Grace Project Builds Single Source of Truth Using SAP General Ledger," 2008; and Ed Taylor, "The Business Benefits of a General Ledger Migration at W.R. Grace & Co." May 6, 2008.

CASE STUDY QUESTIONS

1. Why did WR Grace's general ledger system need an overhaul?
2. What made SAP a logical partner for Grace's upgrade?
3. What obstacles did SAP and Grace face in their attempts to consolidate Grace's ledgers?
4. How successful was the general ledger migration? What are some of the risks of adopting a single general ledger system from a single vendor to run a global business?