CHAPTER 1

Information Systems in Global Business Today

LEARNING OBJECTIVES

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

1. How are information systems transforming business, and what is their relationship to globalization?
2. Why are information systems so essential for running and managing a business today?
3. What exactly is an information system? What are its management, organization, and technology components?
4. What are complementary assets? Why are complementary assets essential for ensuring that information systems provide genuine value for an organization?
5. What academic disciplines are used to study information systems? How does each contribute to an understanding of information systems? What is a sociotechnical systems perspective?

Teaching Suggestions

You are probably meeting in the first class session to introduce yourself, the course, and to meet the students. After going over any requirements you may have for the course, try to give an overview of the course.

Section 1.1, "The Role of Information Systems in Business Today," gives students a feel for the importance of information systems in business today and how they have transformed businesses on the world stage. A good discussion of the six important business objectives outlined in this section allows the instructor and students to discuss why businesses have become so dependent on information systems today and the importance of these systems for the survival of a firm. Stress to students that information systems are not a luxury. In most businesses they are the core to survival. This would be a good time to ask students to discuss how their own schools are using information systems to enhance their product offering.

Table 1-1 is a great way to introduce students to much of the new IT jargon that has developed over the last several years. Most of the technologies will be discussed in future chapters. Ask students how much hands-on experience they've had with some of the new business tools as either an employee or a customer.

Globalization is affecting virtually every country in the world. The most striking evidence of this trend is the increasing presence of cell phones in the very small villages of Africa. As technology becomes more pervasive and, in some cases easier to use, globalization will continue its steady march. China, Singapore, and Russia are good examples of how globalization has flattened the world. They have become major exporters to other countries, especially industrialized and advanced countries like the U.S. and many European countries. Emerging countries, like Poland, the Ukraine, and Ireland, are excellent examples of increasing globalization.

Ask students to provide examples of truly digital firms (Cisco Systems and Dell Computers) as opposed to those businesses (local mom-and-pop stores or a local doctor's office) that still perform many business processes outside of integrated information systems.

Review the six strategic business objectives: operational excellence; new products, services, and business models; customer and supplier intimacy; improved decision making; competitive advantage; and survival. The rest of the text will continually refer back to these six objectives as reasons why firms should incorporate and integrate business processes with information systems.

OPENING CASE: SMART SYSTEMS AND SMART WAYS OF WORKING HELP TOYOTA BECOME NUMBER ONE

Toyota has flourished in a highly competitive environment because it has created a set of finely-tuned business processes and information systems that simultaneously promote agility, efficiency, and quality. It can respond instantly to customers and changes in the marketplace as events unfold, while working closely with suppliers and retailers. The experience of Toyota and other companies described in this text will help you learn how to make your own business more competitive, efficient, and profitable.

The chapter-opening diagram highlights important points raised by this case and this chapter. As part of its ongoing effort to monitor quality, efficiency, and costs, Toyota management saw there was an opportunity to use information systems to improve business performance. Technology alone would not have provided a solution. Toyota had to carefully revise its business processes to support a build-to-order production model that based vehicle production on actual customer orders rather than "best guesses" of customer demand. Once that was accomplished, Oracle e-business software was useful for coordinating the flow of information among disparate internal production, ordering, and invoicing systems within the company and with systems of retailers and suppliers.

By helping Toyota build only the cars customers have ordered, its vehicle order management system reduces inventory costs, because the company and its dealers do not have to pay for making and storing vehicles customers did not want. The system also increases customer satisfaction by making it easier for customers to buy exactly the model, make, and option they desire. Information provided by the system helps management monitor trends and forecast demand and production requirements more accurately. The system creates value for Toyota by making its ordering and production processes more efficient and effective. Electronically integrating key business processes in vehicle ordering and inventory management has made this company much more agile and adaptive to customer demands and changes in its supplier and dealer network.

The diagram at the beginning of the chapter can be used to show students how Toyota's vehicle orders management system helped them solve the business challenge presented by fierce competition and rapidly changing customer preferences. The diagram also illustrates how management, technology, and organizational elements work together to create the system.

1.1 THE ROLE OF INFORMATION SYSTEMS IN BUSINESS TODAY

Computers are changing every aspect of our lives from entertainment to shopping, from the work we do and where we do it, to how we communicate with friends and relatives. Even though we are still hearing negative news about the dot-com bubble from the late 1990s through 2001, the death of doing business on the Internet has been greatly exaggerated. Not only is it alive and well, but thriving. The difference between then and now is that many of the companies went bust primarily because of poor business planning or simply because their product wasn't viable to begin with. As you can see from the opening case in the text, many companies are remodeling their businesses and information systems with the Internet in mind. In fact, doing business on the internet is now the default for most companies and organizations.

Ask managers to describe their most important resources and they'll list money, equipment, materials, and people — not necessarily in that order. But more and more, managers consider information an important resource. As electronic business and electronic commerce grow in popularity and more firms digitize their operations, having useful information is becoming even more important to the global business community.

This chapter gives students an overview of many of the subjects we'll touch on in this course. It will help students understand how all firms today, large and small, local and global, use information systems to achieve important business objectives, such as operational efficiency, customer and supplier relationships, better decision making, and new products and services.

HOW INFORMATION SYSTEMS ARE TRANSFORMING BUSINESS

Technology has driven organizations to change the way they operate and that includes the way they manage. We're going to take an in-depth look at how organizations work and how they've been transformed by technology.

Information systems are the foundation for conducting business today. In many industries, survival and even existence is difficult without extensive use of information technology. No longer can we imagine going to work and conducting business without them. As a society we have come to rely extensively on the use of information appliances such as cell phones, and smart phones (iPhones, BlackBerrys, and other handhelds), and other hardware. Communicating and conducting business is increasingly being carried out through the use of e-mail, online conferencing, and international teleconferencing over the Internet have all become essential tools of business.

In 2006, more than 38 percent of Canadian businesses had registered dot-com Web sites, and 56 of Canadian Internet users shop online. Information systems impact the workplace and the home, and increasingly bring businesses into the homes of Canadians.

WHAT IS NEW IN MIS?

Table 1-1, page 7, outlines new MIS changes and their impact on business. The table is organized by the three dimensions of information systems: technology, management, and organizations.

GLOBALIZATION OPPORTUNITIES

Friedman, 2005 discusses the impact of the internet on "flattening" the world. Ask students to discuss what this means. You can visit Friedman's website and a number of blogs that discuss (and illustrate) his hypothesis.

Ask students that the next time they purchase a product, any product, to look at the fine print and see where it's made. It could be China, or the Philippines, or a South American company, or Canada. The Internet has supported international trade, allowing customers, suppliers and manufacturers to set up relationships online. Manufacturers can source the raw materials that they need from anywhere in the world; suppliers can consolidate online orders from multiple customers to take advantage of economies of scale; customers can compare costs of products from around the world. The global economy discussed in the text is being made possible by technology, and that's why it's so important that students understand how to use information systems technology instead of just computer technology. There's a big difference between the two, and we'll talk about it more.

THE EMERGING DIGITAL FIRM

A **digital firm** is one in which nearly all of the organization's significant business relationships with customers, suppliers, and employees are digitally enabled, and key corporate assets are managed through digital means.

Digital means that the information can be coded in such a way to allow it to be transmitted over computer networks, like the Internet, and stored on a computer medium, like a CD or a computer hard drive.

When a firm goes digital, it's not about just adding a computer system to the mix. Throwing a computer system at outdated **business processes** is exactly the wrong thing to do. A truly digital firm has several characteristics that distinguish it from most of the firms claiming to be digitized:

- Significant business relationships with customers, suppliers, and employees are digitally enabled and mediated.
- Core business processes are accomplished through digital networks and span the entire organization or link multiple organizations.
- Key corporate assets — intellectual property, core competencies, and financial and human assets — are managed through digital means.
- Internal and external environments are quickly recognized and dealt with.

And the number one reason digital firms experience greater opportunities for success and profits is because they view information technology as the "core of the business and the primary management tool."

The opening case about Toyota describes some of these features. Other companies such as Dell Computers use the Internet to allow customers to customize their computers, and to communicate with suppliers. Most organizations have some aspects of "being digital," whether it is communicating with employees, customers, or suppliers.

Bottom Line: Information systems do matter because of the increased need for capital management, the increased productivity that arises from their use, the strategic opportunities and advantages they offer, and because they are becoming the foundation of doing business around the world.

WINDOW ON MANAGEMENT: Virtual Meetings: Smart Management

1. **One consulting firm has predicted that video and Web conferencing will make business travel extinct. Do you agree? Why or why not?**

It's doubtful business travel will disappear altogether. However, it is becoming too expensive, time-consuming and a hassle for employees. New security measures and the increasing price of oil add to dissatisfaction with air travel. It can be a very unproductive use of company resources in terms of time and money. Video and Web conferencing tools continue to improve and are becoming cheaper and easier to use – even for small businesses.

2. What is the distinction between videoconferencing and telepresence?

Videoconferencing allows individuals at two or more locations to communicate through two-way video and audio transmissions at the same time. The critical feature of videoconferencing is the digital compression of audio and video streams by a device called a codec. The streams are divided into packets and transmitted over a network or the Internet.

Telepresence is the top-of-the-line videoconferencing technology that strives to make users feel as if they are actually present in a location different from their own. Telepresence products provide the highest-quality videoconferencing available to date.

3. What are the ways in which videoconferencing provides value to a business? Would you consider it smart management? Explain your answer.

Videoconferencing technology provides value to a business by allowing dramatic increases in the number of customers and partners a business is able to reach for a fraction of the previous price per person. Companies can conduct online meetings that may be helpful for training and sales presentations, sharing documents and presentations, and providing online product demonstrations.

Many videoconferencing packages allow participants to use white boards and other tools to work on documents collaboratively.

Anything that saves company resources, like time and money, while still providing good to excellent communication quality, should be considered smart management.

4. If you were in charge of a small business, would you choose to implement videoconferencing? What factors would you consider in your decision?

Student answers will vary. Factors they should consider in their decision include:

- Does the company really need the technology?
- How will employees conduct meetings?
- What technologies will they use to communicate with others?
- How much travel do employees currently complete and how much will it be reduced?
- Does the company have the network capabilities to use videoconferencing?
- Which is cheaper in the short term – travel or video?

- Which is cheaper in the long term – travel or video?

STRATEGIC BUSINESS OBJECTIVES OF INFORMATION SYSTEMS

Although many managers are familiar with the reasons why managing their typical resources such as equipment and people are important, it is worthwhile to take a moment to examine the growing interdependence between a firm's ability to use information technology and its ability to implement corporate strategies and achieve corporate goals. Specifically, business firms invest heavily in information to achieve six strategic business objectives:

- Operational excellence
- New products, services, and business models
- Customer and supplier intimacy
- Improved decision making
- Competitive advantage
- Survival

Operational Excellence

Businesses seek to improve the efficiency of their operations in order to achieve higher profitability. Information systems and technologies are some of the most important tools available to managers for achieving higher levels of efficiency and productivity in business operations, especially when coupled with changes in business practices and management behaviour.

New Products, Services, and Business Models

Information systems and technologies are a major enabling tool for firms to create new products and services, as well as entirely new business models. A **business model** describes how a company produces, delivers, and sells a product or service to create wealth.

Apple Inc. transformed the traditional business model of buying music at physical stores when they developed the iPod, and started selling music online at iTunes. Wal-Mart maintains its traditional brick-and-mortar existence, but has introduced new products, services on the Internet that supports its competitiveness and profitability.

Customer and Supplier Intimacy

When a business really knows its customers, and serves them well, the way they want to be served, the customers generally respond by returning and purchasing more. This raises revenues and profits. Likewise with suppliers: the more a business engages its suppliers, the better the suppliers can provide vital inputs. This lowers costs.

Fairmont Hotels and Resorts is an excellent example of how the use of information systems and technologies are extensively used to better serve their suppliers and retail

customers. These hotels use information systems to keep track of guest preferences, and analyze their customer data to identify their best customers and create individualized marketing campaigns.

Improved Decision Making

Information systems and technologies have made it possible for managers to use real-time data from the marketplace when making decisions. Previously, managers did not have access to accurate and current data and as such relied on forecasts, best guesses, and luck. The inability to make informed decision resulted in raising costs and lost customers.

Competitive Advantage

Doing things better than your competitors, charging less for superior products, and responding to customers and suppliers in real time all add up to higher sales and higher profits that your competitors cannot match. Dell Computers and Wal-Mart are prime examples of how these companies used information systems and technologies to separate themselves from their competition. Dell remains the most efficient producer of PCs in the world. Wal-Mart is the most efficient retail store in the industry.

Survival

Firms also invest in information systems and technologies because they are necessities of doing business. In most businesses, information systems and technology is the core to survival. In the text, Citibank is described as the first banking firm to introduce ATMs. In doing so, they had a major competitive advantage over their competitors. In order to remain and survive in the retail banking industry, other banks had no choice but to provide ATM services to banking customers.

New federal and provincial statutes and regulations have resulted in giving firms no choice but to turn to information systems and technologies in order to comply with requirements for keeping records on many aspects of their business, including employee and financial records.

Bottom Line: Information systems help improve decision-making, improve customer relationships, and can provide competitive advantage for organizations. In many cases organizations (accounting, universities) have no choice but to use information systems to maintain records and comply with government regulations. Other organizations will use information systems to position themselves above their competition (e.g. amazon.com, wal-mart.com)

1.2 PERSPECTIVES ON INFORMATION SYSTEMS

Information technology (IT) consists of all the hardware and software that a firm needs to use in order to achieve its business objectives.

WHAT IS AN INFORMATION SYSTEM?

This section defines many of the terms used in the textbook.

Information technology (IT) is described as the hardware (including computers, printers, handheld devices, etc.) and software (operating systems, productivity software such as Word, and other programs).

Students should also be introduced to the term **ICT**, information and communications technology.

A distinction is made between **data** (raw facts) and **information** (data that have been shaped into a meaningful form), although in many cases the terms are used interchangeably. In some recent literature, it has been proposed that the distinction is pedantic, and the distinction can be ignored. As an instructor, you can decide whether the distinction is critical in your class.

One area of discussion where it is useful to have the distinction is when you discuss the activities in an information system: **input**, **processing**, **output,** and **feedback.**

Figure 1-5 shows that data are captured during the input function, and are processed before information is output to the people who will use it to make decisions.

Feedback completes the information processing loop. This is output that is used to evaluate and correct, if needed, the input activity.

You might want to use an example to illustrate the activities. One example is a student registration system, where the input data are the student number, course number, time slot. The data are processed to determine if there is seat availability in the course, and the output would include a class list (for the professor) and an email confirmation (to the student). Feedback might include a message that the student is not registered, or has outstanding fees, and cannot be processed.

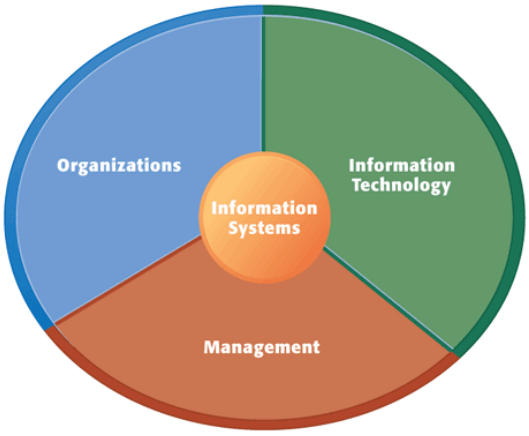
This example can also be used to discuss the elements of a computer based information system, such as the hardware components (scanners, processors, printers, and display monitors), the software components (the programs that compare the registration request with the availability; the programs that check for valid registration).

DIMENSIONS OF INFORMATION SYSTEMS

There is a distinct difference between possessing **information systems literacy** and **computer literacy**. Many students may consider themselves to be computer literate; they are familiar with the Internet, online gaming, storing music on their computers, and using PowerPoint and Word. This is a good time to distinguish between IS and computers, and describe the field of management information systems (MIS). The question can be asked, "What is MIS?" and students may give different answers.

It is important to emphasize that the study of **management information systems** (MIS) deals with behavioural issues as well as technical issues surrounding the development, use, and impact of information systems used by managers and employees in the firm. As such, MIS is defined as the study of information systems focusing on their use in business and management. Figure 1-6 can be used to lead the discussion, and to understand the dimensions of information systems, and that they are "more than computers."

FIGURE 1-6 *Information systems are more than computers*



Using information systems effectively requires an understanding of the organization, management, and information technology shaping the systems. An information system creates value for the firm as an organizational and management solution to challenges posed by the environment.

Organizations

Each organization tends to have its own individual personality and yet share many things in common with other organizations. Students can look at some of the organizations with which they may be associated — softball team, student union/council, health club, or a company for which they work. Each has its own structure that reveals its hierarchy.

In every organization you'll find **senior managers** making long-range decisions, **middle managers** carrying out the plans and goals set by senior managers, and **operational managers** handling the day-to-day operations of the company. As we'll see, information systems output must be geared to each of these levels of management.

Just as every softball team needs good players at different positions, a business organization requires different employees to help it succeed. **Knowledge workers** help create new knowledge for the organization and **data workers** help process the paperwork

necessary to keep an organization functioning. **Production and service workers** allow the company to create its products and services, and get them to the customer?

Students may have some difficulty in understanding knowledge work, and you can use examples from organizations: engineers (plans for buildings/bridges), professors (creating knowledge through research), and architects (house designs). You can discuss how IS can support this type of work; this will also be discussed in more detail in later chapters.

The larger the organization, the more formal the management structure, including the need for standard operating procedures (SOPs). SOPs can help streamline standard business processes so that managers and employees can properly complete their tasks in a more efficient manner. Many companies now integrate these business processes into their information systems to ensure uniformity, consistency, and compliance. As we'll see in upcoming chapters, many companies are even incorporating the informal work processes into their information systems in an effort to capture as much corporate knowledge as possible.

Each organization also has a unique **culture**, or fundamental set of assumptions, values, and ways of doing things, that has been accepted by most of its members. Many students would agree that the professors probably know more than them, and that one reason they attend university is to learn from them.

Management

Students will understand that managers are needed to make decisions and plan for the future. Think about how IS at a university can support day-to-day planning (e.g., how many classrooms are needed to handle student enrollments) and long term planning (e.g., how to recruit more international students). Other examples can come from organizations where students may have worked (e.g., fast food industry: how many burgers to produce, and where to build a new location).

Technology

You should discuss the main aspects of technology including hardware and software, but also include networks and telecommunications technology and database technology.

To describe the IT infrastructure of an organization, you can use an example such as the UPS "Windows on Technology" which follows, or use an example such as the university library. The library will have examples of databases (catalogue, online journals, statistical databases), and use the Internet or other networks to connect students to these databases. The university library will also have a Web page that provides an interface for the student to access the library resources, and may also provide links to other offsite resources. This example can also be used to illustrate the difference between intranets (e.g., information only available to registered students) and extranets (e.g., information available to select external partners, perhaps alumni or other university partners).

All these technologies along with the people who manage and run them (and create them) constitute the organization's **information technology (IT) infrastructure**.

WINDOW ON TECHNOLOGY: UPS COMPETES GLOBALLY WITH INFORMATION TECHNOLOGY

The Window on Technology describes some of the typical technologies used in computer-based information systems today. United Parcel Services (UPS) invests heavily in information systems technology to make its business more efficient and customer oriented. It uses an array of information technologies.

TO THINK ABOUT QUESTIONS

1. What are the inputs, processing, and outputs of UPS's package tracking system?

Inputs: The inputs include package information, customer signature, pickup, delivery, time-card data, current location (while en route), and billing and customer clearance documentation.

Processing: The data are transmitted to a central computer and stored for retrieval. Data are also reorganized so that they can be tracked by customer account, date, driver, and other criteria such as the consolidation of orders for efficient final delivery of packages.

Outputs: The outputs include pickup and delivery times, location while en route, and package recipient. The outputs also include various reports, such as all packages for a specific account or a specific driver or route, as well as summary reports for management.

2. What technologies are used by UPS? How are these technologies related to UPS's business strategy?

Technologies consist of handheld computers (DIADs), bar-code scanners, wired and wireless communications networks, desktop computers, UPS's central computer, storage technology for the package delivery data, UPS in-house package tracking software, and many different pieces of software to access the Internet and many different pieces of software for tracking packages, calculating fees, maintaining customer accounts, and managing logistics.

The Web serves as the foundation for new kinds of information systems such as their Web-based package tracking system. Through the use of DIADs, the UPS drivers automatically capture customers' signatures along with pickup, delivery, and time-card information. UPS's information systems use these data to track packages while they are being transported. The result is an information system solution to the business challenge of providing a high level of service with low prices in the face of mounting competition.

UPS has used the same strategy for over 90 years. Its strategy is to provide the "best service and lowest rates." One of the most visible aspects of technology is the customer's ability to track his/her package via the UPS Web site. However, technology also enables data to seamlessly flow throughout UPS and helps streamline the workflow at UPS. Thus, the technology described in the scenario enables UPS to be more competitive, efficient, and profitable. UPS's culture has been centered on placing service to the customer first. This company philosophy can clearly be found in their package tracking systems.

3. **What problems do UPS's information systems solve? What would happen if these systems were not available?**

Some problems this information system solves relate directly to logistics and supply chain activities, not just for itself, but also for other companies. These services include supply chain design and management, freight forwarding, customs brokerage, mail services, multimodal transportation, and financial services, in addition to logistics services. Because of the advanced integration of its technology, UPS can provide these services cheaper and more efficient than most companies can create them in-house.

Arguably, UPS might not be able to compete effectively without technology. If the technology were not available, then UPS would, as it has through most of its history, attempt to provide that information to its customers, but at higher prices. From the customers' perspective, these technologies provide value because they help customers complete their tasks more efficiently. Customers view UPS's technology as value-added services as opposed to increasing the cost of sending packages.

MIS IN ACTION

Explore the UPS Web site (www.ups.com) and answer the following questions:

1. **What kind of information and services does the Web site provide for individuals, small businesses, and large businesses? List these services and write several paragraphs describing one of them, such as UPS Trade Direct or Automated Shipment Processing. Explain how you or your business would benefit from the service.**

Answers will vary by the type of service students select. It's important that they incorporate principles from this chapter in their answers. Make sure they organize their answers according to how the technology focuses on management, technology, and organizations. Many of the questions in the remaining chapters will ask for that kind of comparative answer.

2. **Explain how the Web site helps UPS achieve some or all of the strategic business objectives we described earlier in this chapter. What would be the impact on UPS's business if this Web site were not available.**

UPS invests heavily in information systems technology to make its business more efficient and customer oriented. It uses an array of information technologies including barcode scanning systems, wireless networks, large mainframe computers, handheld computers, the Internet, and many different pieces of software for tracking packages, calculating fees, maintaining customer accounts, and managing logistics. You may want to highlight how UPS has had to change and adapt to new technologies to remain competitive.

IT ISN'T JUST TECHNOLOGY: A BUSINESS PERSPECTIVE ON INFORMATION SYSTEMS

From a business perspective, an information system provides a solution to a problem or challenge facing a firm and provides real economic value to the business. The decision to build or maintain an information system assumes that the returns on this investment will be superior to other investments in buildings, machines, or other assets. These superior returns will be expressed as:

- Increased productivity
- Increased revenues
- Enhanced organizational performance

From a business perspective, an information system is an important instrument for creating value for the firm. Information systems enable the firm to increase its revenue or decrease its costs by providing information that helps managers make better decisions or that improves the execution of business processes.

COMPLEMENTARY ASSETS: ORGANIZATIONAL CAPITAL AND THE RIGHT BUSINESS MODEL

This section can be used to have students give examples of companies that have used information systems to achieve better results than others. Some examples might be Blockbuster versus Netflix, and UPS versus Canada Post.

You can also reveal the discussion in the literature and popular media around the question whether investment in IT really produces value (especially increases in productivity and shareholder value).

This discussion will reveal that it has been found that organizations need to invest in **complementary** assets as well as technology in order to produce value: a firm must invest in building new business models and processes, changing management behaviour and organizational culture, emphasizing employee training in technology, and creating new partnerships with suppliers, customers, and even competitors. Table 1-2 describes some of the complementary social, managerial, and organizational assets that an organization needs in order to realize returns from IT investments.

Notice the emphasis on training, management support and teamwork, etc. This can be a foundation for the rest of the book: the course emphasizes that managers must consider broad organizational and managerial dimensions to derive benefits from information system investments.

TABLE 1-2 *Complementary Social, Managerial, and Organizational Assets Required to Optimize Returns from Information Technology Investments*

ORGANIZATIONAL ASSETS	Supportive organizational culture that values efficiency and effectiveness
	Efficient business processes
	Appropriate business model
	Decentralized authority
	Distributed decision-making rights
	Strong IS development team
MANAGERIAL ASSETS	Strong senior management support for technology investment and change
	Incentives for management innovation
	Teamwork and collaborative work environments
	Training programs to enhance management decision skills
	Management culture that values flexibility and knowledge-based decision making
SOCIAL ASSETS	The Internet and telecommunications infrastructure
	IT-enriched educational programs raising labour force computer literacy
	Standards (both government and private sector)
	Laws and regulations creating fair, stable market environments
	Technology and service firms in adjacent markets to assist implementation

Bottom Line: Information literacy is more than just clicking a mouse, pounding the computer keyboard, or surfing the Web. It's about integrating the various elements of an organization, technical and nontechnical, into a successful enterprise. As a successful manager you must concentrate on all the dimensions (organizations, IT, management) and integrate them into a single, cohesive system that serves the needs of the organization, the wants of the customer, and the desires of the employees. The more complex the system, the harder to manage, but the greater the potential payoff.

1.3 CONTEMPORARY APPROACHES TO INFORMATION SYSTEMS

The study of information systems deals with issues and insights contributed from technical and behavioural disciplines. The disciplines that contribute to the technical approach are computer science, management science, and operations research. The disciplines contributing to the behavioural approach are psychology, sociology, and economics.

TECHNICAL APPROACH

Some students may think that this course will follow a technical approach. You can clarify that it is the disciplines of computer science, management science, and operations research are those that contribute to the technical aspects of information systems, but that this course is not singularly technical.

BEHAVIOURAL APPROACH

It is interesting to point out that there is much research in the information systems field that looks at behavioural aspects of information systems. You can give examples of some of this research, such as looking at how people's brains process information, and how humans best use graphical user interfaces (such as icons on a desktop).

APPROACH OF THIS TEXT: SOCIOTECHNICAL SYSTEMS

An organization can't afford to view its information resources as belonging to either the techies (technical approach) or the non-techies (behavioural approach). Responsibility for information belongs to everyone in the organization. This is the **sociotechnical** approach — a combination of the two approaches. Everyone has to work together to ensure that information systems serve the entire organization.

To help you understand the importance of viewing management information systems using the sociotechnical approach, look at what trade journals have said. David Haskin, writing in the April 1999 issue of *Windows* Magazine, quotes Steve Roberts, vice president of information technology for Mind Spring Enterprises, an Atlanta-based Internet service provider: "The gap in understanding between technical and nontechnical people is the biggest challenge I've seen." Haskin goes on to say, "Because technology is the bedrock on which successful businesses are built, the stakes in making this relationship work are high. Failing to use the correct technology can put you at a competitive disadvantage, and glitches in existing technologies can bring a business to a grinding halt."

Bottom Line: Information systems and the use of technology belong to *everyone* in an organization. This concept is best carried out through a sociotechnical approach

to viewing information systems, which allows both the technical and behavioural approaches to be combined for the good of the organization.

KEY TERMS

The following alphabetical list identifies the key terms discussed in this chapter.

Business functions — specialized tasks performed in a business organization, including manufacturing and production, sales and marketing, finance and accounting, and human resources.

Business model — an abstraction of what an enterprise is and how the enterprise delivers a product or service, showing how the enterprise creates wealth.

Business processes — the unique ways in which organizations coordinate and organize work activities, information, and knowledge to produce a product or service.

Complementary assets — additional assets required to derive value from a primary investment.

Computer hardware — physical equipment used for input, processing, and output activities in an information system.

Computer literacy — knowledge about information technology, focusing on understanding how computer-based technologies work.

Computer software — detailed, preprogrammed instructions that control and coordinate the work of computer hardware components in an information system.

Culture — fundamental set of assumptions, values, and ways of doing things that has been accepted by most members of an organization.

Data — streams of raw facts representing events occurring in organizations or the physical environment before they have been organized and arranged into a form that people can understand and use.

Data management technology — the software that governs the organization of data on physical storage media.

Data workers — people such as secretaries or bookkeepers who process the organization's paperwork.

Digital firm — organization in which nearly all significant business processes and relationships with customers, suppliers, and employees are digitally enabled and key corporate assets are managed through digital means.

Extranets — private intranet that is accessible to authorized outsiders.

Feedback — output that is returned to the appropriate members of the organization to help them evaluate or correct input.

Information — data that have been shaped into a form that is meaningful and useful to human beings.

Information system — interrelated components working together to collect, process, store, and disseminate information to support decision making, coordinate, control, analysis, and visualization in an organization.

I*nformation systems literacy* — broad-based understanding of information systems that includes behavioural knowledge about organizations and individuals using information systems as well as technical knowledge about computers.

Information technology (IT) — all the hardware and software technologies that a firm needs to use in order to achieve its business objectives.

Information technology (IT) infrastructure — computer hardware, software, data, storage technology, and networks providing a portfolio of shared IT resources for the organization.

Input — the capture or collection of raw data from within the organization or from its external environment for processing in an information system.

Internet — international network of networks that is a collection of hundreds of thousands of private and public networks.

Intranets — an internal network based on Internet and World Wide Web technology and standards.

Knowledge workers — people, such as engineers or architects, who design products or services and create knowledge for the organization.

Management information systems (MIS) — the study of information systems focusing on their use in business and management.

Middle management — people in the middle of the organizational hierarchy who are responsible for carrying out the plans and goals of senior management.

Network — the linking of two or more computers to share data or resources, such as a printer.

Networking and telecommunications technology — physical devices and software that link various pieces of hardware and transfer data from one physical location to another.

Operational management — people who monitor the day-to-day activities of the organization.

Organizational and management capital — investments in organization and management such as new business processes, management behaviour, organizational culture, or training.

Output — the distribution of processed information to the people who will use it or to the activities for which it will be used.

Processing — the conversion, manipulation, and analysis of raw input into a form that is more meaningful to humans.

Production or service workers — people who actually produce the products or services of the organization.

Senior management — people occupying the top most hierarchy in an organization who are responsible for making long-range decisions.

Sociotechnical view — design to produce information systems that blend technical efficiency with sensitivity to organizational and human needs.

World Wide Web (WWW) — a system with universally accepted standards for storing, retrieving, formatting, and displaying information in a networked environment.

Review Questions

1. **How are information systems transforming business and what is their relationship to globalization?**

   Describe how information systems have changed the way businesses operate and their products and services.

   Wireless communications, including computers, cell phones, and PDAs, are keeping managers, employees, customers, suppliers, and business partners connected in every way possible. E-mail, online conferencing, the Web, and the Internet, are providing new and diverse lines of communication for all businesses, large and small. Through increased communication channels and decreased costs of the communications,

customers are demanding more of businesses in terms of service and product, at lower costs. E-commerce is changing the way businesses must attract and respond to customers.

Identify three major new information system trends.

Table 1-1 outlines new MIS changes and their impact on business. The table is organized by the three dimensions of information systems: technology, management, and organizations.

Describe the characteristics of a digital firm.

- Significant business relationships with customers, suppliers, and employees are digitally enabled and mediated.
- Core business processes are accomplished through digital networks spanning the entire organization or linking multiple organizations.
- Key corporate assets – intellectual property, core competencies, and financial and human assets – are managed through digital means.
- They sense and respond to their environments far more rapidly than traditional firms.
- They offer extraordinary opportunities for more flexible global organization and management, practicing time-shifting and space-shifting.

Describe the challenges and opportunities of globalization in a "flattened" world.

Customers no longer need to rely on local businesses for products and services. They can shop 24/7 for virtually anything and have it delivered to their door or desktop. Companies can operate 24/7 from any geographic location around the world. Jobs can just as easily move across the state or across the ocean. Employees must continually develop high-level skills through education and on-the-job experience that cannot be outsourced. Business must avoid markets for goods and serves that can be produced offshore much cheaper. The emergence of the Internet into a full-blown international communications system has drastically reduced the costs of operating and transacting business on a global scale.

2. Why are information systems so essential for running and managing a business today?

List and describe six reasons why information systems are so important for business today.

Six reasons why information systems are so important for business today include:
(1) Operational excellence
(2) New products, services, and business models
(3) Customer and supplier intimacy
(4) Improved decision making

(5) Competitive advantage
(6) Survival

Information systems are the foundation for conducting business today. In many industries, survival and even existence without extensive use of IT is inconceivable, and IT plays a critical role in increasing productivity. Although information technology has become more of a commodity, when coupled with complementary changes in organization and management, it can provide the foundation for new products, services, and ways of conducting business that provide firms with a strategic advantage.

3. What exactly is an information system? How does it work? What are its management, organization and technology components?

Define an information system and describe the activities it performs.

An information system is a set of interrelated components that work together to collect, process, store, and disseminate information to support decision making, coordination, control, analysis, and visualization in an organization. In addition to supporting decision making, information systems may also help managers and workers analyze problems, visualize complex subjects, and create new products.

List and describe the organizational, management, and technology dimensions of information systems.

- Organization: The organization dimension of information systems involves issues such as the organization's hierarchy, functional specialties, business processes, culture, and political interest groups.
- Management: The management dimension of information systems involves setting organizational strategies, allocating human and financial resources, creating new products and services and re-creating the organization if necessary.
- Technology: The technology dimension consists of computer hardware, software, data management technology, and networking/telecommunications technology.

Distinguish between data and information and between information systems literacy and computer literacy.

- Data are streams of raw facts representing events occurring in organizations or the physical environment before they have been organized and arranged into a form that people can understand and use.
- Information is data that have been shaped into a form that is meaningful and useful to human beings.
- Information systems literacy is a broad-based understanding of information systems. It includes a behavioral as well as a technical approach to studying information systems.

- In contrast, computer literacy focuses primarily on knowledge of information technology. It is limited to understanding how computer hardware and software works.

Explain how the Internet and the World Wide Web are related to the other technology components of information systems.

The Internet and World Wide Web have had a tremendous impact on the role information systems play in organizations. These two tools are responsible for the increased connectivity and collaboration within and outside the organization. The Internet, World Wide Web, and other technologies have led to the redesign and reshaping of organizations. They have helped transform the organization's structure, scope of operations, reporting and control mechanisms, work practices, work flows, and products and services.

4. What are complementary assets? Why are complementary assets essential for ensuring that information systems provide genuine value for an organization?

Define complementary assets and describe their relationship to information technology.

Complementary assets are those assets required to derive value from a primary investment. Firms must rely on supportive values, structures, and behavior patterns to obtain a greater value from their IT investments. Value must be added through complementary assets such as new business processes, management behavior, organizational culture, and training.

Describe the complementary social, managerial, and organizational assets required to optimize returns from information technology investments.

Table 1-3 lists the complementary social, managerial, and organization assets required to optimize returns from information technology investments. Here are a few of them:

Organizational assets:

- Supportive culture that values efficiency and effectiveness
- Appropriate business model
- Efficient business processes
- Decentralized authority

Managerial assets:

- Strong senior management support for technology investment and change
- Incentives for management innovation
- Teamwork and collaborative work environments

Social assets:

- The Internet and telecommunications infrastructure
- IT-enriched educational programs raising labour force computer literacy
- Standards (both government and private sector)

5. What academic disciplines are used to study information systems? How does each contribute to an understanding of information systems? What is a sociotechnical systems perspective?

List and describe each discipline that contributes to a technical approach to information systems.

A technical approach to information systems emphasizes mathematically-based models to study information systems and the physical technology and formal capabilities of information systems. Students should know the differences between computer science (theories of computability, computation methods, and data storage and access methods), management science (development of models for decision making and managerial practice), and operations research (mathematical techniques for optimizing organizational parameters such as transportation, inventory control and transaction costs).

List and describe each discipline that contributes to a behavioral approach to information systems.

A behavioral approach to information systems focuses on questions such as strategic business integration, behavioral problems of systems utilization, system design and implementation, social and organizational impacts of information systems, political impacts of information systems, and individual responses to information systems. Solutions to problems created by information technology are primarily changes in attitudes, management, organizational policy, and behavior.

Describe the sociotechnical perspective on information systems.

A sociotechnical perspective combines the technical approach and behavior approach to achieve optimal organizational performance. Technology must be changed and designed to fit organizational and individual needs and not the other way around. Organizations and individuals much also change through training, learning, and allowing technology to operate and prosper.

Discussion Questions

1. Information systems are too important to be left to computer specialists. Do you agree? Why or why not?

Although student answers will vary, this is a good place to reiterate that information systems are more than just technology. Information systems development and usage involves organization, management, and technology dimensions. It is important to

understand who will use the information systems and how the information systems will be used to facilitate decision making and control within the organization. Computer specialists understand the technology and definitely play an important role within the development and maintenance of information systems. Computer specialists have an in-depth technology background, but may not be well versed in the business or its operations. This is why computer specialists should function as part of a team, and this team should have the hybrid strength of many different skills and personalities. The team should definitely understand the business, the business requirements, and the goals for the information systems.

2. **If you were setting up Web sites for NBA teams, what management, organization, and technology issues might you encounter?**

Answers will vary, however a good starting point is to use Table 1.2 to flush out some suggestions.

Organization: Typical organizational problems include:

- Outdated/poor business processes (usually inherited from the past)
- Unsupportive culture and attitudes
- Political in-fighting
- Turbulent business environment/changes in the organization's surrounding environment
- Complexity of task
- Inadequate resources

Technology: Typical technology problems include:

- Insufficient or aging hardware
- Outdated software
- Inadequate database capacity
- Insufficient telecommunications capacity
- Incompatibility of old systems with new technology
- Rapid technological change

Management: Typical management problems include:

- Lack of employee training
- Difficulties of evaluating performance
- Legal and regulatory compliance
- Work environment
- Lack of employee support and participation
- Creating, designing, and delivering new products and services
- Redirecting and redesigning organizations

Collaboration and Teamwork: Creating a Web Site for Team Collaboration

Students will be asked to add to this Web site throughout the remaining chapters.

Use this checklist to ensure all elements of the Web site have been created:

- Create a Google account
- Specify collaborators
- Specify professor as site viewer
- Assign name to site
- Select theme
- Add features
- Add repository
- Create calendar

Use this checklist to evaluate the elements of the Web site:

- Are the page contents fairly well-organized?
- Are page formats fairly well-designed?
- Have all team members been given collaboration rights?
- Has the professor been given permissions for viewing the site content
- Is the repository fairly well-organized or a hodge-podge of files?
- Has the calendar been created and is it fairly easy to use?

Learning Track Module

Students will find Learning Track modules on these topics at the Laudon Web site for this chapter.

How Much Does IT Matter? In May 2003, Nicholas Carr, an editor at *Harvard Business Review*, wrote an article titled "IT Doesn't Matter." This and subsequent articles with a similar theme created a vigorous debate about the potential and actual role of information technology and systems in creating business strategic advantage. If you would like to participate in this debate and learn more about it, you will find a Learning Track Module on this topic at the MyMISLab site for this chapter. You can also find more information about the current state of this debate on the Web. Just Google "IT doesn't matter" and read several rebuttals, one of the best being an article by Robert M. Metcalfe, inventor of Ethernet, a major networking technology, called "Why I.T. Matters," (*MIT Technology Review*, January 2004). It's free at Technologyreview.com on the Internet. IT really does matter!

Information Systems and Your Career

Hands-on MIS: Projects

This section gives students an opportunity to analyze real world information systems needs and requirements. It provides several exercises you can use to determine if students are grasping the material in the chapter.

Management Decision Problems

1. **Dollar General Corporation:** Wants to keep costs as low as possible so it does not use an automated method for keeping track of inventory at each store. What decisions have to be made before investing in an information system solution?

    - Determine business problems – mismanagement of inventory, too little or too much inventory, no ability to track inventory.
    - Lack of information system to manage inventory is actually increasing costs rather than decreasing them.
    - What is the exact problem the company wants to solve – reduce costs.

2. **Snyders of Hanover:** The financial department uses spreadsheets and manual processes for much of its data gathering and reporting. Assess the impact of this situation on business performance and management decision making.

    - Data entry errors from repetitive entry
    - No information available on-demand
    - Late reporting of critical decision-making information
    - Time consuming

IMPROVING DECISION MAKING: USING DATABASES TO ANALYZE SALES TRENDS

Software skills: Database querying and reporting
Business Skills: Sales trend analysis

The MyMISLab for Chapter 1 contains an MS-Access database of sales transactions on weekly store sales of computer equipment in various sales regions. The data for this exercise is in the file named Ch01_Database_Question.mdb, which is in the Chapter 1 folder.

This exercise helps students understand how a raw file of sales transactions can be analyzed using database software to produce valuable information for managers. The solutions provided here were created using the query wizard and report wizard capabilities of Microsoft Access. Students can, of course, create more sophisticated reports if they wish, but much valuable information can be obtained from simple query and reporting functions. The main challenge is to get students to ask the right questions about the information. Some questions which can be analyzed include:

1. **Which products should be restocked?**
2. **Which stores and sales regions would benefit from a promotional campaign and additional marketing?**
3. **When (what time of year) should products be offered at full price, and when should discounts be used?**

   The answers to the above questions can be found in the file named Ch01_Database_Solution.mdb which is in the Chapter 1 folder.

ACHIEVING OPERATIONAL EXCELLENCE: USING INTERNET SOFTWARE TO BUDGET FOR SHIPPING COSTS

Software skills: Internet-based software
Business Skills: Information-driven decision making and cost management

Compare three shippers, such as Federal Express (www.fedex.ca), UPS (www.ups.ca), and Canada Post (www.canadapost.ca). Consider not only costs but also such issues as delivery speed, pickup schedules, drop-off locations, tracking ability, and ease of use of the Web site. Which service did you select? Explain why in a slide presentation.

Although student answers will vary, a Microsoft Excel spreadsheet was created as a guide for the services and prices of each of the three shippers. Please see the file named Ch01_Shipping_Solution.xls in the Chapter 1 folder.

After examining the solution, you may direct students to discuss whether being the low cost shipper is always the best, or should the value-added services, such as an easy Web site, be factored into the equation. There will be times in business when the lowest cost is the only decision factor while at other times, customer service, etc. will be more critical.

CASE STUDY: HOW THE ROYAL CANADIAN GOLF ASSOCIATION CUT COSTS AND IMPROVED CUSTOMER SERVICE

1. **Why did RCGA invest in information technology?**

   The system that the RCGA used was housed on a single, unnetworked computer. If any change in a schedule was needed, it could only be made at that single computer. In addition, players had to apply for a tournament using a paper form that was mailed or faxed to the computer site, where it was entered by hand.

   They wanted to improve the efficiency for registrations and schedule-creation, as well as allow players to register, using a Web site. This would provide anyplace, anytime access to the information for the RCGA, as well as allowing players to register online.

In summary, they invested in technology to improve operational efficinces for the organization, and better customer service for the players.

2. **What were the disadvantages of the old system?**

   Problems included:
   - Inability to access or change tournament information offsite from the computer system
   - No customer (player) self-service
   - Data entry centralized at one site, resulting in
     - slow data updates,
     - lack of current information for organizers, and
     - increased costs (volunteers) of inputting data

3. **What do you think might have been the obstacles to overcome in developing the new tournament application?**

   - Costs
   - Time
   - Determining the requirements of the new system
   - Transferring data to new system
   - Training volunteers
   - Advertising the site to users
   - Finding a Web site developer and ensuring the Web site meets the needs of both the RCGA and the players
   - Registering domain names
   - Maintaining security and privacy of player data

4. **How do you think the new Web sites help the RCGA to fulfill its mission and strategy?**

   The system cut costs of mailing and printing. It reduced the need for volunteers to enter player data, making the volunteers' job more enjoyable. It also allowed customers (players) to control their data and find information online. Therefore, it met the needs of the RCGA to be cost efficient.

   It meets the strategic needs of the RCGA by having multiple Web sites that helps them develop relationships with golfers across Canada. It helps the RCGA to develop junior golfers and to create awareness of the RCGA with these young golfers. It also creates relationships with clubs. This can improve awareness of the RCGA, which translates into more volunteers, better tournaments, more entries, improved communications between members, and better service to its members.