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# Chapter 12

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## Management Information Systems

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**H**ow have management information systems (MIS) and information technology (IT) had such a profound impact on business in the past 10 years? Maybe the better question to ask is has information technology changed business or has business actually created information technology in the past 10 years? Surprisingly, if we take a look at business in the 1990s, it's actually less about technology and more about competition: A continued focus on increased productivity and efficiency has intensified competition and driven business toward technology. However, as Diana Farrell relates in the *Harvard Business Review*, "With the technology sector in shreds, more than a few believe that IT changed scarcely anything [in business] at all."

Today's business owner or professional can tell that technology does in fact play a key role in the day-to-day operations. In fact, some businesses no longer even have a tangible presence but rather exist only in cyber-land. The transformation from bricks-and-mortar businesses into e-businesses has leveled off but the role of technology and management information systems in business is undeniable. In this chapter we focus on giving an overview of the essentials for today's cyber-environment and technology-driven organizations and give a particular focus to MIS.

## **MANAGEMENT INFORMATION SYSTEMS**

Management information systems can be described as tools that help managers organize and make decisions from their data. More simply, effective MIS aids communication. Unsurprisingly, it's still true that people generally accomplish more together than they do apart, and the old concept of collaboration and communication is still at the core of business. Management information systems strive to efficiently collect, format, and communicate information to a wide variety of people. A number of software packages and applications designed to help you collaborate more and communicate better will be described later on in the chapter. First, it is important to have a solid understanding of computing hardware, since these are the tools of processing and communication used in management information systems.

### ***Key Components of Computing Hardware Tools***

Computer hardware is a term to identify the tools that we typically see when looking at someone's desk: the computer itself, the monitor, the input devices such as the keyboard, disk drive, CD-ROM and DVD-ROM, the mouse, and so on. There are also the components inside the computer that store and process the data that is entered into the systems.

There are all kinds of computers that range from mainframe computers to handhelds. Mainframe computers are large computers that are mainly used by companies to manage bulk data processing—they are very powerful and very expensive. Handhelds, or personal digital assistants (PDAs), are small, increasingly inexpensive, portable devices that allow the regular consumer to connect to calendars, e-mail accounts, phone books, telephones, games, cameras, and much more.

### ***Software***

The real power and use of what the computer can do, however, is largely a function of the software that is installed into these various systems. The most fundamental of the software functions is the operating system OS that runs the computer. Examples of the OS include Windows XP, Windows 2000, Linux, Mac OS, and Unix.

These provide different processes through which we operate and work on our computer systems.

The software directs the computer to perform very specific tasks such as creating a financial spreadsheet/statement/model, preparing a slide presentation, or writing a document on a word processing program. Specific applications software include programs such as Microsoft's Word (word processing), PowerPoint (presentations), and Excel (financial spreadsheets).

Managing the hardware and software that are used in any business is a difficult task because it requires understanding the functions of each and understanding their purposes.

## **ROLE OF THE CHIEF INFORMATION OFFICER**

For the small business owner or professional, you are probably reading this chapter to learn about the role and purpose of management information systems and, in effect, to become the "CIO" for your business. The chief information officer, or CIO, is the person in the company responsible for managing all the information collected from the various hardware and software applications and making sure that the information and communication flow is sufficient to meet the needs of the company objectives.

The CIO Insight Research Company has identified the different roles of the chief information officer. CIOs are responsible for evaluating the fit between the company's strategy and the technology used to implement its strategy. They are responsible for interviewing and hiring, vetting IT risks and opportunities, monitoring large investments, auditing IT infrastructure for reliability and risk, and counseling IT staff on selected strategic issues. This is no small job.

In an article in the *Harvard Business Review*, Diana Farrell suggests the CIO should be able to answer each of the following 10 questions:

1. Is the company leveraging IT in our most important business initiatives?

2. Is our management and shareholder information of the highest accuracy and integrity?
3. Are we leveraging technology to ensure business continuity?
4. Are we getting the best return on our technology expenditures?
5. Are our businesspeople capable of using and managing information and technology effectively?
6. Are we leveraging IT for business innovation and learning?
7. Are we capitalizing on the business potential of the Internet?
8. Are we optimizing the supply and delivery of IT services?
9. Do we have the right IT partners?
10. What do we expect from the CIO and IT organization?

It is likely that at least one of these questions has crossed your mind during the course of running your business or practicing your profession. The information in this chapter will help you to better answer the questions and become a more effective CIO for your business.

## **FUNCTIONS OF MIS: TOOLS TO SHARE DATA IN A UNIFORM CONTEXT**

Microsoft Word is one of the most basic software tools and is commonly used. It is a word processing application that allows users to input, store, retrieve, edit, print, and share various types of documents. These documents can also be easily attached to e-mail messages and sent to various locations where collaborators can work on the same document. Microsoft Word also has an editorial tool that allows users working collaboratively to track and illustrate changes to a document without altering the integrity of the document.

For example, this chapter has been written using Microsoft Word. An author first writes the content; other contributors and editors change, format, and edit the content, and then the content from this specific chapter can be integrated into the larger work. In this sense, Word is an effective tool in a management information system because

it is facilitating the way a business operates. Think of the time and effort saved because with this word processing technology a document can be shared, stored, transmitted, worked on, and printed.

As even the most basic word processing capabilities grow, it is increasingly possible to keep fewer paper files—a movement toward the “paperless office.” Although we’ve seen a large trend in this direction, many business owners and professionals are still uncomfortable getting rid of paper copies altogether.

One of the software applications commonly used for desktop publishing is Adobe. You may be familiar with Adobe Acrobat, which is one of the applications of this software that allows people to upload documents on the Web and have others download the same document; but unlike a Word document, the formatting and content cannot be changed, altered, or extracted. Adobe allows the user to input the content and design and format it in a more intricate manner than a word processing application allows, for example, into printed material. Often a desktop publishing application will be used for functions such as producing brochures, newsletters, calendars, and reports.

Other very useful applications for the small business are spreadsheet programs such as Microsoft Excel. This software is a very dynamic and powerful tool that can create reports and worksheets that the user can manipulate by using simple formulas such as addition and division, use complex models that link sheets to each other, and have them interface with real-time data, depending on the needs of the business. The program can also compute statistics, run financial models, create a variety of charts, and monitor performance. Although many people are intimidated by numbers, spreadsheets can simplify and sort data in a user-friendly manner. Spreadsheet programs can also create graphics or charts generated from data that you input. The graphics can then be inserted into word-processing documents or presentations.

The impact of electronic mail, or e-mail, has revolutionized personal and professional communication. E-mail provides a rapid communication tool that can share information, provide updates, and transport data almost instantly in most cases. E-mail has been adopted to communicate both inside and outside an organization; it can carry such important documents as contracts and agreements through the use of file attachments or simply provide basic messages such as re-

confirming a meeting. Not surprisingly, software has been created to help users manage the information that comes through their e-mail accounts. One such tool is Microsoft Outlook, which allows users to receive, send, and manage not only their e-mail accounts, but also their calendars, contacts, tasks, and notes. Software applications such as Outlook have proven to reduce paperwork and decrease time wasted in playing telephone tag, with a corresponding impact on increasing productivity.

One of the easiest ways that a small company can make a big impact is by looking professional in all its communication with stakeholders. An opportunity to set your company apart from the competition is by having outstanding presentations that aren't merely based on agendas and notes but, technology permitting, have a polished look projected onto a screen to accompany your ideas. As discussed in Chapter 10, presentation software such as PowerPoint allows you to create entire presentations, replete with graphics, audio and video clips, impressive effects, and even prerehearsed timing tools. It ultimately allows you to combine text with multimedia and design that are consistent with the professional image that you would like to project.

If PowerPoint can't handle all of the multimedia computing that you would like to use, there are technologies that can integrate media—voice, video, graphics, and animation—and convert them into computer-based applications that can be shared and duplicated with others. One of the expanding uses for multimedia computing is employee presentations, client presentations, use in conferences, and use in the classrooms of some of the more advanced educational institutions. Presentation software has the power to focus an audience, project an image, and aid communication with unparalleled success when used effectively.

Another important software application combines information sharing through a common database with communication via e-mail so that employees or associates can collaborate on projects. This groupware application allows employees to work together on a single document simultaneously while seeing what their collaborators are changing in real time.

As is the case with all of these applications, groupware allows a

company to increase the scale and efficiencies of its business. Software allows users to use, copy, edit, share, and track data at record speed and then allows the diffusion and reach of their work to increase exponentially. Metcalf's Law states that, in fact, the use of applications such as those just described increases exponentially by the number of users that adopt it. For example, e-mail would be fairly useless if just one person had an e-mail account. E-mail has increased value the more people adopt it and use it to communicate and share information. It is important to think about how your business's stakeholders are communicating; which applications are they using to understand the information you need to share? In evaluating technologies and applications, you should always choose those that the majority of your stakeholders use, if they offer the desired functions, to ensure comprehension and effectiveness of company outputs.

## **INFORMATION SYSTEMS FOR DECISION MAKING**

MIS is used for communicating, but the ultimate goal is to use these tools to help make better decisions. In this way, the software used for managerial decision making should be based on characteristics of the individual, the task being performed, and how information is presented.

Jane Carey and Charles Kacmar demonstrate the variety of factors that go into deciding which technology is best suited for a particular decision-making situation. These tools and processes have a variety of functions and purposes, ranging from managing customers through customer relationship management software, to knowledge management functions (sharing and disseminating the "institutional memory" of the organization), to shipping and tracking the company's products or services.

Decision support systems (DSS), for example, are information systems that quickly provide relevant data to help people make decisions to choose a particular course of action. For example, a DSS tool may be able to simulate a situation and predict various outcomes based on known variables. What will the revenue of an airline be given the possible number of flights completed (taking into consideration

weather delays and other unforeseen obstacles), how many passengers will be on each flight, what number of seats they are sold, at which price, and so on. A DSS can take into account all of these variables and come up with various revenue projections based on the possible outcomes. These tools might be complicated to figure out at first, but prove to be invaluable in the long run for the amount of time and monetary resources saved.

Executive information systems (EIS) allow managers to access the company's primary databases utilized specifically by top managers. These systems can be highly customized and typically cater to a specific industry. For example, one such system describes itself as:

The first comprehensive decision-support system designed for property/casualty companies. You can project financial results, discover and mitigate unacceptable risks, optimize reinsurance structures, test alternative investment strategies, allocate capital and reveal the sources of value within your company. Don't spend your time building models, spend it refining strategies. Financial decision-making requires reliable and thorough projections of the macro-economy and financial markets. [Our tool] is the most comprehensive economic scenario generator, incorporating individual security classes, inflation indices and macro state variables. It models historical relationships across markets, for realistic simulations that allow for stress-testing that simpler models can't achieve.

—DFA Capital Management, Inc. ([www.dfa.com](http://www.dfa.com))

## **CHALLENGE OF PROTECTING AGAINST COMPUTER CRIME**

As explored earlier in the chapter, e-mail is an extremely valuable tool that has found a secure place in today's business environment, but it should also be noted that e-mail does have significant limitations with regard to privacy, piracy, and filtering. Not only is there a risk to your company through electronic mail, but computer crime, cyberterrorism, and viruses all pose a threat to your business operating systems.

Intellectual property is the most valuable part of any business and as an intangible asset it is also extremely difficult to protect. Just as computers and software programs offer efficient ways of communicating, they also provide gateways to unintended/illegal information sharing that is difficult to monitor.

The Computer Security Institute conducted a survey in 2003 that had disturbing results. The survey showed that 15 percent of businesses didn't know whether their systems were attacked the previous year. And of those who reported that they had had attacks on their systems, more than half of them never reported it to anyone. Just as crime on the street has law enforcement officers monitoring and trying to control it, so does computer crime.

Although the data may seem hard to believe, consider that employees or outsiders can change or invent data in computing programs to produce inaccurate or misleading information or illegal transactions or can insert and spread viruses. There are also people who access computer systems for their own illicit benefit or knowledge or just to see if they can get in, which is referred to as hacking. Almost as if it were a very challenging game, computer hacking has been responsible over the past several years for some of the most serious crimes in business. One hacking technique referred to as the Trojan horse allows hackers to take over a computer without the user knowing and capture the password of an investor's online account, for example. These are the security issues that clients and companies have to face as online investing, banking, and account management become more the norm.

Identity theft, international money laundering, theft of business trade secrets, auction fraud, web site spoofing, and cyber-extortion are all schemes that were carried out in 2002 and involved at least 125,000 victims and more than \$100 million. And these crimes didn't make the Computer Security Institute's Computer Crime and Security Survey.

Computer viruses are programs that secretly attach themselves to other computer programs or files and change, export, or destroy data. Because viruses are frequently spread through e-mail, it is important to know who the sender is before opening the message or an attachment. It is best to use antivirus software to see if the document has a virus or whether the message should simply be deleted.

Not only is the Federal Trade Commission (FTC) concerned about viruses, but Microsoft, together with the FBI, Secret Service, and Interpol, announced the introduction of an antivirus reward program in November 2003. Microsoft is involved with funding the program to help law enforcement agencies identify and bring to justice those who illegally release damaging worms, viruses, and other types of malicious code on the Internet.

Other computer crimes consist of actual theft of computing equipment (laptops and PDAs are particularly vulnerable due to their small size), using computer technology to counterfeit currency or other official documents (passports, visas, ID cards, etc.), and using computer technology to illegally download or “pirate” music and movies that are copyrighted. With so much potential for computer crime, what can small business owners do to protect themselves?

The U.S. Department of Homeland Security suggests taking the following steps if you are worried that your systems have been attacked:

- ✓ Respond quickly.
- ✓ Don't stop system processes or tamper with files if you are unsure of what actions to take.
- ✓ Follow organizational policies/procedures.
- ✓ Use the telephone to communicate.
- ✓ Contact the incident response team of your credit union.
- ✓ Consider activating caller identification on all incoming lines.
- ✓ Establish contact points with general counsel, emergency response staff, and law enforcement.
- ✓ Make copies of files intruders may have copied or left.
- ✓ Identify a primary point of contact to handle potential evidence.
- ✓ Don't contact the suspected perpetrator.

In addition, it is important to prevent access to your system and viewing of your data by unauthorized users. Passwords, firewalls, and encryption software are useful in this regard.

Finally, it critical to back up your data and computing systems

in case your system is attacked and you need to retrieve data that has been altered or destroyed in the process. There are many systems and ways for backing up data and it doesn't matter which you choose, but rather that you consistently and accurately back up your data for your records.

## **INTERNET, INTRANET, AND EXTRANET**

As businesses and professional practices implement the use of technology and management information systems, it becomes important to link these tools together and provide a means for the machines, the information they produce, and those who use and benefit from the system to communicate with each other. Thus, computers in an organization and computers in different organizations form networks to facilitate the exchange.

You may have heard someone refer to an "extranet" before and thought the individual actually meant "Internet" because we all know that that's what most people use to find and share information; but there are three major types of networks that allow people to access and share information.

The Internet is what a company uses to connect to the World Wide Web and communicate with clients and the broader outside world. This communication happens through e-mail, web sites, and researching, or accessing, public information.

The company intranet, on the other hand, doesn't connect the company to the outside world, but rather to an internal network. This wide area network (WAN) connects all of the company's computers to allow them to access the same hard drive and therefore be able to share files and information from a central, internal location.

An extranet occurs when the business or practice is networked to a variety of stakeholders such as suppliers, dealers, manufacturers, or distributors. This is a network that is shared among a select set of businesses that work together closely and need to share information quickly to efficiently plan and execute their business.

These larger networks define where information is shared and who can access it; the importance of other computer networks is that they define how the information is shared.

## **COMPUTER NETWORKS AND THEIR IMPORTANCE**

Computing systems consist of hardware and software and also networks. A local area network (LAN) has the capacity to connect computers to the network from one physical site in the company's offices and within different buildings. At the designated site, people can share both the hardware and software of the system set up in that location.

LANs are changing, though, as they move toward a wireless application (WLAN) that provides the benefits of networking equipment without the use of cables and being hardwired. Before you decide which is best for your business, you should consider the number of wireless access points, the type of information/data that will be transmitted, the speed with which you will need the data transmitted, the bandwidth that applications require, mobility coverage for roaming, and whether the system you purchase will be easily upgradable as the technology advances.

You should also consider that the WLAN's speed as it appears when you buy it might not necessarily be the product's real-world speed, because the WLAN is a shared medium and divides available throughput rather than providing dedicated speeds to the connected devices such as a dial-up connection. This limitation makes it a little more challenging to figure out how much speed you will need in the end. Therefore, it is critical to try to purchase a model that is upgradable.

Because wireless networks utilize technology that is a form of broadcasting data through the air, instead of a tailored system of wires, they present a concern over the security of such systems. When choosing a wireless system, internal security measures must be included to make sure the wireless data cannot be "hijacked" or hacked into by a cyberthief or pirate.

Throughput is a major consideration for your wireless deployment. Consider what types of traffic—e-mail, Web traffic, speed-hungry enterprise resource planning (ERP) or computer-aided design (CAD) applications—will ride across your WLAN most often. Network speeds diminish significantly as users wander farther from their access points, so install enough access points to support not only all your users but the speeds at which they need to connect.

One certainty, however, is that with the advent of wireless, the requirement of sitting in one place connected to a wall to access the Internet is becoming obsolete. A virtual office might be everyone's reality in the not too distant future.

Another type of network that is used is the broadband wide area networks. These are more powerful networks that have the ability to connect computers in different places by microwave, satellite, or telephone and can link together a large geographical area. These types of networks are growing, especially in the restaurant business. Restaurants are deploying these networks to have a virtual private network for managing supply chain integration with Web-based food-ordering and back-office functions. Some restaurants even use them for "front-of-the-house" applications such as credit card authorization. Restaurants that are using this high level of technology include Au Bon Pain, Chevy's, McDonald's, and Arby's. These restaurants have also shown a preference for satellite technology for transmitting their data, and this seems to have been a growing trend in 2003 according to Spacenet, a WAN service provider. It is not surprising as satellites' speed and reliability continue to improve.

But the limits of WANs have yet to be reached. Optimization offerings are hitting the market promising to accelerate applications with high-end units. They are more scalable and more compressible, boosting the performance of even the e-commerce sites that carry the heaviest traffic volumes. This higher-powered technology comes at a price, though. These systems represent significant costs depending on the scale of compression, acceleration, and speed you need for your business.

## **CATEGORIES OF MANAGEMENT INFORMATION SYSTEMS**

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There are three primary MIS categories: transaction processing systems, management support systems, and office automation systems.

These basic terms are descriptive. Transaction processing systems handle daily business operations; they collect and organize operational data from the activities of the company. Management support systems are used to help analyze the data that is collected and organized; they

help the manager make decisions by forecasting, generating reports, and performing other types of analysis. Office automation systems facilitate communication between people who use the same operating systems through word processing, e-mail, fax machines, and other types of technologies.

## **HOW COMPANIES MANAGE INFORMATION TECHNOLOGY TO THEIR ADVANTAGE**

Before any purchases are made it is imperative to look at what applications or combination of applications will be best suited to your company or small business. The technology packages should be planned out to ensure that the right technology is being used.

The first step in that process is evaluating what your goals and objectives are for the purpose of the technology. It's a good idea to have a collaboration of the needs of the executives, the IT managers, and other managerial staff who will have specific needs or ideas about the technologies being used; this can help shift the traditional bottom-line-driven point of view to a top-down, strategic perspective and increase the staff's perceived value in the technology.

It is then useful to map the information flow to analyze how information is transferred from one point to another within an organization. While this concept itself is simple, it is important to understand that mapping the information flow can also support a ranking system to identify the most valuable potential client for information resource center (IRC) services, create a picture of the competitive landscape, and help define the necessary actions for short- and long-term budgeting.

There are three primary benefits to mapping information flows. The first enables an understanding of how information is used and by whom. You should ask yourself the basic question of what information you already have within your organization and then figure out where it is located and how you can access it. The second pinpoints the ultimate client or key stakeholder for various types of information services, as well as where information touches as it passes through the organization. The third primary benefit helps to focus information services on the highest potential opportunities. In other words, it helps

you clearly identify which information has the highest value and how you can do a better job at capturing it. This realization can make the value of the information center even more obvious.

There are numerous consultants who specialize in helping small businesses map their information flows; here are the generally accepted five steps to the information mapping system that a consultant will use.

1. Describe the current situation. What is the company organization chart? Who are the clients? Who aren't the clients but still use the system? Once the general idea is generated, it is of critical importance to drill down even deeper and ask yourself how well you really know what the client's needs are. Which departments do they interact with? What is the sphere of influence over the account?
2. Describe the potential clients in other business units within the company and discuss their specific information needs. This helps to give a better understanding of which information needs are, and are not, being met currently.
3. Mapping the potential clients is the next step. This allows a visualization of the potential areas for overlap, potential for consolidation of resources, and new solutions for optimal information flow.
4. As effective decision making becomes more difficult with complex, competitive, and dynamic working environments, it is critical to rank the solutions for prioritization. This process helps you decide which solution will meet the majority of the company needs while using the budgeted resources. The ranking process can be conducted by assessing the risk activity within the organization. Even by just assigning each activity with low-, medium-, or high-risk levels, you can create a priority scheme for the organization, which allows the best solution to be found for the least amount of time and effort.
5. The final step in the process is then creating the information map. Mapping the final solutions to show each department and the suggestions for their information needs creates an un-

derstanding of each subset of the organization, highlights the ultimate client, and results in information solution recommendations for each.

At the core behind mapping information flows is knowledge management. Many companies have found that as the organization grows, information that is critical to the company's success ends up getting lost, or no one is quite sure who should know it or where to access it. As a result, mapping information flows is getting increased attention, but so too is basic knowledge management.

A case study to show how critical knowledge management is for success is found in the Brixco story. Ashley Braganza of the Cranfield School of Management noted that Brixco, a 4,000-employee utility company, found it needed to make radical changes to its working practices, but was hindered by outdated IT systems and poorly managed knowledge, especially customer knowledge across its four main functional communities—customer operations, finance, sales, and marketing. Brixco decided to turn its IT solution project around by creating, in effect, a “community of communities of practice” that spanned its four main functional communities. Rather than putting employee requirements at the center of the system, Brixco asked the board to prioritize the key objectives linked to the business strategy for the company. When this was accomplished, a small group of people formed a team to identify stakeholders in the process and then backed into what knowledge the employees needed to deliver to these stakeholders. This meant that the company was consistent in the messages being sent out to clients and that the necessary information was more easily managed. The findings from this company suggest that people/employees are able to articulate the linkages between knowledge and their day jobs, and through the links to stakeholders' expectations they can tie their knowledge back to the organization's business strategy.

Knowledge management is about sharing organizational collective knowledge, improving productivity, and fostering innovation within the organization. It ends up making information more easily accessible to all who need it and increases the efficiency and productivity of the company.

## **LEADING TRENDS IN INFORMATION TECHNOLOGY**

Experts are forecasting a trend toward increased spending on technology after a cyclical drop soon after Y2K concerns passed. With antiquated legacy systems getting more and more expensive to fix, old computers breaking down, and the benefits of mobile computing continually being realized, new technology is expected to enter the business world with renewed speed. As is often the case with the gradual diffusion of technological innovation into the marketplace, telecom and storage services are simultaneously decreasing in cost.

According to Michael J. Miller, editor-in-chief of *PC* magazine, the biggest growth opportunity for management information systems technology is in Web services. He predicts that emerging Web service standards will promote integration and let companies tie together existing applications within an organization, connect to outside applications, and create applications that are entirely new. Due to the increasing number of applications in the corporate world, Miller also does not see that just one player (such as Microsoft or Sun Microsystems) will dominate the market.

Mimicking the security issues discussed earlier, Miller sees that security is the biggest obstacle for continued growth in the sector and that both consumers and businesses will need to address issues of security better.

Another trend in MIS is what is referred to as business process management (BPM). As has been illustrated in this chapter, there are myriad applications and packages that can be used for the IT enthusiast. A new trend that is emerging in the area, however, is business process management. BPM is recognized as one of the fastest growing technologies in the software world with a market value of over \$400 million in 2003 (according to an analyst in the Delphi Group). The innovation of the technology finds its roots in automating the processes that involve people. It includes capabilities derived from process modeling, process monitoring, application integration, and rapid application development tools.

Additionally, there is a trend toward integrating different technologies. As mentioned earlier, PDAs can now include telephones

and cameras, but there has also been the creation of “palmtops” and Web phones. These innovations in technology are going outside the communication realm and now migrating toward regular household appliances such as washers, refrigerators, and even microwaves.

One of the greatest trends in the world of information systems, however, is a shortage of the people who can help integrate, install, and run these information systems. Companies are finding it increasingly difficult to stay current with the latest technologies and are facing a shortage of IT personnel. This can be seen as an excellent opportunity for the technologically inclined, but can be a competitive hindrance to a company that simply can't access the resources needed to keep up in its industry, and to its clients as well. In the future, the trend toward IT outsourcing will continue and most likely make the reliance on consultants even greater.

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