Management Information Systems (MIS): Common Body of Knowledge Review

Information Systems

One thing you have to do in any area is to learn the definitions of terms. One of the most important terms in information systems is “information”. Data, information, and knowledge are not the same things. Information is a set of facts organized in such a way that it provides additional value beyond that of the facts themselves. It is derived from data or raw facts. There are many different types of data such as alphanumeric, image, audio, and video. Converting data into information is done by using a logical process that has an established goal. Knowledge is required to set up the required relationships among the data that result in the useful information. Information systems are used to convert data into information. The cost of this transformation is offset by the value of the information that results. In order for information to have value it has to be accessible, accurate, complete, economical, flexible, relevant, reliable, secure, simple, timely, and verifiable. From the organization’s viewpoint, the creation of information must relate to achieving the organization’s goals.

All business organizations contain a number of value-added processes. The value chain is a series of activities that reveals how organizations can add value to their products and services. Managing these is called supply chain management. Value may mean lower price, better service, higher quality, or product uniqueness. Value is derived from the skill, knowledge, time, and energy invested in the product or service by the company. Adding value to their products and services can give companies a competitive edge over their competition.

Organizational structure refers to organizational subunits and the way they relate to the overall organization. The following structures can be used: traditional (hierarchical structure), project (centered on major products or services), team (centered on work teams or groups), and virtual (employs individuals or groups in geographically dispersed areas connected through an electronic network).

Organizational change deals with how nonprofit and for-profit organizations plan for, implement, and handle change. Change theories identify the steps of change and how to implement them. Reengineering involves radical changes in how the business operates. This type of change can be used to create significant changes in business results. Continuous improvement is designed to continually change to improve the business to add value to products and services. This should enhance customer relationships and promote long-term profitability. Technology diffusion measures how much technology is used throughout the organization, while technology infusion is how much it is used in a particular area or department.

Quality is how well a product or service meets or exceeds customer expectations. High quality products will satisfy customers better. They will work properly and reliably, meet requirements and expectations, and will be delivered promptly using proper customer relations. Total quality management and six sigma are methods used to help ensure quality.

Cost reduction can be achieved through various methods including outsourcing, delivery on-demand, and downsizing. Outsourcing is obtaining functions from outside the company, delivery on-demand means having the resources available at the time and place when required and not before or after, and downsizing is reducing the workforce.

Competitive advantage is an edge in some area that the company has over its competition. The company’s survival and profitability may depend on how well the company achieves this. The following situations are some where competitive advantage can be utilized: rivalry among existing competitors, threat of new market entrants, threat of substitute products and services, bargaining power of buyers, and bargaining power of suppliers.

To be competitive, a company must be capable of rapid, responsive, and innovative change. It must orient its information system plans with the company’s business strategies and objectives. Some
strategies the company can use to achieve competitive advantage include: lower cost, product
differentiation, creating the best product in one area, changing how the industry is organized, new
products and services, improved products and services, and others.

Various methods are used to determine the value of investing in information systems. Productivity
measures output compared to input. It can be based on various factors such as labor, raw materials,
quality, and production time. Return on investment (ROI) is a measure of the additional profits or benefits
that are generated as a percentage of the investment in IS technology. Other means to determine the
value of information systems include growth of earnings, market share growth, customer knowledge and
satisfaction enhancement, and the total cost of ownership (TCO). In deciding to invest in information
systems, managers should consider the costs of designing, developing, and implementing these systems.
Information systems can sometimes be costly failures.

Hardware Components
Processing in a computer system is accomplished by moving data between the central processing units
and primary storage and processing it. Each central processing unit (CPU) has three parts: the
arithmetic/logic unit, the control unit, and the registers. The arithmetic/logic unit (ALU) performs all math
and logical comparisons. The control unit fetches instructions, decodes them, and schedules data in and
out of the ALU, the registers, primary storage, secondary storage, and various output devices. Registers
are high-speed storage areas in the CPU that hold program instructions and data immediately before,
during, and after execution of instructions. Primary storage (memory) holds program instructions and data
while a program is being run.

Executing instructions is a two-step process: fetch and execute. During the fetch part, the computer
fetches the instruction (sends a message to the memory to send the instruction back to the CPU) and
then decodes the instruction. During the execution part, the computer does the instruction and stores the
results. All the parts of the CPU are in one unit and the other parts are separate but linked.

Primary memory, also called random access memory (RAM), stores instructions or data. This type of
memory is volatile because RAM chips only store data if they are powered. If the power is lost or
interrupted, all the data is gone. ROM or read-only memory is generally nonvolatile. It provides a small
permanent storage area for data and instructions such as the instructions to start the computer when it is
powered on. A cache is usually composed of high-speed memory that the CPU can access faster than
main memory. Cache can improve the overall performance of the computer.

Multiprocessing can speed up computer performance by using coprocessors. The coprocessor runs
certain instructions such as input/output while the CPU works on another program. The coprocessor is
usually external to the CPU and runs at a slower speed. Another type of multiprocessing uses a multiple
core microprocessor, which has two or more independent CPUs in a single chip. These allow multiple
programs to be executed simultaneously and thereby increase overall processing capability. Parallel
computing involves simultaneously running the same program on multiple CPUs to get the results
closer. A variant of this is called massively parallel processing. Connecting hundreds and even thousands of
processors together.

Secondary storage is used to store large amounts of data, instructions, and information more
permanently than main memory. Secondary storage is nonvolatile, can store more data, and is cheaper.
Storage can be done either sequentially or directly. Sequential access means that data is accessed in the
order in which it is stored, while direct access means that data can be retrieved directly.

Secondary storage types include magnetic tapes, magnetic disks, and optical disks. A redundant array of
independent/inexpensive disks (RAID) where the data is stored on multiple disks, allows for data recovery
in case one disk fails. Optical storage types are compact disc read-only memory (CD-ROM), CD-
recordable (CD-R), CD-rewritable (CD-RW), digital video disc (DVD), memory cards, flash memory, and
holographic discs.
Businesses or enterprises require storage of large amounts of data. The methods commonly used for enterprise storage are attached storage, network-attached storage (NAS), and storage area networks (SANs). Attached storage involves having tape, hard disks, and optical secondary storage devices connected directly to a single computer. Simple and cost-effective for single users and small groups, it is not effective for large groups for sharing and backing up data. NAS has the storage devices connected to a network that all members of the group can access. SANs are special-purpose, high-speed networks that provide links between the storage media and enterprise computers.

Keyboards and the computer mouse are the most common devices used for data input to the computer. Voice-recognition systems use microphones and special software to record and convert your voice into digital signals that are converted into text by a special program. Terminals such as those at supermarkets and stores are another means of data entry and input. They accept general commands, text, and data, convert these into machine-readable format, and then send them to the main computer system.

Cathode-ray tubes (CRTs) are one method of output and work like a TV screen. Liquid crystal display (LCD) monitors are flat panels that use liquid crystals to form the images. LCDs have the advantage over CRTs of being flicker-free, lighter, smaller, and not emitting possibly harmful radiation. Other input/output systems include computer-based navigation systems (GPS), multi-function printers that can copy, print, fax, and scan, and eyebud screens (portable headsets that display video in front of one eye).

Computers can be organized into different categories. Handheld computers (PDAs) are small, portable, single-user computers. Portable computers include laptops, notebooks, subnotebooks, and tablet computers. Thin clients are cheap, limited capacity desktop computers that access a network for their programs and storage. Desktop computers are relatively small, inexpensive, versatile single-user computer systems. Workstations have more powerful processors than personal computers but are still small enough to fit on a desktop and are used for engineering and similar tasks. A computer server provides the programs and links necessary for a network or Internet applications. Mainframe computers are large, powerful computers and must reside in an environment-controlled computer room or data center with special equipment to control the temperature, humidity, and dust levels around the computer. Supercomputers are very powerful computer systems with extremely fast processing speeds that are used by government agencies to perform the high-speed processing needed in weather forecasting and military applications but are now being used more broadly for commercial purposes.

**Software**

Software is the computer programs that tell the computer hardware what to do. Systems software is the programs that coordinate everything that goes on in the computer and are categorized as operating systems, utility programs, and middleware. Tasks performed by systems software include performing common computer hardware functions, providing a user with interface and input/output management, providing a degree of hardware independence, managing system memory, managing processing tasks, providing networking capability, controlling access to system resources, and managing files. Popular PC operating systems include Windows, Mac OS, and Linux. Powerful server software such as Windows Server from Microsoft, UNIX, NetWare from Novell, Red Hat Linux, and Mac OS X Server from Apple Computer is also available. For mainframes, the system software includes z/OS from IBM, MPE/iX from Hewlett-Packard, and Red Hat Linux for IBM. Other system software is available for the more esoteric forms of computers such as PDAs, digital cameras, etc.

Application software is the programs that help users solve particular computing problems. Like systems software, there is application software developed for every type of computer. Word processing, spreadsheets, graphics, databases, etc. are all available for virtually every kind of computer.

Programming languages provide the means of creating both systems and applications software. The instructions used to provide the functions in software have to be written in a programming language and then converted into the machine language that the computer understands. From the beginning programming languages developed from machine language into assembly language then into high-level language, then query and database languages, and now the natural and intelligent languages. Most
programming today is done using either graphic user interface programming for systems such as Windows or object-oriented languages that manipulate objects that are data and the actions that can be performed on the data. Object-oriented languages are designed to make it easy to reuse code. Major software problems today include software bugs (finding and eliminating programming errors), copyright issues (who owns it), licensing (how much will you pay me to use it), open-source, shareware and public domain software (all generally available free, much to the chagrin of the pay-for-use companies), multi-organizational software development (which one owns what), software upgrades (free or pay), and global software support (how many languages do you have to support).

Database management systems process and organize huge amounts of data and are an essential part of business computer systems. Data is generally organized in a hierarchy that begins with a bit (a 0 or a 1, could also be yes/no or on/off) and progresses through characters (represented by bytes which are 8 bit groups), fields (a collection of characters such as a last name or an address), records (collections of fields), and files (multiple related records) to a database (multiple related files). An entity is another term for something for which records are collected such as employees, inventory, and customers. An attribute is a characteristic of an entity which in a database is called a field such as employee number, last name, first name, hire date, and department number of an employee. A key is a field or collection of fields that can be used to identify the record. A primary key is a field or collection of fields that uniquely identifies the record.

Two different designs are used in developing a database: a logical design and a physical design. The logical design of a database is how the data should be structured and arranged to satisfy the organization’s processing requirements. Physical design takes the logical design and creates an actual database that meets the needs of the organization. The relational model is the most popular database type. In a relational database the data elements are arranged in two-dimensional tables called relations, organizing the data in rows and columns. A database management system (DBMS) is the program used as the interface between a database and application programs or a database and the user.

A data warehouse holds business information from many sources in the company, covering all aspects of the company’s processes, products, and customers. It is designed specifically to support management decision making. A data mart brings the data warehouse concept to small and medium-sized businesses and to departments within larger companies by containing only a subset of the data for a single aspect of a company’s business. Data mining is an information analysis tool that involves the automated discovery of patterns and relationships in a data warehouse by making use of advanced statistical techniques and machine learning to discover facts in a large database, including databases on the Internet.

**Telecommunications Systems**

Telecommunications refers to the electronic transmission of signals for communications, including such means as telephone, radio, and television. The telecommunications model starts with a sending unit that transmits the signal to a telecommunications device that converts the signal into a different form or type. The telecommunications device then sends the signal through a medium (anything that carries an electronic signal and connects a sending device and a receiving device). The signal is received by a telecommunications device connected to the receiving unit. A transmission medium can be divided into multiple channels capable of carrying a message. These channels can be simplex (one direction only – TV, broadcast radio), half-duplex (both ways but only one at a time – CB, ham, or other radio), or full-duplex (both directions simultaneously – telephone). Bandwidth is the rate at which data is exchanged, usually measured in bits per second (bps).

There are two categories of transmission media, guided (sent over a solid medium such as wire) and wireless or unguided media (broadcast through the air). Guided media include twisted-pair wire, coaxial cable, fiber-optic cable, and broadband over power lines (BPL), which provides network connections over standard high-voltage power lines. The major wireless technologies include microwave, satellite, radio, and infrared. The wireless media types are microwave transmission, cellular transmission, and infrared transmission.
Telecommunications hardware devices include modems, multiplexers, and front-end processors. A modem converts the digital signal to an analog signal, and vice versa. A multiplexer encodes data from two or more data sources onto a single communications channel. Front-end processors are special-purpose computers that manage communications to and from a computer system. A digital subscriber line (DSL) is a telecommunications technology that delivers high-bandwidth information over existing phone lines.

A computer network consists of the media, devices, and software needed to connect two or more computer systems or devices. A personal area network (PAN) is a wireless network with a range of about 33 feet. A local area network (LAN) connects computer systems and devices within the same geographic area. A metropolitan area network (MAN) connects users and their computers in a geographical area larger than a LAN but smaller than a WAN. A wide area network (WAN) ties together large geographic regions. Mesh networking follows the same principles as the long distance telephone system and links systems through any available node to create a connection. They are robust in that if one node fails, all the other nodes can still communicate with each other.

In centralized processing, all computer operations occur in a single location. With decentralized processing, devices are placed at various remote locations. In distributed processing, computers are placed at remote locations but are connected to each other via telecommunications devices.

In the client/server architecture, servers are dedicated to different functions such as database management, printing, communications, and program execution. Each server is accessible by all the computers on the network. Computers using services from the servers on the network are called clients.

A communications protocol is a set of rules that control telecommunications connections. Some common telecommunications protocols are Frame Relay, ATM, IEEE 802.3 (Ethernet), and T-carrier system. The hardware devices that enable the high-speed switching of messages from one network to another are bridges, switches, routers, and gateways.

A network operating system (NOS) controls the computer systems and devices on a network and allows them to communicate with each other. It performs the same types of functions for the network as operating system software does for a computer.

The Internet

The Internet is the world's largest computer network. It consists of smaller, interconnected networks, all exchanging information and sharing resources. Its ancestor is the ARPANET, a project started by the U.S. Department of Defense (DOD) in 1969.

The Internet works by transmitting data from one computer to another using a set of conventions known as the Internet Protocol (IP). Another major protocol used in connection with IP is the Transport Control Protocol (TCP). Combined they form the TCP/IP protocol. Every computer on the Internet has an assigned address called its Uniform Resource Locator, or URL, that uniquely identifies it. Although the URL is actually a series of numbers separated by periods as 123.123.123.123, the use of the actual numbers has been replaced by using an address consisting of a unique name with an appropriate extension such as: http://www.saintleo.edu. The “http” part tells the browser to use the Hypertext Transport Protocol to access the file. The “www” part of the address means that the address is associated with the World Wide Web service. The www, a menu-based system, organizes Internet resources throughout the world into a series of hypertext-linked menu pages. The “saintleo.edu” part of the address is the domain name that identifies the Internet host site. A table of names and their related URL numbers is kept available so that systems can quickly find the actual URL to access. Users can access the Internet in several ways, including LAN server, Serial Line Internet Protocol (SLIP), or Point-to-Point Protocol (PPP), online services such as America Online and Microsoft Network, or other ways, such as using wireless devices and the Wireless Application Protocol (WAP). An Internet service provider (ISP) is a company that offers access to the Internet.
Hypertext Markup Language (HTML) is the standard page description language for Web pages and is used to create a unique, hypermedia-based menu on the user’s computer. Other emerging standards include Extensible Markup Language (XML), Extensible Hypertext Markup Language (XHTML), Cascading Style Sheets (CSS), Dynamic HTML (DHTML), and Wireless Markup Language (WML). New software offers the opportunity to program for the Internet. A programming language called Java allows small programs called applets to be embedded within HTML documents.

A Web browser (Microsoft Internet Explorer, Netscape, Mozilla, etc.) is the program that allows you to access the Internet and the World Wide Web. To find specific Web sites, Web tools called search engines have been developed. Popular search engines include Yahoo!, Google, Ask Jeeves, and AltaVista.

Java is an object-oriented programming language that creates small programs, called applets, that can be embedded within an HTML document. When activated, the applet is downloaded onto the client workstation and run. Besides Java, other programming languages and tools are available for Web programming. These include JavaScript, VBScript, ActiveX, and Hypertext Preprocessor, or PHP.

Business Uses of the Web include e-mail, instant messaging, push technology, Internet cell phones, handheld computers, career information, job searching, telnet, ftp, Web log (blog), video log (vlog), podcasting, usenet and newsgroups, chat rooms, Internet phone, videoconferencing services, content streaming, shopping on the Web, Web auctions, music, radio, video, TV on the Internet, and office on the Web.

An intranet is an internal corporate network built using Internet and World Wide Web standards and products. An extranet extends selected resources of an intranet out to a group of its customers, suppliers, or other business partners. Three major categories of network issues for business are “management issues,” “service and speed issues,” and “privacy, fraud, security, and unauthorized Internet sites.”

**Electronic Commerce**

E-commerce is a general concept that covers any business transaction executed electronically and includes the following types of commerce: Business-to-Business (B2B) E-Commerce, Business-to-Consumer (B2C) E-Commerce, Consumer-to-Consumer (C2C) E-Commerce, and eGovernment.

In order for a company to convert its business processes from traditional to e-commerce, they must define an effective e-commerce model and strategy including the following: community, content, and commerce. In addition, companies frequently need to change their distribution systems and work processes and their IT personnel must successfully integrate Web-based order processing systems with traditional inventory control and production planning systems.

A variant of e-commerce is called mobile commerce, or m-commerce, which relies on the use of wireless devices to place orders and conduct business.

Some advantages of Electronic and Mobile Commerce include allowing consumers and companies to access worldwide markets, cost reductions in doing business, making the flow of goods and information faster, making order processing and order fulfillment more accurate, and enhancing customer service.

Threats to the continued growth and success of e-commerce and m-commerce include security (confirming the identity of parties), theft of intellectual property (violation of patents, copyrights, or trademarks), fraud (phishing or click fraud are among the less obvious), invasion of consumer privacy (online profiling threatens the customer’s anonymity), lack of Internet access (lots of people don’t have access), return on investment (costs a lot of money to set up and operate a site and returns are hard to quantify), legal jurisdiction (whose laws apply for transactions), and taxation (to whom do you have to pay taxes, how much and when).

Establishment and operations in e-commerce requires both hardware and software. Hardware is a server with adequate storage capacity and computing power. Software is the programs that provide the following
services: security and identification, retrieving and sending Web pages, Web site tracking, Web site development, and Web page construction. In addition, the e-commerce software must be able to provide catalog management, product configuration, shopping cart, e-commerce transaction processing, and Web traffic data analysis.

Electronic payment systems are required for e-commerce. Essential in this is the need to have identification and encryption techniques that safeguard business transactions. Digital certificates and the Secure Sockets Layer (SSL) communications protocol are used for this purpose. Some of the methods used to make online payments include electronic cash, smart cards, credit cards, debit cards, and charge cards.

Enterprise Systems
Transaction processing systems (TPSs) process the data needed to maintain essential business records. TPSs consist of hardware, software, procedures, telecommunications, databases, and people organized to support the basic TPS processes of data collection, data editing, data correction, data manipulation, data storage, and document production. Transaction processing is done in two manners: batch processing (transactions accumulated over time and processed as a single unit) and online transaction processing (OLTP) (each transaction is processed immediately). It is important that the TPS be reliable, making disaster recovery planning and audits essential. TPSs include order processing systems, purchasing systems, and accounting systems.

Enterprise Resource Planning (ERP) software is a set of integrated programs that manage a company’s business operations for the entire enterprise. Advantages of ERP include improving data access for operational decision making, eliminating older, less responsive legacy systems, improving work processes, and upgrading technology infrastructure. Disadvantages of ERP include implementation expense and time, difficulty in implementation, integration difficulties with other systems, one vendor risk, and implementation failure risk.

Production and supply chain management is the process of developing and utilizing a production plan using the information in the ERP database. The process includes sales forecasting, creating and following the sales and operations plan, demand management, detailed scheduling, materials requirement planning, purchasing, and finally, production.

A customer relationship management (CRM) system is designed to allow the company to manage every aspect of customer relations, including marketing and advertising, sales, after sale customer service, and programs to retain loyal customers. This is based on collecting data on everything that occurs with every customer and storing it in the database so the company can analyze the date to understand and predict customer needs and use this information to improve the customer’s relations with the company.

Because they operate across country borders and around the world, multinational corporations must have enterprise systems that can deal with these challenges: different languages and cultures, disparities in information system infrastructure, varying laws and customs rules, and multiple currencies.

Information and Decision Support Systems
Management information and decision support systems can be used in all areas of business to cut costs, increase profits, and find new opportunities. The company strategic plan and goals set the direction for decision making, helping all parts of the company achieve their objectives and goals. Information systems provide the information to promote strategic planning and problem solving resulting in better decisions.

Once a problem has been identified, the problem-solving process begins. One model has the problem-solving process consisting of five stages: intelligence (identification and definition of potential problems or opportunities), design (development and feasibility determination of possible solutions), choice (selection
of actions), implementation (putting the solution into effect), and monitoring (evaluation of implementation’s achievement of goals).

Computerized decision support systems either optimize (achieve the best goal) or satisfice (achieve a satisfactory goal, not necessarily the optimum). Heuristics, sometimes called “rules of thumb” are frequently used in decision making. The Sense and Respond (SaR) method of decision-making involves determining problems or opportunities (sense), and creating methods to solve the problems or grasp the opportunities (respond). SaR requires organizations that are flexible and dynamic. The SaR approach can be utilized with management information and decision support systems.

A management information system (MIS) is an integrated collection of people, procedures, databases, and devices that provide managers and decision makers with information to help achieve organizational goals. The primary purpose of an MIS is to help an organization achieve its goals by providing managers with insight into the regular operations of the organization so that they can control, organize, and plan more effectively and efficiently. In short, an MIS provides managers with information, typically in reports (scheduled reports, demand reports, exception reports, and drill-down reports), that supports effective decision making and provides feedback on daily operations. MISs are used by managers at all levels of an organization. The MIS is just one of many sources of managerial information. Managers also utilize decision support systems, executive support systems, and expert systems in decision-making. As most organizations are structured along functional lines or areas, MISs can be divided in the same manner. MISs typically support the following areas: finance, manufacturing, marketing, and human resources. Each system is composed of inputs, processing subsystems, and outputs. Most MISs receive inputs from the corporate strategic plan, TPSs, other functional areas, and external sources, including the Internet.

**Artificial Intelligence**

AI is a broad field that includes several specialty areas, such as expert systems, robotics, vision systems, natural language processing, learning systems, and neural networks. Expert systems have been developed to diagnose problems, predict future events, and solve energy problems. Computerized expert systems use heuristics to provide guidance on problems. Robotics is the study and use of robots for business purposes. Vision systems is the development of systems that can duplicate and surpass the human eye with innovations such as infra-red vision, etc. Natural language processing is the attempt to have computers understand natural languages such as are spoken by humans. Learning systems is the study and creation of computers that learn from situations and mistakes like humans. Neural networks are the study of replicating the functions of the human brain in a computer.

**Systems Development**

Four common systems development life cycles exist: traditional, prototyping, rapid application development (RAD), and end-user development. The traditional systems development life cycle is as follows: systems investigation, systems analysis, systems design, systems implementation, and systems maintenance and review. Prototyping approaches the systems development process using change and repetition. Problem requirements and solutions are identified, analyzed, different solutions are developed, and a revised system is created during each repetition. Users then try the prototype and provide feedback to make further changes until a satisfactory system is created. The main advantage of this method is that a prototype can be created rapidly and errors and problems can be detected early. Disadvantages of the method include a lack of adequate documentation, a tendency to omit backup and recovery, performance, and security issues, and a tendency to have projects that go on and on due to a lack of a specific goal. Rapid application development (RAD) is another method used to speed deployment of problem-solving solutions through the use of specific tools, techniques, and methodologies designed to speed development. Advantages include combining the structure of the traditional SDLC with the speed of prototyping to create good documentation and stimulate teamwork among stakeholders. Disadvantages include a tendency to burn out developers quickly and require a larger percentage of the stakeholder’s and users’ time. Some other approaches to rapid development include agile development and extreme programming (XP) that establishes a methodology to allow systems to change as they are
being developed. The end-user SDLC has positive (sometimes development occurs more quickly because end-users believe they have better knowledge of their own needs and the negative aspects of some parts of proposed changes) and negative (systems frequently fail due to the users not having the necessary expertise and designed systems do not integrate with other applications) aspects.

**Security, Privacy, and Ethical Issues**

Many nontechnical issues are associated with using information systems and the Internet and these provide both opportunities and threats to today's organizations. These issues include such as preventing computer waste and mistakes, avoiding violations of privacy, complying with laws on collecting data about customers, and monitoring employees

**Computer Crime**

Some of the main areas of concern in the area of computer crime are (1) the computer as a tool to commit crime (cyber-terrorism, identity theft), (2) the computer as the object of crime (illegal access and use, using antivirus programs, information and equipment theft, software and Internet software piracy, computer-related scams, international computer crime), and (3) preventing computer-related crime (crime prevention by state and federal agencies, crime prevention by corporations, using intrusion detection software, using managed security, service providers (ISPs), Internet laws for libel and protection of decency, preventing crime on the Internet). These areas are all of concern and should be an item of high interest for any organization in today's world.

**Privacy Issues**

Privacy deals with the right to not have information about one available to anyone who wants it. For information systems, privacy is about collecting and using data. Regardless of where we are or what we are doing, data is always being collected and stored on every one of us. As we have frequently seen in the morning newspaper or evening TV news, data about us is passed around over the Internet without our knowledge or consent. The U.S. Federal government is one of the largest collectors of data. Over 100 Federal agencies have collected over 4 billion records on us. State and local governments and profit and nonprofit organizations also collect data on each of us. The right to privacy at work is becoming an important issue. The rights of workers who want privacy and the interests of companies demanding to know more about their employees are conflicting in areas such as health records, behavior, lifestyle, etc. If the email system is provided by your employer, Federal law permits your employer to monitor your e-mail. As was seen in several recent lawsuits, e-mail messages that have been supposedly been erased from hard disks can be retrieved and used, not just because the laws of discovery require that companies produce all relevant business documents but the capability exists to retrieve the data even though you might think it was erased. It is a reasonable assumption that there is no privacy on the Internet and that you use it at your own risk. Some believe that if a company has a Web site, they should have strict privacy procedures and be accountable for privacy invasion. The potential for privacy invasion on the Internet is huge. Those wanting to invade your privacy could be anyone, criminals or bosses. Remember, if you use the Internet, anything you send or receive can be seized without your knowledge or consent.

A recent area of concern is the selling of data collected on customers and others. You should realize that this process has been going on for years. Did you ever wonder how the "Welcome to the Neighborhood" committee that arrived at your new house even before you had really moved in? Your friendly local telephone and utility company sold your information while the ink was still wet. In most cases, this process helped rather than hurt anyone. With the advent of the Internet, the process has only grown. Selling information to other companies can be very lucrative. So lucrative that many companies continue to store and sell the data they collect even though they frequently receive significant criticism for their actions. In the past few decades, significant laws have been passed regarding either an individual's right to privacy or business privacy rights and the fair use of data and information. Some of the most important of these include the Privacy Act of 1974, the Gramm-Leach-Blilley Act of 1999, and the USA Patriot Act, which was
passed in response to the September 11 terrorism acts. There are a number of Federal laws that relate to privacy.

Most organizations have privacy policies, even though not required by law. Some companies have a privacy bill of rights specifying how the privacy will be protected. Corporate privacy policies should address the customer’s knowledge, control, notice, and consent over the storage and use of information. They should also cover who has access to private data and when it can be used.

Some of the steps that you can take to protect your personal privacy include the following: find out what is stored about you in existing databases, be careful when you share information, be proactive to protect your privacy, and when purchasing anything from a Web site, make sure that you safeguard your credit card numbers, passwords, and personal information.