Chapter 1

Foundations of Information Systems in Business

Section 1
Foundation Concepts:
Information Systems in Business

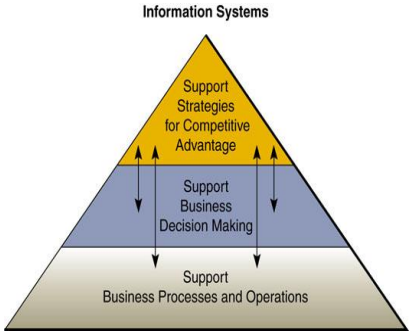
I. The Real World of Information Systems

- **Information Systems are an essential field in the study of business administration and management.**
- **IS and IT and Internet technologies play vital roles in business and improve the effectiveness and efficiency of business processes, managerial decision making, and workgroup collaboration.**

- **What is an Information System? An IS may be computerized or not**
  - **Smoke signals for communication**
  - **Card catalogs in a library**
  - **Your book bag, day planner, notebooks, and file folders**
  - **The cash register at your favorite fast-food restaurant**
  - **A paper-based accounting ledger**

- **Framework of major areas:**
  - **Foundation Concepts – fundamental behavioral, technical, business, and managerial concepts about information systems**
  - **Information Technologies – major concepts, developments, and management issues in IT**
  - **Business Applications – major uses of IS for operations, management, and competitive advantage**
  - **Development Process – how an IS is planned, developed, and implemented to meet business opportunities**
  - **Management Challenges – effectively and ethically managing IT at the end-user, enterprise, and global levels of a business**

II. The Fundamental Roles of IS in Business



- **Support of Strategies for Competitive Advantage**
- **Support of Business Decision Making**
- **Support of Business Processes and Operations**

III. Trends in Information Systems

- **1960's**
  - **Electronic Data Processing (EDP)**
  - **Management Information Systems (MIS)**
- **1970's**
  - **Decision Support Systems (DSS)**
- **1980's**
  - **End User Computing**
  - **Executive Information Systems (EIS)**
  - **Enterprise Resource Planning (ERP)**
- **1990's**
  - **The Internet**
  - **Intranets and extranets**
  - **Global networks**
- **2000's**
  - **<u>Business Intelligence (BI)</u> – all applications and technologies focused on gathering and analyzing data/information for strategic business decisions**
  - **<u>Internet-based/Web-enabled enterprises</u> – dramatically changed the capabilities of IS in business**
  - **<u>Global e-business and e-commerce</u> – now commonplace**
  - **IS is now solidly entrenched as a strategic resource in the modern organization**

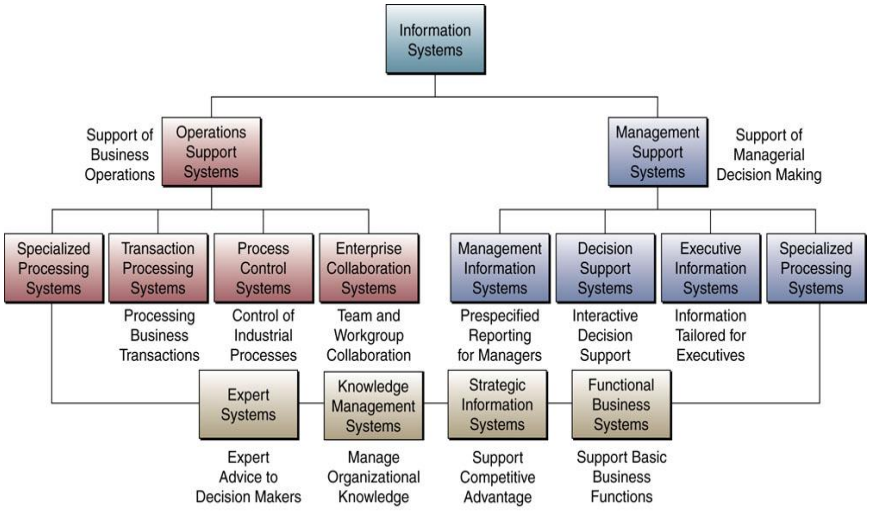
IV. The Role of e-Business in Business

- **<u>E-Business</u> – use of Internet technologies to empower business processes, e-commerce, and enterprise collaboration within a firm and its customers, suppliers, and stakeholders**
- **<u>Enterprise Collaboration Systems</u> – support communication, coordination, and collaboration among networked teams/workgroups**
- **<u>E-Commerce</u> – buying, selling, marketing, and servicing products, services, and information over computer networks**

V. Types of Information Systems

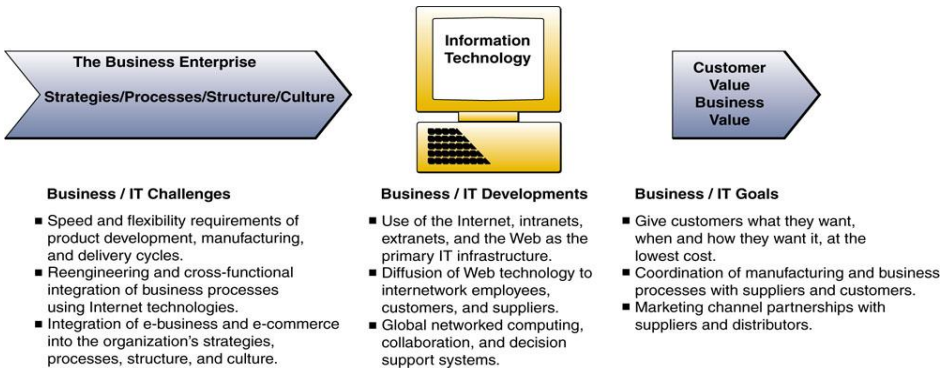
- **Operation Support Systems – help run the daily business, but do not provide much information for managerial decision-making**
  - **Transaction Processing Systems – record & process daily transactions**
  - **Process Control Systems - monitor and control physical processes**
  - **Enterprise Collaboration Systems (Office Automation Systems) – enhance team and workgroup communications and productivity**
- **Management Support Systems**
  - **Management Information Systems – reports and displays for managers to help them make better business decisions**
  - **Decision Support Systems – direct computer support for decision-making**
  - **Executive Information Systems – critical information specifically for executives to make better decisions; not just a better MIS**
- **Other Categories of Information Systems**
  - **Expert Systems – expert advice for operational decisions**
  - **Knowledge Management Systems – support creation, organization, and dissemination of business knowledge**
  - **Strategic Information Systems – apply IT to products, services, and processes for strategic advantage**
  - **Functional Business Systems – support basic business functions**
  - **Cross-Functional Systems – integrate various roles and outputs into a variety of functions**

V. Types of Information Systems

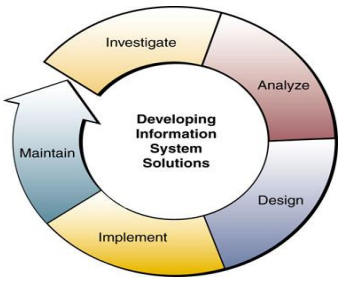


VI. Managerial Challenges of Information Technology

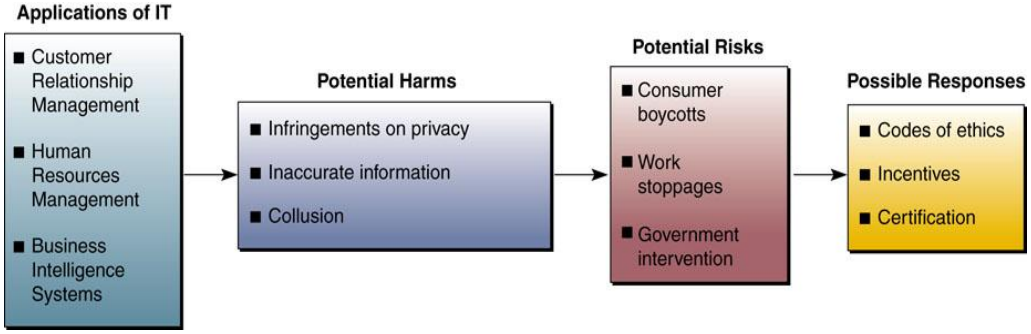
- **Challenges and Opportunities**
  - **Business/IT Challenges**
  - **Business/IT Developments**
  - **Business/IT Goals**
- **Success and Failure with IT**
  - **<u>Effectiveness</u> – does it work?**
  - **<u>Efficiency</u> – how well does it work?**



- **Developing IS Solutions – an Information Systems is a Solution to a Business Problem**
  - **<u>Investigate</u> (Plan) – recognize the problem exists**
  - **<u>Analyze</u> – investigate the current system**
  - **<u>Design</u> – designing the new system**
  - **<u>Implement</u> – put the new system into effect**
  - **<u>Maintain</u> (Use) – use, monitor, and maintain the new system**



- **Challenges and Ethics of IT – what is improper, irresponsible, or harmful?**



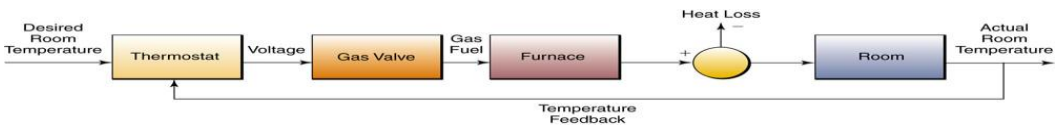
- **Challenges of IS and IT Careers – in business, if you are not in an IT career, you will work regularly with IS professionals**
  - **Employment opportunities in IS are strong**
  - **Business Technologist – a professional competent in both business and IT**
  - **U.S. Department of Labor – IS positions expected to be among fastest growing for years to come**
- **The IS Function**
  - **IS is a major functional area of business, just as important as any business function**
  - **IS is an important contributor to operational efficiency, employee productivity and morale, and customer services and satisfaction**
  - **IS is an important strategic resource**

Section 2
Foundation Concepts: The Components of Information Systems

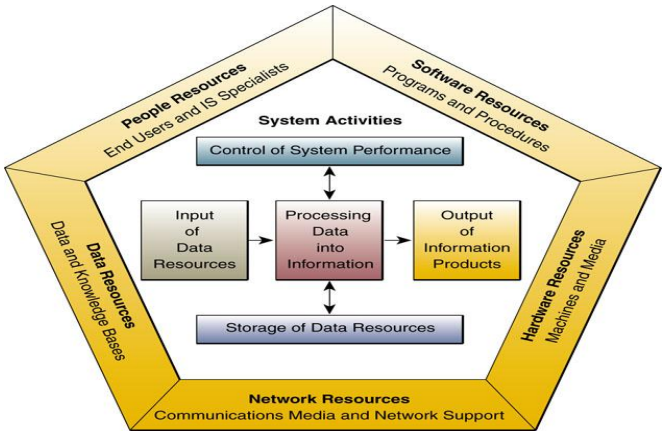
I. System Concepts: The Foundation for Business Processes

- **What Is a System?**
  - **<u>Input</u> – capture the data to be processed**
  - **<u>Processing</u> – change the data into information**
  - **<u>Output</u> – disseminate the information product to its destination**
- **Feedback and Control**
  - **<u>Feedback</u> – data about the performance of the system**
  - **<u>Control</u> – monitoring the feedback to determine if the system is meeting its objectives**

- **Other System Characteristics**
  - **<u>Environment and Subsystems</u>**
  - **<u>Interface</u> – a shared boundary between systems**
  - **<u>Open (and Closed) Systems</u> – open systems interact with other systems (closed systems do not interact with other systems)**
  - **<u>Adaptive Systems</u> – have the ability to change themselves or their environment**



III. Information System Resources



- **People Resources**
  - **IS Specialists**
  - **End Users**

- **Hardware Resources**
  - **Machines – the computing devices themselves**
  - **Media – where data is stored**

- **Software Resources**
  - **Programs – instructions that tell the computer what to do**
    - **System Software – runs the computer**
    - **Application Software – a particular use by end users**
  - **Procedures – instructions on how to use the system**

- **Data Resources**
  - **Data – unorganized facts and figures**
  - **Information – data organized so that it has value to the organization**

- **Network Resources**
  - **Communications Media- the physical pathways over which signals travel**
  - **Network Infrastructure – hardware, software, and data technologies needed to support communications networks**

IV. Information System Activities

- **Input of Data Resources**
- **Processing of Data into Information – organize, analyze, and manipulate data**
- **Output of Information Products – dissemination of information products to appropriate end users**
- **Storage of Data Resources**
- **Control of System Resources – monitoring feedback to assure the system meets its performance standards**

V. Recognizing Information Systems

- **People, Hardware, Software, Data, and Network Resources**
- **Types of Information Products Used**
- **Performance of Input, Processing, Output, Storage and Control Activities**

Chapter 2

Competing with Information Technology

Section 1

Fundamentals of Strategic Advantage

I. Strategic IT

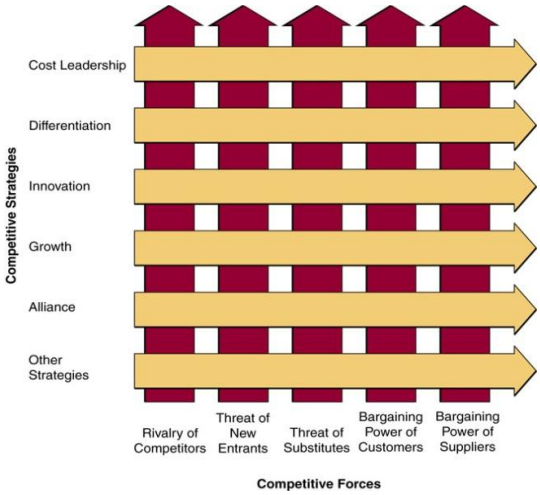
- **Technology is now the actual cause and driver of business strategies**
- **Technology is no longer an afterthought in forming business strategies**

II. Competitive Strategy Concepts

- **Strategic Information Architecture – the collection of strategic information systems that shape/support the competitive position/strategies of a firm**

- **Competitive Forces (Porter)**
  - **Rivalry of Competitors**
  - **Threat of New Entrants**
  - **Threat of Substitutes**
  - **Bargaining Power of Customers**
  - **Bargaining Power of Suppliers**

- **Competitive Strategies**
  - **Cost Leadership Strategy**
  - **Differentiation Strategy**
  - **Innovation Strategy**
  - **Growth Strategy**
  - **Alliance Strategy**



III. Strategic Uses of Information Technology

- **Other Strategic Initiatives**
  - **Locking by Building Relationships**
    - **Lock In Customers**
    - **Lock In Suppliers**
    - **Lock Out Competitors**

  - **Switching Costs – make customers/supplier dependent on mutually beneficial inter-enterprise information systems**
  - **Raise Barriers to Entry – discourage or delay other firms from entering a market**
  - **Leverage Investment in IT – develop new products and services that are not possible without strong IT capabilities**

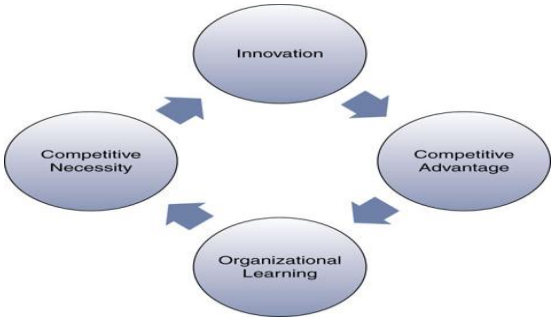
II. Competitive Strategy Concepts

Basic Strategies in the Business Use of Information Technology
Lower Costs • Use IT to substantially reduce the cost of business processes. • Use IT to lower the costs of customers or suppliers.
Differentiate • Develop new IT features to differentiate products and services. • Use IT features to reduce the differentiation advantages of competitors. • Use IT features to focus products and services at selected market niches.
Innovate • Create new products and services that include IT components. • Develop unique new markets or market niches with the help of IT. • Make radical changes to business processes with IT that dramatically cut costs; improve quality, efficiency, or customer service; or shorten time to market.
Promote Growth • Use IT to manage regional and global business expansion. • Use IT to diversify and integrate into other products and services.
Develop Alliances • Use IT to create virtual organizations of business partners. • Develop interenterprise information systems linked by the Internet and extranets that support strategic business relationships with customers, suppliers, subcontractors, and others.

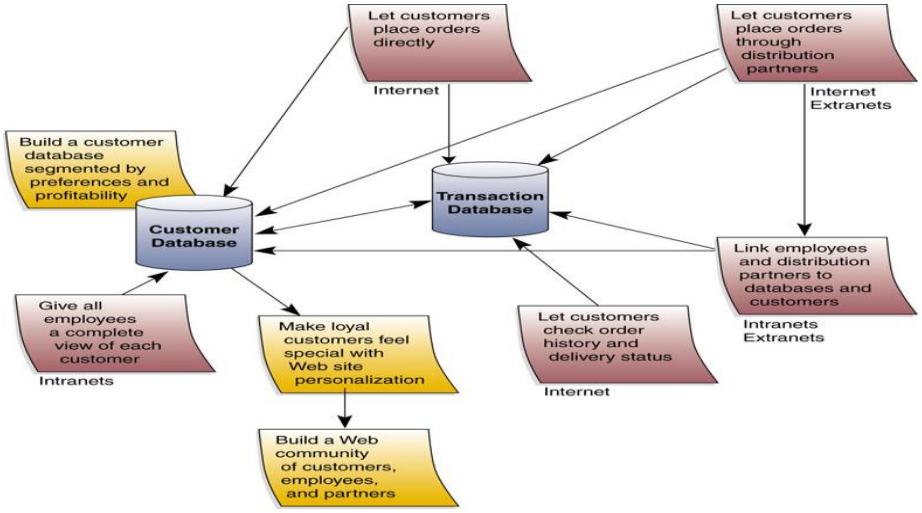
Strategy	Company	Strategic Use of Information Technology	Business Benefit
Cost Leadership	Dell Computer Priceline.com eBay.com	Online build to order Online seller bidding Online auctions	Lowest-cost producer Buyer-set pricing Auction-set prices
Differentiation	AVNET Marshall Moen Inc. Consolidated Freightways	Customer/supplier of e-commerce Online customer design Customer online shipment tracking	Increase in market share Increase in market share Increase in market share
Innovation	Charles Schwab & Co. Federal Express Amazon.com	Online discount stock trading Online package tracking and flight management Online full-service customer systems	Market leadership Market leadership Market leadership
Growth	Citicorp Walmart Toys 'R' Us Inc.	Global intranet Merchandise ordering by global satellite network POS inventory tracking	Increase in global market Market leadership Market leadership
Alliance	Walmart/Procter & Gamble Cisco Systems Staples Inc. and Partners	Automatic inventory replenishment by supplier Virtual manufacturing alliances Online one-stop shopping with partners	Reduced inventory cost/ increased sales Agile market leadership Increase in market share

Other Strategic Uses of Information Technology
• Develop interenterprise information systems whose convenience and efficiency create switching costs that lock in customers or suppliers.
• Make major investments in advanced IT applications that build barriers to entry against industry competitors or outsiders.
• Include IT components in products and services to make substitution of competing products or services more difficult.
• Leverage investment in IS people, hardware, software, databases, and networks from operational uses into strategic applications.

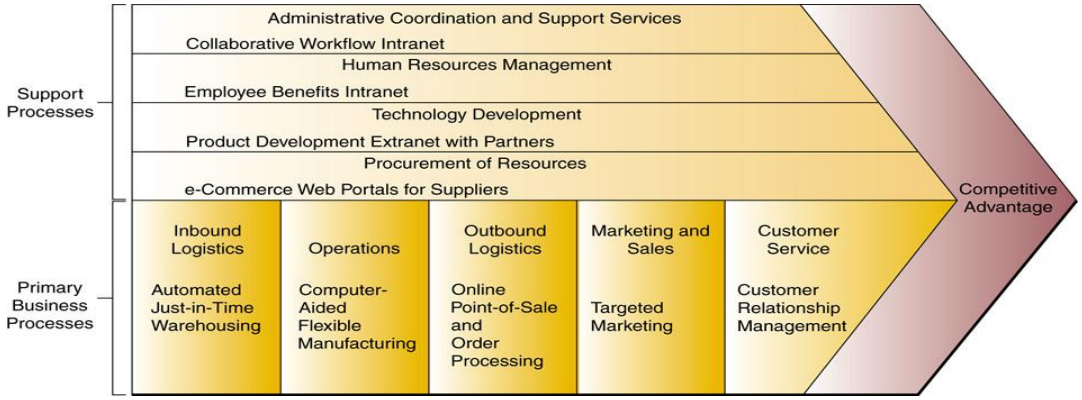
Competitive Advantage and Competitive Necessity



- IV. Building A Customer-Focused Business – Strategic Focus on Customer Value
  - **Recognizing that Quality, not Price, has become the primary factor in a customer's perception of value**
  - **Internet technologies can make customers the focal point of e-business applications**
- IV. Building A Customer-Focused Business – Strategic Focus on Customer Value



- V. The Value Chain and Strategic IS
  - **Value Chain – the series/chain/network of activities that add value to products/services**
  - **Primary Processes – directly related to manufacture of products or delivery of services**

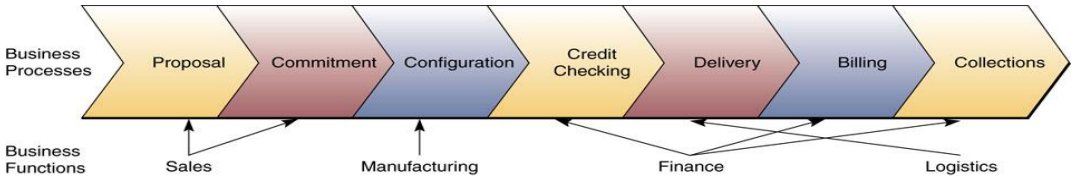


- V. The Value Chain and Strategic IS
  - **Support Processes – business activities that that support daily operations of the firm and indirectly contribute to products/services**
  - **Value Chain Examples**
  - **The Value Chain Concept can help identify where and how to apply strategic capabilities of IT**

- Section 2
  Using Information Technology for Strategic Advantage
- I. Strategic Uses of IT
- **Support everyday operations (non-strategic)**
- **Use IT as a major competitive differentiator (strategic)**

II. Reengineering Business Processes

- **Business Process Reengineering (BPR)**
  - **High Potential Payback, but High Risk of Failure**
  - **Organizational Redesign**
    - **Process Teams**
    - **Case Managers**
- **The Role of Information Technology – IT plays a major role in BPR**



II. Reengineering Business Processes

	Business Improvement	Business Process Reengineering
Level of Change	Incremental	Radical
Process Change	Improved new version of process	Brand-new process
Starting Point	Existing processes	Clean slate
Frequency of Change	One-time or continuous	Periodic one-time change
Time Required	Short	Long
Typical Scope	Narrow, within functions	Broad, cross-functional
Horizon	Past and present	Future
Participation	Bottom-up	Top-down
Path to Execution	Cultural	Cultural, structural
Primary Enabler	Statistical control	Information technology
Risk	Moderate	High

III. Becoming An Agile Company

Business today is changing from mass market products/services that were standardized, long-lived, information-poor, exchanged in one-time transactions to global competition with niche markets that are individualized, short-lived, information-rich, exchanged on an ongoing basis with customers

- **4 Basic Strategies:**
  - **Customer Perception of Goods and Services**
  - **Partnering with Customers, Suppliers, and Even Competitors**
  - **Organize to Thrive on Change and Uncertainty**
  - **Leverage Impact of Personnel and Their Knowledge**
- **Types of Agility**
  - **Customer**
  - **Partnering**
  - **Operational**

III. Becoming An Agile Company

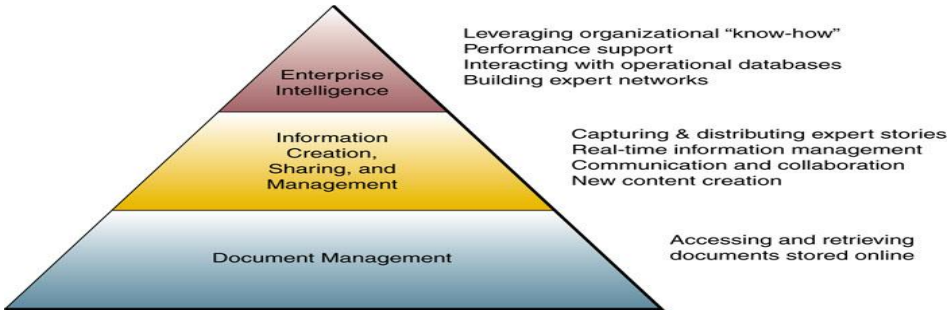
Type of Agility	Description	Role of IT	Example
Customer	Ability to co-opt customers in the exploitation of innovation opportunities • As sources of innovation ideas • As co-creators of innovation • As users in testing ideas or helping other users learn about the idea	Technologies for building and enhancing virtual customer communities for product design, feedback, and testing	eBay customers are its de facto product development team because they post an average of 10,000 messages each week to share tips, point out glitches, and lobby for changes
Partnering	Ability to leverage assets, knowledge, and competencies of suppliers, distributors, contract manufacturers, and logistics providers in the exploration and exploitation of innovation opportunities	Technologies facilitating interfirm collaboration, such as collaborative platforms and portals, supply chain systems	Yahoo! has accomplished a significant transformation of its service from a search engine into a portal by initiating numerous partnerships to provide content and other media-related services from its Web site
Operational	Ability to accomplish speed, accuracy, and cost economy in the exploitation of innovation opportunities	Technologies for modularization and integration of business processes	Ingram Micro, a global wholesaler, has deployed an integrated trading system allowing its customers and suppliers to connect directly to its procurement and ERP systems

IV. Creating A Virtual Company

- **Virtual Company – Uses the Internet, intranets and extranets to create virtual workgroups and support alliances with business partners**
- **Virtual Company Strategies**
  - **Share infrastructure and risk with alliance partners**
  - **Link complimentary core competencies**
  - **Reduce concept-to-cash time through sharing**
  - **Increase facilities and market coverage**
  - **Gain access to new markets and share market or customer loyalty**
  - **Migrate from selling products to selling solutions**

V. Building a Knowledge-Creating Company

- **One sure Source of Competitive Advantage is <u>Knowledge</u>**
- **The Business of a "Knowledge-Creating" company is Continuous Innovation**
- **Explicit Knowledge – written down or stored on computers**
- **Tacit Knowledge – "how-to" knowledge residing in the workers; very important but little incentive to share this information so it is never written down**
- **Knowledge Management – 3 levels:**
  - **Enterprise Knowledge**
  - **Information Creation, Sharing, and Management**
  - **Document Management**



VI. Knowledge Management Systems

- **Making personal knowledge available is the central activity of a knowledge-creating company**
- **This takes place continuously at all levels of the organization**
- **Knowledge management has become a major strategic use of information technology**
- **Goal of Knowledge Management – to create, organize, and disseminate important business knowledge whenever and wherever it is needed in the organization**
- **Knowledge Management systems:**
    - **Facilitate organizational learning and knowledge creation**
    - **Provide rapid feedback top knowledge workers**
    - **Encourage employee behavioral change**
    - **Significantly improve business performance**

Chapter 3

Computer Hardware

Section 1

Computer Systems: End User and Enterprise Computing

- **I. Introduction**

  All computers are systems of Input, Processing, Storage, Output, and Control Components

- **II. A Brief History of Computer Hardware**

  Without computers many technological achievements would not have been possible:

  - **Counting with fingers/toes, chicken bones, shells**
  - **Calculate – from Calculus, meaning "small stone"**
  - **Blaise Pascal, 1642 – invented the first mechanical adding machine**
  - **Joseph Jacquard, 1801 – "Jacquard's Loom" accurately reproduced patterns on a loom**
  - **Herman Hollerith – Hollerith's Punch Card system to record census data in late 1880's; 1911 – merged with competitor to form IBM**
  - **ENIAC (Electronic Numerical Integrator and Calculator), 1946 – the world's first electronic digital computer**
  - **1950's – Transistors were invented and replaced tubes**
  - **1958 – Integrated Circuit ("chip") was invented**
  - **1970's – 1980's**
    - **Further miniaturization od circuits**
    - **ALTAIR 8800 – the first programmable micro-computer**
    - **Apple Computer and IBM PC**

- **III. Types of Computer Systems**

- **Computers come in a variety of sizes, shapes, and computing capabilities –**
  - **Mainframes**
  - **Midrange (obsolete due to powerful microcomputers)**
  - **Microcomputers**

- **IV. Microcomputer Systems (Personal Computer)**

  The most important category for businesses and consumers, exceeds the power of many mainframes

  - **Workstations – support mathematical and graphical demands**
  - **Network Servers – support telecommunications and resource sharing**
  - **Computer Terminals – any device that allows access to a computer**
  - **Network Computers – designed specifically for use with networks and the Internet; low TCO (total cost of ownership)**
  - **Information Appliances – Web-enabled devices for accessing information from anywhere – cell phones, PDAs, handheld PCs**

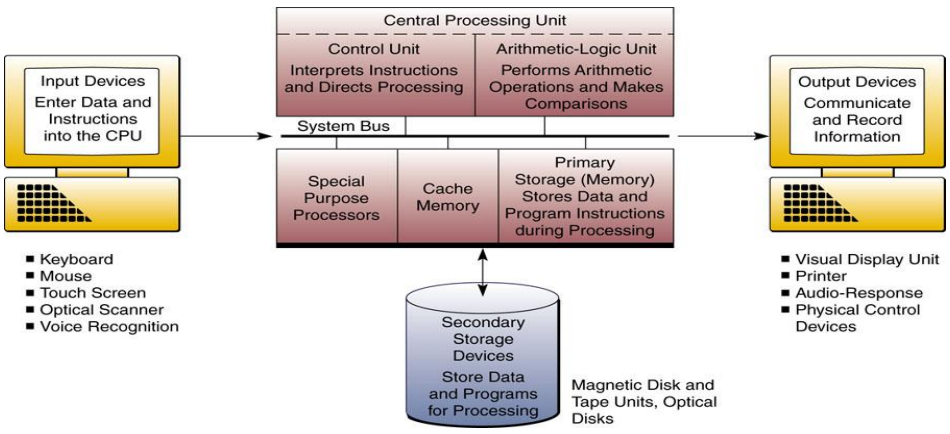
- **V. Midrange, Mainframe, and Supercomputer Systems**
    - ❖ **Midrange Systems – popular as Network Servers; disappearing due to microcomputers**
    - ❖ **Mainframe Systems – large, fast, and powerful, used for high transaction processing and complex computations; used by corporations and government agencies**
    - ❖ **Supercomputers – extremely powerful, extremely high speeds and massive numeric computations**
    - ❖ **The Next Wave of Computing – minisupercomputers; connecting all the power of unused desktops in an organization**
        - ❖ **Distributed (Grid) Computing – parallel computing over a network**
            - ❖ **Advantages – purchase nodes as a commodity, economies of scale**
            - ❖ **Disadvantages – untrustworthy calculations, lack of centralized control**

- **VI. Technical Note: The Computer System Concept**

Understanding the computer as a system is of vital importance

- ❖ **The Computer is MORE than a collection of electronic devices:**
    - ❖ **Input – convert data into electronic form for entry into the system**
    - ❖ **Processing – the CPU (Central Processing Unit) consists of the Arithmetic-Logic Unit (ALU – performs the arithmetic and logic functions) and the Control Unit (controls the rest of the computer)**

- ❖ **The Computer is MORE than a collection of electronic devices:**
    - ❖ **Output – converts electronic information into human-intelligible form**
    - ❖ **Storage – store data and instructions for processing**
    - ❖ **Control – the other component of the CPU manages the activities of the rest of the computer**



- **Computer Processing Speeds**
  - **MIPS – million instructions per second**
  - **Teraflops – trillion floating point operations per second**

- **VII. Moore's Law**
- **Moore's Law 1965 – the number of transistors on a chip will double every 18-24 months; more broadly interpreted – the power or speed of a computer will double every 18-24 months**
  - **The Price would halve in that same time, which has also proven to be true**
  - **Recent statistics indicate this time has decreased to 12 months**

Section 2

Computer Peripherals: Input, Output, and Storage Technologies

- **I. Peripherals**

Peripheral - a generic name for all input, output, and secondary storage devices not part of the CPU but part of the system

- **Online – electronically connected to and controlled by the CPU**
- **Offline – separate from and not controlled by the CPU**

- **II. Input technologies**
- **Source Document – the original record of the data, very important for auditing purposes; now accepted in both electronic or physical form**
- **Graphical User Interface (GUI) – presents icons, buttons, windows, etc. for use with Pointing Devices (as opposed to a text-based interface)**
- **Input Devices – keyboards, mice, light pens, trackballs, touch screens**
- **Speech Recognition Systems – understands spoken commands/words**
  - **Discrete Speech Recognition – speak each word separately**
  - **Continuous Speech Recognition – recognizes conversationally-paced speech**
  - **Speaker-Independent Voice Recognition – understands speech from a voice it has never heard before**
- **Optical Scanning – converts text or graphics to digital input for direct entry of source documents**
- **Other Input Technologies**
  - **Magnetic Stripe – on credit cards**
  - **Smart Cards – contain an embedded chip**
  - **Digital Cameras**
  - **Magnetic Ink Character Recognition (MICR) – used in banking industry**

- **III. Output Technologies**
- **Most popular are video and printed output**
  - **Video Output – most popular form of output**
  - **Printed Output (Hardcopy) – most popular after video; still required for some legal purposes**

- **IV. Storage Tradeoffs**

❖ **Tradeoffs are Cost vs. speed vs. capacity, but all regularly increase in speed, cost and capacity**

- ❖ **Primary Storage (Random Access Memory or RAM) – Semiconductor memory, Volatile; faster but more expensive**
- ❖ **Secondary Storage – Magnetic Disks, Optical Disks, Magnetic Tape; Non-Volatile; slower but cheaper**

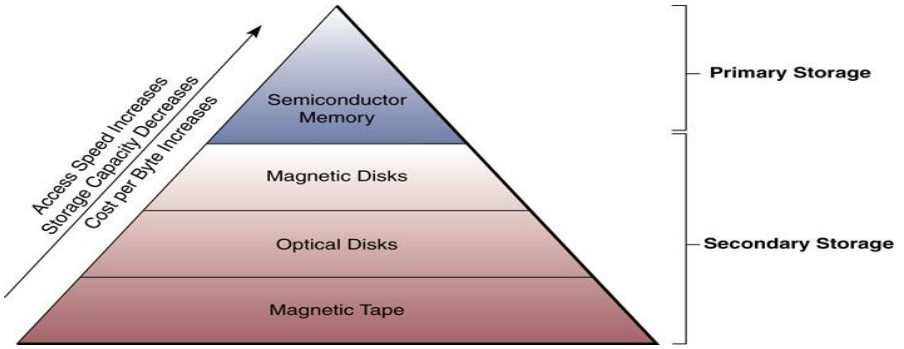
❖ **Computer Storage Fundamentals**

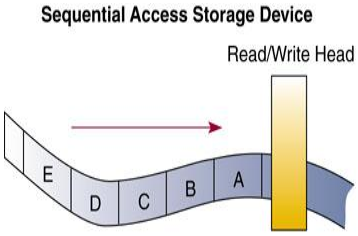
- ❖ **Binary Representation – Two-state, on/off, +/-, 0/1**
- ❖ **Bit – Binary digit, 0/1**
- ❖ **Byte – Grouping of bits (typically 8 bits/byte), represents a single character**
- ❖ **ASCII – formalized code determining what byte values represent which character**
- ❖ **Storage capacities – kilobytes (KB), megabytes (MB), gigabytes (GB), terabytes (TB)**

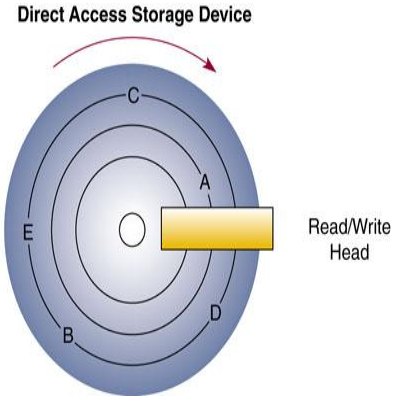
❖ **Direct and Sequential Access**

- ❖ **Direct Access – Random Access Memory (RAM) and Direct Access Storage Devices (DASD) – Direct Access and Random Access are the same concept; locate an address on the storage device and go directly to that location for access to the datum**
- ❖ **Sequential Access – All tape devices are accessed serially – device must be read one record at a time from the first stored datum until the desired datum is located**

- **IV. Storage Tradeoffs**







- **V. Semiconductor Memory**
  - **RAM (Random Access Memory) – volatile, may be read and over-written**
  - **ROM (Read Only Memory) – non-volatile, may be read but not over-written or erased; PROM and EPROM may be reprogrammed**
  - **Flash (Jump) Drives – solid-state memory**
  - **ReadyBoost – Microsoft product that uses any flash product as a cache to increase Windows access speed**
  - **Solid-State Drive (SSD) – transistor device created to be accessed like a hard drive; no moving parts, non-volatile, much faster access speed**

- **VI. Magnetic Disks – the most common form of secondary storage**
  - **RAID Storage (Redundant Arrays of Independent Disks) – interconnected groups of hard drives, fast speeds, fault tolerant (redundant backups) through networks**

- **VII & VIII. Magnetic Tape & Optical Disks**
  - **Magnetic Tape – slow speeds, but inexpensive for large amounts of backups**
  - **Optical Disks – CD-ROM, CD-R, DVD-R (cannot be erased or re-written); CD-RW, DVD-RW (may be erased or re-written)**

- **VII. Radio Frequency Identification (RFID)**

  RFID – for tagging and identifying mobile objects (store merchandise, postal objects, sometimes living organisms); provides information to a reader when requested
  - **Passive – no power source, derives power from the reader signal**
  - **Active – self-powered, do not need to be close to the reader**
  - **RFID Privacy Issues – may be used as spychips; gathers sensitive information about an individual without consent**

Chapter 4

Computer Software

Section 1

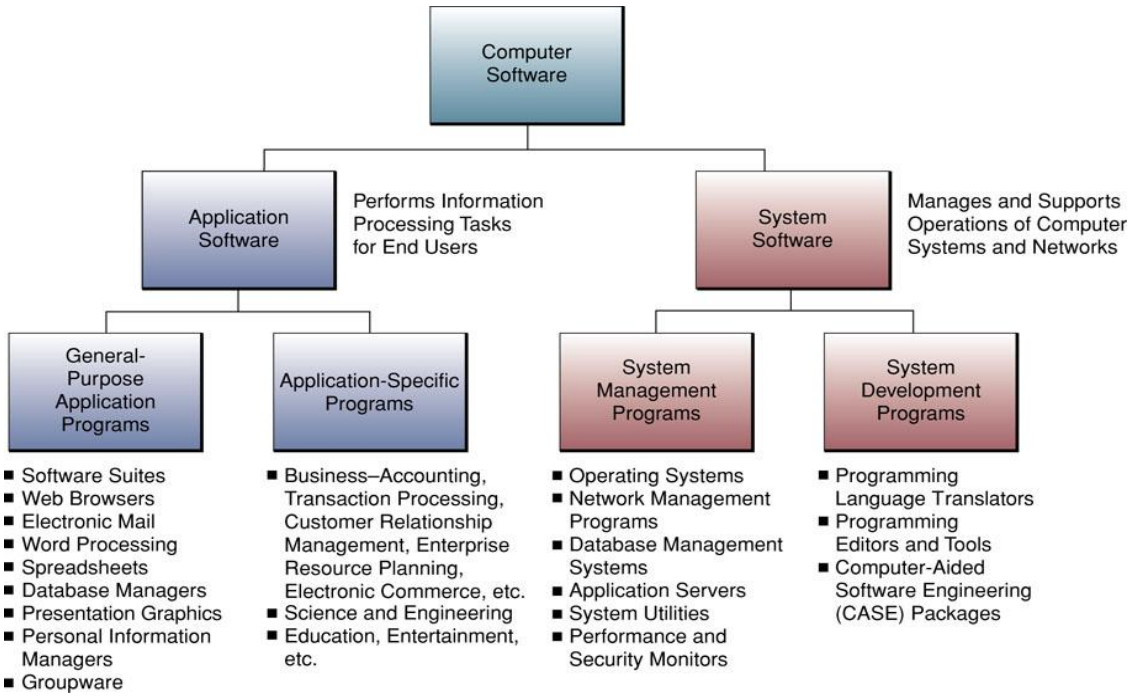
Software: End-user Applications

- **I. Introduction to Software**

❖ **What is Software? – software is programs – instructions that tell the computer and associated peripherals what to do**

❖ **Types of Software**
  - ❖ **System Software – programs that run the computer**
  - ❖ **Application Software – programs perform a function/job for you**

❖ **Application Software for End Users**
  - ❖ **General Purpose Application Programs – perform common information processing jobs for end users**
    - ❖ **Productivity Package – increases productivity of user**
  - ❖ **Application-Specific Software – does a specific function**
  - ❖ **Custom Software – designed and created specifically to do a particular job for one company**
  - ❖ **Commercial Off-the-Shelf Software (COTS) – developed to sell many copies (usually for profit); source code may not be modified by user**
  - ❖ **Open Source Software – anyone may modify the software, the documentation and source code are available to anyone**



- **II. Business Application Software**
- **Available to support any part of business**
- **Reengineer/Automate Business Processes**
  - **Customer Relationship management (CRM)**
  - **Enterprise Resource Planning (ERP)**
  - **Supply Chain Management (SCM)**
- **Internal Organizational Activities**
  - **Human Resource management (HRM)**
  - **Accounting**
  - **Finance**
- **Decision Support tools**
  - **Data Mining**
  - **Enterprise Information Portals**
  - **Knowledge Management Systems**

- **III. Software Suites and Integrated Packages**
- **Software Suites – bundle together a variety of general-purpose software applications**
  - **Advantages:**
    - **Lower cost than buying each package individually**
    - **All the programs use a common graphical user interface (GUI)**
    - **The programs are designed to work together**
  - **Disadvantages:**
    - **Many features are never used**
    - **Suites take up a lot of disk space**
- **Integrated Packages – combine some but not all of the functions of several programs; offer advantages in a smaller package**
  - **Less powerful than software suites – leave out some functions**
  - **Take up less disk space than software suites**
  - **Cost less than software suites**

- **IV & V. Web Browsers & E-Mail**
- **Web Browsers – the most widely used software (even more than email)**
- **Electronic Mail, Instant Messaging, and Blogs**
  - **Email – has changed the way people communicate**
  - **Instant Messaging (IM) – email/computer-conferencing hybrid**
  - **Blog – short for Weblog or Web Log – a personal or commercial website on a particular topic or range of topics, frequently updated**

- **VI. Word Processing and Desktop Publishing**
- **Word Processing – creation, revision, editing, and printing of documents; spell checkers and grammar checkers, thesaurus**
- **Desktop Publishing – produce printed documents that look professionally published**

- **VII & VIII. Spreadsheets and Presentation Graphics**
  - **Spreadsheets – used for analysis, planning, and modeling; calculations, graphics, what-if scenarios**
  - **Presentation Graphics – convert numeric data into graphics displays for easy and intuitive comprehension**

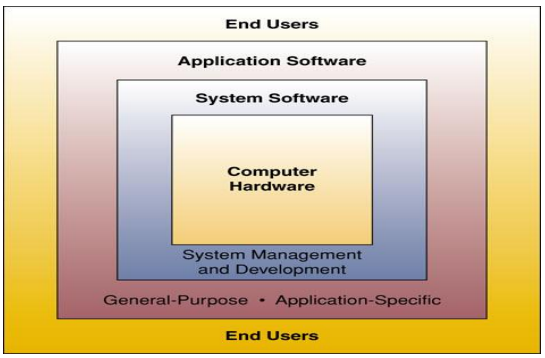
- **IX & X. Personal Information Managers (PIM) and Groupware**
  - **Personal Information Managers (PIM) – help end-users store, organize, and retrieve basic personal and business information**
  - **Groupware – helps workgroups and teams collaborate**

- **XI. Software Alternatives**
  - **Application Service Providers – provide necessary applications for a fee (rather than a firm developing or purchasing the s/w)**
  - **Cloud Computing – a recent advance in computing and software delivery; software and virtualized hardware are provided as a service over the Internet; "cloud" is a metaphor for the Internet**
  - **Software Licensing – a complex topic involving copyrights, trademarks, and intellectual property rights; in most cases software is not purchased but "licensed" for use under very specific circumstances**

Section 2

System Software: Computer System Management

- **I. System Software Overview**
  - **System Management Programs – programs that manage the hardware, software, network, and data resources**
  - **System Development Programs – programs that help users develop IS programs and procedures; CASE tools**



- **II. Operating Systems – programs that run the computer operations**
  - **Operating Systems Functions –**
    - **User Interface – how the user communicates with the computer**
      - **Graphical User Interface (GUI)**
      - **Command-driven**
      - **Menu Driven**
    - **Resource Management – manages the hardware and network resources**
    - **File Management – controls the creation, deletion, and access of files of the data and programs**
    - **Task Management – manages which tasks are performed and when**
      - **Multitasking (Multiprogramming or Timesharing) – programs take turns using the processor**
        - **Preemptive – each program gets a slice of time**
        - **Cooperative – programs use the processor when it is not being used by another program**
      - **Virtual Machines- applications run independently at the same time**

- **Unix – a multitasking, multiuser, portable (runs on different hardware platforms) operating system**
- **Linux – low-cost, reliable, powerful, open-source UNIX-like operating system**
- **Open-Source Software – source code is available to users, can be modified by users**
- **OpenOffice.org 3 – an open-source office suite, may be used entirely free without any license fees**
- **Mac OS X – the latest OS from Apple for Macintosh computers**
- **Application Virtualization – software technologies that allow applications to run on various platforms**

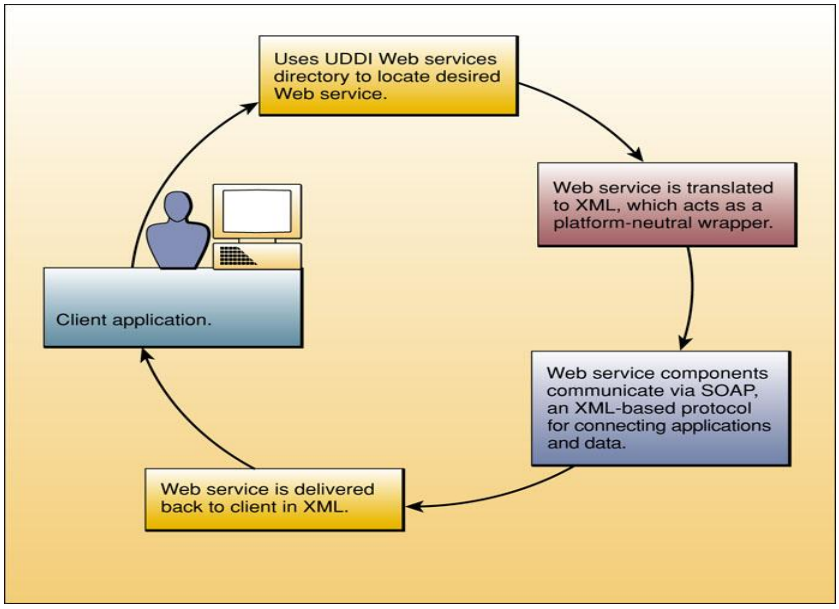
- **III. Other System Management Programs**
- **Utilities – system management programs marketed separately from an operating system**
- **Middleware – helps diverse software work together more efficiently**

- **IV. Programming Languages**
- **Machine Languages – first generation language – instructions written in binary (0's and 1's); runs directly on the computer**
- **Assembler Languages – second generation language – uses symbols/mnemonics to represent operational codes; converted into binary by an Assembler**
- **High-Level Languages – third generation language – BASIC, COBOL, FORTRAN; converted into binary by Compliers and Interpreters; users tell the computer What results they want and How to get there**
- **Fourth-Generation Languages (4GL) – non-procedural languages; users tell the computer What results they want, but the computer decides How to get there**
- **Fifth Generation Languages (5GL) – natural languages, very close to English, conversational**
- **Object-Oriented Languages (5GL) – combine the data elements and the programs that act on them into Objects; Reusability**

- **V. Web and Internet Languages and Services**
- **HTML (Hypertext Markup Language) – a page description language (markup languages are NOT programming languages)**
- **XML (eXtensible Markup Language) – describes the Content of Web pages by applying contextual labels to the data**

- **V. Web and Internet Languages and Services**
- **Java and .NET**
    - **Java – a platform independent, object-oriented programming language; very powerful**
    - **Applets – small Java programs that can be executed by any computer running any OS anywhere on the network**
    - **.NET – Microsoft's collection of programming support for Web services**
- **Web Services – software that electronically links applications of different users and different platforms**

- **V. Web and Internet Languages and Services**



- **VI.Programming Software**

❖ **Language Translator Programs – instructions must be translated into binary to be executed by the computer**
  - ❖ **Assembler – translates symbolic instructions written in assembly language**
  - ❖ **Compiler – translates high level language statements; translates the entire program (Source code) into binary (Object code) then executes the entire binary program**

❖ **Interpreter – translates and executes one line of the program at a time**

❖ **Programming Tools – help programmers identify and minimize errors as they write the code**
  - ❖ **CASE Tools (Computer-Aided Software Engineering) – automated software support tools for developing systems**

Chapter 5

Data Resource Management

Section 1

Technical Foundations of Database Management

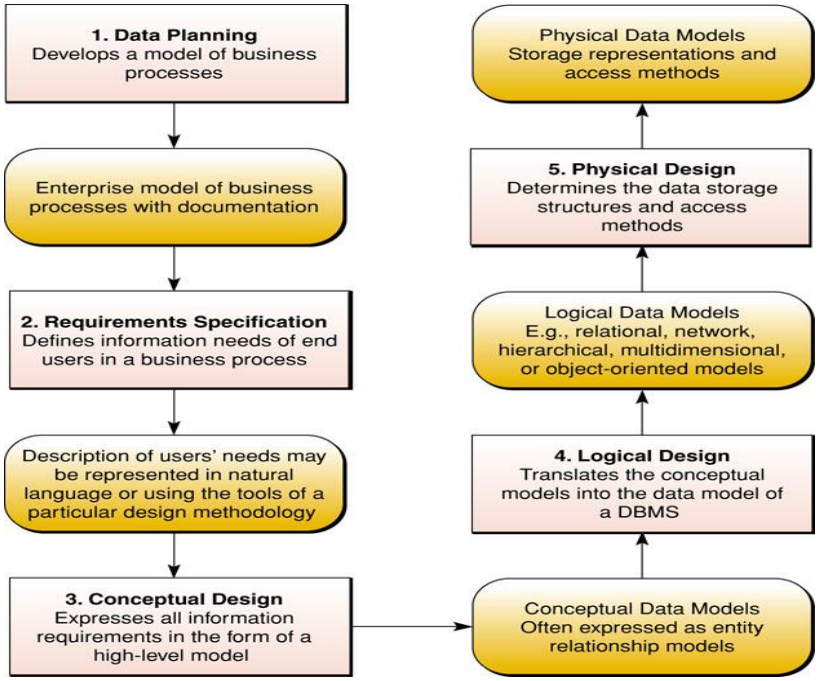
- **I. Database Management System**
- ❖ **Data resources must be structured and organized in some logical manner so they can be accessed, processed, retrieved, and managed easily**

- **II. Fundamental Data Concepts**
- ❖ **Character – the most basic logical data element that can be observed, a single alpha or numeric or other symbol, represented by one byte**
- ❖ **Field – a grouping of related characters, as a last name or a salary, represents an attribute of some entity General Purpose Application Programs – perform common information processing jobs for end users**
- ❖ **Record – a grouping of attributes that describe an entity**
- ❖ **File – a group of related data records**
- ❖ **Database – a collection of logically related data elements**

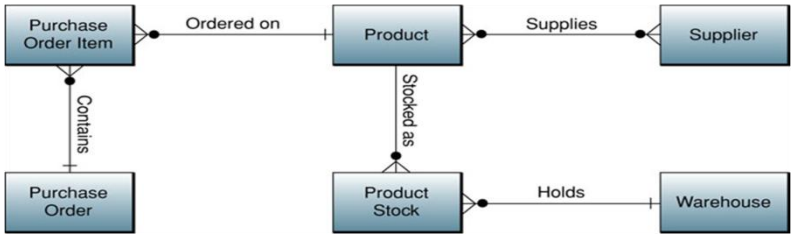
- **III. Database Structures (Models)**
- ❖ **Hierarchical Structure – treelike structure of one-to-many parent-child relationships (each child can have only one parent)**
- ❖ **Network Structure – similar to hierarchical but allows many-to-many relationships (a child record can have more than one parent)**
- ❖ **Relational Structure – the most widely used database model today; data is represented as a series of two-dimensional tables called Relations; each column is a named attribute of the entity, each row is an unnamed instance of that entity**
- ❖ **Relational Operations**
  - ❖ **Select – create a subset that meets a criterion**
  - ❖ **Join – temporarily combine two or more tables for comparison**
  - ❖ **Project – create a subset of the columns in the temporary tables**
- ❖ **Multidimensional Structure – variation of the Relational model using multidimensional structures to organize and express relationships**
- ❖ **Object-Oriented Structure – combining the data of interest and the processes that act on that data into a structure called an object**
  - ❖ **Encapsulation – allows complex data types**
  - ❖ **Inheritance – allows replication of some/all of the characteristics of a parent object in the creation of a child object**
- ❖ **Evaluation of Database Structures – databases have grown more complex as needs have changed and grown in complexity**
- **III. Database Structures (Models diagrams) See slides.**

- **IV. Database Development**
- ❖ **Database Administrator (DBA) – controls development and administration of the database**

- ❖ **Data Definition Language (DDL) – used to specify the contents, relationships, and structure of the database**
- ❖ **Data Dictionary – directory containing the metadata**
- ❖ **Metadata – data about the data**
- ❖ **Data Planning and Database Design**
  - ❖ **Data Modeling (Entity-Relationship Diagrams) – logical models of the data itself; this must be done before choosing the database model**
  - ❖ **Schema – the physical/internal view of a system**
  - ❖ **Subschema – the logical/external view of a system**



Entity Relationship Diagram



Section 2

Managing Data Resources

- **I. Data Resource Management**

❖ **Data are an organizational resource that must be managed as any other resource**

- **II. Types of Databases**

❖ **Operational Databases – store detailed data to support business processes and operations**

- **Distributed Databases – many organizations distribute their databases over multiple locations**
  - **Replication – complex process of updating distributed data**
  - **Duplication – simplified method of updating distributed data**
- **External Databases – outside the firm, free or fee-based**
- **Hypermedia Databases – hyperlinked pages of multimedia**

- **III. Data Warehouses and Data Mining**
- **Data Warehouse – stores data extracted from other databases**
- **Data Mart – subset of a data warehouse focusing on a single topic, customer, product, etc.**
- **Data Mining – analyzing a data warehouse to reveal hidden patterns and trends**
- **III. Data Warehouses and Data Mining** (SEE Slides)

- **IV. Traditional File Processing**
- **Data was stored in independent files without regard to other needs for that data**
- **Problems of File Processing – databases seek to solve these problems**
  - **1. Data Redundancy – the same data is kept in more than one location; databases seek to Control (NOT reduce!) Redundancy; this led to Data Inconsistency – same data in multiple locations but the Values were Different**
  - **2. Lack of data Integration – data not easily available for ad hoc requests**
  - **3. Data Dependence – data and programs were "tightly coupled", changing one meant having to change the other**
  - **4. Lack of Data Integrity (Standardization) – data was defined differently by different end users or applications**

- **V. Database Management Approach**
- **Consolidate the data from separate files into databases accessible by multiple application programs**
  - **Database Management System (DBMS) – a collection of programs to create, maintain, and use (retrieve) data in a database**
  - **Database Maintenance – organizational databases need to be updated continually**
  - **Application Development – facilitated by the Data Manipulation Language (DML) provided by the DBMS**
- **Database Interrogation – query ("ask") the database for information**
  - **Query Language – allows ad hoc requests of the database**
  - **SQL Queries (Structured Query Language) – standard query language found in many databases**
  - **Boolean Logic – 3 logical operators: AND, OR, and NOT**
  - **Graphical and Natural Queries – easier methods of structuring SQL statements**

Chapter 6

Telecommunications and Networks

Section 1

Telecommunications and Networks

- **I. Networking the Organization**

❖ **Merging computing and communications yields computer networks which are more than the sum of their parts.**

- **II. The Concept of a Network**

❖ **The Concept of a Network – an interconnected/interrelated system**

- ❖ **Metcalf's Law – the utility (use) of a network equals the square of the number of users**

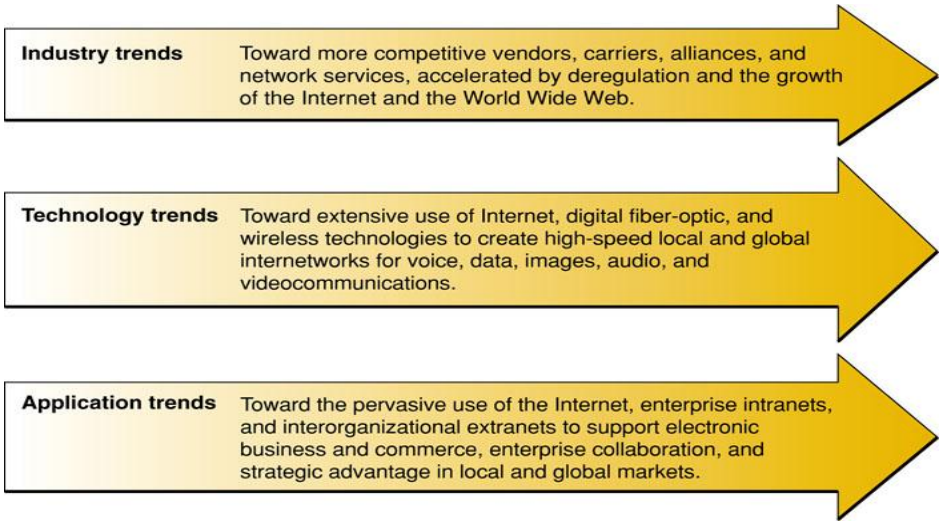
- **III. Trends in Telecommunications**

❖ **Telecommunications – the exchange of information in any form over a network**

- ❖ **Industry Trends – massively changed from government regulated monopolies to a fiercely competitive markets with many choices**
- ❖ **Business Application Trends – all these changes have caused significant changes in the businesses use of telecommunications**
- ❖ **Internet2 – a high performance network using an entirely different infrastructure from the public Internet; used mostly by universities (educational), research, and government**

❖ **Technology Trends**

- ❖ **Internet Networking Technologies – open systems with unrestricted connectivity using Internet networking technologies**
- ❖ **Open Systems – IS using common standards for h/w, s/w, applications, and networking**
- ❖ **Middleware – programs that mediate between other programs; an essential part of IT infrastructure because it joins disparate systems**
- ❖ **Wireless technologies**



- **IV. The Business Value of Telecommunications Networks**

❖ **Cut costs, shorten lead/response times, improve collaboration, support e-commerce**

- ❖ **The Internet Revolution – a "network of networks", the largest and most important network, constantly expanding**
- ❖ **Internet Service Providers (ISP) – provides easy access to the Internet**
- ❖ **Internet Applications – browsing the Net, email, instant messaging**
- ❖ **Business Use of the Internet – the Internet adds value to every prt of the business cycle**
- ❖ **The Business Value of the Internet**

- **V. The Role of Intranets**

❖ **Intranet – a private internal network using Internet technologies**

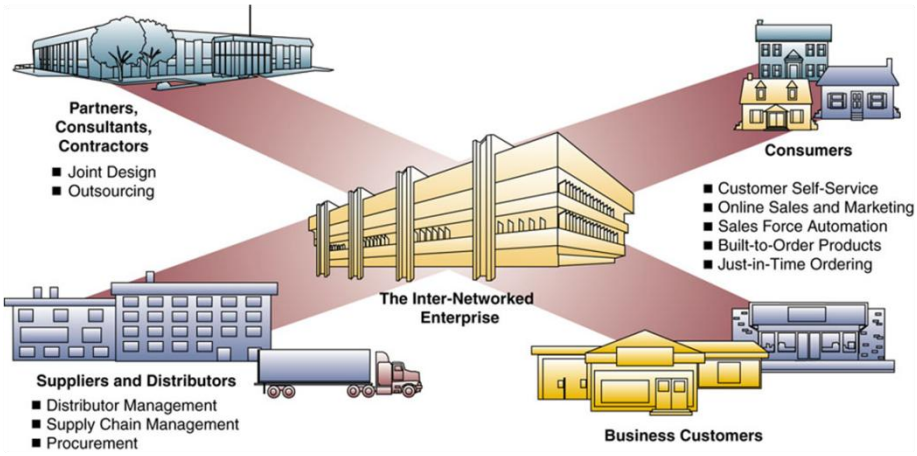
- ❖ **The Business Value of Intranets – an enterprise information portal supporting communications and collaboration**
- ❖ **Communications and Collaboration – improved by Intranets**
- ❖ **Web Publishing – developing and publishing hyperlinked multimedia documents**
- ❖ **Business Operations and Management – develop/deploy critical applications supporting operations and managerial decision making**
- ❖ **Intranet Portal Management – managed by IS/IT professionals**

- **VI. The Role of Extranets**

❖ **Extranet – A private network using Internet technologies (intranet) opened to select external entities for purposes of communications**

❖ **Purpose – interconnect the business with its suppliers/customers/business partners**

Extranets connect the internetworked enterprise to customers, suppliers, and trading partners



Section 2

Telecommunications Network Alternatives

- **I. Telecommunications Alternatives**
  - **Telecommunications is a highly technical, rapidly changing field, but most business professional do not need detailed knowledge of these details**

- **II. Telecommunications Network Model – 5 basic components:**
  - **Terminals – any input/output device to transmit/receive data**
  - **Telecommunications Processors – support data transmission/reception between terminals**
  - **Telecommunications Channels – media over which messages are sent**
  - **Computers – interconnected by telecommunications networks**
  - **Telecommunications control software – programs to control telecommunications activities and functions**

- **III. Types of Telecommunications Networks**
  - **A Network is defined by its geographic area and who owns the equipment**
    - **Wide Area Networks (WAN) – between cities/large geographic areas, LANs connected by common carrier or leased lines**
    - **Metropolitan Area Networks (MAN) – LANs connected over a specific geographical area**
    - **Local Area Networks (LAN) – equipment owned by the firm, short distances, usually within a single building (or room), A LAN allows sharing of resources**
    - **Virtual Private Networks (VPN) – a network using the Internet as a backbone but incorporating security for privacy**
    - **Client/Server Networks – a powerful, central computer (server) providing information and processing (services) to multiple end-user computers (clients)**
    - **Network Computing – a minimally-powered browser-based computer obtains its data and processing from the Internet**
    - **Peer-to-Peer Networks (P2P)**
      - **Central Server Architecture – P2P software connects a PC to the central server with a directory of all other users (peers)**
      - **Pure Peer-to-Peer – PCs connected without any central server**

- **IV. Digital and Analog Signals**
  - **Analog (continuous) – any value between the maximum/minimum value is possible (e.g., any frequency between 20hz and 20K hz)**
  - **Digital (discrete) – only certain values are permitted (e.g., 0 and 1)**

- **V. Telecommunications Media**
  Media – the physical pathway over which signals travel

- **Twisted-Pair Wire – pair of very thin copper wires twisted in opposite directions (noise reduction); cheap, easy to use, but low bandwidth**
- **Coaxial Cable – central copper wire wrapped with insulator, an external wire braid surrounded by a cover; not as easy to manipulate, more expensive than twisted pair, but higher bandwidth**
- **Fiber Optics – hair-thin glass fibers wrapped in protective jacket (cladding), conducts light (photons); difficult to handle, expensive, but highest bandwidth**
- **The Problem of "The Last Mile" – although a telecomm provider puts the latest technology to your door, your home/office is still wired with old fashioned technology, so all the provider's efforts do not help once the signal reaches your location and you are constrained (limited) by the technology in your own home/office**

- **VI. Wireless Technologies**

Wireless Technologies – communications without wires

- **Terrestrial Microwave – earth-bound towers and line-of-sight radio signals, towers placed on hills and tops of building**
- **Communications Satellites – also use microwaves, satellites in geosynchronous orbits, for voice, video, and data**
- **Cellular and PCS Systems – use cellular technologies**
- **Wireless LANs – cheaper than re-wiring a building**
- **Bluetooth – short range wireless**
- **The Wireless Web – wireless is becoming so popular that new wireless standards for the Web are appearing**

- **VII. Telecommunications Processors**

- **Modems – Modulate/Demodulate – change digital signals to analog and analog to digital to use common carrier (voice lines) between computers; most common processor**
- **Inter-Network Processors – connects networks; switches, routers, hubs**
- **Multiplexor – allows a single channel to carry multiple signals at one time**

- **VIII. Telecommunications Software**

- **Network Management – network operating systems and telecommunications monitors**

- **IX. Network Topologies**

- **Topologies – the structure (or "look") of a network; 3 basic types: bus, ring, star** (SEE Slides)
- **Protocols – formal rules for communications**
- **Network Architectures**
- **The Internet's TCP/IP – Transmission Control Protocol/Internet Protocol – the standard protocol for the Internet**
- **Voice Over IP – Internet telephony, replaces public-switched service**

- **The OSI Model – a standard "reference model" for how messages should be transmitted**
  - **Layer 1: The physical layer**
  - **Layer 2: The data link layer**
  - **Layer 3: The network layer**
  - **Layer 4: The transport layer**
  - **Layer 5: The session layer**
  - **Layer 6: The presentation layer**
  - **Layer 7: The application layer**

- **X. Bandwidth Alternatives**
- **Bandwidth: the capacity of a network**

- **XI. Switching Alternatives**
- **Switching Alternatives – packet switching and other new ideas to replace the standard circuit switching of POTS (Plain Old Telephone Service)**

- **XII. Network Interoperability**
- **Network Interoperability – common procedures and protocols so that anyone on a network can communicate with anyone else on another network**

Chapter 7

e-Business Systems

Section 1

E-Business Systems

- **I. Introduction**

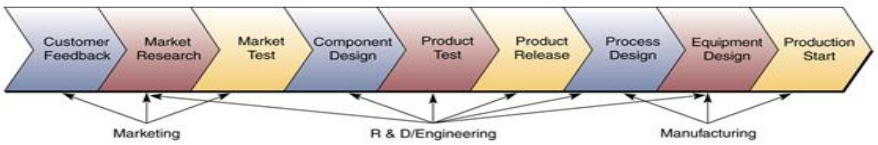
❖ **e-business is much broader than e-commerce, using the Internet for any type of business activity**

- **II. Cross-Functional Enterprise Applications**

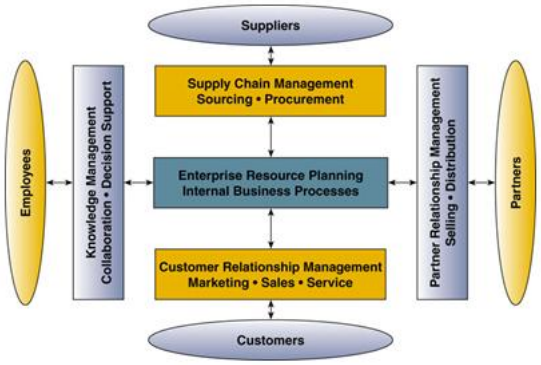
❖ **Reengineer/improve business activities by crossing boundaries of traditional business functions**

- ❖ **Enterprise Application Architecture – overview of major cross-functional enterprise applications and their interrelationships**

The New Product Development Process



Interrelationships of Cross-Functional Enterprise Applications



- **III. Enterprise Application Integration**

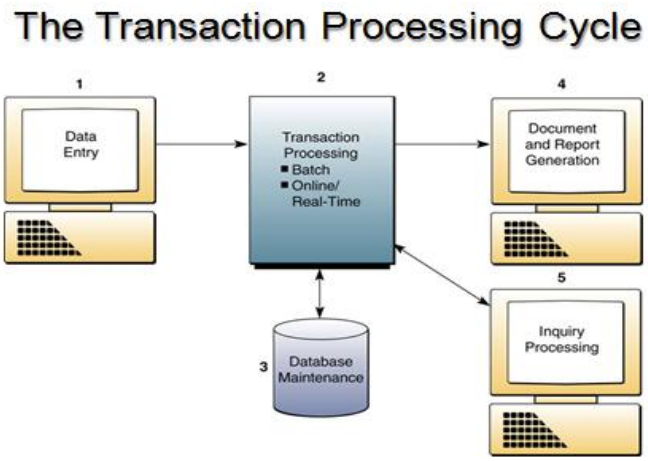
❖ **Connects e-business applications; integrates front-office and back-office applications**

- **IV. Transaction Processing Systems**

❖ **Handles/records daily business activities (transactions)**

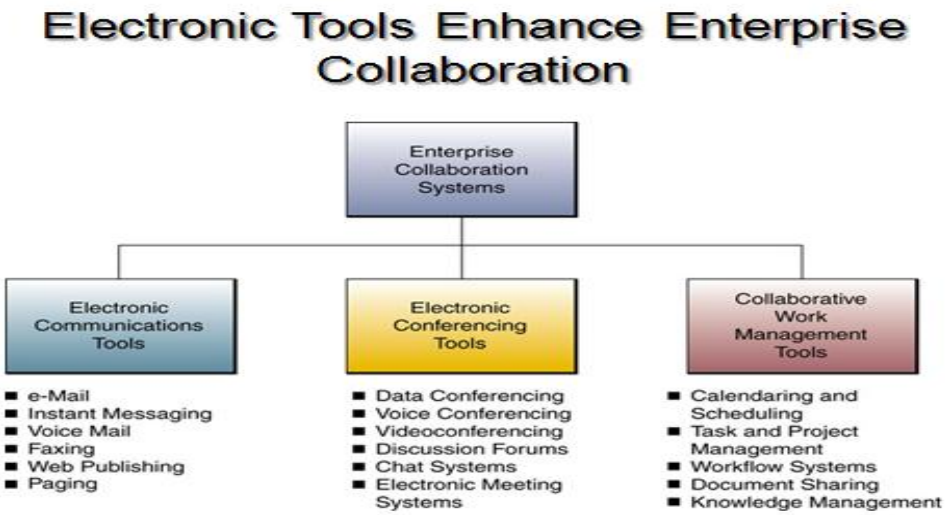
- ❖ **Transaction – anything that occurs during daily business of which a record must be kept**
- ❖ **Online transaction Processing Systems – capture and process transactions immediately, in real time**

- **Transaction Processing Cycle – 5 activities:**
  - **Data Entry – capture business data**
  - **Transaction Processing**
    - **Batch Processing – record data, the process it periodically in "batches"**
    - **Real-time (Online) Processing – capture and process the data immediately after it occurs**
- **Database Maintenance – Databases must be updated so they are always correct and up-to-date**
- **Document and Report Generation – T-P systems produce a variety of reports**
- **Inquiry Processing – users may query and receive reports about transactions**



- **V. Enterprise Collaboration Systems (ECS)**
- **Cross-functional IS help users to:**
  - **Communicate – share information**
  - **Coordinate – organize work efforts and resources**
  - **Collaborate – work together on projects**
- **Tools for Enterprise Collaboration**
  - **Electronic Communication Tools**
    - **e-Mail**
    - **Instant Messaging**
    - **Voice Mail**
    - **Faxing**
    - **Web Publishing**
    - **Paging**
- **Tools for Enterprise Collaboration**
  - **Electronic Conferencing Tools**
    - **Data Conferencing**
    - **Voice Conferencing**
    - **Videoconferencing**
    - **Discussion Forums**
    - **Chat Systems**
    - **Electronic Meeting Systems**

- **Tools for Enterprise Collaboration**
  - **Collaborative Work Management Tools**
    - **Calendaring and Scheduling**
    - **Task and Project Management**
    - **Workflow Systems**
    - **Document Sharing**
    - **Knowledge Management**

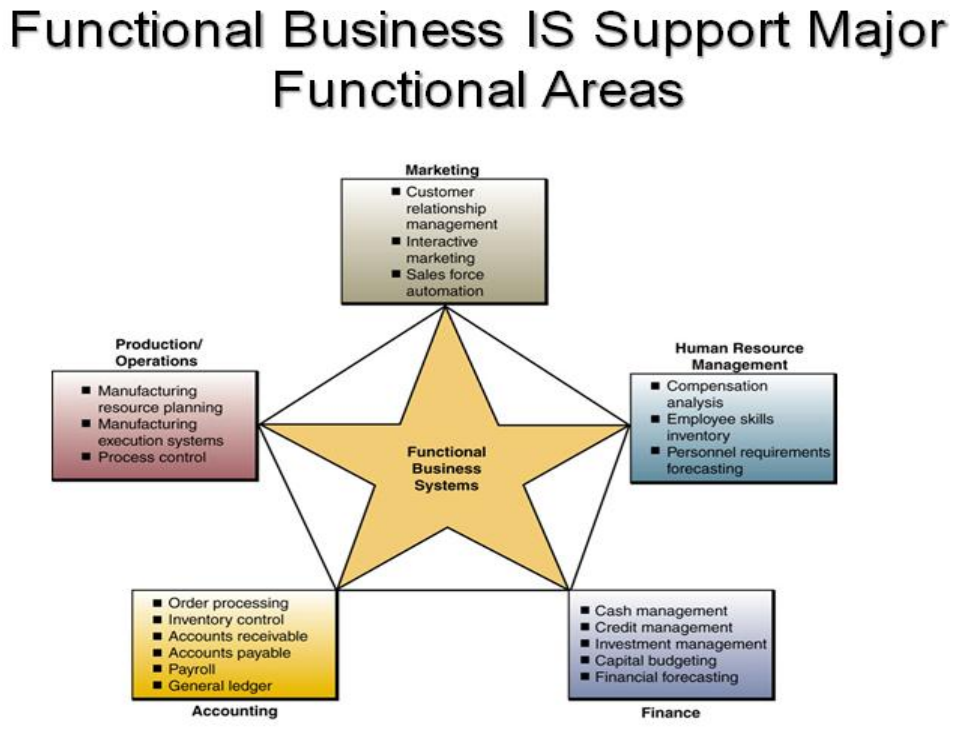


Section 2

Functional Business Systems

- **I. Introduction**

- **IT in Business – some IS support specific business functions**



- **II. Marketing Systems**

❖ **IS that aid in planning, promotions and sale of existing products in existing markets**

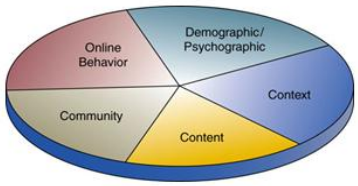
- ❖ **Interactive Marketing – customer-focused two-way transactions between a firm and its (potential) customers**
- ❖ **Sales Force Automation – connect the sales force to the Internet, intranets, and extranets**

❖ **Targeted Marketing – advertising/promotion concept that includes:**

- ❖ **Community – the group of people interested in the product**
- ❖ **Content – the message aimed at the community**
- ❖ **Context – relevant/related to the target audience**
- ❖ **Demographic/Psychographic – aimed only at specific types/classes of people**
- ❖ **Online Behavior – track a person's online behavior so the advertising can be targeted to the individual**

Marketing IS Support Major Components of the Marketing Function

Major Components of Targeted Marketing



- **III. Manufacturing Systems**

❖ **Support the production/operations function**

❖ **Computer-Integrated Manufacturing**

Goal: to create flexible, agile, manufacturing processes that efficiently produce highest quality products

3 Objectives:

- ❖ **Simplify (reengineer) production processes**
- ❖ **Automate – with computers, machines, robots**
- ❖ **Integrate – tie together all production and support processes with networks, cross-functional software, and other IT**

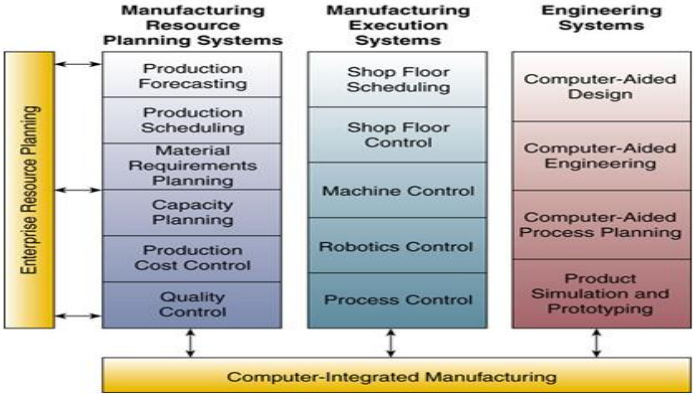
❖ **Computer-Aided Manufacturing – automate the production process**

❖ **Manufacturing Execution Systems –monitor performance**

❖ **Process Control – control ongoing physical processes**

❖ **Machine Control – use of computers to control machines**

Manufacturing IS Support Computer-Integrated manufacturing



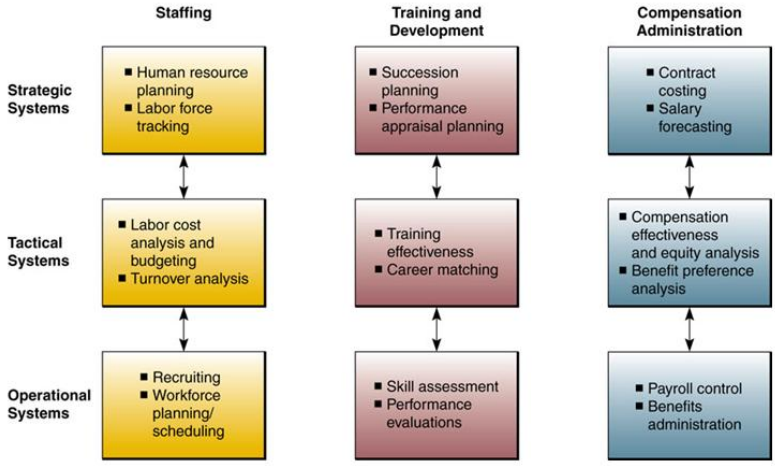
- **IV. Human Resource Systems**

❖ **Human Resource Information Systems (HRIS) support:**

- ❖ **Planning to meet personnel needs**
- ❖ **Development employee to their full potential**
- ❖ **Control personnel policies and programs**

❖ **HRM and the Internet – Internet is a major force for change in HRM**

❖ **HRM and Corporate Intranets – Intranets allow firms to provide services to customers and employees**



- **V. Accounting Systems**

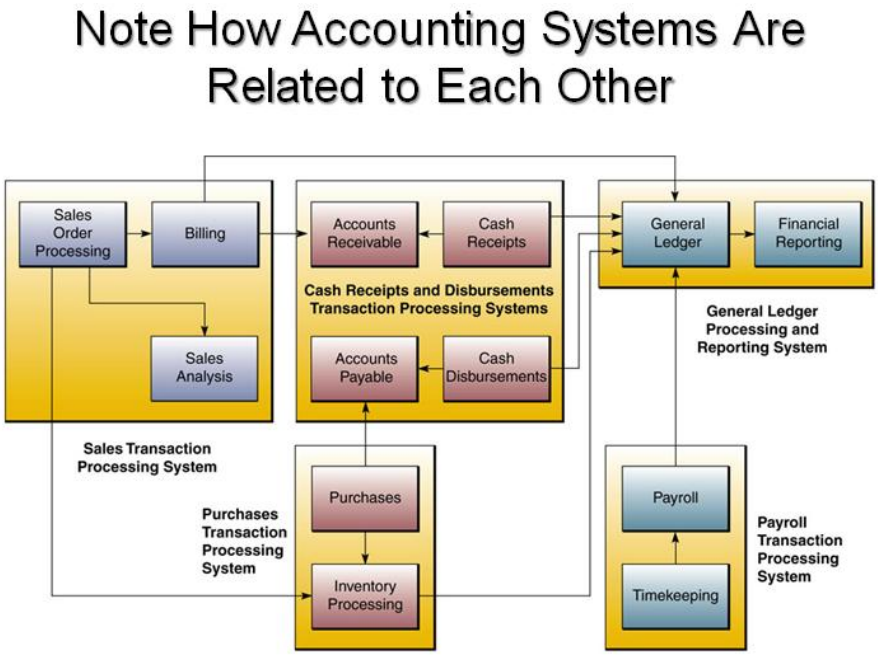
❖ **The oldest and most widely used IS in business; emphasize legal/historical record keeping accurate financial statements**

❖ **6 operational accounting systems:**

- ❖ **Order Processing – capture/process orders, create data for inventory control and accounts receivable**
- ❖ **Inventory Control – process data reflecting changes in inventory, provides shipping/reorder information**
- ❖ **Accounts Receivable – record amounts owed by customers, produce customer invoices/statements and credit management reports**

- ❖ **Accounts Payable – record purchases from, amounts owed to, and payments to suppliers, and produce cash management reports**
- ❖ **Payroll – record employee work and compensation data, produce paychecks and payroll documents**
- ❖ **General Ledger – consolidate data from other accounting systems, produce periodic financial statements and reports**

❖ **Online Accounting Systems – interactive, directly involved in processing business transactions**



- **VI. Financial Management Systems**

❖ **Support decisions concerning:**

❖ **Financing a business – determine financing needs**

❖ **Allocation and control of financial resources**

❖ **Capital Budgeting – evaluate profitability and financial impact of proposed capital expenditures**

❖ **Financial Planning – evaluate present and projected financial performance**

Chapter 8

Business Across the Enterprise

Section 1

Customer Relationship Management: The Business Focus

- **I. Introduction**
  - **Businesses today must be Customer-centric/Customer-focused – Customer, Customer, Customer!**

- **II. What Is CRM?**
  - **Providing the organization with a single complete view of every customer, and providing the customer with a single complete view of the organization and its extended channels**
  - **Contact and Account Management – capture and track relevant data about past and planned contacts**
    - **Sales – providing software tools and data sources to manage sales activities, and optimize cross-selling and up-selling**
      - **Cross-selling – selling related products to current customers**
      - **Up-selling – selling better products than the one currently purchased**
    - **Marketing and Fulfillment – automate direct marketing, scheduling, and tracking, and assist in scheduling responses and requests, while capturing relevant information for the marketing database**
    - **Customer Service and Support – provide customer service software tools, and real-time access to the customer database**
      - **Call Center Software – routes calls to customer support agents**
      - **Help Desk Software – provides assistance for customer service agents having problems with a product/service**
    - **Retention and Loyalty Programs – enhancing and optimizing customer retention and loyalty is a major business strategy because:**
      - **It costs 6 times more to sell a new customer than an existing one**
      - **Dissatisfied customers will tell 8–10 people about bad experiences**
      - **A firm can boost sales 85% by increasing customer retention 5%**
      - **Odds of selling a new customer – 15%; Odds of selling a current customer – 50%**
      - **If a firm resolves a service problem quickly, 70% of complaining customers will do business with the firm again**

- **III. The Three Phases of CRM**
  - **Acquire – CRM helps a new customer perceive value of a superior product/service**
  - **Enhance – CRM supports superior customer service, and cross-selling/up-selling**
  - **Retain – CRM helps proactively identify and reward the most loyal and profitable customers**

- **IV. Benefits and Challenges of CRM**
  - **CRM helps identify and reward the best customers**
- **V. CRM Failures**
  - **Although over 70% of firms plan to implement CRM, over 50% of CRM projects fail to produce promised results due to:**
    - **Lack of senior management sponsorship**
    - **Improper change management**
    - **Projects take on too much too fast**
    - **Poor integration between CRM and core business systems**
    - **Lack of end-user incentives leading to low user adoption rates**
- **VI. Trends in CRM**
  - **Firms must create tighter linkages with customers while enhancing the customer experience**
    - **Operational CRM – supports/synchronizes customer interactions**
    - **Analytical CRM – extracts customer information and predicts customer behavior**
    - **Collaborative CRM – enables collaboration with customers, suppliers, and business partners**
    - **Portal-Based CRM – enables access to customer information and CRM tools**

Section 2

Enterprise Resource Planning: The Business Backbone

- **I. Introduction**
  - **ERP is a multifunctional enterprise wide backbone that integrates/automates business processes and information systems**
- **II. What is ERP?**
  - **A cross-functional software suite supporting basic internal business processes of a firm**
- **III. Benefits and Challenges of ERP**
    - **Major Business Value from ERP**
      - **Quality and Efficiency – significant improvements in quality and efficiency of customer service, production, and distribution**
      - **Decreased Costs – significant reductions in transaction costs, hardware and software, and IT support staff**
      - **Decision Support – provides cross-functional information that enables better decision making across the enterprise**
      - **Enterprise Agility – breaks down departmental/functional walls and enables more flexible, adaptive organizational structures**
    - **Costs of ERP – if you do not do ERP properly you can kill the firm**
    - **Causes of ERP Failures**
      - **#1 cause – underestimating the complexity of planning, development, and training necessary for success**
      - **Failure to involve affected employees**
      - **Trying to do too much too fast**
      - **Overreliance on claims of software vendors/consulting firms**

- **IV. Trends in ERP**
  - **Improvements in Integration and Flexibility – ERP modules have become more flexible and easier to install**
  - **Extensions to Business Applications – access to intranets/extranets**
  - **Broader Reach to New Users – use of the Internet, intranets and extranets provides new links to customers, suppliers, and partners**
  - **Adoption of Internet Technologies –enables all the above**

Section 3

Supply Chain Management: The Business Network

- **I. Introduction**

Successful SCM is based on accurate order processing, JIT inventory management, and timely order fulfillment; this was theoretical 10 years ago, but is now a competitive weapon

- **II. What is SCM?**

A cross-functional interenterprise system using IT to support/manage links between key business processes and suppliers, customers, and business partners

  - **Electronic Data Interchange (EDI) – an early SCM methodology for exchanging information between partners using standard document message formats, still very popular but being replaced by .xml-based Web services**

- **III. The Role of SCM**

To optimize the effective/efficient movement of materials between suppliers, customers, and other partners

- **IV. Benefits and Challenges of SCM**

SCM solutions are becoming more complex

Benefits:

  - **Faster, More Accurate Order Processing**
  - **Reductions in Inventory Levels**
  - **Quicker Times to Market**
  - **Lower Transaction and Materials Costs**
  - **Strategic Relationships with Suppliers**

Challenges – SCM Failures Caused By:

  - **Lack of Knowledge about Demand Planning**
  - **Inaccurate/Overly Optimistic Demand Forecasts**
  - **Inaccurate Production, Inventory, and Other Business Data**
  - **Lack of Adequate Collaboration Among Marketing, Production, and Inventory Management Departments**

- **V. Trends in SCM**

3 Stages to SCM Implementation

  - **Improve Internal Supply Chain Processes and Improve Relationships with Suppliers and Customers**
  - **Use Supply Chain Software, Intranets, and Extranets with Trading Partners**
  - **Develop and Implement Collaborative SCM Applications**

Chapter 9

e-Commerce Systems

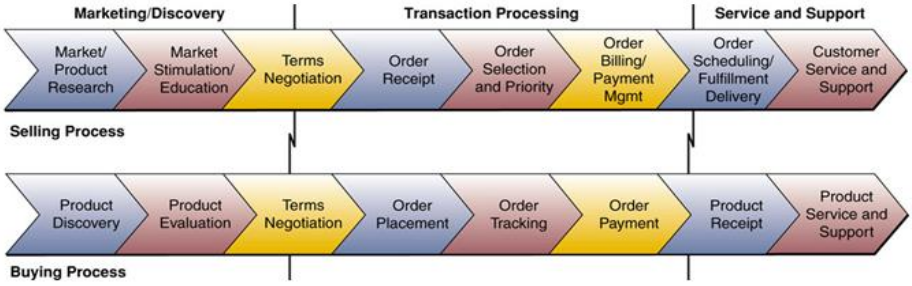
Section 1

E-Commerce Fundamentals

- **I. Introduction to e-Commerce**
  - **Electronic Commerce – the entire online process of developing, marketing, selling, delivering, servicing, and paying for products and services transacted on networked global marketplaces; more than just buying and selling online**
  - **e-Commerce – the online exchange of value; more than just buying and selling on the Internet**
- **II. The Scope of e-Commerce**

Includes marketing, discovery, transaction processing, product and customer service process, intranet and extranet access, and customer collaboration

e-Commerce Technologies – involves most information and Internet technologies



Categories of e-Commerce

- **Business-To-Consumer (B2C) e-Commerce – still small when compared with all online commerce**
- **Consumer-To-Consumer (C2C) e-Commerce – online auctions, online advertising of personal products and services**
- **Business-To-Business e-Commerce – most of e-Commerce is here**
- **Business-To-Government (B2G) e-Commerce**

- **III. Essential e-Commerce Processes**

Access Control and Security – secure access between parties to assure trust

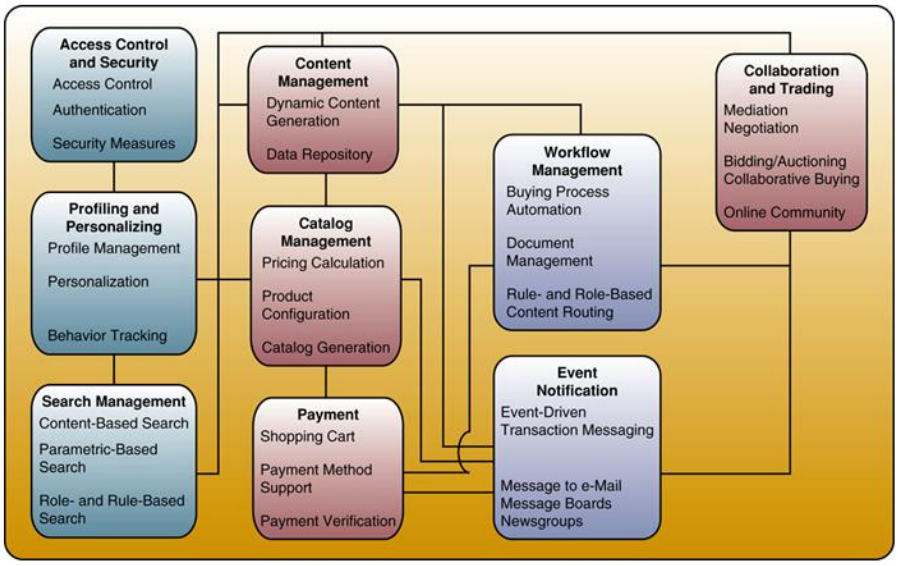
Profiling and Personalizing – processes that gather data on you and your behavior to provide personalized service; this may raise ethical issues

Search Management – effective and efficient search processes are required for a good Web site; there are more than 30 different search engines on the Internet

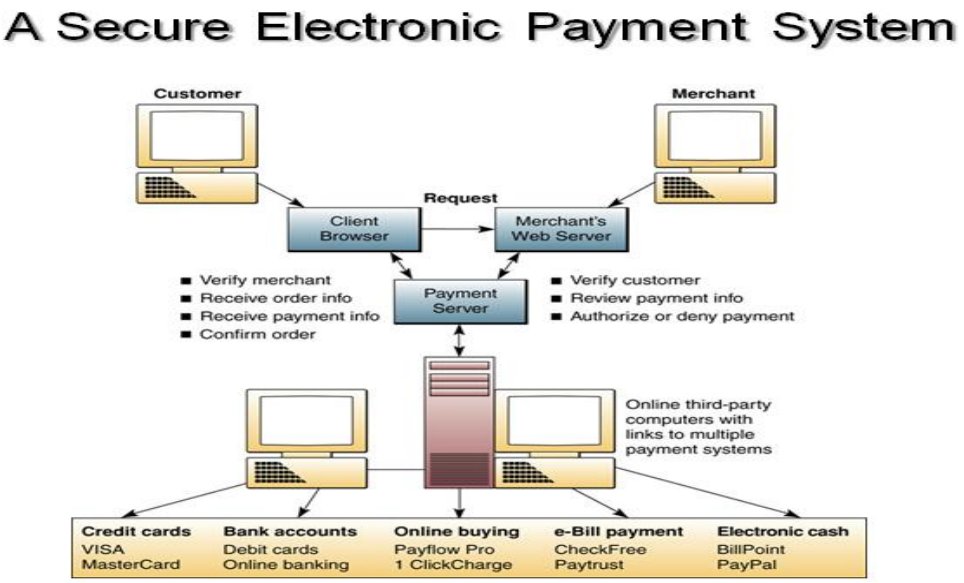
Content and Catalog Management

- **helps e-commerce firms develop, generate, deliver, and archive text and multimedia data**
- **works with profiling tools**
- **may include product configuration to support customer self-service and mass customization**

- **Workflow Management – ensure proper transactions, decisions, and work activities are performed, and documents distributed correctly**
- **Event Notification – monitor all e-commerce processes and record all relevant events; most e-commerce applications are event-driven and respond to things that happen (events)**
- **Collaboration and Trading – a major category of e-commerce; processes consist of collaboration and trading services needed by various stakeholders**



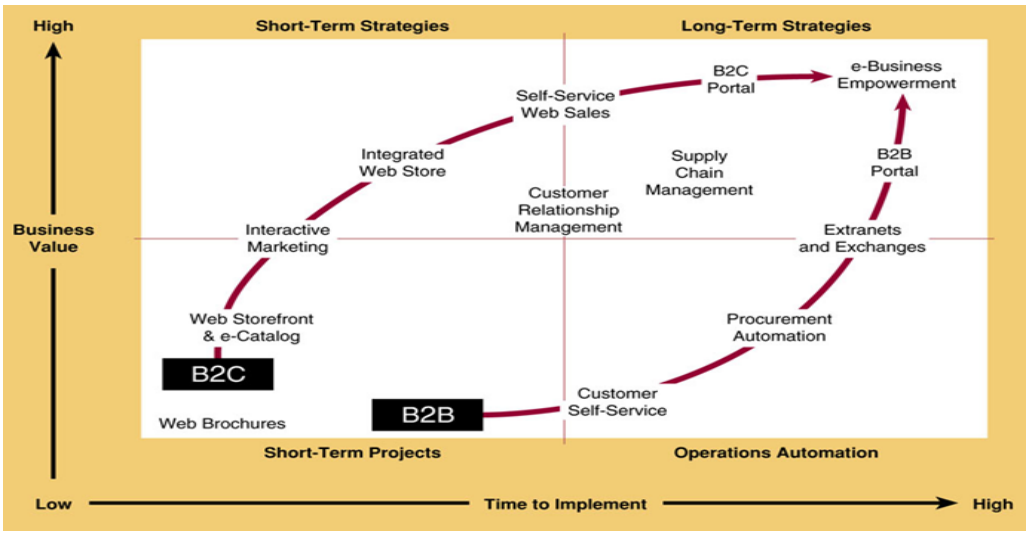
- **IV. Electronic Payment Processes**
- **Very complex due to the anonymous nature of electronic transactions**
- **Web Payment Processes – most rely on credit card payment processes**
- **Electronic Funds Transfer (EFT) – a variety of information technologies to capture and process money/credit transfers between banks, businesses, and customers**
- **Secure Electronic Payments – measures taken to ensure security of information in electronic payments**
    - **Encrypt data between customer and merchant**
    - **Encrypt data between customer and firm authorizing credit cards**
    - **Take sensitive information offline**



Section 2

e-Commerce Applications and Issues

- **I. Introduction**
  - ❖ **e-commerce has changed how firms do business and is now defining how firms do business**
  - ❖ **e-Commerce Trends**



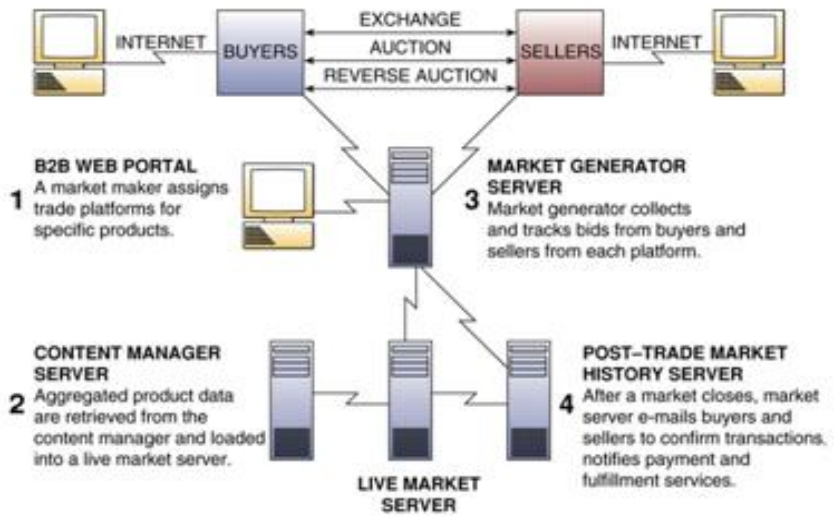
- **II. Business-To-Consumer (B2C) e-Commerce**
  - ❖ **Attract potential customers, transact goods and services, build customer loyalty**
    - ❖ **e-Commerce Success Factors**
      - ❖ **Selection and Value – attractive products, competitive prices**
      - ❖ **Performance and Service – easy navigation and purchasing, prompt shipping and delivery**
      - ❖ **Look and Feel – attractive Website, multimedia catalog**
      - ❖ **Advertising and Incentives – targeted Webpage advertising, email promotions, discounts, special offers**
      - ❖ **Personal Attention – personalized Web pages and product recommendations, email notices, interactive support**
      - ❖ **Community Relationships – virtual communities and links to related Web sites**
      - ❖ **Security and Reliability – security of customer information and transactions, trustworthy product information, reliable order fulfillment**
      - ❖ **Great Customer Communications – easy-to-find contact information, online order status, product support**

Traditional Vs. Web Market Communications

Buying Process	Awareness	Consideration	Preference	Purchase	Loyalty
Traditional Market Communications	■ Television ads ■ General interest magazines	■ Television ads ■ General interest magazines	■ Niche magazines ■ Collateral	■ Point-of-sale promotions ■ Direct marketing	■ Product experience ■ Buyers' clubs
Web Market Communications	■ Buttons ■ Banners ■ Sponsorships	■ Banners	■ Microsites ■ Brochureware ■ Web site	■ Daily specials ■ Sweepstakes ■ First-time order incentives	■ e-Mail alerts ■ Newsletters

- **III. Web Store Requirements**
  - ❖ **Most B2C e-commerce ventures are retail businesses on the Web; primary focus is to develop, operate, and manage the Website to attract and maintain customers for repeat sales**
    - ❖ **Getting Customers to Find You – customers must find you on the Web**
    - ❖ **Search Engine Optimization (SEO) – focus on improving the number/quality of visitors to a Web site**
    - ❖ **Serving Your Customers – a Web site should help serve customers personally and efficiently so they become loyal customers**
      - ❖ **Web Cookie File – a file stored on the customer's computer with details about their visit to your Web site**
    - ❖ **Managing a Web Store – a Web store must be managed as both a Web site and a retail store**
- **IV. Business-To-Business (B2B) e-Commerce**
  - ❖ **The wholesale/supply side of e-Commerce**
- **V. e-Commerce Marketplaces**
  - ❖ **One-to-Many – sell-side marketplace – one major supplier dictates products and prices**
  - ❖ **Many-to-One – buy-side marketplace – many suppliers attempt to sell to one buyer**
  - ❖ **Some-to-Many – distribution marketplace – many suppliers combine catalogs to attract a larger audience of buyers**
  - ❖ **Many-to-Some – procurement marketplace – buyers combine purchasing power to gain lower prices from suppliers**
  - ❖ **Many-to-Many – auction marketplace – used by many buyers and sellers**

A Sample B2B e-Commerce Web Portal

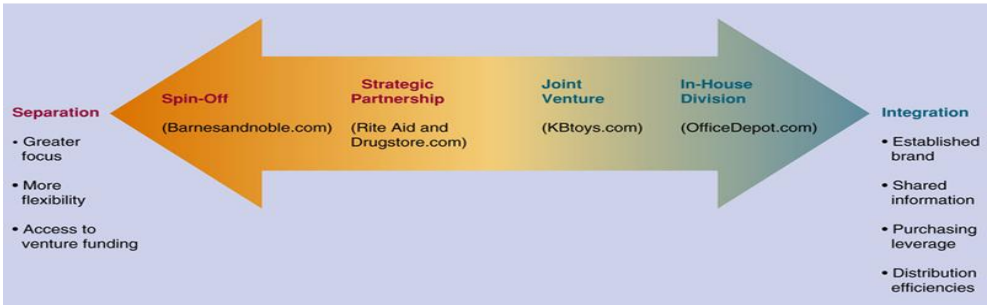


- **VI. Clicks and Bricks in e-Commerce**

❖ **Should virtual electronic business be combined with physical operations or kept separate?**

- ❖ **e-Commerce Integration – the Internet is just another channel that gets plugged onto the business architecture**
- ❖ **Other Clicks and Bricks Strategies – partial integration of e-commerce into the physical business operations, or complete separation of the two**
- ❖ **e-Commerce Channel Choices – a marketing/sales channel created to conduct/manage e-commerce activities**

An Integrated Vs. Separate e-Commerce Business



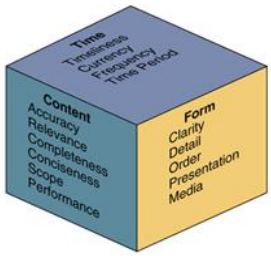
Chapter 10

Supporting Decision Making

Section 1

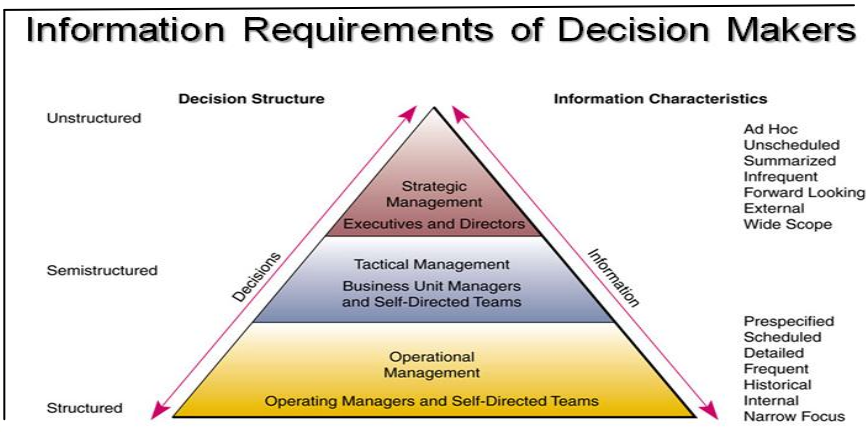
Supporting Decision Making

- **I. Introduction**
- **An organization is a nexus of decisions with information needs supplied by an Information System**
- **Information, Decisions, and Management – the type of information required by decision makers is directly related to the level of management decision making and the amount of structure in the decision situation**
  - **Strategic Management – executive level, long-range plans, organizational goals and policies, and objectives**
  - **Tactical Management – mid-level management, medium- and short-range plans to support objectives made by executives, and allocation of resources and performance monitoring of organizational subunits**
  - **Operational Management – short-range plans, day-to-day operations, direct the use of resources and performance of tasks**
- **Information Quality – characteristics of information products**
  - **Timeliness – was information present when needed?**
  - **Accuracy – was the information correct & error free?**
  - **Completeness – was all the needed information there?**
  - **Relevance – was the information related to the situation?**
- **Decision Structure**
  - **Structured – operational level, occur frequently, much information available**
  - **Semistructured – managerial level (most business decisions are here), not as frequent, less information available**
  - **Unstructured – executive level, infrequent, little information available**



Dimensions of Information

Time Dimension	
Timeliness	Information should be provided when it is needed.
Currency	Information should be up-to-date when it is provided.
Frequency	Information should be provided as often as needed.
Time Period	Information can be provided about past, present, and future time periods.
Content Dimension	
Accuracy	Information should be free from errors.
Relevance	Information should be related to the information needs of a specific recipient for a specific situation.
Completeness	All the information that is needed should be provided.
Conciseness	Only the information that is needed should be provided.
Scope	Information can have a broad or narrow scope, or an internal or external focus.
Performance	Information can reveal performance by measuring activities accomplished, progress made, or resources accumulated.
Form Dimension	
Clarity	Information should be provided in a form that is easy to understand.
Detail	Information can be provided in detail or summary form.
Order	Information can be arranged in a predetermined sequence.
Presentation	Information can be presented in narrative, numeric, graphic, or other forms.
Media	Information can be provided in the form of printed paper documents, video displays, or other media.



- **II. Decision Support Trends**
- ❖ **Using IS to support business decision making is increasing**
- ❖ **Business Intelligence (BI) – improving business decision making using fact-based support systems**
- ❖ **Business Analytics (BA) – iterative exploration of a firm's historical performance to improve the strategic planning process**
- **III. Decision Support Systems**
- **IS providing interactive support to managers during the decision-making process**
- **DSS Components – DSS relies on model-bases as well as databases**

- **IV. Management Information Systems**
- ❖ **Supports day-to-day managerial decision making**
- ❖ **Management Reporting Alternatives – MIS reports:**
    - ❖ **Periodic Scheduled Reports – supplied on a regular basis**
    - ❖ **Exception Reports – created only when something out of the ordinary happens**
    - ❖ **Demand Reports and Responses- available when requested**
    - ❖ **Push Reporting – reports sent without being requested**

- **V. Online Analytical Processing**
- ❖ **Enables examination/manipulation of large amounts of detailed and consolidated data from many perspectives**
    - ❖ **Consolidation aggregation of data**
    - ❖ **Drill-Down – displaying details that comprise the consolidated data**
    - ❖ **Slicing and Dicing – looking at a database from different viewpoints**
    - ❖ **OLAP Examples – the real power of OLAP is the combining of data and models on a large scale, allowing solution of complex problems**
    - ❖ **Geographic Information (GIS) and Data Visualization (DVS) Systems**
        - ❖ **GIS – facilitate use of data associated with a geophysical location**
        - ❖ **DVS – represent complex data using interactive 3-dimensional models, assist in discovery of patterns, links and anomalies**

- **VI. Using Decision Support Systems**
- ❖ **Involves interactive analytical modeling for exploring possible alternatives:**
    - ❖ **What-If Analysis – change variables and relationships among variables to see changing outcomes**
    - ❖ **Sensitivity Analysis – special case of what-if; change one variable at a time to see the effect on a pre-specified value**
    - ❖ **Goal-Seeking Analysis – reverse of what-if; changing variables to reach a target goal of a variable**
    - ❖ **Optimization Analysis – complex goal-seeking; finding the optimal value for a target variable**

- ❖ **Data Mining for Decision Support – providing decision support through knowledge discovery (analyze data for patterns and trends)**

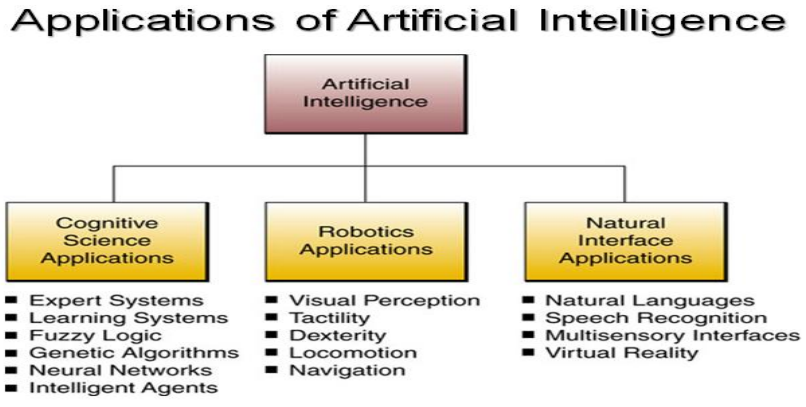
- ❖ **Market Basket Analysis (MBA) – one of the most common and useful types of data mining; MBA applications:**
  - ❖ **Cross-Selling – offer associated items to that being purchased**
  - ❖ **Product Placement – related items physically near each other**
  - ❖ **Affinity Promotion – promotions based on related products**
  - ❖ **Survey Analysis – useful to analyze questionnaire data**
  - ❖ **Fraud Detection – detect behavior associated with fraud**
  - ❖ **Customer Behavior – associate purchases with demographic and socioeconomic data**

- **VII. Executive Information Systems (EIS) a.k.a. Executive Support Systems (ESS)**
- ❖ **Popular to the point of being called "Everyone's Information Systems"**
  - ❖ **Features of an EIS – can be tailored to preferences of the executive, provides drill-down capabilities and "dashboards"**
- **VIII. Enterprise Portals and Decision Support**
- ❖ **Enterprise Information Portals (EIP) – Web-based interface with integration of MIS, DSS, EIS, etc., to give intranet/extranet users access to a variety of applications and services**
- **IX. Knowledge Management Systems**
- ❖ **Use of IT to gather, organize, and share knowledge within an organization**
  - ❖ **Enterprise Knowledge Portal – entry to knowledge management systems**

Section 2

Advanced Technologies for Decision Support

- **I. Business and AI**
- ❖ **A variety of ways to support decision making and improve competitive advantage**
- **II. An Overview of Artificial Intelligence (AI)**
- ❖ **Goal of AI is to simulate the ability to think – reasoning, learning, problem solving**
- ❖ **Turing Test – if a human communicates with a computer and does not know it is a computer, the computer is exhibiting artificial intelligence**
- ❖ **CAPTCHA (Completely Automated Public Turing Test) – a test to tell people from computers – a distorted graphic with letters/numbers; a human can see the letters/numbers a computer cannot**
- ❖ **Domains of Artificial Intelligence**
  - ❖ **Cognitive Science – how humans think and learn**
  - ❖ **Robotics – machines with intelligence and human-like physical capabilities**
  - ❖ **Natural Interfaces – speaking to a computer in a normal voice**



- **III. Expert Systems**
  - **Components of an Expert System**
    - **Knowledge Base – contains facts and the heuristics (rules) to express the reasoning procedures the expert uses**
    - **Software Resources –**
      - **Inference Engine – the program that processes the knowledge (rules and facts)**
      - **Interface – the way the user communicates with the system**
    - **Expert System Applications**
      - **Decision Management – consider alternatives, recommendations**
      - **Diagnostics/Troubleshooting – infer causes from symptoms**
      - **Design/Configuration – help configure equipment components**
      - **Selection/Classification – help users choose products/processes**
      - **Process Monitoring/Control – monitor/control procedures/processes**
    - **Benefits of Expert Systems – captures expertise of a specialist in a limited problem domain**
    - **Limitations of Expert Systems – limited focus, inability to learn, cost**
- **IV. Developing Expert Systems**
  - **Easiest is an expert system shell – an experts systems without the knowledge base**
    - **Knowledge Engineering – a knowledge engineer (similar to a systems analyst) is the specialist who works with the expert to build the system**
- **V. Neural Networks**
  - **Computing systems modeled after the brain**
- **VI. Fuzzy Logic Systems**
  - **Reasoning with incomplete or ambiguous data**
    - **Fuzzy Logic in Business – rare in the U.S. (preferring expert systems), but popular in Japan**
- **VII. Genetic Algorithms**
  - **Simulates evolutionary processes that yield increasingly better solutions**
- **VIII. Virtual Reality (VR)**
  - **Computer-simulated reality**
  - **VR Applications – CAD, medical diagnostics, flight simulation, entertainment**
- **IX. Intelligent Agents**
  - **Use built-in and learned knowledge to make decisions and accomplish tasks that fulfill the intentions of the user**

Chapter 11

Business/IT Strategies for Development

Section 1

IT Planning Fundamentals

I. Introduction

- **Simply knowing the importance and structure of e-business is not enough. A Plan is needed to transition from an old business design to a new e-business design.**

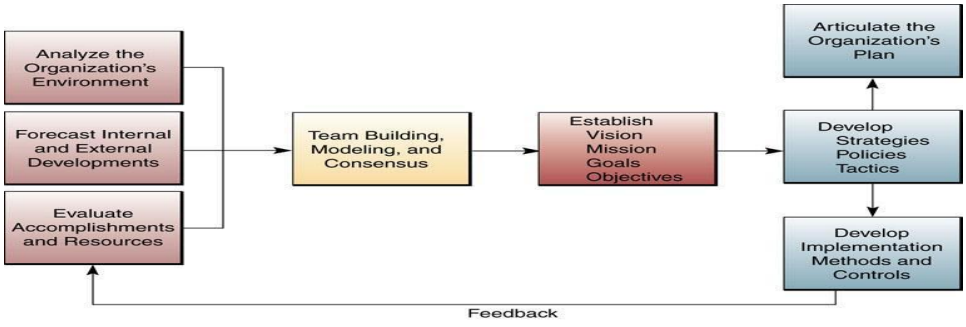
II. Organizational Planning

- **Enterprise-wide plans are required to introduce IT/IS-based solutions to the entire firm.**
- **Strategic Planning – develop a firm's mission, goals, policies**
- **Tactical Planning – develop objectives, procedures, rules, schedules, budgets**
- **Operational Planning – implement/control day-to-day operations**

III. The Scenario Approach

- **A less rigid but more realistic strategic planning methodology; combine known facts about the future with plausible alternatives**
- **Knowledge:**
  - **Trends – Things we think we know something about**
  - **Uncertainties – Elements we consider uncertain or unknowable**

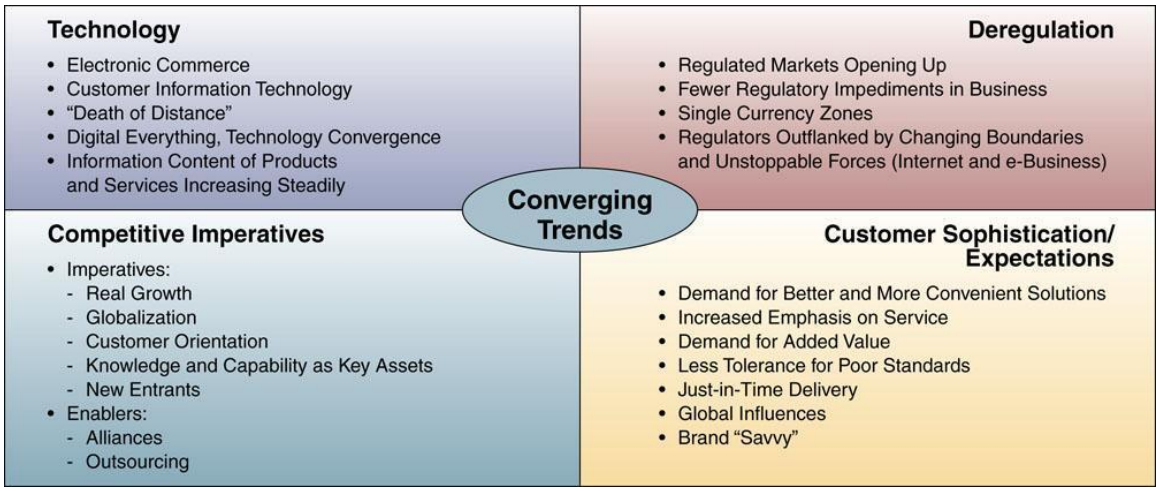
Components of an Organizational Planning Process



Strategic Visioning Questions for e-Business

Strategic Business Visioning	
• **Understanding the Customer**	Who are our customers? How are our customers' priorities shifting? Who should be our target customers? How will an e-business help reach our target customer segments?
• **Customer Value**	How can we add value for the customer with e-business services? How can we become the customer's first choice?
• **Competition**	Who are our real competitors? What is our toughest competitor's business model? What are they doing in e-business and e-commerce? Are our competitors potential partners, suppliers, or customers in an e-business venture?
• **Value Chain**	How would we design a value chain if we were just starting an e-business? Who would be our supply chain partners? What roles should we play: e-commerce Web site, B2C portal, B2B marketplace, or partner in an e-commerce alliance?

Converging Trends in Strategic Business/IT Planning



IV. Planning for Competitive Advantage

- **Evaluation of potential benefits/risk of using IT for competitive advantage**
- **SWOT (strengths, weaknesses, opportunities, threats) Analysis – evaluate impact of each possible strategic opportunity**
  - **Strengths – core competencies and resources**
  - **Weaknesses – areas of substandard performance**
  - **Opportunities – potential for new markets or innovation**
  - **Threats – potential for losses**

V. Business Models and Planning

- **Conceptual framework of how a business can deliver value to customers at a cost and still turn a profit**

Questions for All Business Models

Component of Business Model	Questions for All Business Models
Customer value	Is the firm offering its customers something distinctive or at a lower cost than its competitors?
Scope	To which customers (demographic and geographic) is the firm offering this value? What is the range of products/services offered that embody this value?
Pricing	How does the firm price the value?
Revenue source	Where do the dollars come from? Who pays for what value and when? What are the margins in each market and what drives them? What drives value in each source?
Connected activities	What set of activities does the firm have to perform to offer this value and when? How connected (in cross section and time) are these activities?
Implementation	What organizational structure, systems, people, and environment does the firm need to carry out these activities? What is the fit between them?
Capabilities	What are the firm's capabilities and capabilities gaps that need to be filled? How does a firm fill these capabilities gaps? Is there something distinctive about these capabilities that allows the firm to offer the value better than other firms and that makes them difficult to imitate? What are the sources of these capabilities?
Sustainability	What is it about the firm that makes it difficult for other firms to imitate it? How does the firm keep making money? How does the firm sustain its competitive advantage?

Questions for e-Business Models

Component of Business Model	Questions Specific to e-Business Models
Customer value	What is it about Internet technologies that allows your firm to offer its customers something distinctive? Can Internet technologies allow you to solve a new set of problems for customers?
Scope	What is the scope of customers that Internet technologies enable your firm to reach? Does the Internet alter the product or service mix that embodies the firm's products?
Pricing	How does the Internet make pricing different?
Revenue source	Are revenue sources different with the Internet? What is new?
Connected activities	How many new activities must be performed as a result of the Internet? How much better can Internet technologies help you to perform existing activities?
Implementation	How do Internet technologies affect the strategy, structure, systems, people, and environment of your firm?
Capabilities	What new capabilities do you need? What is the impact of Internet technologies on existing capabilities?
Sustainability	Do Internet technologies make sustainability easier or more difficult? How can your firm take advantage of it?

VI. Business/IT Architecture Planning

- **Plans on how to use IT to support customer value and business value goals**
- **Strategic Development – business strategies that support a firm's business vision**
- **Resource Management – strategic plans for managing or outsourcing a firm's IT resources**
- **Technology Architecture – strategic IT choices reflecting an IT architecture that supports a firm's e-business and other IT initiatives**
- **Information Technology Architecture – blueprint that contains:**
    - **Technology Platform – complete infrastructure supporting strategic use of IT for e-commerce and business/IT applications**
    - **Data Resources – databases and data warehouses**
    - **Application Architecture – business applications**
    - **IT Organization – organizational structure of the IS function within a firm**
- **Balanced Scorecard – measuring a company's activities in terms of its visions and strategies; not based on proven economic theory or decision sciences**
    - **Financial Perspectives – measures of financial performance**
    - **Customer Perspective – measures directly impacting customers**
    - **Business Process Perspective – measures performance of key business processes**
    - **Learning and Growth Perspective – measures the firm's learning curve**

VII. Identifying Business/IT Strategies

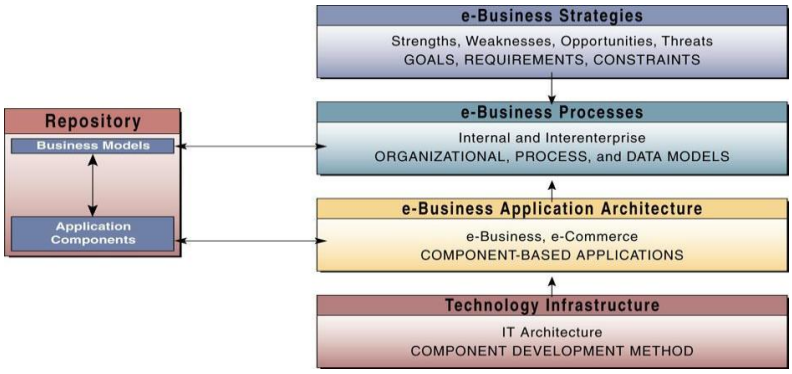
- **To optimize strategic impact, firms must continually assess the value of IT/e-commerce applications**
    - **Cost and Efficiency Improvements – low internal/external connectivity and low use of IT**
    - **Performance Improvement in Business Effectiveness – high internal but low external connectivity, need to improve collaboration**
    - **Global Market Penetration – high external connectivity and use of IT**
    - **Product and Service Transformation – extensively networked internally and externally**

VIII. Business Application Planning

- **IT proposals for addressing strategic business priorities and planning for application development**

- **Business/IT Architecture Planning – combines strategic planning methods (SWOT, etc.) with recent modeling and development methodologies**

E-Business Architecture Planning



Section 2

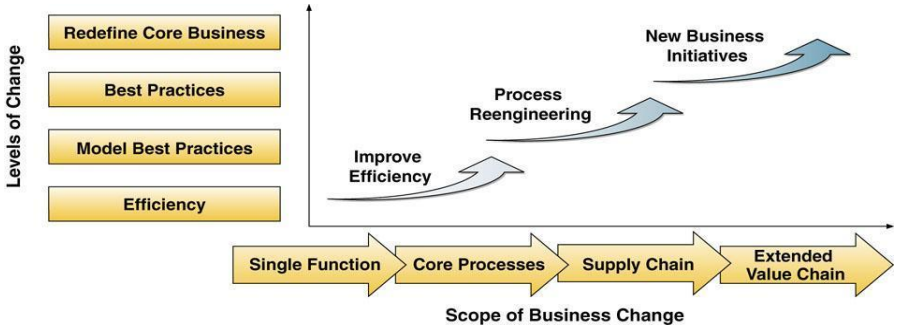
Implementation Challenges

I. Implementation

- **Carrying out the strategic plans developed in the planning process**

II. Implementing Information Technology

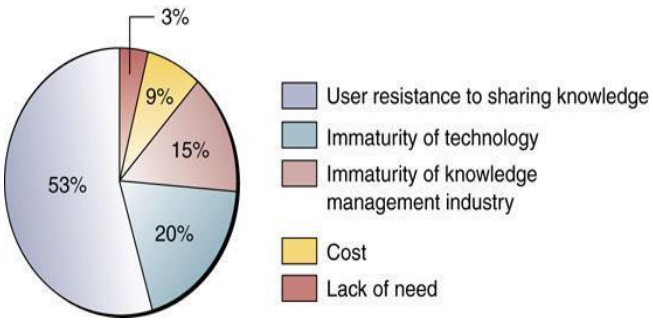
- **Moving to e-business involves major organizational change**



Impact and Scope of Business Change Caused By IT Implementation

III. End-User Resistance and Involvement

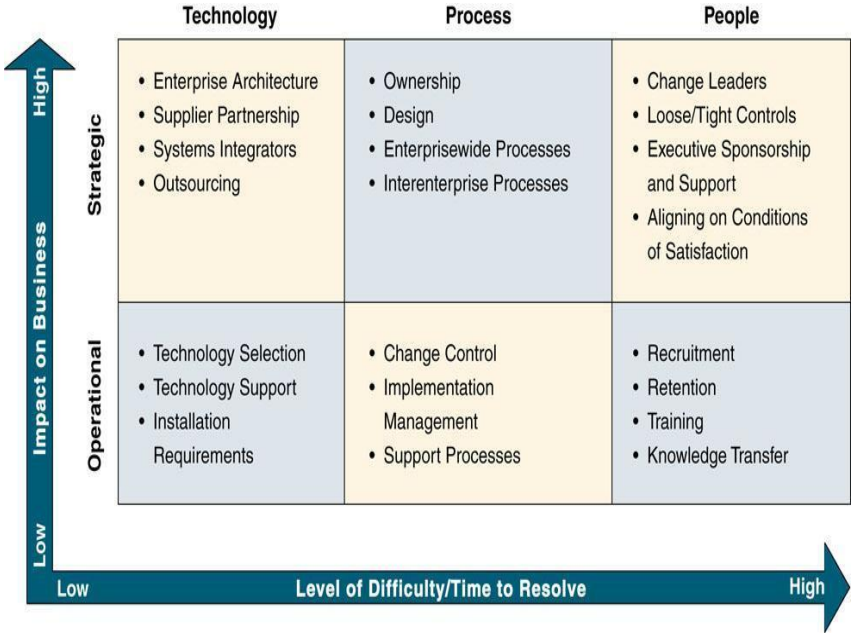
- **New ways of doing things always generates some resistance from those affected; end-user involvement in the change process can help minimize the resistance**



Obstacles to Knowledge Management Systems

IV. Change Management

- **Managing organizational change is important and can be difficult; people are a major focus here**
- **A Change Management Process – these 8 steps are just one way of visioning change management**



Key Dimensions of Change Management

Chapter 12

Implementing Business/IT Solutions

Section 1

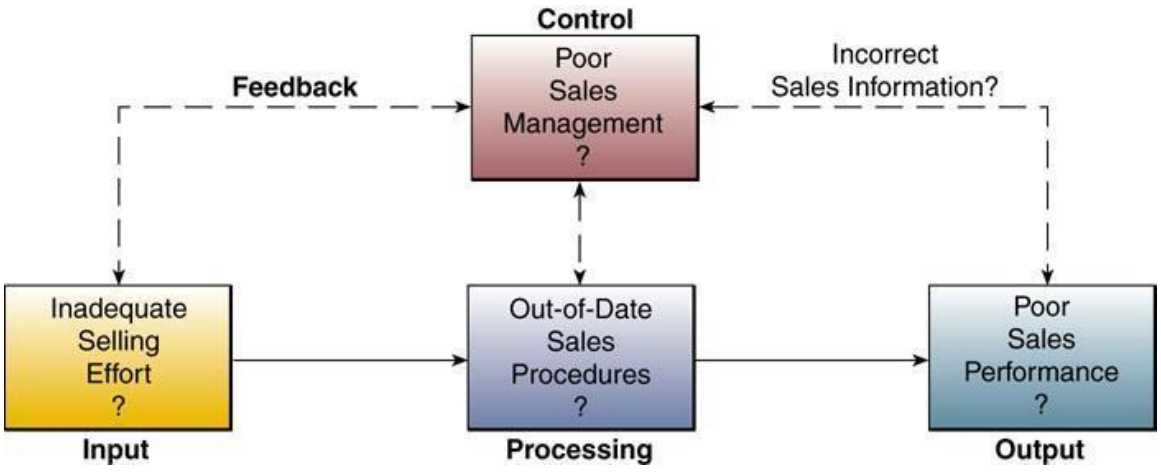
Developing Business Systems

I. IS Development

- **Applying the Systems Approach to IS development**
- **The Systems Approach is a systematic way to develop a solution to a problem**

II. The Systems Approach

- **Uses a systems orientation to defining and solving problems and opportunities**
- **Problem Solving – there are specific steps in solving any problem**
  - **Recognize/Define a Problem or Opportunity – recognize it exists**
  - **Develop and Evaluate Alternative System Solutions – what are the different ways to solve this problem?**
  - **Select the Best System Solution – decide which alternative is best**
  - **Design the Selected System Solution – design the system for the chosen solution**
  - **Implement and Evaluate the Success of the Designed System – put the solution into effect and monitor results for the outcome**
- **Systems Thinking – the "Fifth Discipline" – seeing the system context**
  - **See the Interrelationships among the systems rather than linear cause-and-effect chains**
  - **See the Process of change among the systems rather than discrete 'snapshots' of change**



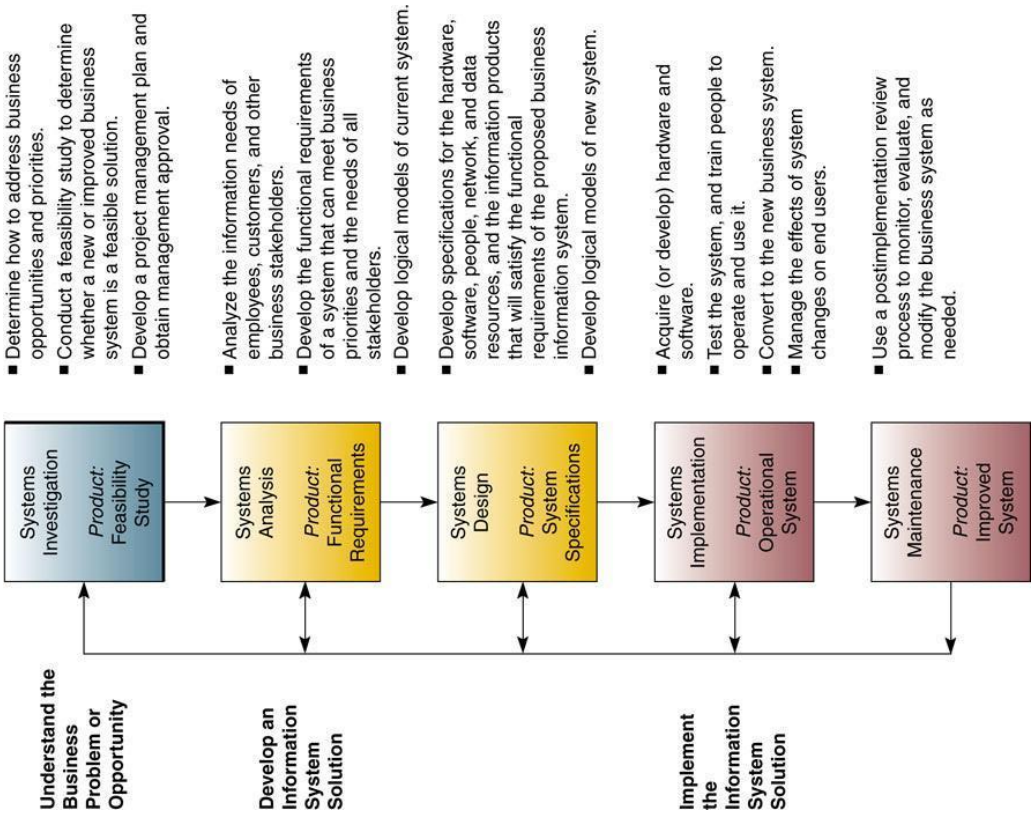
Systems Thinking

III. Systems Analysis and Design

- **The process of designing and implementing an IS – Object-oriented or Life Cycle approaches**
- **The Systems Development Life Cycle – a multistep, iterative process to designing systems, very popular, 5 Phases: Investigation, Analysis, Design, Implementation, Maintenance**

IV. Starting the Systems Development Process

- **Systems development can be very costly, investigations are made to determine whether to proceed**
- **Feasibility Studies – identify needs, resources, costs, benefits**
- **Operational Feasibility – will the proposed system fit existing business environment and objectives?**
- **Technical Feasibility – degree to which current technical resources can be applied to the new system**
- **Human Factors Feasibility – assess the degree of approval/resistance to the new system**
- **Economic Feasibility – the extent to which the proposed system will provide positive economic benefits to the organization**
  - **Cost/Benefit Analysis – do the benefits justify the costs?**
  - **Tangible Costs/Benefits – can be calculated/quantified (hardware, software, increase in payroll)**
  - **Intangible Benefits – hard to calculate (customer approval, political feedback)**
- **Legal/Political Feasibility – what are the legal/political ramifications of the new system?**



The Systems Development Life Cycle

Operational Feasibility	Economic Feasibility
• How well the proposed system supports the business priorities of the organization. • How well the proposed system will solve the identified problem. • How well the proposed system will fit with the existing organizational structure.	• Cost savings. • Increased revenue. • Decreased investment requirements. • Increased profits. • Cost/benefit analysis.
Technical Feasibility	**Human Factors Feasibility**
• Hardware, software, and network capability, reliability, and availability.	• Employee, customer, supplier acceptance. • Management support. • Determining the right people for the various new or revised roles.
Legal/Political Feasibility	
• Patent, copyright, and licensing. • Governmental restrictions. • Affected stakeholders and reporting authority.	

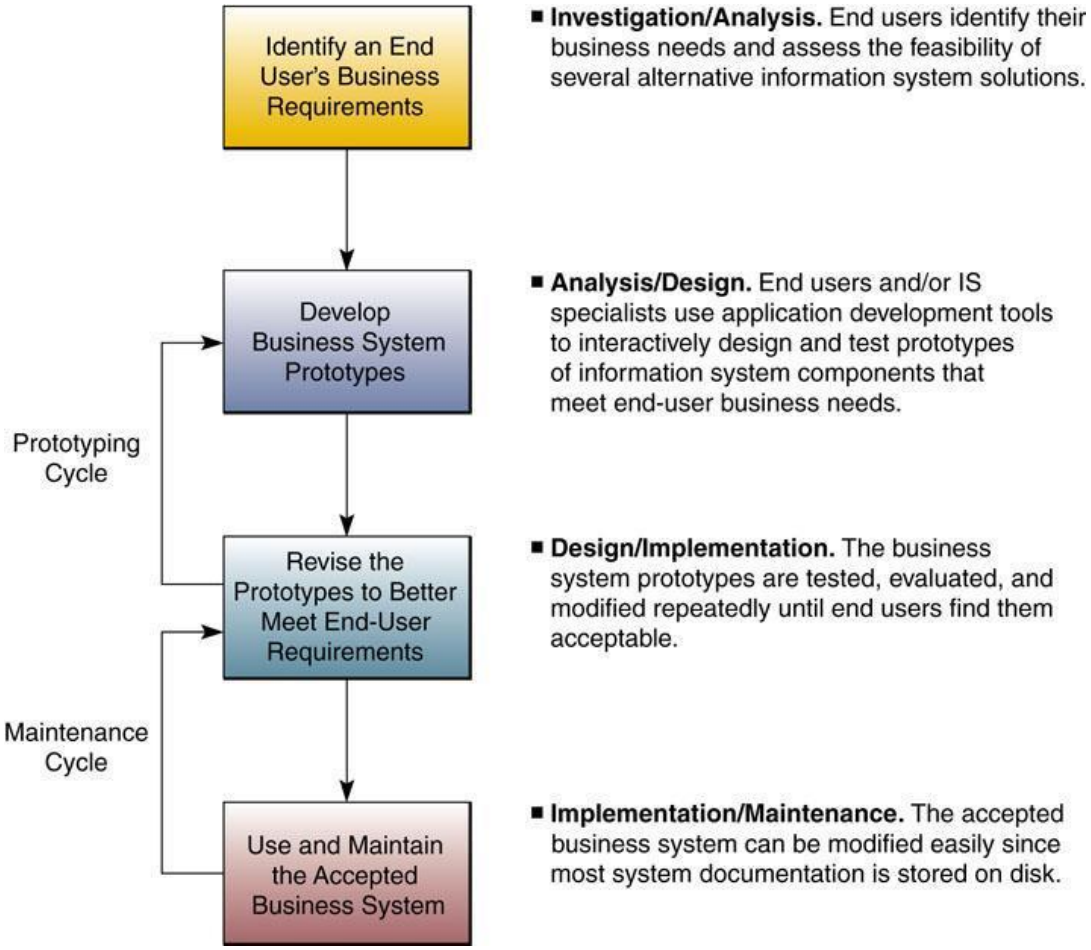
Feasibility Factors

V. Systems Analysis

- **A detailed study of the current system and organizational needs**
- **Organizational Analysis – you must have a thorough understanding of the organization to make the system work well**
- **Analysis of the Present System – "those who fail to study history are doomed to repeat it", a complete understanding of the current system is critical**
- **Logical Analysis – create logical models the current system, WHAT the system does without regard to HOW**
- **Functional Requirements Analysis and Determination – what Information is required for each business activity and what Processing is required in the system**

VI. Systems Design

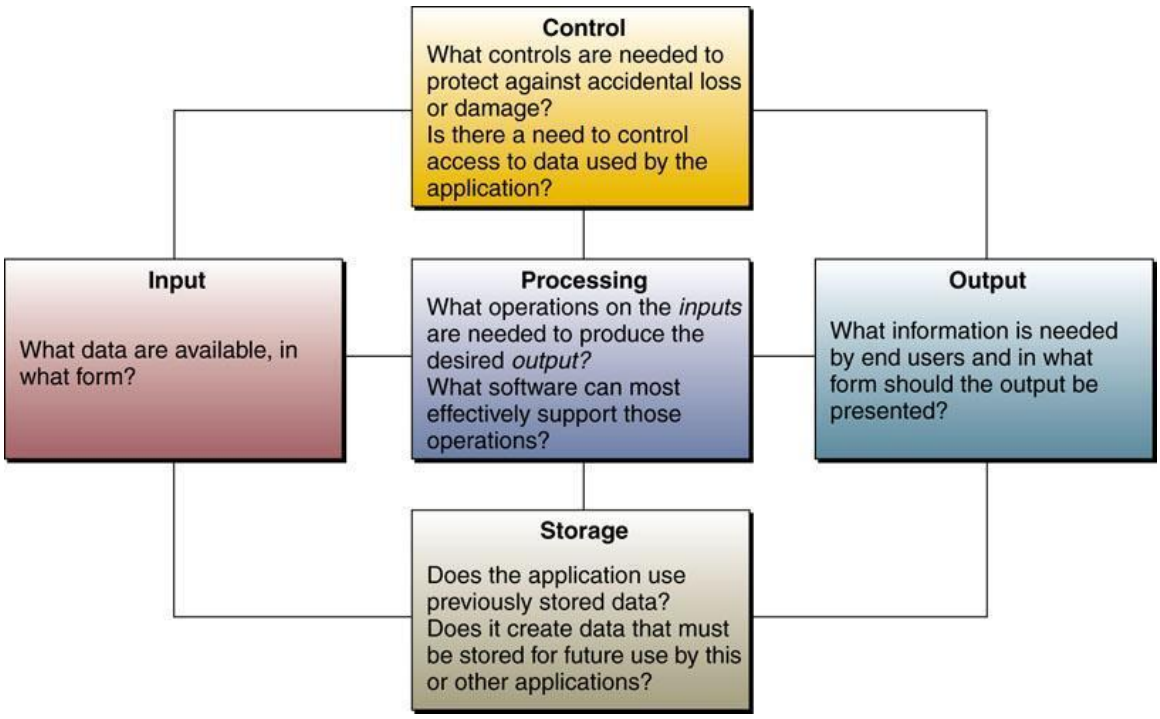
- **Create a new system to solve the problem/opportunity**
- **Prototyping – create working models of the proposed system**
- **The Prototyping Process – prototypes are developed quickly for trial by users to obtain user feedback**
- **User Interface Design – critical because the interface is the part of the systems closest to the user**
- **System Specifications – listing of elements that formalize the design**



The Prototyping Process

VII. End-User Development

- **IS professionals act as consultants while user do their own application development**
- **Focus on IS Activities – focus should be on fundamental activities: input, processing, output, storage, control**
- **Doing End-User Development – may discover new or improved ways to do the job**



VII. Technical Note: Overview of Object-Oriented Analysis and Design

- **Objects – anything a programmer wants to manage or manipulate**
- **Object-Oriented Programming (OOP)**
  - **Inheritance – ability to inherit properties of a higher-order object**
  - **Modularity – a series of interlinked yet stand-alone modules**
  - **Polymorphism – different behavior based on conditions**
  - **Encapsulation – concealing all the properties inside the object**
- **Object-Oriented Analysis (OOA) – modeling the problem domain as an object-oriented system**
  - **Object-Oriented Design (OOD) – create solutions using objects**

Section 2

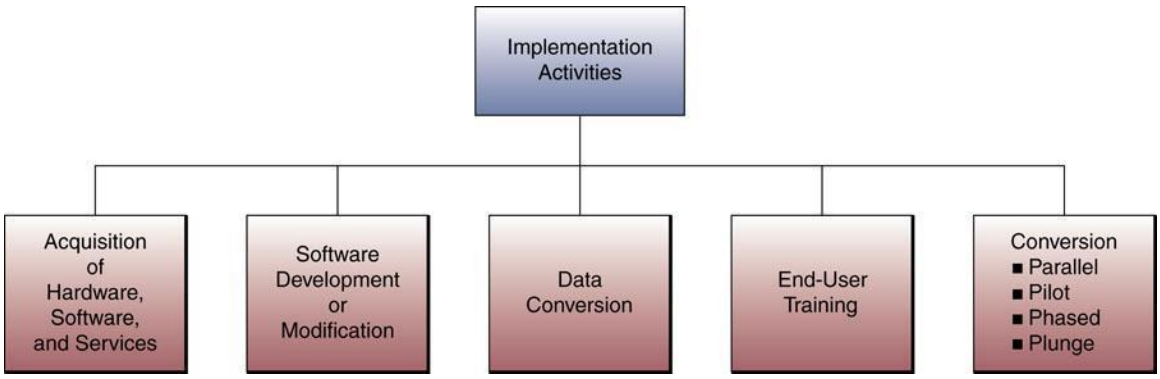
Implementing Strategic Business Systems

I. The World of Systems Implementation

- **Implementation is a vital step that must be completed; it is important to PLAN an implementation.**

II. Implementing New Systems

- **May be difficult and time-consuming**



The Implementation Process

III. Project Management

- **What Is a Project? – a set of activities with a beginning and an end, has goals and tasks, may have constraints (limitations)**
- **The Process of Project Management – five phases:**
  - **Initiation and Defining – state the problem and identify objectives and resources, explore costs/benefits**
  - **Planning – identify and sequence objectives/activities**
  - **Executing – put plans into motion**
  - **Controlling – ensure project objectives and deadlines are met**
  - **Closing – install deliverables, release resources, end the project**

Project Management Phase	Example Activities
Initiating/Defining	• State the problem(s)/goal(s). • Identify the objectives. • Secure resources. • Explore costs/benefits in feasibility study.
Planning	• Identify and sequence activities. • Identify the "critical path." • Estimate time and resources needed for completion. • Write a detailed project plan.
Executing	• Commit resources to specific tasks. • Add additional resources/personnel if necessary. • Initiate project work.
Controlling	• Establish reporting obligations. • Create reporting tools. • Compare actual progress with baseline. • Initiate control interventions if necessary.
Closing	• Install all deliverables. • Finalize all obligations/commitments. • Meet with stakeholders. • Release project resources. • Document the project. • Issue final report.

Phases of Project Management

IV. Evaluating Hardware, Software, and Services

- **Performance must be demonstrated and evaluated**
- **Hardware Evaluation Factors – physical and performance characteristics**
- **Software Evaluation Factors – similar to evaluating hardware**
- **Evaluating IS Services – services may be provided by suppliers of hardware/software or by third parties; do the services address your needs?**

Hardware Evaluation Factors	Rating
Performance What is its speed, capacity, and throughput?	
Cost What is its lease or purchase price? What will be its cost of operation and maintenance?	
Reliability What are the risk of malfunction and its maintenance requirements? What are its error control and diagnostic features?	
Compatibility Is it compatible with existing hardware and software? Is it compatible with hardware and software provided by competing suppliers?	
Technology In what year of its product life cycle is it? Does it use a new untested technology, or does it run the risk of obsolescence?	
Ergonomics Has it been "human factors engineered" with the user in mind? Is it user-friendly, designed to be safe, comfortable, and easy to use?	
Connectivity Can it be easily connected to wide area and local area networks that use different types of network technologies and bandwidth alternatives?	
Scalability Can it handle the processing demands of a wide range of end users, transactions, queries, and other information processing requirements?	
Software Are system and application software available that can best use this hardware?	
Support Are the services required to support and maintain it available?	
Overall Rating	

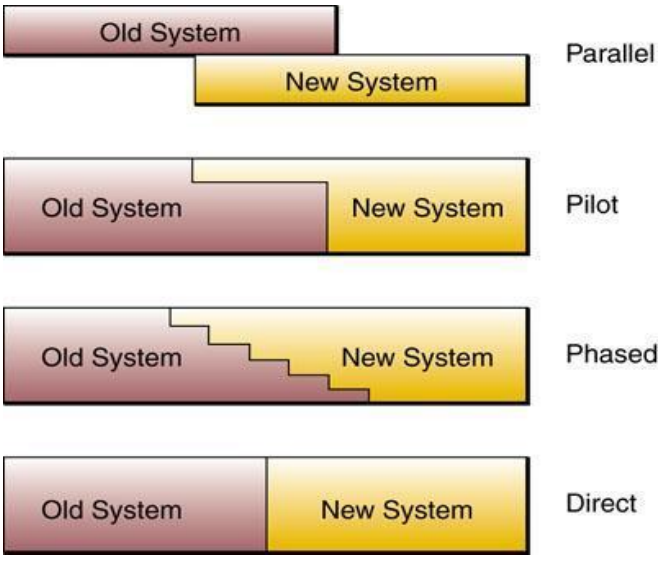
Software Evaluation Factors	Rating
Quality Is it bug-free, or does it have many errors in its program code?	
Efficiency Is the software a well-developed system of program code that does not use much CPU time, memory capacity, or disk space?	
Flexibility Can it handle our business processes easily, without major modification?	
Security Does it provide control procedures for errors, malfunctions, and improper use?	
Connectivity Is it *Web-enabled* so it can easily access the Internet, intranets, and extranets, on its own, or by working with Web browsers or other network software?	
Maintenance Will new features and bug fixes be easily implemented by our own software developers?	
Documentation Is the software well documented? Does it include help screens and helpful software agents?	
Hardware Does existing hardware have the features required to best use this software?	
Other Factors What are its performance, cost, reliability, availability, compatibility, modularity, technology, ergonomics, scalability, and support characteristics? (Use the hardware evaluation factor questions in Figure 12.22.)	
Overall Rating	

Evaluation Factors for IS Services	Rating
Performance What has been their past performance in view of their past promises?	
Systems Development Are Web site and other e-business developers available? What are their quality and cost?	
Maintenance Is equipment maintenance provided? What are its quality and cost?	
Conversion What systems development and installation services will they provide during the conversion period?	
Training Is the necessary training of personnel provided? What are its quality and cost?	
Backup Are similar computer facilities available nearby for emergency backup purposes?	
Accessibility Does the vendor provide local or regional sites that offer sales, systems development, and hardware maintenance services? Is a customer support center at the vendor's Web site available? Is a customer hotline provided?	
Business Position Is the vendor financially strong, with good industry market prospects?	
Hardware Do they provide a wide selection of compatible hardware devices and accessories?	
Software Do they offer a variety of useful e-business software and application packages?	
Overall Rating	

V. Other Implementation Activities

- **Testing – testing and debugging are important, does the system work as it should?**
- **Data Conversion – new implementations often require replacing software and databases**
- **Documentation – an important means of communication, often overlooked**
- **Training – training users is vital, usually under-budgeted, and expensive**

- **System Conversion Strategies – cutting over to the new system**
  - **Direct – simplest but most dangerous method, turn off the old system and turn on the new one**
  - **Parallel – most expensive but safest, run both systems until everyone is satisfied, then turn off old system**
  - **Pilot – let only a select few users use the new system until they are happy, then implement the new system for everyone; best user representation can be selected for the trials**
  - **Phased (Modular) – gradual conversion one module at a time, combines best of both direct and modular while minimizing risks**
- **Postimplementation Activities – Use and Maintenance – the longest and most costly phase of a system's life; correct errors, improve performance, adapt to changes in the business environment**
- **Systems Maintenance – making changes to the system**
  - **Corrective – fix errors**
  - **Adaptive – adding new functionality**
  - **Perfective – improve performance**
  - **Preventative – reduce chances of future system failure**
- **Postimplementation Review – ensure the new system meets established business objectives**



System Conversion Strategies

Chapter 13

Security and Ethical Challenges

Section 1

Security, Ethical, and Societal Challenges of IT

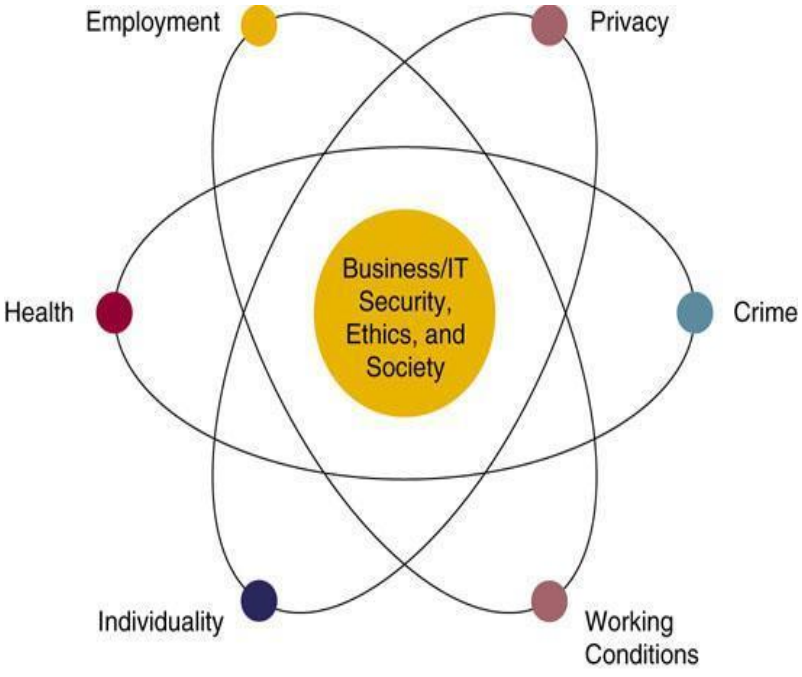
I. Introduction

- **Use of IT in business poses security challenges, ethical questions, and societal challenges**
- **The Nexus of IT, Ethics, Security, and Safety – we must consider the impact technologies have on society**

II. Ethical Responsibility of Business Professionals

- **As a business professional you have the responsibility to promote Ethical (what does that mean???) use of IS in the workplace**
  - **Business Ethics – ethical questions that are part of daily business decision making**
  - **Ethical Use of Technology – the use of technology raises its own ethical questions**
  - **Ethical Guidelines – many firms have specific guidelines for ethical computer and Internet use by employees**

II. Ethical Responsibility of Business Professionals



Security, Ethical, and Societal Aspects of IT Use

Equity	Rights	Honesty	Exercise of Corporate Power
Executive salaries	Corporate due process	Employee conflicts of interest	Product safety
Comparable worth	Employee health screening	**Security of company information**	Environmental issues
Product pricing	**Customer privacy**	Inappropriate gifts	Disinvestment
Intellectual property rights	**Employee privacy**	Advertising content	Corporate contributions
Noncompetitive agreements	Sexual harassment	Government contract issues	Social issues raised by religious organizations
	Affirmative action	Financial and cash management procedures	Plant/facility closures and downsizing
	Equal employment opportunity	Questionable business practices in foreign countries	Political action committees
	Shareholder interests		**Workplace safety**
	Employment at will		
	Whistle-blowing		

Principles of Technology Ethics

- **Proportionality.** The good achieved by the technology must outweigh the harm or risk. Moreover, there must be no alternative that achieves the same or comparable benefits with less harm or risk.
- **Informed Consent.** Those affected by the technology should understand and accept the risks.
- **Justice.** The benefits and burdens of the technology should be distributed fairly. Those who benefit should bear their fair share of the risks, and those who do not benefit should not suffer a significant increase in risk.
- **Minimized Risk.** Even if judged acceptable by the other three guidelines, the technology must be implemented so as to avoid all unnecessary risk.

Categories of Ethical Business Issues

III. Computer Crime – using a computer to do something illegal

- **Hacking and Cracking**
  - **Hacking – obsessive use of computers, unauthorized use of networked systems**
  - **Cracking (black hat or dark-side hacker) – malicious or criminal hacker**
- **Cyber Theft – many computer crimes involve theft of money; many firms do not reveal that they've been victims due to bad publicity**
- **Cyber-terrorism – causing physical, real-world harm or severe disruption of infrastructure**
- **Cyber-Warfare – actions by a nation-state to cause damage or disruption to another nation-state**
- **Unauthorized use at Work – time and resource theft, this can be a very wide range of actions, many firms have written policies for (im)proper use of computers and IT resources**
- **Software Piracy –unauthorized copying of software**
- **Theft of Intellectual Property – any infringement of copyrighted materials**

- **Computer Viruses and Worms – insert destructive routines into computer systems to cause damage**
- **Adware and Spyware**
    - **Adware – allows Internet advertisers to display ads without the consent of the user**
    - **Spyware – uses the network connection without the user's knowledge or permission, collects and distributes information about the user**

IV. Privacy Issues

- **IT can store and retrieve information affecting the privacy of the individual**
- **Privacy on the Internet – the Internet gives users a feeling of anonymity while making them vulnerable to privacy violations**
- **Computer Matching – profiling**
- **Privacy Laws – many countries regulate collection and use of personal data**
    - **HIPAA – health related privacy laws**
    - **Sarbanes-Oxley – standards for publicly held firms**
- **Computer Libel and Censorship – what can and cannot be said (legally) online**
    - **Spamming – indiscriminate sending of unsolicited email**
    - **Flaming – extremely critical, derogatory, vulgar email**

V. The Current State of Cyber Law

- **A very wide range of legal and political issues, VERY controversial**

VI. Other Challenges

- **Employment Challenges – impact of IT on employment is a major ethical concern**
- **Computer Monitoring – using a computer to monitor productivity in the workplace, or to monitor behavior in public**
- **Challenges in Working Conditions – IT can eliminate monotonous tasks, and create some, too**
- **Challenges of Individuality – one concern is the effect of IT on a person's individuality**

VII. Health Issues

- **IT raises a variety of health issues**
- **Ergonomics (Human Factors Engineering) – designing healthy work environments that are safe and comfortable**

VIII. Societal Solutions

- **IT can have many beneficial effects on society**

Section 2

Security Management of Information Technology

I. Introduction

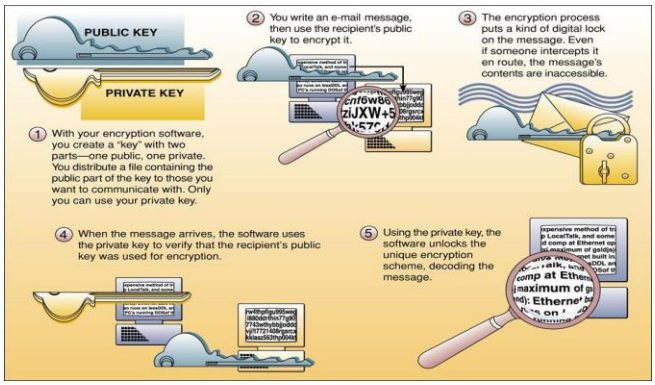
- **The number one problem with e-commerce is security; the Internet was developed for interoperability not impenetrability**

II. Tools of Security Management

- **Goal of Security Management – accuracy, integrity, and safety of all information processes and resources**

III. Inter-Networked Security Defenses

- **How so you balance the need for security with the need for access?**
- **Encryption – using a mathematical algorithm to encode a message before transmission and descramble it for reception**
- **Firewalls – a hardware or software gatekeeper that keeps unauthorized transmissions out of a system**
- **Denial of Service Attacks – using zombie/slave computers to overload another system with large volumes of service requests**
- **E-Mail Monitoring – firms watch employees use of email**



Public Key/Private Key Encryption

IV. Viral Defenses

- **Antivirus software**

V. Other Security Measures

- **Security Codes – login IDs and passwords**
- **Backup Files – duplicate files of data or programs**
- **Security Monitors – monitor systems for unauthorized use, fraud, and destruction**
- **Biometric Security – measure/verify an individual's physical traits**
- **Computer Failure Controls – preventing computer failure or minimizing its effects**
- **Fault-Tolerant Systems – providing backup components in case of a system failure**
- **Disaster Recovery – getting a system running again after a disaster**

VI. System Controls and Audits

- **Information System Controls – assure accuracy, validity, and propriety of IS activities**
- **Auditing IT Security – IT security should be periodically examined**

Chapter 14

Enterprise and Global Management of Information Technology

Section 1

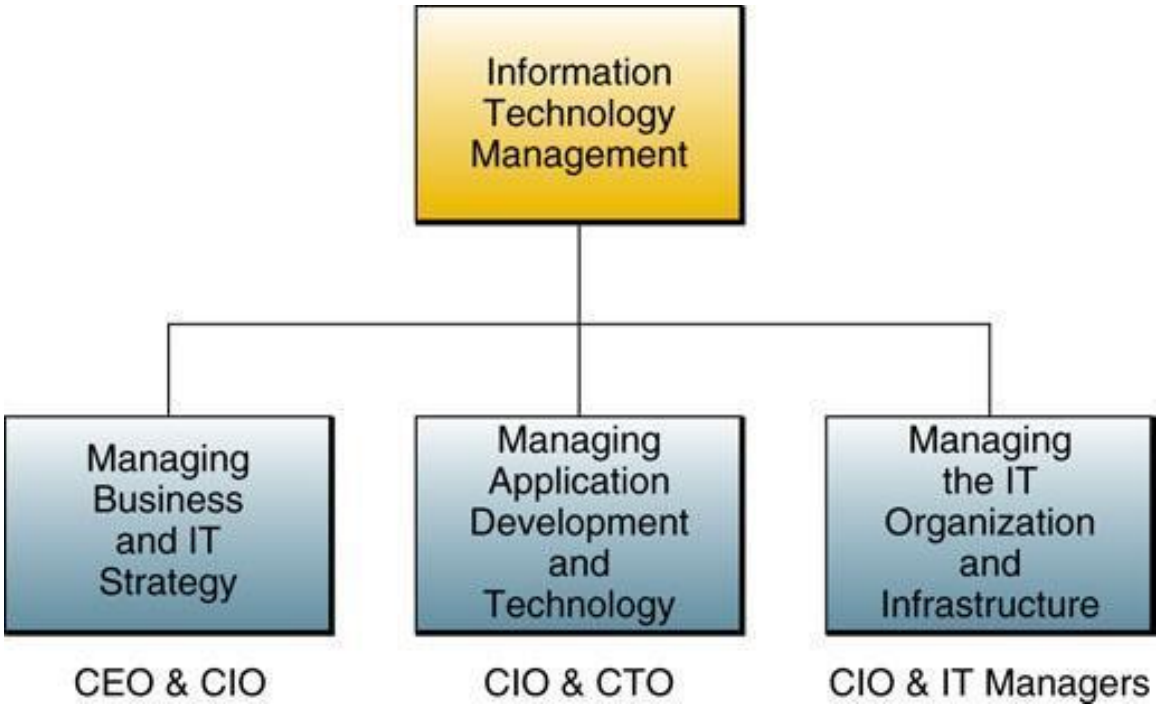
Managing IT for the Enterprise

I. Business and IT

- **IT is an important strategic and operational resource and managers need to understand its management**

II. Managing Information Technology

- **IT is an organizational resource and must be managed**
- **Managing the Joint Development and Implementation of Business/IT Strategies – CEO and CIO align IT with strategic business goals**
- **Managing the Joint Development and Implementation of New Business/IT Applications and Technologies – CIO and CTO manage development and implementation of IT**
- **Managing the IT Organization and the IT Infrastructure – CIO and IT managers control IT professionals and IT infrastructure**



IT Management

III. Business/IT Planning

- **Business/IT Planning – focus on innovative approaches to satisfying a firm's customer values and business values**
- **3 major components:**
  - **Strategy Development – develop strategies that support a firm's business vision**
  - **Resource Management – develop strategic plans for managing/outsourcing a firm's IT resources**
  - **Technology Architecture – make choices that reflect IT architecture that supports the firm's business initiatives**
- **Information Technology Architecture – conceptual design/blueprint that includes:**
  - **Technology Platform – a computing/communications infrastructure that the strategic use of IT for e-commerce and other business/IT applications**
  - **Data Resources – operational and specialized databases/data warehouses providing data for business processes/decision support**
  - **Applications architecture – IT applications that support strategic business initiatives**
  - **IT Organization – organizational structure of IS in a business**

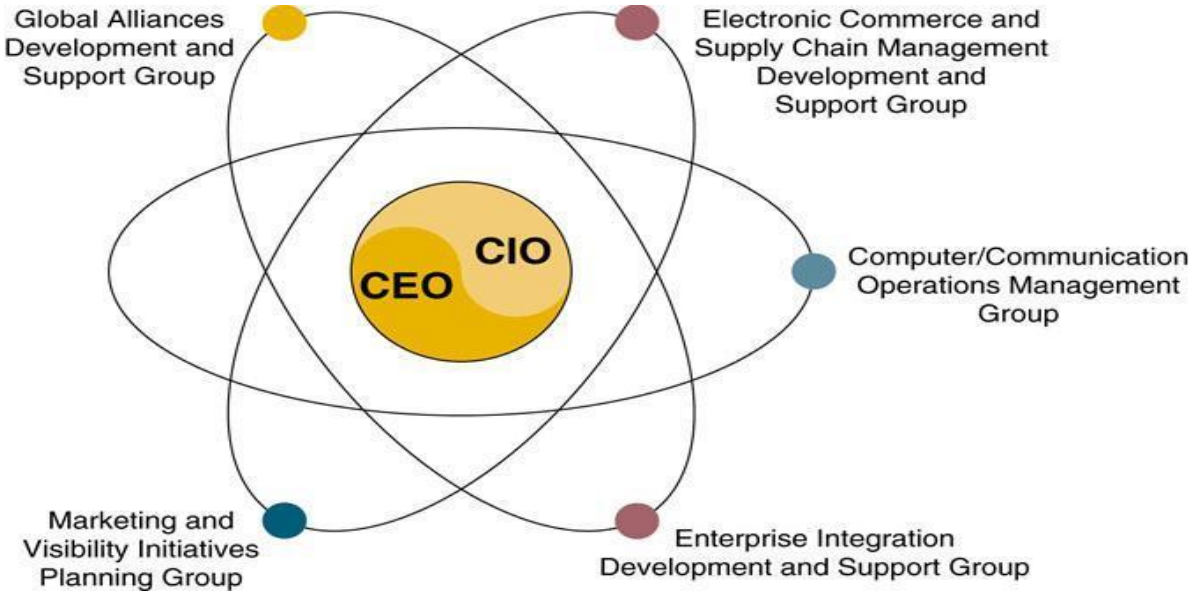
IV. Managing the IT Function

- **Recently IT is becoming more centralized**

V. Organizing IT

- **Historically, IT was first centralized (mainframes), the decentralized (distributed client/server), and is now becoming centralized for management of IT**
- **Managing IS Operations – Application Development Management – managing teams of analysts, developers, and other IS professionals**
- **Managing IS Operations – IS Operations Management – managing system operations, networks, production, and system performance**
- **IT Staff Planning – recruiting qualified personnel, providing continuing training, managing IS personnel**
- **The CIO and Other Executives – CIO is an executive who works with the CEO to develop strategic uses of IT to improve competitive advantage, does not direct day-to-day IS/IT activities**

- **Technology Management – IT resources must be managed carefully because they have a major impact on the organization**
- **Managing User Services – supporting end-user and workgroup computing**



The IT Function in a Modern Organization

VI. Outsourcing and Offshoring IT and IS

- **Outsourcing – purchasing products/services that were previously provided internally; 5 main reasons:**
  - **Save Money – Achieve Greater Return on Investment (ROI) – outsourcing can provide large cost savings**
  - **Focus on Core Competencies – outsourcing allows a firm to concentrate on their own business/industry, not on IT**
  - **Achieve Flexible Staffing Levels – outsourcing allows business growth without increasing overhead**
  - **Gain Access to Global Resources – outsourcing provides access to IT resources all over the world**
  - **Decrease Time to Market – outsourcing allows small firms to compete successfully against larger firms**
- **Offshoring – relocation of a firm's business processes to a lower-cost location, usually overseas**
- **Trends in Outsourcing and Offshoring – originally outsourcing and offshoring were used to lower costs, but now are used to find highly talented IS/IT personnel**

Top 10 Reasons Companies Outsource	Top 10 Factors in Vendor Selection
1. Reduce and control operating costs	1. Commitment to quality
2. Improve company focus	2. Price
3. Gain access to world-class capabilities	3. References/reputation
4. Free internal resources for other purposes	4. Flexible contract terms
5. Necessary resources are not available internally	5. Scope of resources
6. Accelerate reengineering benefits	6. Additional value-added capability
7. Function is difficult to manage internally or is out of control	7. Cultural match
8. Make capital funds available	8. Existing relationship
9. Share risks	9. Location
10. Cash infusion	10. Other
Top 10 Factors for Successful Outsourcing	**Top 10 IT Areas Being Outsourced**
1. Understand company goals and objectives	1. Maintenance and repair
2. A strategic vision and plan	2. Training
3. Select the right vendor	3. Applications development
4. Ongoing management of the relationships	4. Consulting and reengineering
5. A properly structured contract	5. Mainframe data centers
6. Open communication with affected individuals/groups	6. Client/server services and administration
7. Senior executive support and involvement	7. Network administration
8. Careful attention to personnel issues	8. Desktop services
9. Near-term financial justification	9. End-user support
10. Use of outside expertise	10. Total IT outsourcing

VII. Failures in IT Management

- **There have been failures in IT/IS where promised results have not occurred, or failures in effectiveness or efficiency**
- **Management Involvement – management and end-user involvement is key in successful IS/IT performance**
- **IT Governance (ITG) – IT projects can affect performance of an entire organization, so governance is important**

IT Decision	Senior Management's Role	Consequences of Abdicating the Decision
• **How much should we spend on IT?**	Define the strategic role that IT will play in the company, and then determine the level of funding needed to achieve that objective.	The company fails to develop an IT platform that furthers its strategy, despite high IT spending.
• **Which business processes should receive our IT dollars?**	Make clear decisions about which IT initiatives will and will not be funded.	A lack of focus overwhelms the IT unit, which tries to deliver many projects that may have little companywide value or can't be implemented well simultaneously.
• **Which IT capabilities need to be companywide?**	Decide which IT capabilities should be provided centrally and which should be developed by individual businesses.	Excessive technical and process standardization limit the flexibility of business units, or frequent exceptions to the standards increase costs and limit business synergies.
• **How good do our IT services really need to be?**	Decide which features—for example, enhanced reliability or response time—are needed on the basis of their costs and benefits.	The company may pay for service options that, given its priorities, aren't worth their costs.
• **What security and privacy risks will we accept?**	Lead the decision making on the trade-offs between security and privacy on one hand and convenience on the other.	An overemphasis on security and privacy may inconvenience customers, employees, and suppliers; an underemphasis may make data vulnerable.
• **Whom do we blame if an IT initiative fails?**	Assign a business executive to be accountable for every IT project; monitor business metrics.	The business value of systems is never realized.

Optimize the IT Function by Involvement of Senior Management in Critical Business/IT Decisions

Section 2

Managing Global IT

I. The International Dimension

- **Managing a business today means dealing with the international dimension**

II. Global IT Management

- **Must include cultural, political, and geoeconomic challenges of the business community**

III. Cultural, Political, and Geoeconomic Challenges

- **Global IT means focusing on global IT challenges**
  - **Cultural – differences in language, religion, customs, and attitudes**
  - **Political – laws are different in each country**
  - **Geoeconomic – dealing with the realities of geography and economics**

IV. Global Business/IT Strategies

- **Businesses are moving away from International and Global strategies to Transnational strategies**

V. Global Business/IT Applications

- **Global Business Drives – business requirements caused by the nature of the industry and its competitive environment**
  - **Global Customers – customers may be anywhere**
  - **Global Products – products are the same throughout the world**
  - **Global Operations – subsidiaries may change based on economics**
  - **Global Resources – use/cost of resources are shared by subsidiaries**
  - **Global Collaboration – knowledge/expertise of colleagues is shared**

Business Drivers of Global IT
• **Global Customers.** Customers are people who may travel anywhere or companies with global operations. Global IT can help provide fast, convenient service.
• **Global Products.** Products are the same throughout the world or are assembled by subsidiaries throughout the world. Global IT can help manage worldwide marketing and quality control.
• **Global Operations.** Parts of a production or assembly process are assigned to subsidiaries based on changing economic or other conditions. Only global IT can support such geographic flexibility.
• **Global Resources.** The use and cost of common equipment, facilities, and people are shared by subsidiaries of a global company. Global IT can keep track of such shared resources.
• **Global Collaboration.** The knowledge and expertise of colleagues in a global company can be quickly accessed, shared, and organized to support individual or group efforts. Only global IT can support such enterprise collaboration.

VI. Global IT Platforms (Infrastructure)

- **Technically complex, and has political and cultural implications**
- **The Internet as a Global IT Platform – it has become a low-cost interactive channel for communications and data exchange**

VII. Global Data Access Issues

- **Transborder Data Flows (TDF) are considered a violation of national sovereignty by many countries because they avoid customs duties and import/export regulations**
- **Internet Access Issues – some countries restrict access to the Internet**

VIII. Global Systems Development

- **Imagine the challenges of developing a domestic system, then multiply that by the number of countries/cultures where that systems will be used**
- **Systems Development Strategies**
  - **Transform a local application into a global application**
  - **Establish a Multinational Development Team to handle global application development**
  - **Establish Centers of Excellence – assign a project to a particular team based on its experience in that business or technical area**