CS3754

Textbook:

A) **R. Elmasri and S.B. Navathe, "Fundamentals of Database Systems", 6th Edition, Addison-Wesley, 2011, (ISBN-13: 9780136086208)**

B) **G. Luger, "Artificial Intelligence: Structures and Strategies for Complex Problem Solving", 6th Edition, Addison-Wesley, 2009, (ISBN 0-321-54589-3)**

Reference Book:

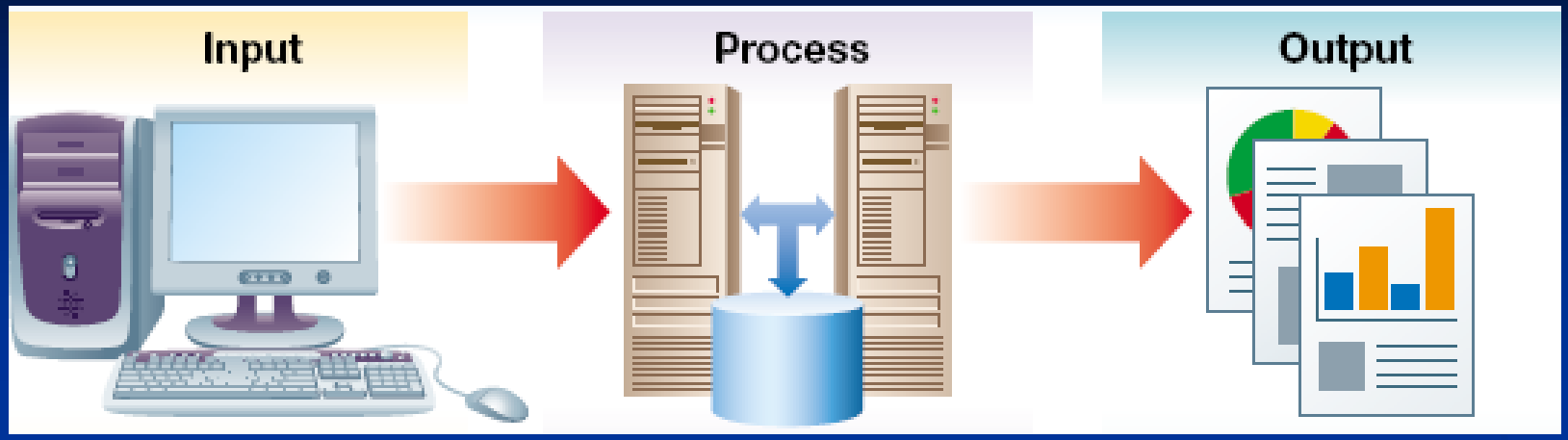
C) **E. Sciore, "Database Design and Implementation", John Wiley & Sons, 2009, (ISBN 978-0-471-75716-0)**

D) **Class notes under the directory of /local/pub/cs3754 on the computer garfield.**

Learning Objectives

1. Define and understand the term **Information Systems (IS)**
2. Explain the technology, people, and organizational components of information systems
3. Describe the types of jobs and career opportunities in information systems and related fields
4. Describe the various types of information systems

Information Systems: Turn Data



Data

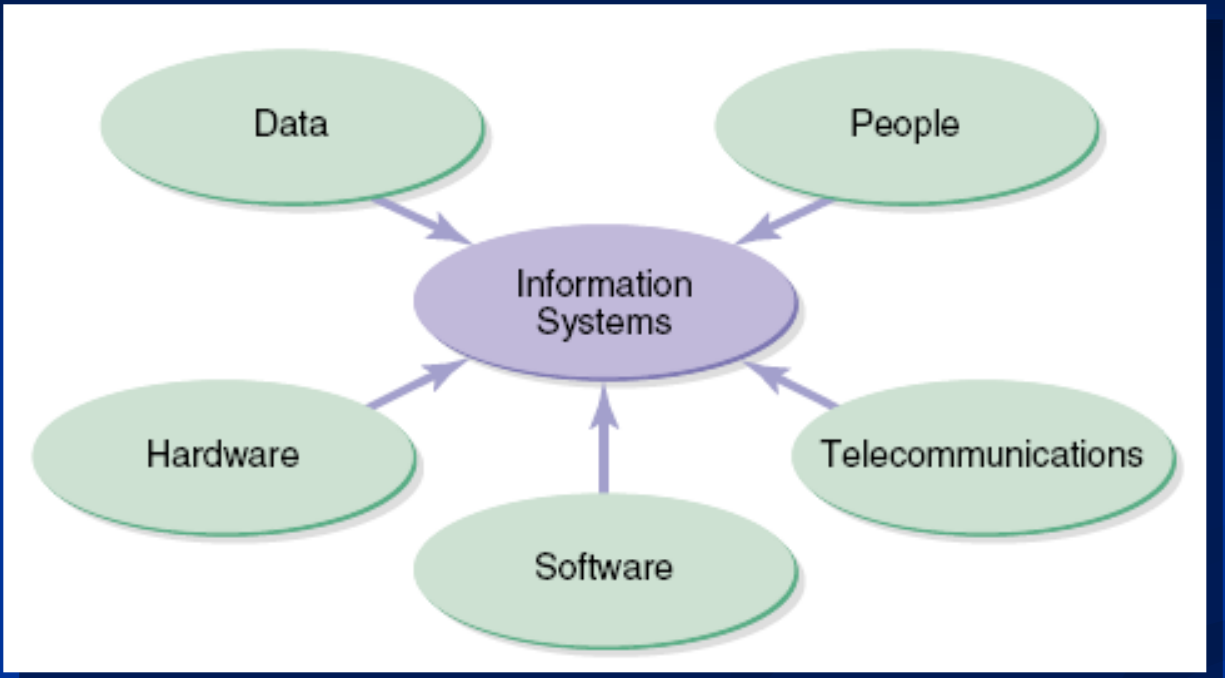
- Raw material
- Unformatted information
- Generally has no context

Information

- Processed material
- Formatted information
- Data given context

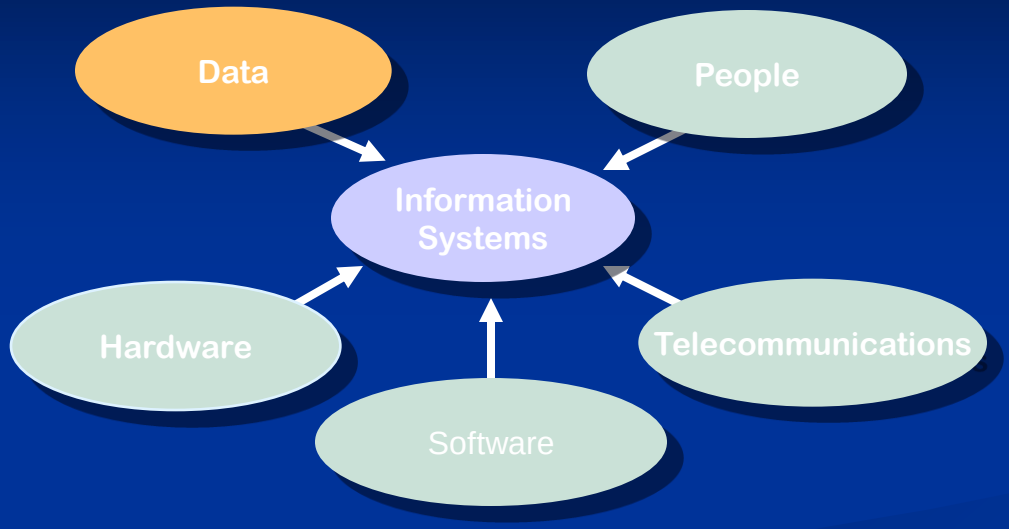
Individual time cards for factory workers entered into the payroll system	**Examples**	Department Labor Report, Project Status Report, Employee Payroll Checks

What are Information Systems?



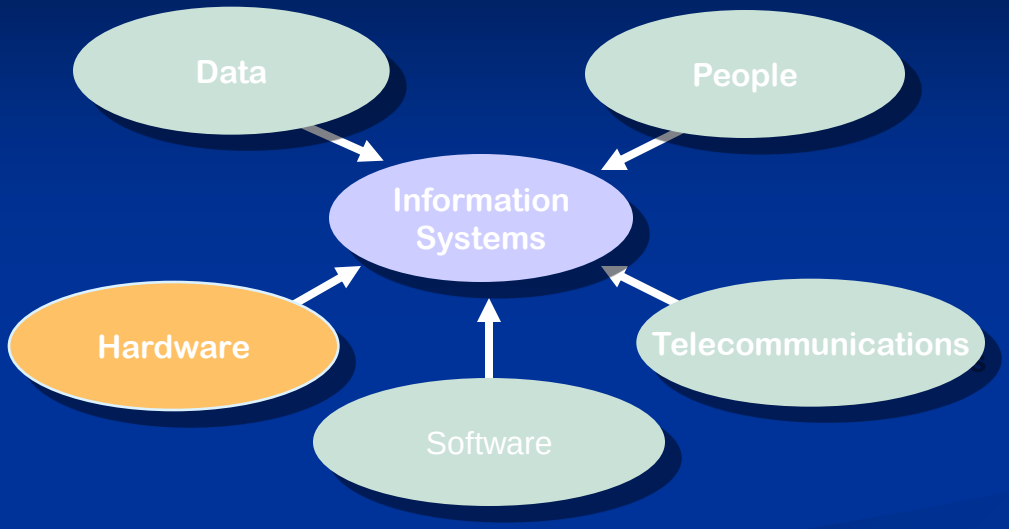
- A combination of technical components
- Built and used by people to collect, create, and distribute useful data
- Used typically in organizational settings but are evolving for personal use

Information Systems Components: Data



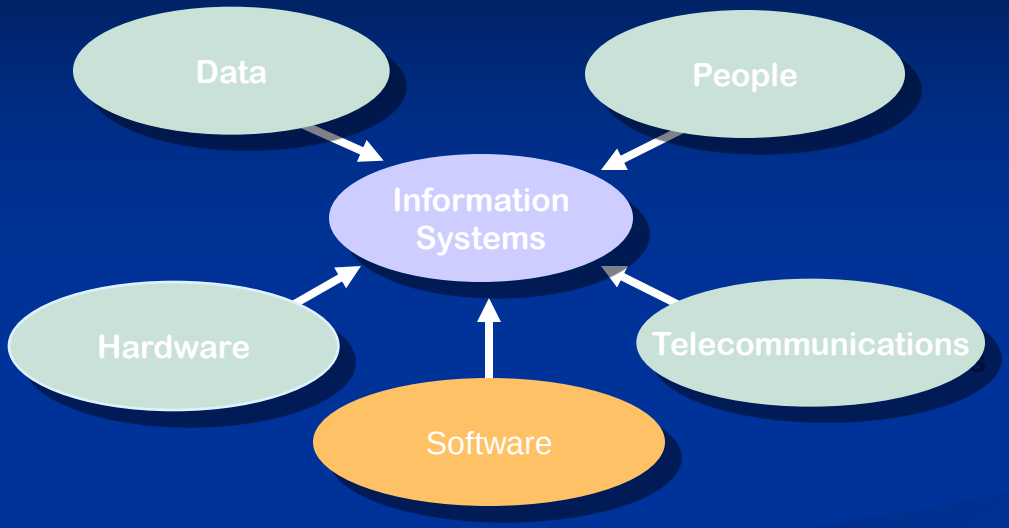
- The raw inputs for entry into information systems
- Organized, processed and stored by an IS to support user information needs
- Provides basis for qualitative/quantitative analysis

Information Systems Components: Hardware



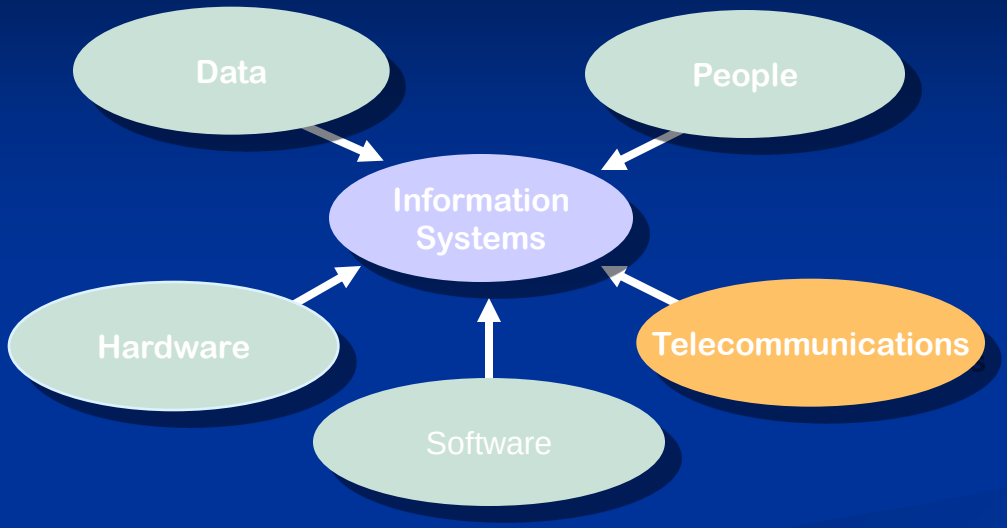
- The physical components of information systems
- Hardware components include processors, input and output devices, and storage devices
- Typical configurations based on application

Information Systems Components: Software



- The instructions that operate the information system
- System software controls the hardware
- Application software allows user tasks to perform specific tasks

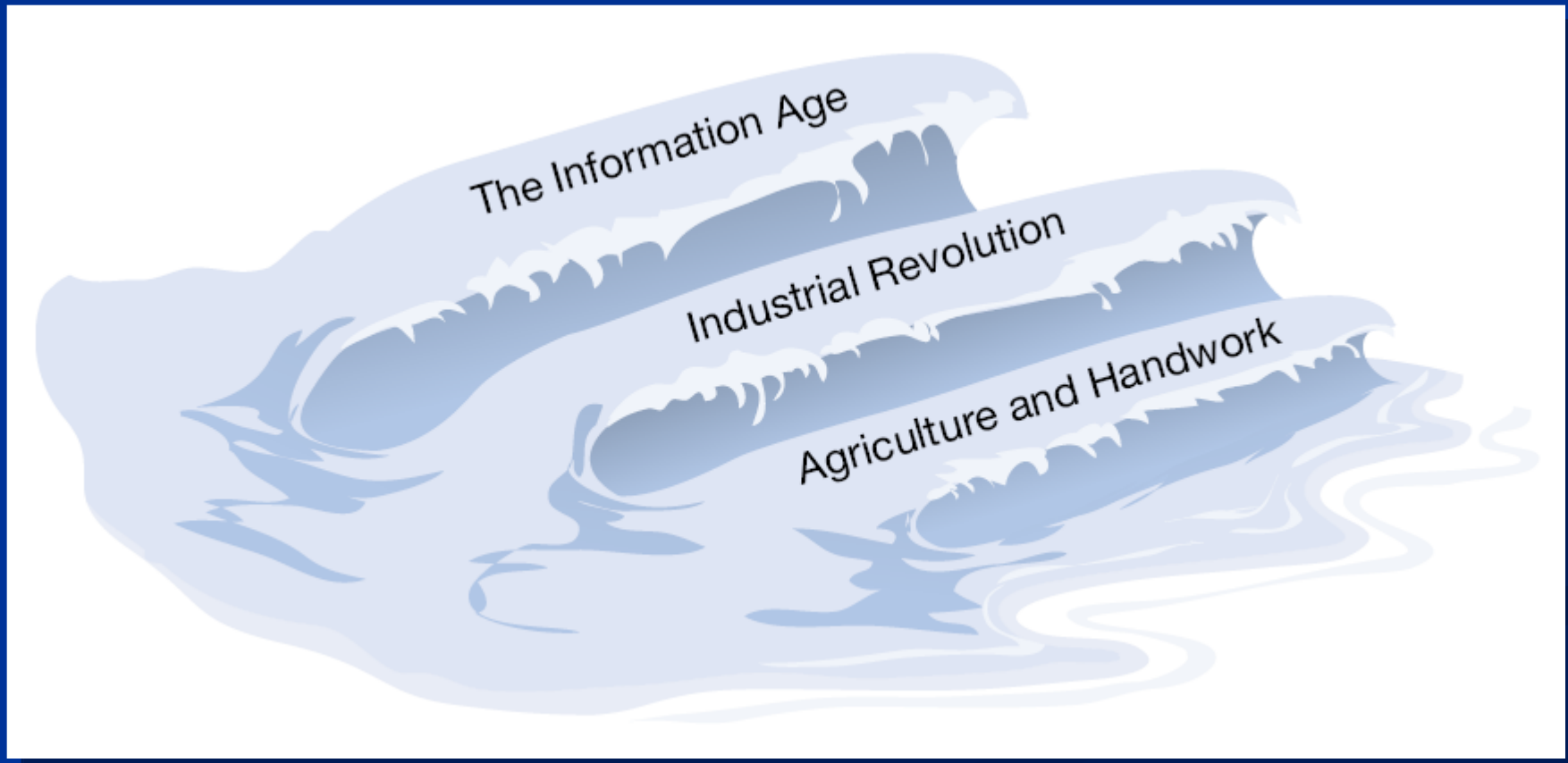
Information Systems Components: Telecommunications



- The communication mechanism of information systems
- Allows two or more computers to communicate (Internet)
- Utilizes standard protocols for IS communication

Information Society Evolution: Periods of Change

Agricultural	Industrial	Informational
(Prior to 1890's)	(1890's to 1960's)	(1960's to Present)



Information Society Evolution: Terms and Issues

Information Society

Knowledge Worker (Peter Drucker 1959)

- A term invented to describe a future trend in the workforce
- These will be professionals that create, modify and/or synthesize information as a fundamental part of their job
- They will require higher education levels and received higher compensation than workers in agriculture or manufacturing
- The term is still generally accepted today

Information Society Evolution: Terms and Issues

Information Society

Knowledge Society (Drucker - 1959)

- Term invented to describe the next evolution of society
- This evolution would be a result of the rise in the numbers and importance of knowledge workers in society
- Education was described as the cornerstone of the knowledge society as it is core to the knowledge worker

Information Society Evolution: Terms and Issues

Information Society

New Economy (Wired Magazine - Late 1990s)

- Similar to “knowledge society” but more descriptive
- Describes a society where people use their brains more than their hands in their work and personal lives
- Where communications technology and other IT systems will create global competition for all products and services
- Other names: Digital Economy, Network Era, Internet Era

Typical Careers in Information Systems

IS Activities	Typical Careers	Salary Ranges
Develop	Systems analyst	$40,000–$80,000+
	Systems programmer	$50,000–$80,000+
	Systems consultant	$50,000–$100,000+
Maintain	Database administrator	$75,000–$100,000+
	Webmaster	$40,000–$75,000+
Manage	IS director	$80,000–$120,000+
	Chief information officer	$125,000–$250,000+
Study	University professor	$60,000–$200,000+
	Government scientist	$60,000–$200,000+

Careers in information systems require high technical competence and generally pay well

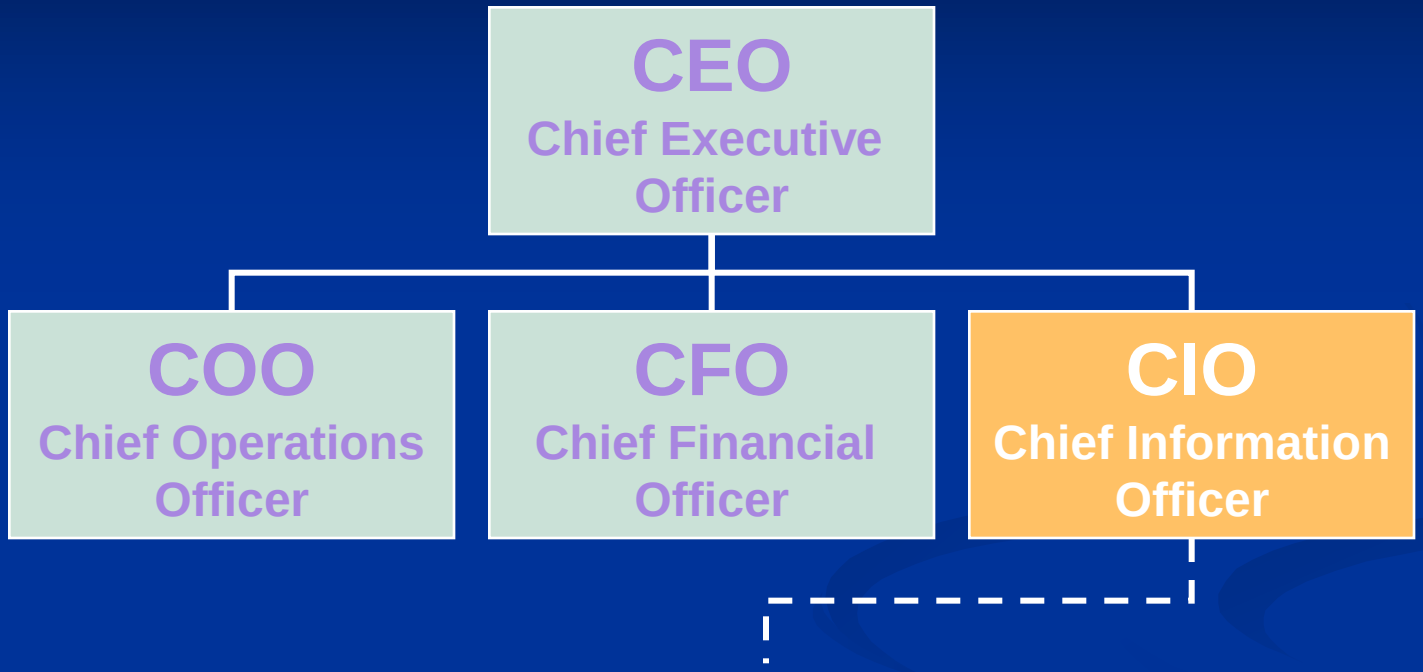
Executive Roles in Information Technology

- Manages External Stakeholder Relationships
- Sets Strategic Direction
- Defines High Level IT Needs for the Future

- Manages Operations
- Allocates Resources
- Primary Consumer of IT within the Organization

- Manages Accounting & Finance
- Forecasts Needs and Secures Financial Resources
- Allocates Budget for IT Expenditures

Executive Roles in Information Technology



- Manages IT Organization and Operations
- Forecasts IT Needs from Business Strategy
- Sets Direction for IT Architecture and Organization
- Plans, Designs and Delivers IT throughout the firm

Three Distinct Competencies of IS Professionals

Technical
- Knowledge of hardware, software, networking, and security
- Most IS professionals are not deep technical experts but can direct/manage others with the required technical skills

Business
- Understand the nature of business including process, management, social, and communication domains
- Unique skills over those with only technical skills

Systems
- Knowledge of approaches and methods, also possess critical thinking and problem solving skills necessary to build and integrate large information systems
- Unique skills over those with only technical skills

IS Impact on Organizations: New Opportunities

U.S. Internal Revenue Service (IRS) Creates a Website and Allows eFiling

Current IRS Tasks

Post Office
- Stock Forms & Publications

IRS Office
- Mail Forms/Publications
- Enter Tax Returns in System
- Conduct Audits

IRS Hotline
- Answer FAQs
- Resolve Problems

New Website

Activate eFiling

Modified IRS Tasks

Post Office
- Minimal Stocking of Forms/Pubs

IRS Office
- Minimal Mailing Forms/Pubs
- Reduced Entry of Tax Returns
- Conduct Audits (MORE!)

IRS Hotline
- Reduced Answering FAQs
- Resolve Problems

Implementation Results

- Reduced labor costs in forms distribution, hotline support, data entry from access to info/materials on the website and efiling
- Allow for redeployment of resources to primary activities including conducting audits and resolving problems

Levels of the Organization and Traditional Systems

- Executive Information Systems
- Decision Support Systems (both levels)
- Management Information Systems
- Transaction Processing Systems
- Expert Systems

- Functional Area Information Systems (Across all levels within a function)

Traditional Information System

Transaction Processing Systems	Process day-to-day business event data in an organization (Operational level)
Management Information Systems	Produce details information to help manage a firm or part of a firm (Managerial)
Executive Information Systems	Provide very high-level, aggregate information to support decisions (Executive)
Decision Support Systems	Provide analysis tools and databases to support quantitative decision making (Multiple)
Expert Systems	Mimic human expert in a particular area and provide answers or advice (Operational)
Functional Area Information Systems	Support the activities within a specific functional area of the firm (All)

Other Information Systems - Not

Office Automation System	Support a wide range of predefined, daily work activities of individuals or groups (e.g. MS Word)
Collaboration System	Enable People to communicate, collaborate, and coordinate with each other (e.g. email)
Customer Relationship Management	Support the interaction between the firm and its customers (e.g. sales force automation or call center technology)
Electronic Commerce	Enable customers to buy goods and service from a firm's website. (www.amazon.com)
Enterprise Resource Planning System	Support and integrate all facets of the business (e.g. planning, manufacturing, sales, etc.)

Operational vs Informational Systems

Characteristic	Operational System	Informational System
Primary purpose	Run the business on a current basis	Support managerial decision making
Type of data	Current representation of state of the business	Historical or point-in-time (snapshot)
Primary users	Online customers, clerks, salespersons, administrators	Managers, business analysts, customers (checking status, history)
Scope of usage	Narrow vs. simple updates and queries	Broad vs. complex queries and analysis
Design goal	Performance	Ease of access and use

Table 3.5 Comparison of operational and informational systems.

IS Competitive Advantage Perspectives: Who is Right?

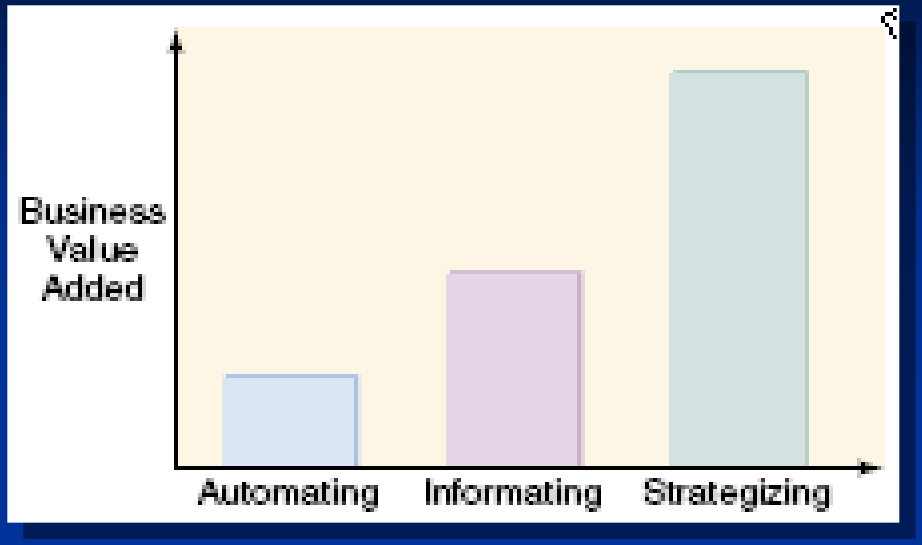
"IT Doesn't Matter" - Car 2003

- As IT becomes more pervasive, technology becomes more standardized and ubiquitous
- The result is that the same technologies are available to all competitors in an industry
- This produces no competitive advantage

"The Engine that Drives Success: The Best Companies have the Models Because they Have the Best IT Strategies" - Lundberg 2004

- Companies with bad business models fail regardless of IT systems or other capabilities
- Companies with good business models use IT to execute successful business models and succeed

IS for Competitive Advantage: Business Value



- Using IS to create/support business strategy is the most effective approach creating the most business value
- Strategic IS systems are typically custom built and are integrated to support the business strategy
- Strategic IS systems are by nature hard to replicate just as are good business models

Competitive Advantage: Dual Nature of Systems

FedEx Customer Website
versus
Denver International Airport Baggage System

Evaluation Factors	IS That Works (FedEx)	IS Gone Wrong (DIA)
Strategic in Nature	Yes	Yes
Established Technology	Yes	No
Capable Suppliers	Yes	??
Structured Implementation	Yes	No
Capable IS Support	Yes	??

The Future of Information

Ownership and Control (Old School IS)

- Large back logs of user requests…very poor service
- Arrogance and feeling of ownership and control of IT
- Can't do attitude…told users why they couldn't do things
- Resulted in a very poor relationship with users

- Business managers became technology savvy
- Systems evolved and became easier to develop
- Business organizations developed their own systems

Consulting and Service Mentality (New School IS)

- IS is taking on an IT consulting role
- "Service Mentality"…users are customers to be served
- Proactively support and problem solve for their customers
- Fundamentally believe that customers own the technology

IS Role in Change: Trends and Terms

Downsizing (Sometimes called Rightsizing)

- Reducing organizational headcount to meet the financial goals of the organization
- IT is viewed as the lever to provide the systems necessary to increase productivity

Outsourcing

- Transferring business functions outside the organization to increase service levels and/or reduce operating cost
- IT is not immune to this trend. Certain commodity IT technical jobs will be increasingly transferred overseas
- IT must find better methods to manage offshore work

Global outsourcing

In U.S.

- In 2003, $10 Billion for global outsourcing of software and services
- In 2008, $31 Billion for global outsourcing. It will help the U.S. real gross domestic product(GDP) to be over $120 billion higher than without global outsourcing.

The Future for IS

IS needs will continue to grow as technology developments advance

Although outsourcing will continue, there will be strong demand for IS professionals

There is a need for personnel that can speak the language of technology and business and the skills to manage projects and people

Characteristics for success include: continuous learning and growth, finding new ways to add value, flexibility, and developing unique skills