Management
and Industrial Strategy

אסטרטגיה ניהולית ותעשייתית

פרופ' רון קנת
ד"ר יוסי רענן

Professor Ron Kenett - ron@kpa.co.il

Dr. Yossi Raanan - yossir@kpa.co.il

Part V

מטרת הקורס

- הבנת חשיבות אסטרטגיה ניהולית ותעשייתית בסביבה עתירת טכנולוגיה להשגת:
    - כושר תחרות
    - התאמה לסביבה משתנה
    - יציאה ממשבר
    - כניסה לשווקים חדשים

מבנה הקורס

תנאי קדם: אין

שיטת הלימוד:

- הרצאות פרונטליות
- ביצוע פרויקט במסגרת צוות

הרכב הציון:

- עבודת גמר – 60% (40% עבודה, 20% מצגת)
- מבחן סיום – 40% (נדרש ציון עובר לשקלול)

נושאי הקורס - 1

מבואות:

התפתחות תפיסות ניהוליות ומיצוב הטכנולוגיה בתעשייה תוך ניתוח משמעויות המהפכה התעשייתית ומהפכת המידע (סולם האיכות).

מבוא לאסטרטגיות הניהוליות העיקריות המיושמות בתעשייה: ניהול איכות, שש סיגמה, מערכות ייצור גמישות, מערכות תוכנה תעשייתיות ומיכון ארגוני.

אסטרטגיה עסקית ושיווקית:

מודלים לניתוח אסטרטגי כגון: BCG, מקינזי, ארתור ד. ליטל, בוז אלן, אופציות ריאליות.

אסטרטגית שרות:

מערך השירות ותפקידו במחזור חיי המוצר. התמיכה הטכנולוגית הנדרשת במערך השירות. הצגת האסטרטגיות הניהוליות העיקריות בשירותים: שירות מבוזר / מרוכז, מוקדי שרות.

אסטרטגית משאבי אנוש:

מודלים למיפוי ארגוני, סקרי עמדות עובדים, מודלים למיפוי משאבי אנוש, הערכת עובדים ממוקדת תהליך.

נושאי הקורס - 2

אסטרטגית התפעול והאיכות:

ניהול זמין ושיטות ייצור ארגוניות יפניות. שש סיגמה.

מערכות ייצור גמישות, ייצור ברשתות ועקרונות הניהול הרב - מוצרי בתעשיות עתירות מיכון.

אסטרטגית מו"פ וניהול סיכונים:

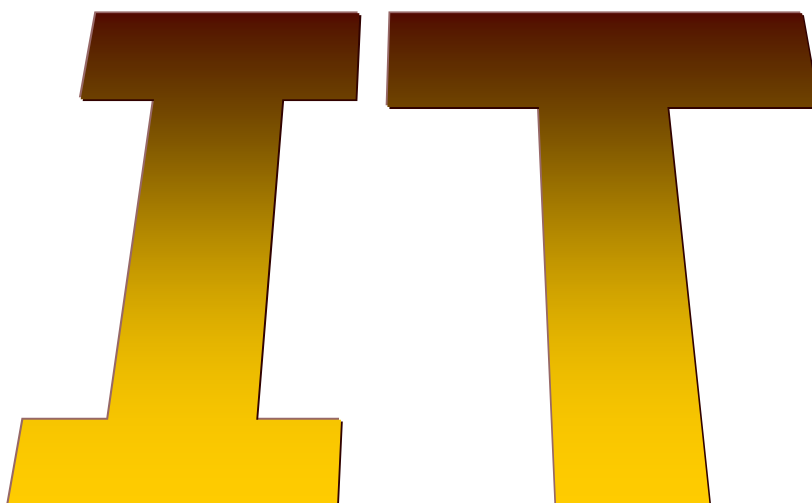CMMI, ניהול סיכונים, פרויקט MUSING.

אסטרטגית מערכות מידע ותקשורת:

אסטרטגית IT. תקשורת לסוגיה והשפעותיה על ההיערכות התעשייתית והשירותית.

ניהול השינוי:

מתודולוגית BEST ו EKD

Why Information Systems Matter

There are four reasons why IT makes a difference to the success of a business:

- **Capital management**

- **Foundation of doing business**

- **Productivity**

- **Strategic opportunity and advantage**

Capital Management

- **IT is the largest single component of capital investment in the United States.**

- **About $1.8 trillion is spent each year by American businesses.**

- **Managers and business students need to know how to invest this capital wisely.**

- **The success of your business in the future may well depend on how you make IT investment decisions.**

Information Technology Capital Investment

Total IT Investment versus Total Business Investment
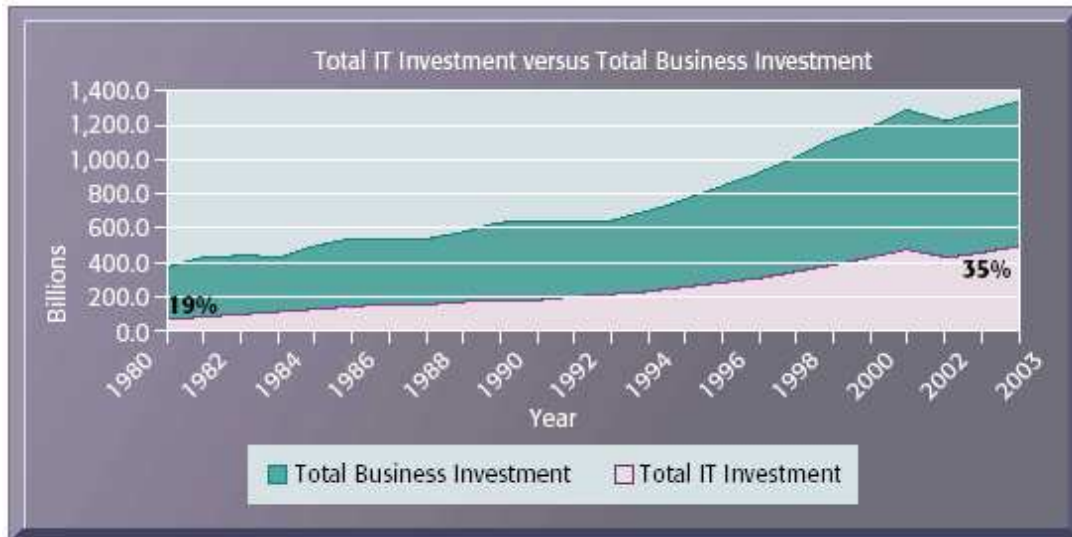
Source: Based on the data in U.S. Department of Commerce, Bureau of Economic Analysis, *National Income and Product Accounts*, Tables 5.2 and 5.8, 2004.
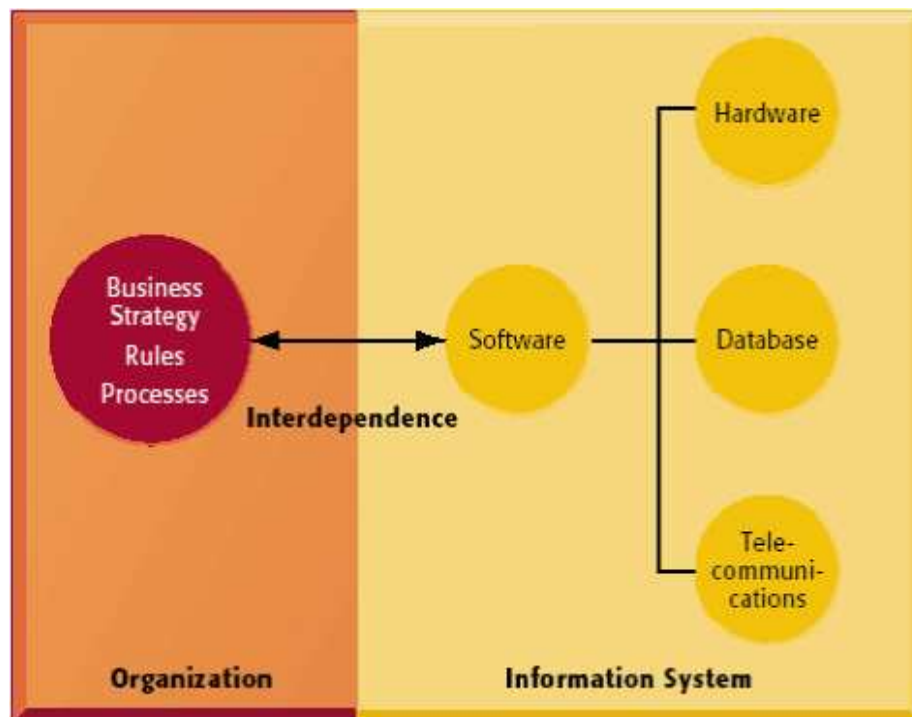
Foundation of doing business:

- **Most businesses today could not operate without extensive use of information systems and technologies.**

- **IT can increase market share.**

- **IT can help a business become a high-quality, low-cost producer.**

- **IT is vital to the development of new products.**

The Interdependence between Organizations and Information Systems

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Productivity:

- **IT is one of the most important tools managers have to increase productivity and efficiency of businesses.**

- **According to the Federal Reserve Bank, IT has reduced the rate of inflation by 0.5 to 1% in the last decade. For firms this means IT is a major factor in reducing costs.**

- **It is estimated that IT has increased productivity in the economy by about 1% in the last decade. For firms this means IT is a major source of labor and capital efficiency.**

Strategic Opportunity and Advantage:

- **Create competitive advantage:** IT makes it possible to develop competitive advantages.

- **New Business Models:** Dell Computer has built its competitive advantage on an IT enabled build-to-order business model that other firms have not been able to imitate.

Strategic Opportunity and Advantage:

- **Create new services:** eBay has developed the largest auction trading platform for millions of individuals and businesses. Competitors have not been able to imitate its success.

- **Differentiate yourself from your competitors:** Amazon has become the largest book retailer in the United States on the strength of its huge online inventory and recommender system. It has no rivals in size and scope.

How Much Does IT Matter?

- **Carr has written that whatever advantages firms build using IT can be easily copied by competitors.**

- **This view is not supported by the evidence: Amazon, eBay, Dell, Wal-Mart and Apple's iTunes are just a few firms that have built and maintained technology-based advantages.**

How Much Does IT Matter?

- **Commoditization of technology is typically a spur to innovation and new business models, products and services.**

- **Competitive advantage derives not from the technology, but on how businesses use the technology.**

- **Innovations in business processes, management and organization are not easily copied from one firm to another.**

Why IT Now?

Digital Convergence and the Changing Business Environment

Growing impact of IT in business firms can be assessed from the following five factors:

- **Internet growth and technology convergence**

- **Transformation of the business enterprise**

Why IT Now?

Digital Convergence and the Changing Business Environment (Continued)

- **Growth of a globally connected economy**

- **Growth of knowledge and information-based economies**

- **Emergence of the digital firm**

The Internet and Technology Convergence

- Growth of the Internet: 120 million online in the United States, 500 million global users

- The Internet is bringing about a convergence of telecommunications and computing: VoIP telephones.

The Internet and Technology Convergence

- Growth in e-business, e-commerce, and e-government

- Internet is bringing about rapid changes in markets and market structure: financial services and banking such as eTrade.com.

- The Internet is making many traditional business models obsolete: the corner music store and video store.

Transformation of the Business Enterprise:

- **Flattening**

- **Decentralization**

- **Flexibility**

Transformation of the Business Enterprise (Continued):

- **Location independence**

- **Low transaction and coordination costs**

- **Empowerment**

- **Collaborative work and teamwork**

Globalization

- **Management and control in a global marketplace**

- **Competition in world markets**

- **Global workgroups**

- **Global delivery systems**

Rise of the Information Economy

- **Knowledge and information-based economies**

- **New products and services**

- **Knowledge as a central productive and strategic asset**

Rise of the Information Economy (Continued)

- **Time-based competition**

- **Shorter product life**

- **Turbulent environment**

- **Limited employee knowledge base**

The Growth of the Information Economy
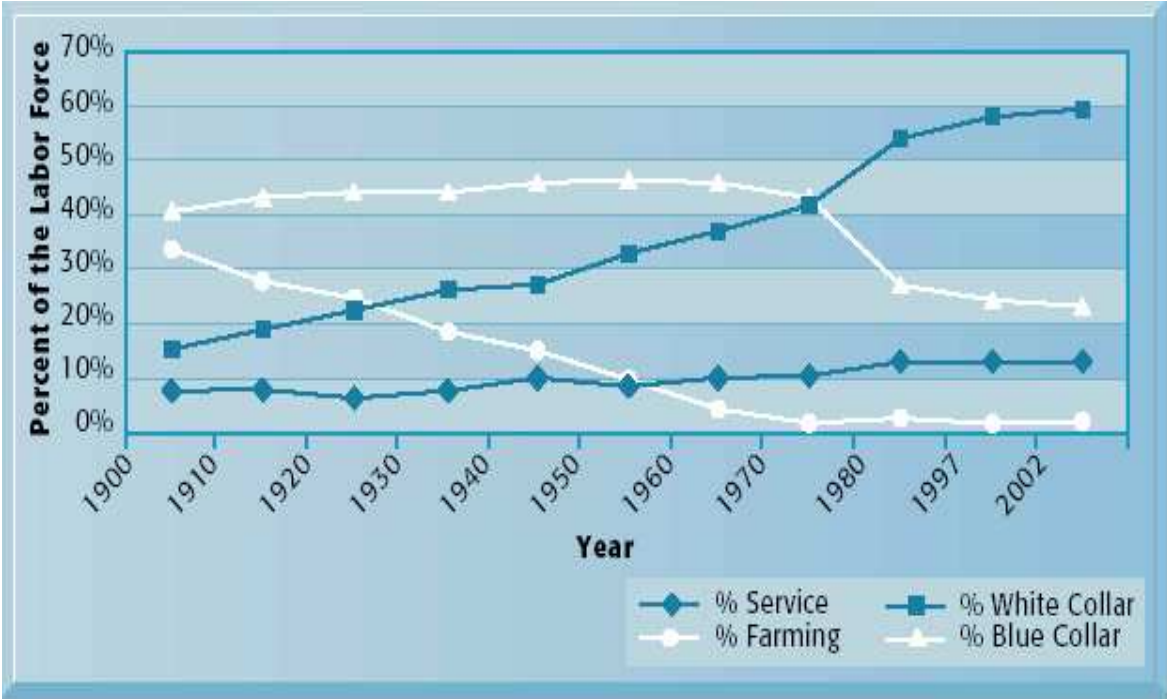
Emergence of the Digital Firm

- **Digitally enabled relationships with customers, suppliers, and employees**

- **Core business processes accomplished using digital networks**
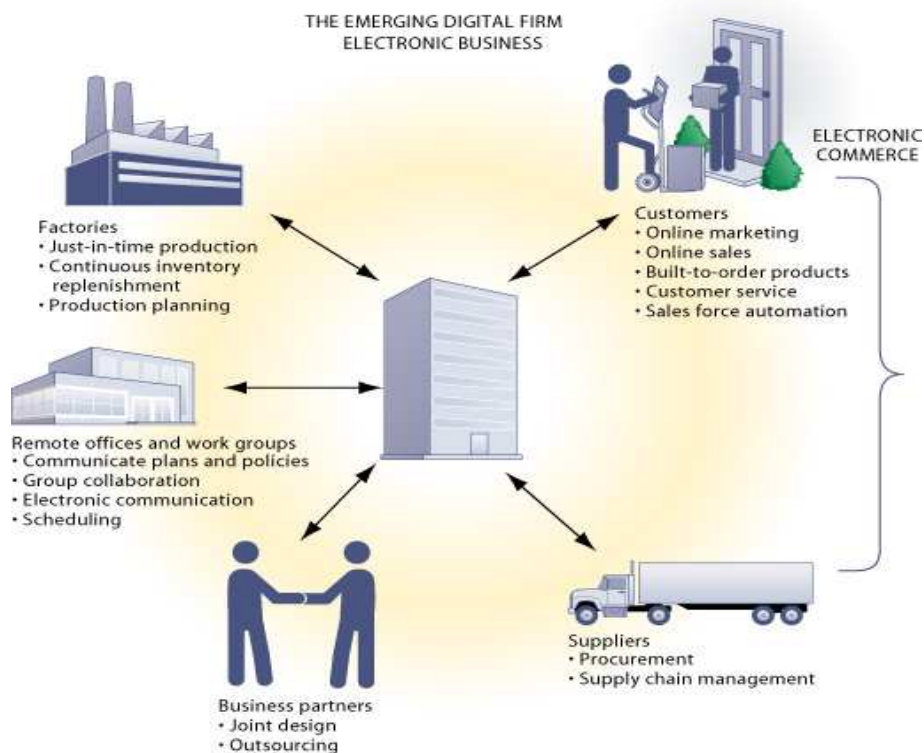
- **Digital management of key corporate assets**

Emergence of the Digital Firm (Continued)

- **Agile sensing and responding to environmental changes**

- **Seamless flow of information within the firm, and with strategic partners**

The Emerging Digital Firm

THE EMERGING DIGITAL FIRM
ELECTRONIC BUSINESS

ELECTRONIC COMMERCE

Factories
• Just-in-time production
• Continuous inventory replenishment
• Production planning

Customers
• Online marketing
• Online sales
• Built-to-order products
• Customer service
• Sales force automation

Remote offices and work groups
• Communicate plans and policies
• Group collaboration
• Electronic communication
• Scheduling

Business partners
• Joint design
• Outsourcing

Suppliers
• Procurement
• Supply chain management

What Is an Information System?

Technology perspective: A set of interrelated components that collect (or retrieve), process, store, and distribute information to support decision making and control in an organization

What is an Information System? (Continued)

- **Data: Streams of raw facts representing events such as business transactions**

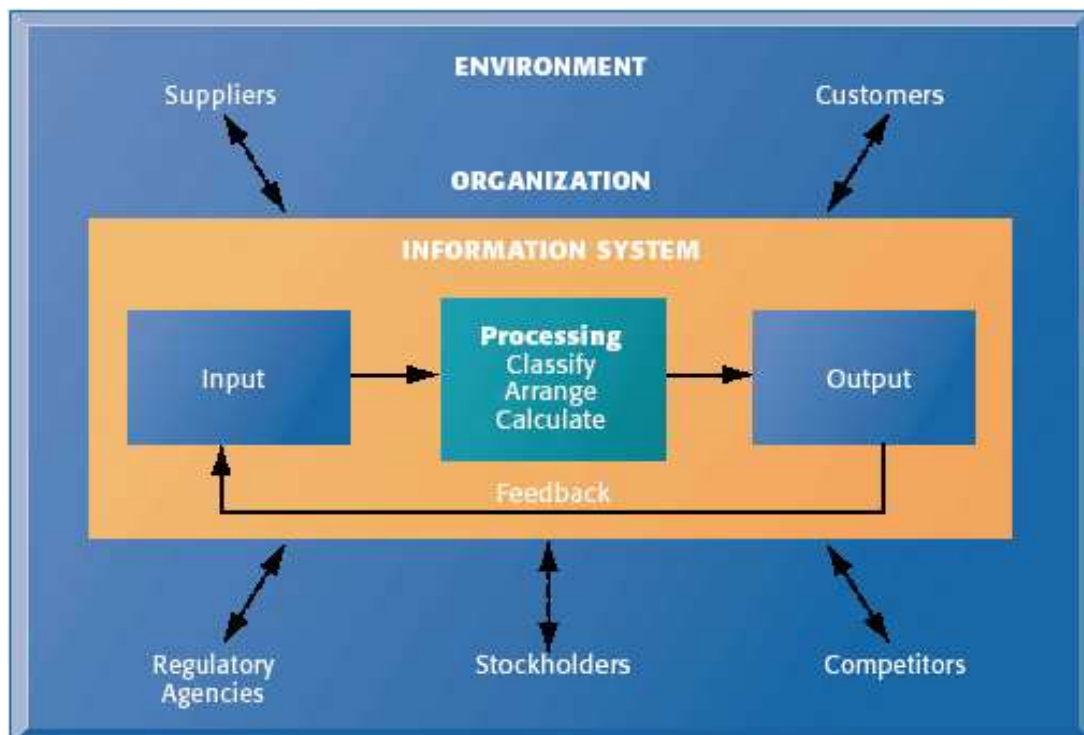- **Information: Clusters of facts meaningful and useful to human beings in the processes such as making decisions**

Data and Information

	Data			Information	

331 Brite Dish Soap 1.29
863 BL Hill Coffee 4.69
173 Meow Cat .79
331 Brite Dish Soap 1.29
663 Country Ham 3.29
524 Fiery Mustard 1.49
113 Ginger Root .85
331 Brite Dish Soap 1.29

Sales Region: Northwest
Store: Superstore #122

ITEM NO.	DESCRIPTION	UNITS SOLD
331	Brite Dish Soap	7156

YTD SALES
$ 9,231.24

Data

Information

Functions of an Information System

Computer-Based Information System

- **Rely on computer hardware and software**

- **Processing and disseminating information**

- **Fixed definitions of data and procedures**

- **Collecting, storing, and using information**

A Business Perspective on Information Systems

Information systems are more than just technology. Businesses invest in IS in order to create value and increase profitability.

- Information systems are an *organizational* and *management* solution to *business challenges* that arise from the *business environment.*

A Business Perspective on Information Systems (Continued)

- Based on information technology but also require significant investment in organizational and management changes and innovations

- IS create value primarily by changing business processes and management decision making.

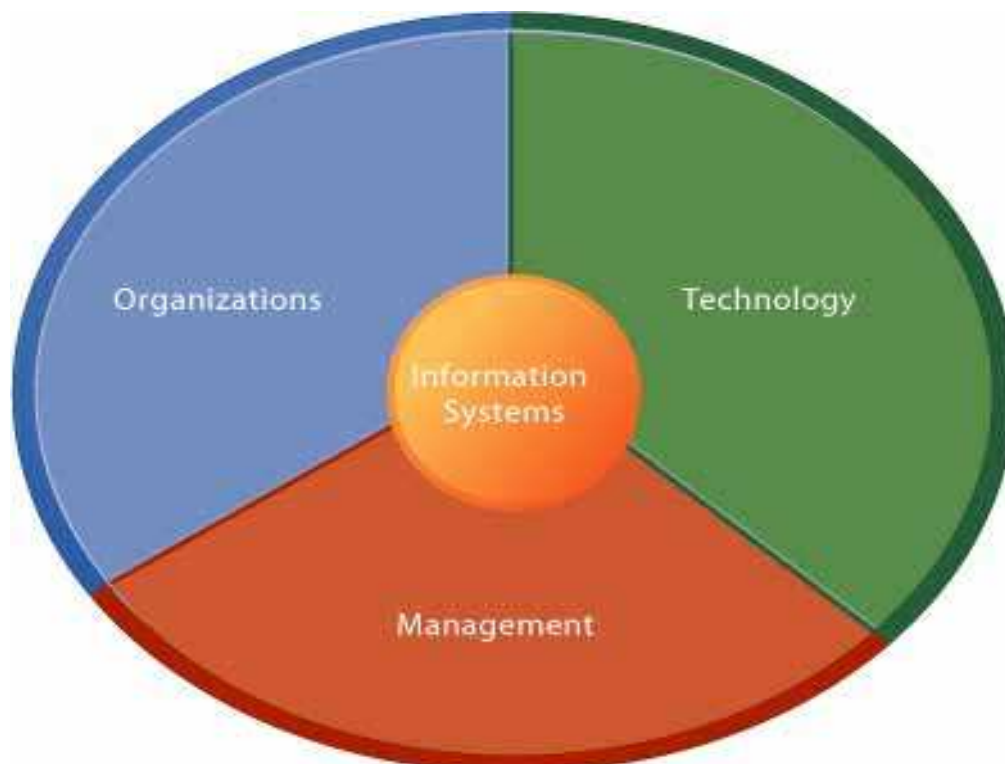# The Business Information Value Chain

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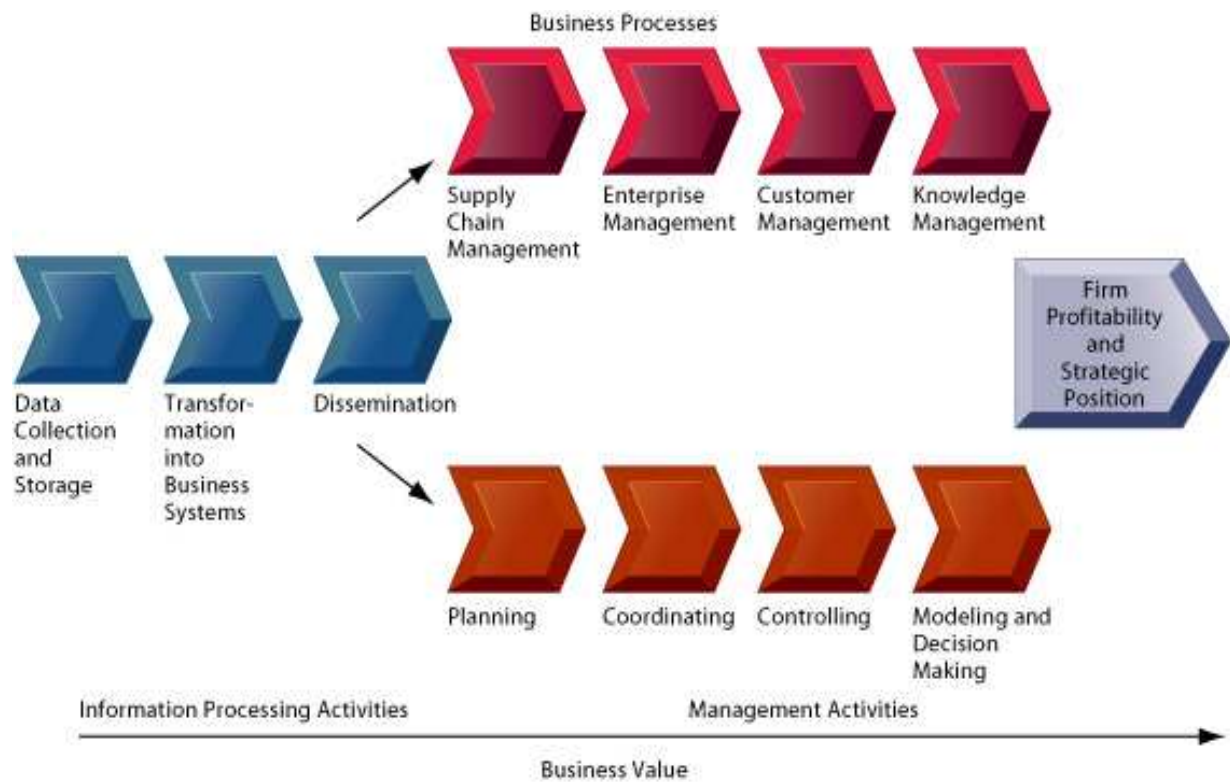
Information Systems Are More than Computers

Some Definitions

- **Information systems literacy:** Broad-based understanding of information systems that includes behavioral knowledge about organizations, management and individuals using information systems as well as technical knowledge about computers

- **Computer literacy:** Knowledge about information technology, focusing on understanding how computer technologies work

Major Business Functions Rely on Information Systems

- **Sales and marketing**

- **Manufacturing**

- **Finance**

- **Accounting**

- **Human resources**

- **Research & Development**

Dimensions of Information Systems

Three Important Dimensions of Information Systems

- **Organizations**

- **Managers**

- **Technology**

You will need to understand and *balance* these dimensions of information systems in order to create *business value.*

The Organizational Dimension of Information Systems

- **People**

- **Structure**

- **Business processes**

- **Culture**

- **Politics**

The Management Dimension of Information Systems

Managers are:

- **Sense makers**

- **Decision makers**

- **Planners**

- **Innovators of new processes**

- **Leaders: set agendas**

The Management Dimension of Information Systems (Continued)

Managers who can understand the role of information systems in *creating business value* are the key ingredient to success with systems, and cannot easily be replicated by your competitors.

The Technology Dimension of Information Systems

Information technology is one of the tools managers use to cope with change:

- **Hardware: Physical equipment**

- **Software: Detailed preprogrammed instructions**

- **Storage: Physical media for storing data and the software**

The Technology Dimension of Information Systems (Continued)

- **Communications technology: Transfers data from one physical location to another**

- **Networks: Links computers to share data or resources**

Managers need to *know enough* about information technology to make *intelligent decisions* about how to use it for *creating business value.*

Complementary Assets and Organizational Capital

Complementary assets:

- **New business processes**

- **Management behavior**

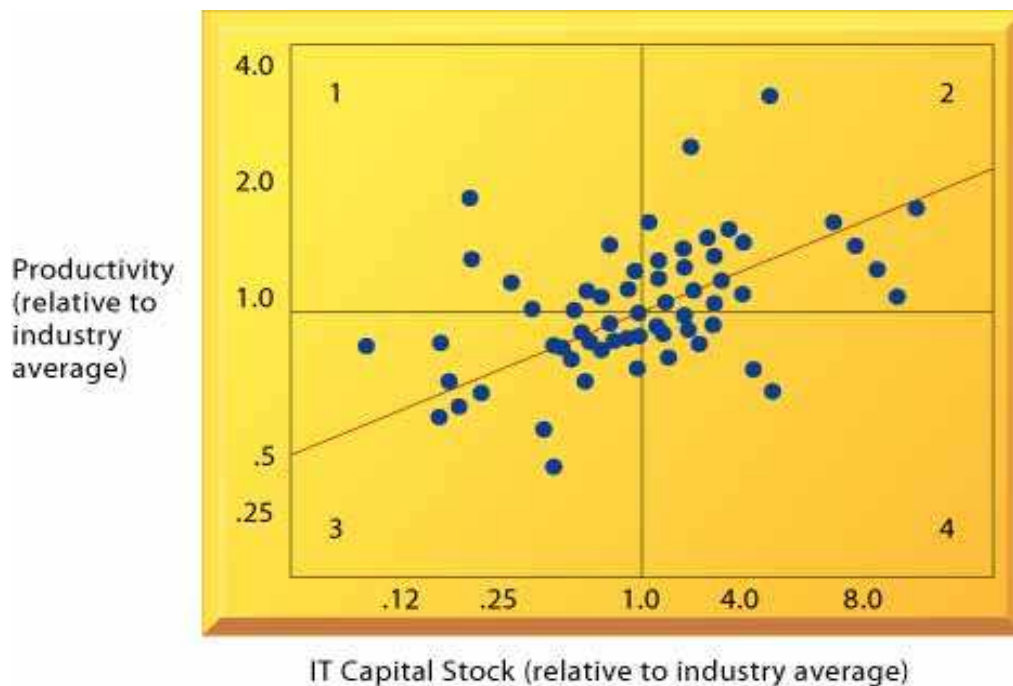- **Organizational culture**

- **Training**

Complementary Assets and Organizational Capital

Organizational capital:

- **Supportive business culture that values efficiency and effectiveness**

- **Efficient business processes, decentralization of authority**

- **Highly distributed decision rights**

- **A strong information system (IS) development team**

Variation in Returns on Information Technology Investment

CONTEMPORARY APPROACHES TO INFORMATION SYSTEMS
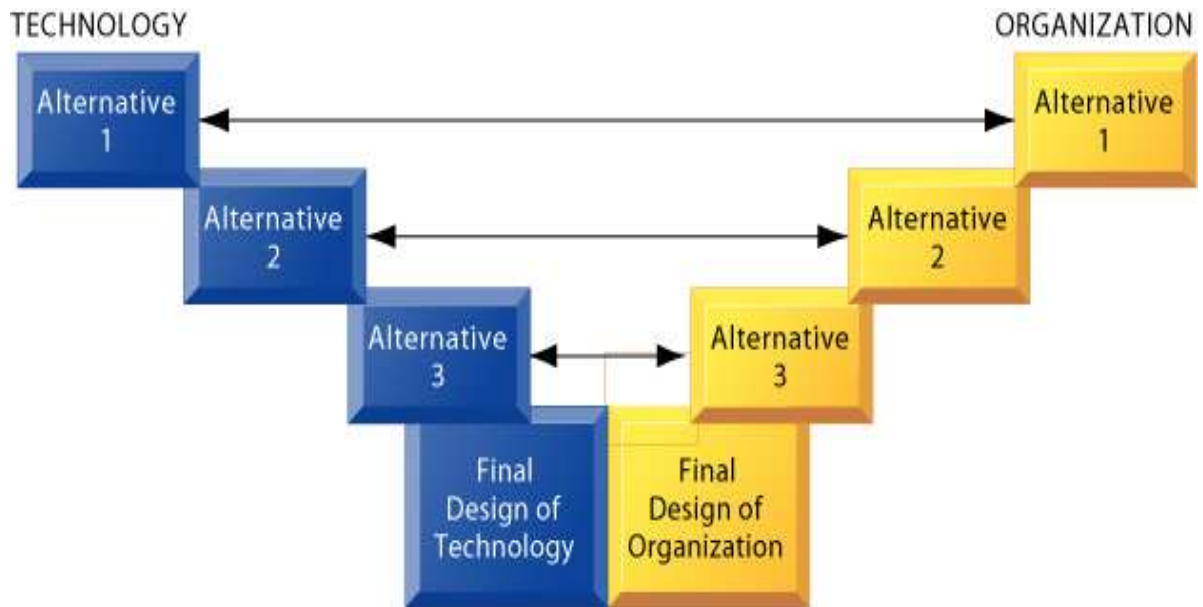
Sociotechnical Systems

Optimize systems performance:

- **Technology and organization**

- **Organizations mutually adjust to one another until fit is satisfactory**

CONTEMPORARY APPROACHES TO INFORMATION SYSTEMS

A Sociotechnical Perspective on Information Systems

Types of Information Systems

Different Kinds of Systems

Three main categories of information systems serve different organizational levels:

1. **Operational-level systems:** support operational managers, keeping track of the elementary activities and transactions

2. **Management-level systems:** serve the monitoring, controlling, decision-making, and administrative activities

3. **Strategic-level systems:** help senior management tackle and address strategic issues
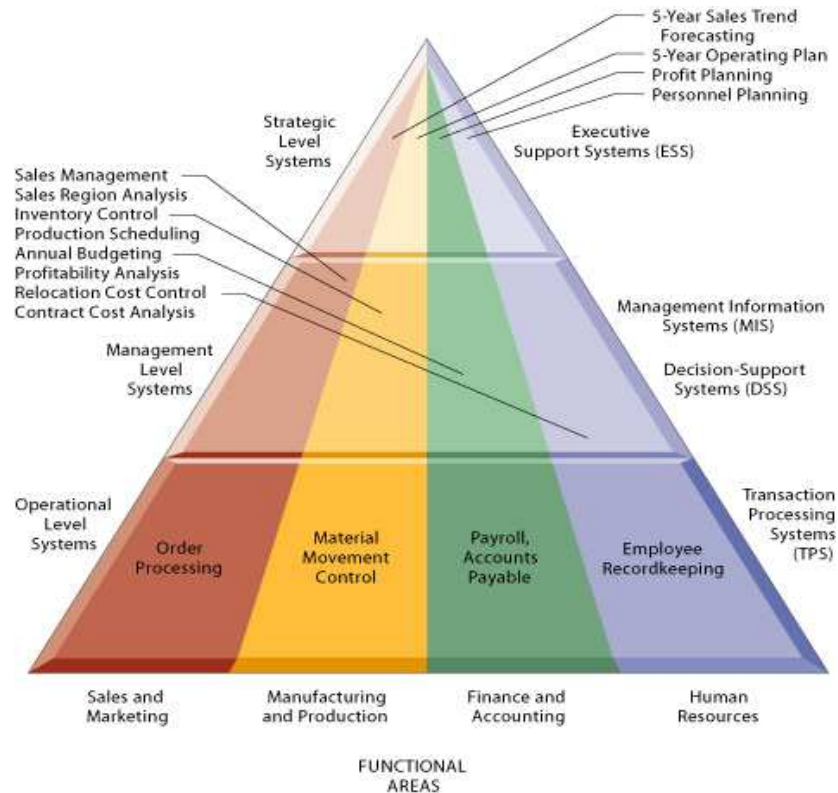

Major Types of Systems

- **Transaction Processing Systems (TPS)**

- **Management Information Systems (MIS)**

- **Decision-Support Systems (DSS)**

- **Executive Support Systems (ESS)**
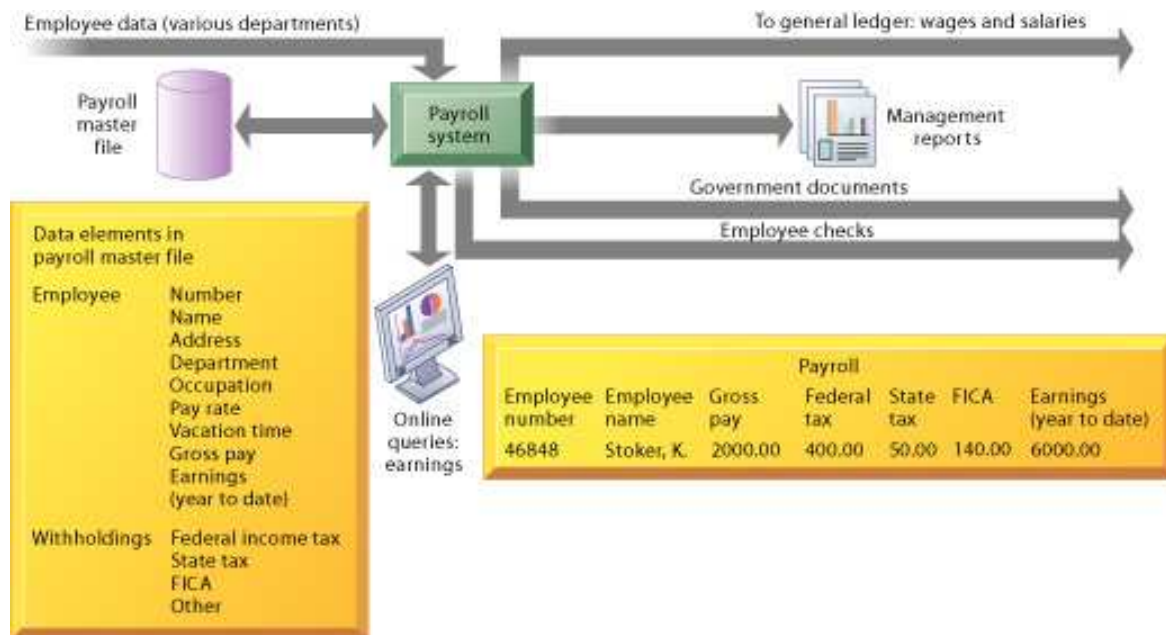
The Four Major Types of Information Systems

Transaction Processing Systems (TPS)

- **Basic business systems that serve the operational level**

- **A computerized system that performs and records the daily routine transactions necessary to the conduct of the business**

A Symbolic Representation for a Payroll TPS

Typical Applications of TPS

| TYPE OF TPS SYSTEM				
	Sales/marketing systems	Manufacturing/production systems	Finance/accounting systems	Human resources systems	Other types (e.g., university)
Major functions of system	Customer service Sales management Promotion tracking Price changes Dealer communications	Scheduling Purchasing Shipping/receiving Operations	General ledger Billing Cost accounting	Personnel records Benefits Compensation Labor relations Training	Admissions Grade records Course records Alumni records
Major application systems	Sales order information system Sales commission system Sales support system	Machine control systems Purchase order systems Quality control systems	General ledger Payroll Accounts receivable/payable Funds management systems	Employee records Benefit systems Employee skills inventory	Registration system Student transcript system Curriculum class control systems Alumni benefactor system

Management Information Systems (MIS)

Management level

- **Inputs:** High volume transaction level data

- **Processing:** Simple models

- **Outputs:** Summary reports

- **Users:** Middle managers

Example: Annual budgeting

Management Information Systems (MIS) (continued)
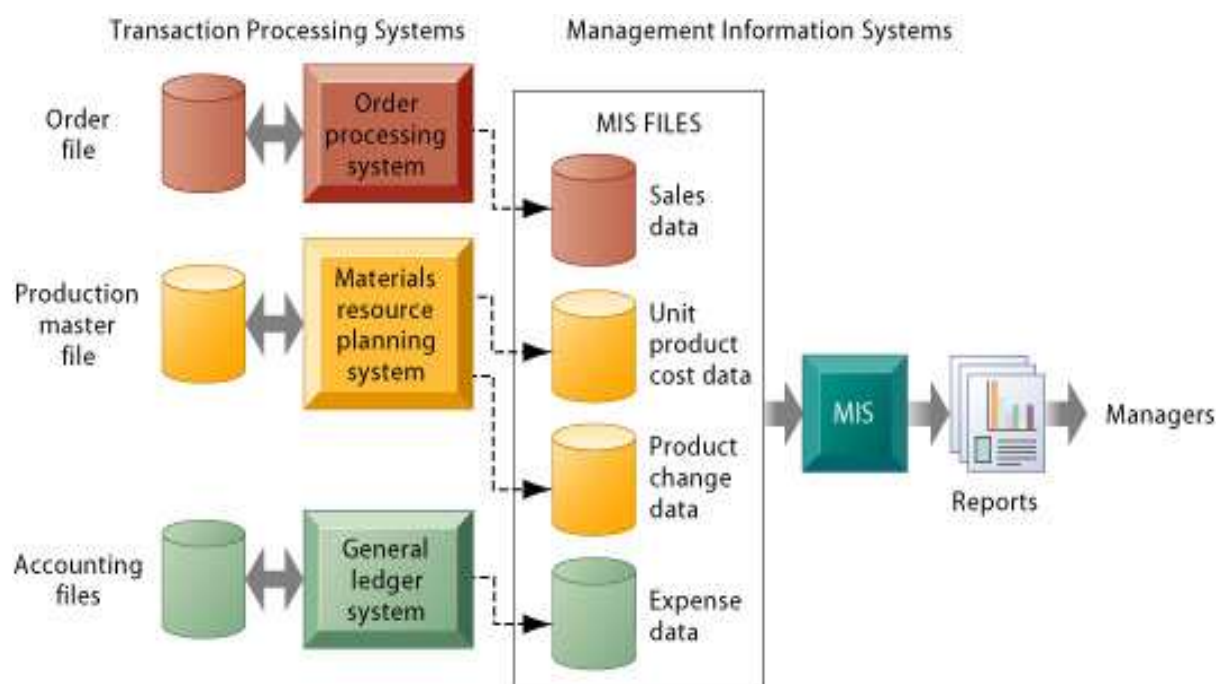
Management Information Systems (MIS) (continued)

Consolidated Consumer Products Corporation Sales by Product and Sales Region: 2005

PRODUCT CODE	PRODUCT DESCRIPTION	SALES REGION	ACTUAL SALES	PLANNED	ACTUAL versus PLANNED
4469	Carpet Cleaner	Northeast	4,066,700	4,800,000	0.85
		South	3,778,112	3,750,000	1.01
		Midwest	4,867,001	4,600,000	1.06
		West	4,003,440	4,400,000	0.91
	TOTAL		16,715,253	17,550,000	0.95
5674	Room Freshener	Northeast	3,676,700	3,900,000	0.94
		South	5,608,112	4,700,000	1.19
		Midwest	4,711,001	4,200,000	1.12
		West	4,563,440	4,900,000	0.93
	TOTAL		18,559,253	17,700,000	1.05

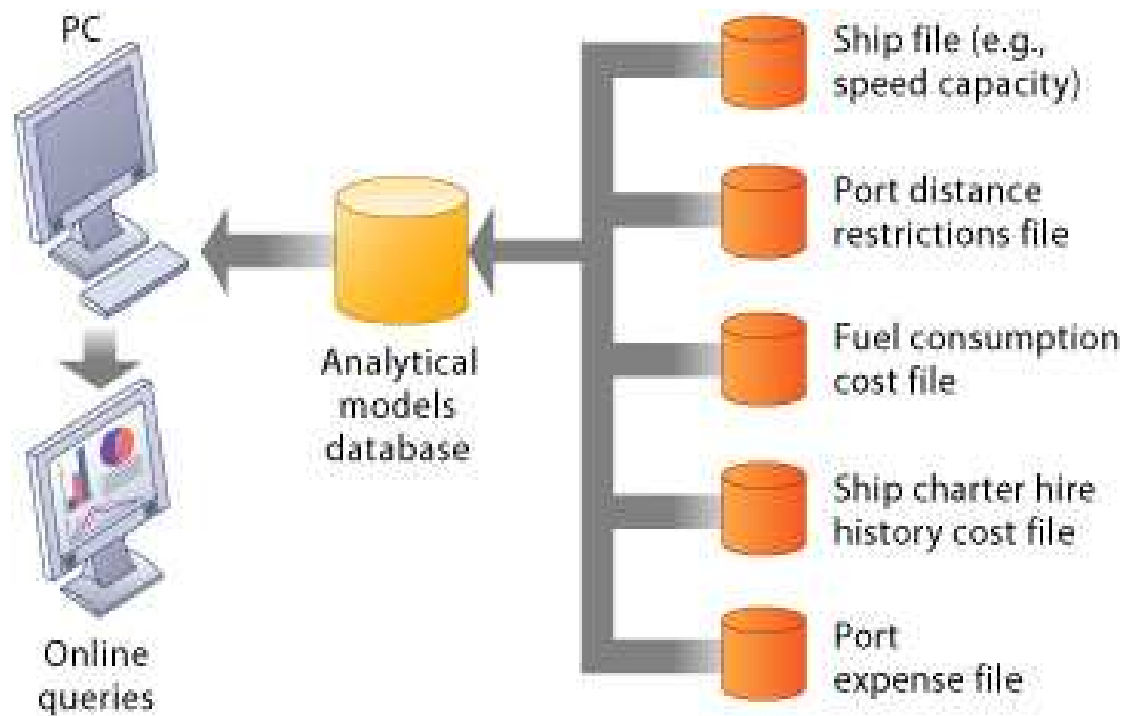## Decision-Support Systems (DSS)

Management level

- **Inputs: Transaction level data**

- **Processing: Interactive**

- **Outputs: Decision analysis**

- **Users: Professionals, staff**

Example: Contract cost analysis

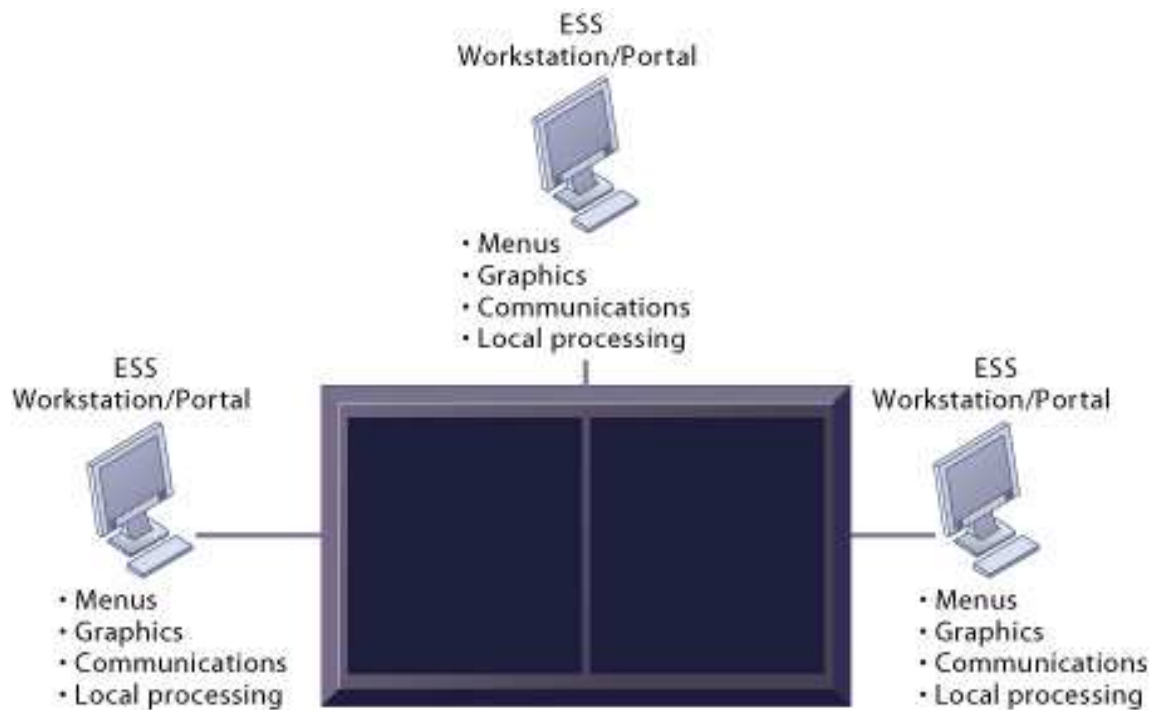# Decision-Support Systems (DSS) (Continued)

EXECUTIVE SUPPORT SYSTEMS (ESS):

- **Inputs: Aggregate data**

- **Processing: Interactive**

- **Outputs: Projections**

- **Users: Senior managers**

Example: 5 year operating plan

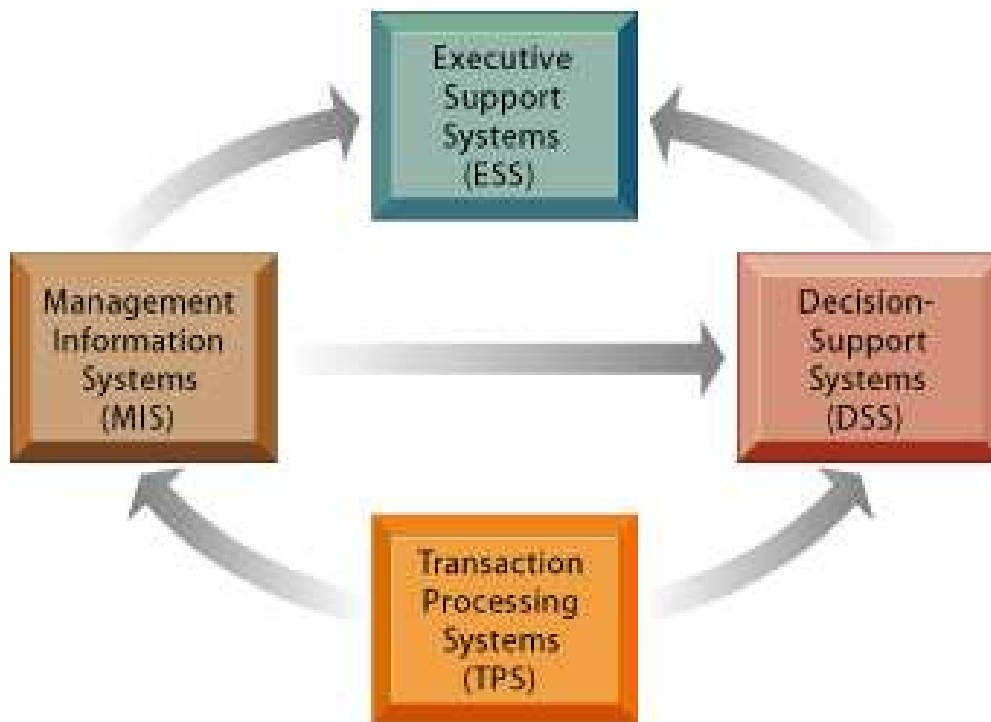## Model of a Typical Executive Support System

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MAJOR TYPES OF SYSTEMS IN ORGANIZATIONS

EXECUTIVE SUPPORT SYSTEMS (ESS) (Continued)

- **Top Level Management**

- **Designed to the individual senior manager**

- **Ties CEO to all levels**

- **Very expensive to keep up**

- **Extensive support staff**

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Relationship of Systems to One Another

Relationship of Systems to One Another

In contemporary digital firms, the different types of systems are closely linked to one another. *This is the ideal*. In traditional firms these systems tend to be isolated from one another, and information does not flow seamlessly from one end of the organization to the other. Efficiency and business value tend to suffer greatly in these traditional firms

Sales and Marketing Systems

Major functions of systems:

- **Sales management, market research, promotion, pricing, new products**

Major application systems:

- **Sales order info system, market research system, pricing system**

Sales and Marketing Systems

SYSTEM	DESCRIPTION	ORGANIZATIONAL LEVEL
Order processing	Enter, process, and track orders	Operational
Pricing analysis	Determine prices for products and services	Management
Sales trend forecasting	Prepare 5-year sales forecasts	Strategic

Manufacturing and Production Systems

Major functions of systems:

- **Scheduling, purchasing, shipping, receiving, engineering, operations**

Major application systems:

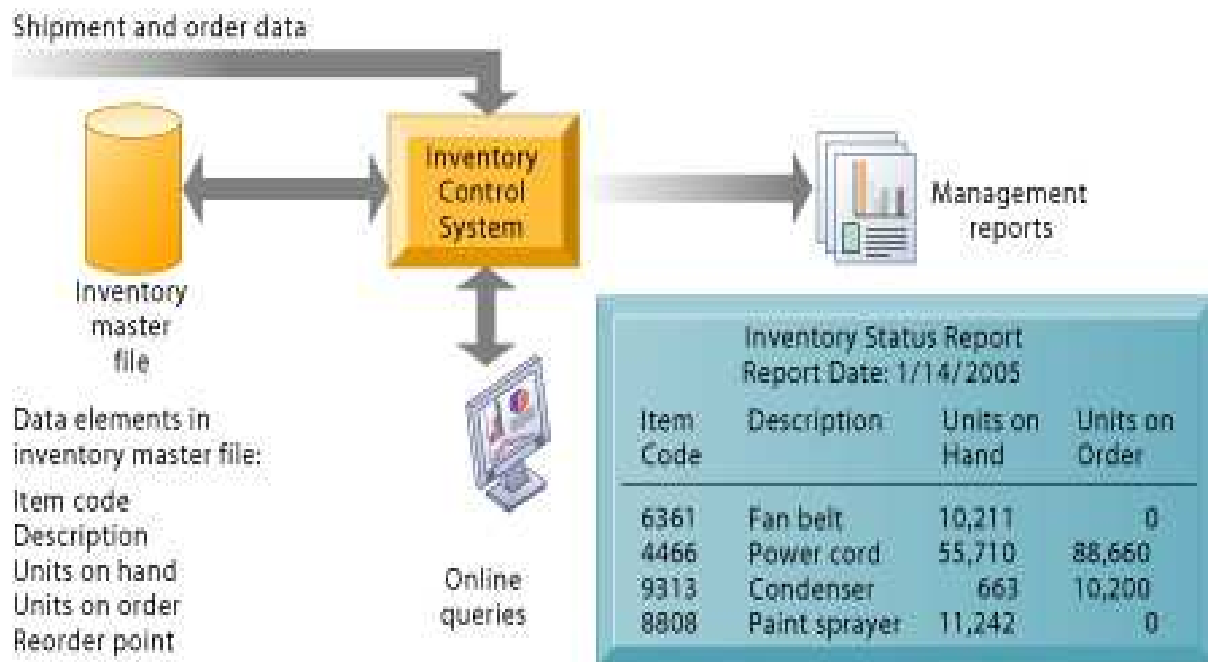- **Materials resource planning systems, purchase order control systems, engineering systems, quality control systems**

Manufacturing and Production Systems

SYSTEM	DESCRIPTION	ORGANIZATIONAL LEVEL
Machine control	Control the actions of machines and equipment	Operational
Production planning	Decide when and how many products should be produced	Management
Facilities location	Decide where to locate new production facilities	Strategic

Overview of an Inventory System

Shipment and order data

Inventory master file

Data elements in inventory master file:

Item code
Description
Units on hand
Units on order
Reorder point

Online queries

Inventory Control System

Management reports

Inventory Status Report
Report Date: 1/14/2005

Item Code	Description	Units on Hand	Units on Order
6361	Fan belt	10,211	0
4466	Power cord	55,710	88,660
9313	Condenser	663	10,200
8808	Paint sprayer	11,242	0

Financing and Accounting Systems

Major functions of systems:

- **Budgeting, general ledger, billing, cost accounting**

Major application systems:

- **General ledger, accounts receivable, accounts payable, budgeting, funds management systems**

Financing & Accounting Systems (Continued)

SYSTEM	DESCRIPTION	ORGANIZATION-AL LEVEL
Accounts receivable	Tracks money owed the firm	Operational
Budgeting	Prepares short-term budgets	Management
Profit planning	Plans long-term profits	Strategic

Human Resource Systems

Major functions of systems:

- **Personnel records, benefits, compensation, labor relations, training**

Major application systems:

- **Payroll, employee records, benefit systems, career path systems, personnel training systems**

Human Resource Systems (Continued)

SYSTEM	DESCRIPTION	ORGANIZATIONAL LEVEL
Training and development	Tracks employee training, skills, and performance appraisals	Operational
Compensation analysis	Monitors the range and distribution of employee wages, salaries, and benefits	Management
Human resources planning	Plans the long-term labor force needs of the organization	Strategic

Human Resource Systems (Continued):

An Employee Recordkeeping System
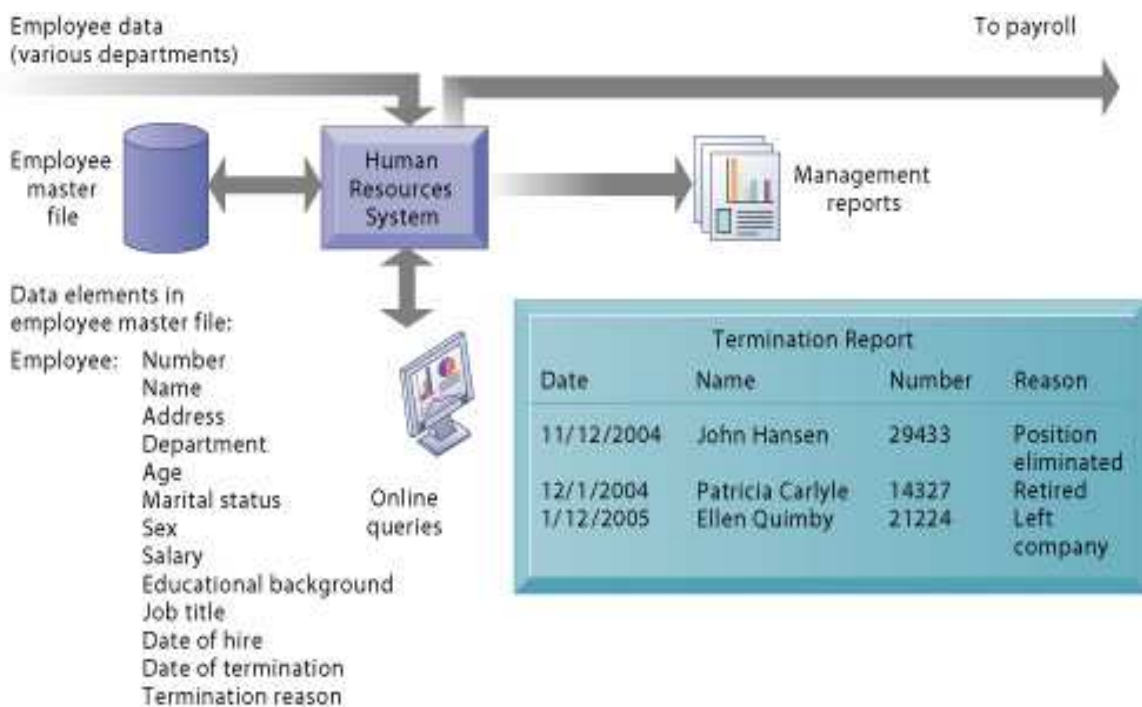
Business Processes and Information Systems

Business processes:

- Manner in which work is organized, coordinated, and focused to produce a valuable product or service

- Concrete work flows of material, information, and knowledge—sets of activities

- Unique ways to coordinate work, information, and knowledge

- Ways in which management chooses to coordinate work

Business Processes and Information Systems (Continued)

- Information systems help organizations achieve great efficiencies by automating parts of processes

- IS also contributes to completely rethinking processes.

- Business processes typically span several different functional areas.

Examples of Business Processes

Manufacturing and production:

- **Assembling product, checking quality, producing bills of materials**

Sales and marketing:

- **Identifying customers, creating customer awareness, selling**

Examples of Business Processes (Continued)

Finance & accounting:

- **Paying creditors, creating financial statements, managing cash accounts**

Human resources:

- **Hiring employees, evaluating performance, enrolling employees in benefits plans**

Business Processes and Information Systems

Cross-Functional Business Processes:

- **Transcend boundary between sales, marketing, manufacturing, and research and development**

- **Group employees from different functional specialties to a complete piece of work**

Example: Order Fulfillment Process

The Order Fulfillment Process
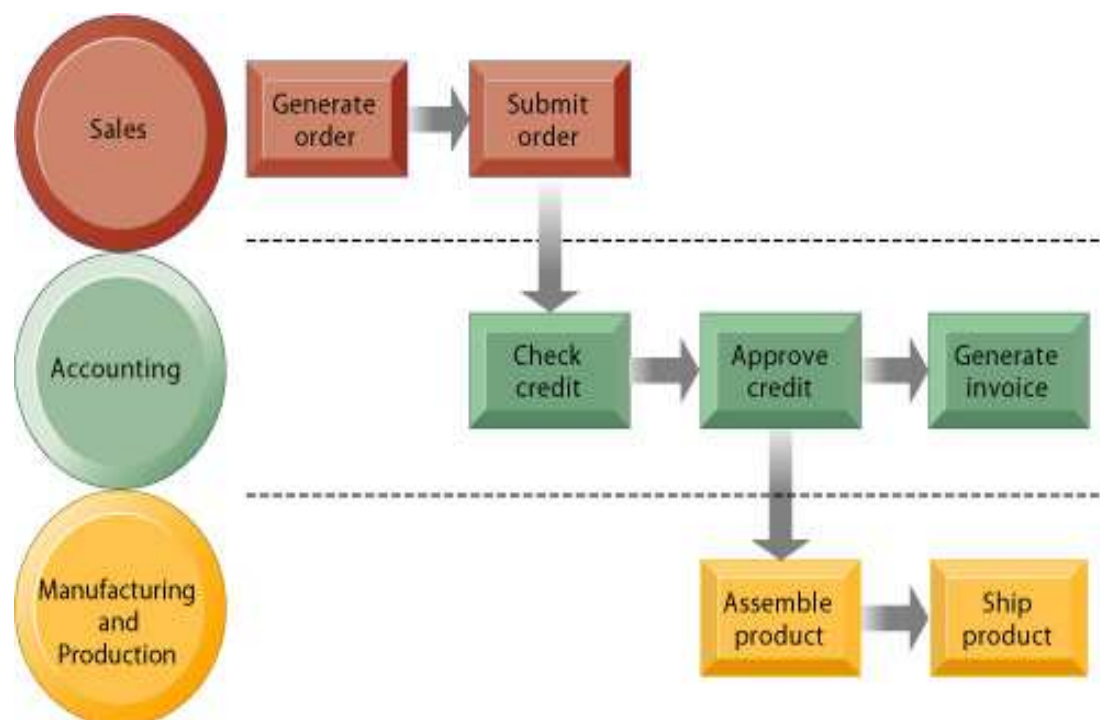
Systems for Enterprise-Wide Process Integration

Enterprise applications:

- **Designed to support organization-wide process coordination and integration**

Systems for Enterprise-Wide Process Integration (Continued)

Consist of :

- **Enterprise systems**

- **Supply chain management systems**

- **Customer relationship management systems**

- **Knowledge management systems**

Enterprise Systems

- **Enterprise systems, also known as enterprise resource planning (ERP) systems, provide a single information system for organization-wide coordination and integration of key business processes.**

- **Information that was previously fragmented in different systems can seamlessly flow throughout the firm so that it can be shared by business processes in manufacturing, accounting, human resources, and other areas.**

Enterprise Application Architecture
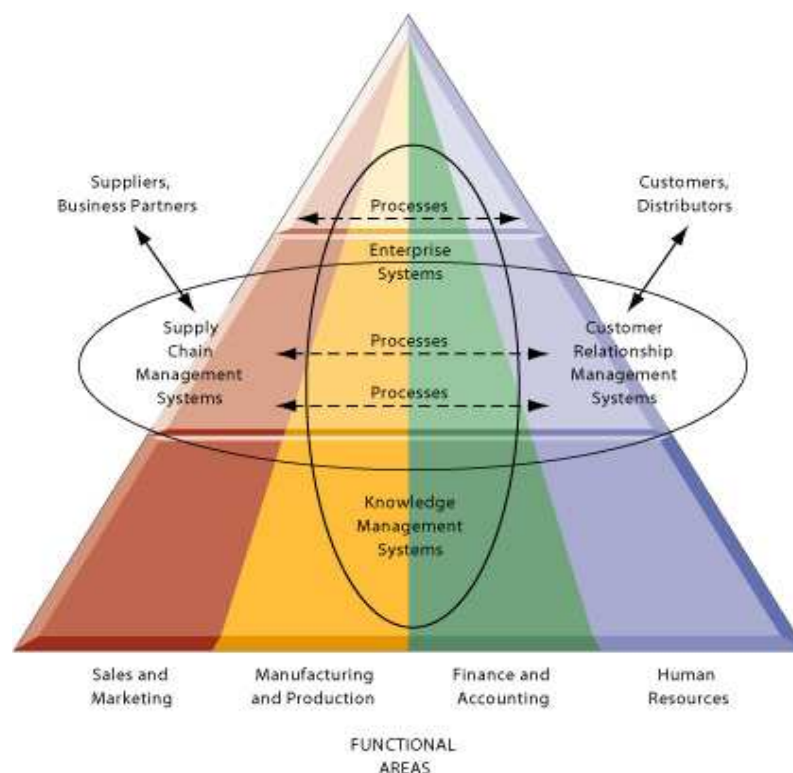
Traditional "Silo" View of Information Systems

Within the business:

- **There are functions, each having its uses of information systems**

Outside the organization's boundaries:

- **There are customers and vendors**
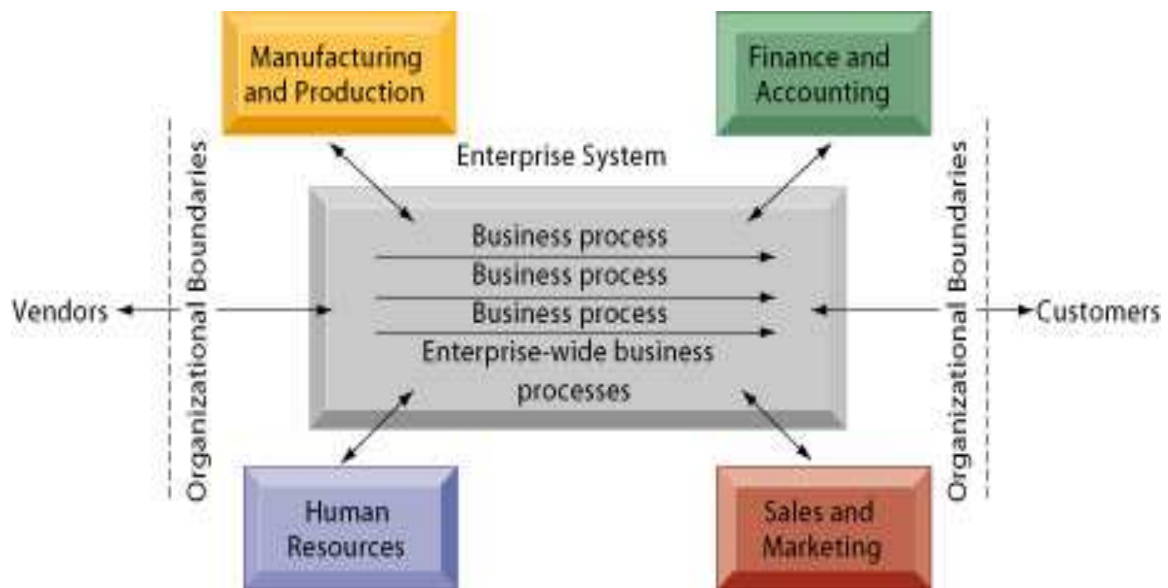
Functions tend to work in isolation

Traditional View of Systems
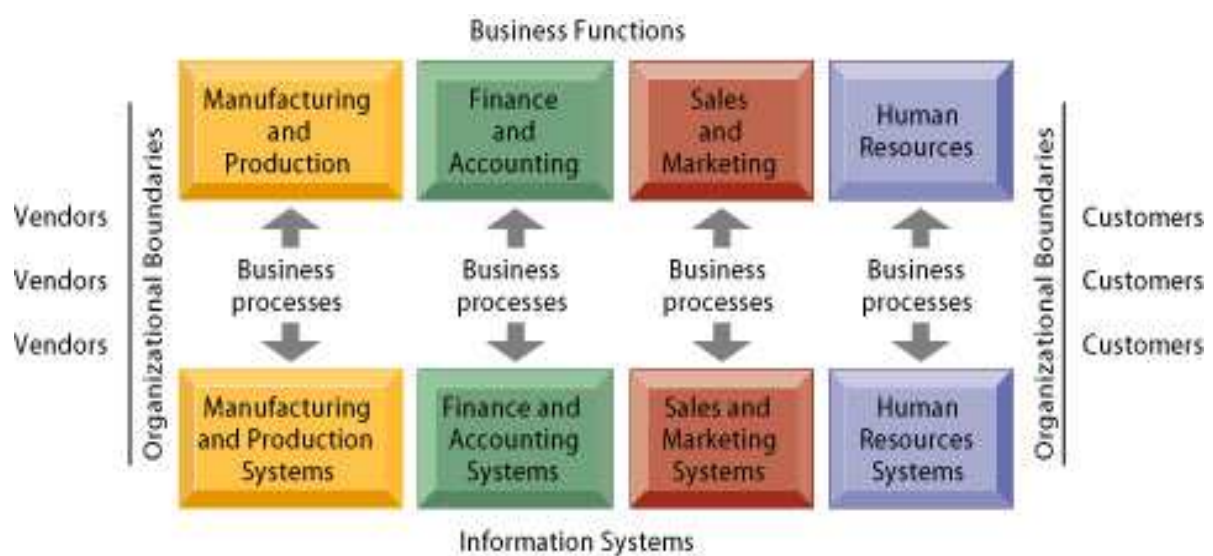
Enterprise Systems

Benefits of Enterprise Systems

- **Help to unify the firm's structure and organization:** One organization

- **Management:** Firm wide knowledge-based management processes

- **Technology:** Unified platform

- **Business:** More efficient operations & customer-driven business processes

Challenges of Enterprise Systems

- **Difficult to build:** Require fundamental changes in the way the business operates

- **Technology:** Require complex pieces of software and large investments of time, money, and expertise

- **Centralized organizational coordination and decision making:** Not the best way for the firms to operate

Supply Chain Management (SCM)

- **Close linkage and coordination of activities involved in buying, making, and moving a product**

- **Integrates supplier, manufacturer, distributor, and customer logistics time**

- **Reduces time, redundant effort, and inventory costs**

- **Network of organizations and business processes**

Supply Chain Management (SCM)

- **Helps in procurement of materials, transformation of raw materials into intermediate and finished products**

- **Helps in distribution of the finished products to customers**

- **Includes reverse logistics - returned items flow in the reverse direction from the buyer back to the seller**

Haworth's Supply Chain Management Systems

Information from Supply Chain Management Systems helps firms:

- **Decide when and what to produce, store, and move**

- **Rapidly communicate orders**

- **Track the status of orders**

- **Check inventory availability and monitor inventory levels**

Information from Supply Chain Management Systems helps firms: (Continued)

- **Reduce inventory, transportation, and warehousing costs**

- **Track shipments**

- **Plan production based on actual customer demand**

- **Rapidly communicate changes in product design**

Customer Relationship Management (CRM)

- **Manages all ways used by firms to deal with existing and potential new customers**

- **Business and technology discipline**

- **Uses information system to coordinate entire business processes of a firm**

Customer Relationship Management (CRM) (Continued)

- **Provides end- to- end customer care**

- **Provides a unified view of customer across the company**

- **Consolidates customer data from multiple sources and provides analytical tools for answering questions**

Customer Relationship Management (CRM)

Knowledge Management Systems

- **Collects relevant knowledge and make it available wherever and whenever it is needed**

- **Support business processes and management decisions**

- **Also link the firm to external sources of knowledge**

- **Support processes for acquiring, storing, distributing, and applying knowledge**

Management Opportunities

There are extraordinary opportunities to use information systems to achieve business value, and increase profitability

Management Challenges

- **Integration and the whole firm view:** Given the different interests and perspectives within a firm, it is difficult to achieve consensus about the need for the "whole firm" viewpoint.

- **Management and employee training:** Training a large number of employees on many systems in a large organization involves commensurately large investments.

Management Challenges: (Continued)

- **Accounting for the cost of systems and managing demands for systems:** Given the large number of different types of systems in a firm, and the large number of people involved with using them, it is a complex task to understand which systems are truly necessary and productive with high returns on investment
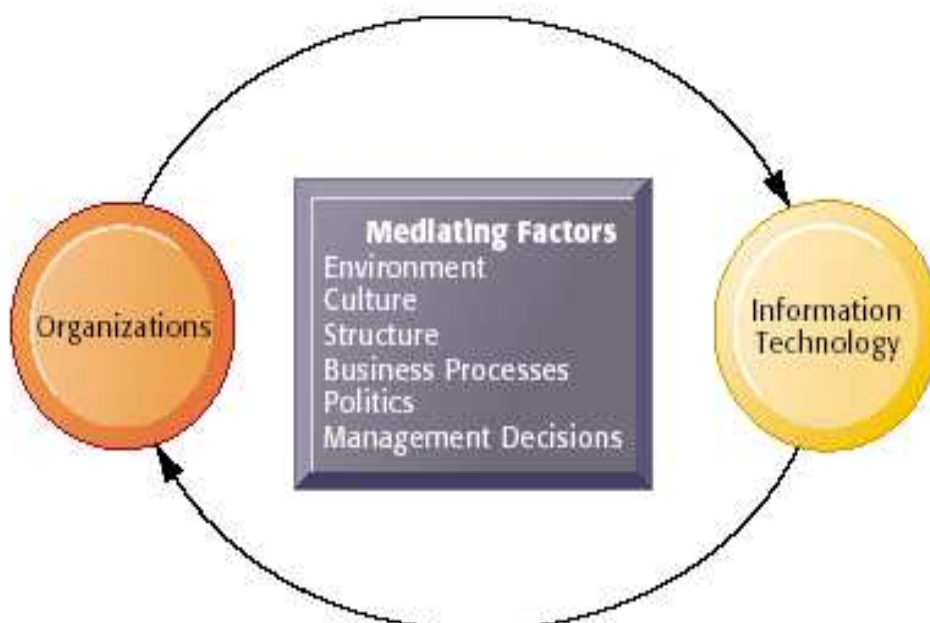

Solution Guidelines:

- **Inventory the firm's information systems:** Develop a list of firm-wide information requirements to give a 360-degree view of the most important information needs of the firm.

- **Employee and management education:** Ensure that you understand how much training is required.

- **Account for the costs and benefits:** Develop an accounting system for information services firm-wide.

Information Systems, Organizations, Management, and Strategy

## The Two-Way Relationship between Organizations and Information Technology

Mediating Factors
Environment
Culture
Structure
Business Processes
Politics
Management Decisions

Organizations

Information Technology

What Is an Organization?

Organization:

- **Stable, formal social structure**

- **Takes resources from the environment and processes them to produce outputs**

The Technical Microeconomic Definition of the Organization
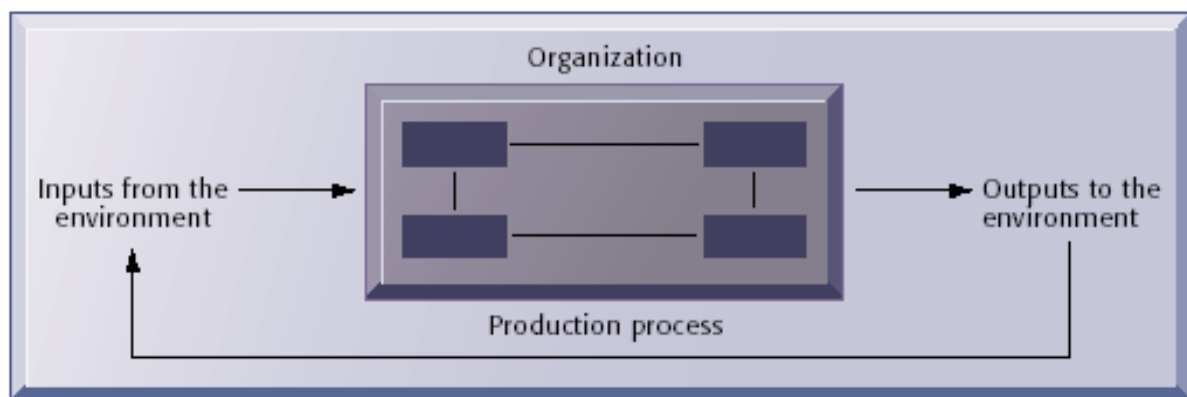
Behavioral Definition of Organization:

- **Collection of rights, privileges, obligations, and responsibilities**

- **Delicately balanced over a period of time through conflict**

- **Conflict resolution**

The Behavioral View of Organizations

FORMAL ORGANIZATION

Structure
Hierarchy
Division of labor
Rules, procedures
Business processes
Culture

Environmental resources →

Process
Rights/obligations
Privileges/responsibilities
Values
Norms
People

→ Environmental outputs
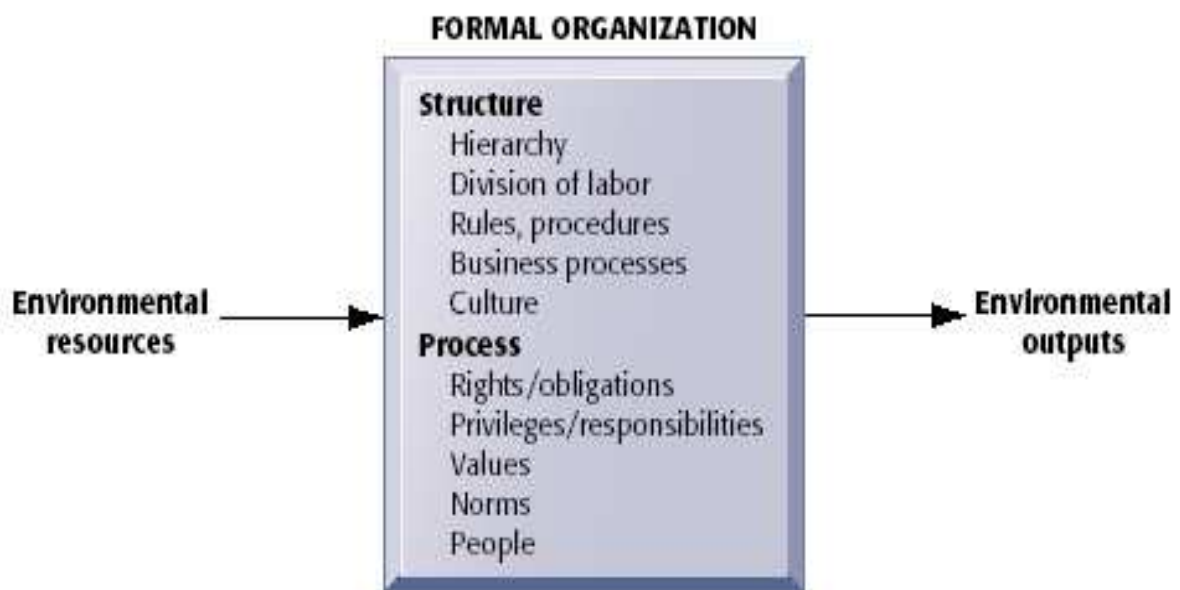
Common Features of Organizations

All organizations have some similar "structural" features.

- Clear division of labor

- Hierarchy

- Explicit rules and procedures

- Impartial judgments

- Technical qualifications for positions

- Maximum organizational efficiency

Routines and Business Processes

- Routines are patterns of individual behavior.

- Business processes are a collection of routines.

- Business firms are a collection of business processes.

- Business processes enable organizations to cope with all recurring expected situations.

Routines, Business Processes, and Firms

Routines, Business Processes, and Firms
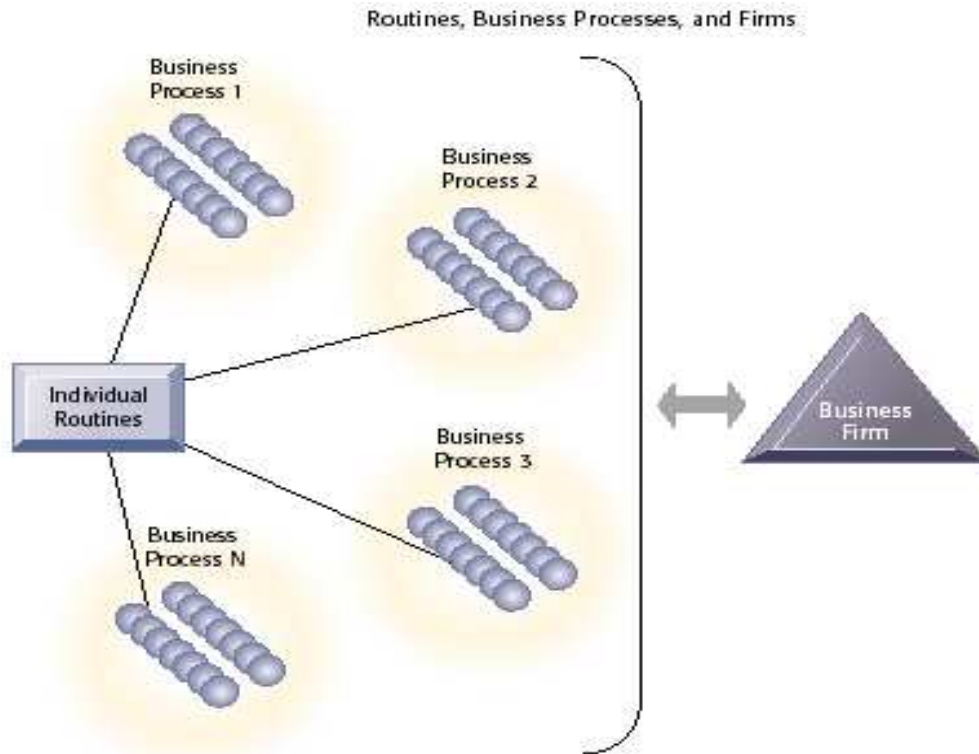
Organizational Politics

- **Divergent viewpoints – and personal ambitions/agendas - lead to political struggle, competition, and conflict.**

- **Hamper organizational change**

Organizational Culture

- **What products the organization should produce**
- **How and where it should be produced**
- **For whom the products should be produced**
- **How do the people behave**
- **How do we get things done in the organization**
- **What is the reward/punishment system**
- **How do we dress**

Unique Features of Organizations

- **Structures**

- **Goals**

- **Constituencies**

- **Leadership styles**

- **Tasks**

- **Surrounding environments**

Organizational Structures

- **Entrepreneurial structure:** Small start-up business

- **Machine bureaucracy:** Midsize manufacturing firm

- **Divisionalized bureaucracy:** Fortune 500 firms

- **Professional bureaucracy:** Law firms, school systems, hospitals

- **Adhocracy:** Consulting firms

Organizations and Environments:

- **Organizations and environments have a reciprocal relationship.**

- **Organizations are open to, and dependent on, the social and physical environment.**

- **Organizations can influence their environments.**

Environments and Organizations Have a Reciprocal Relationship
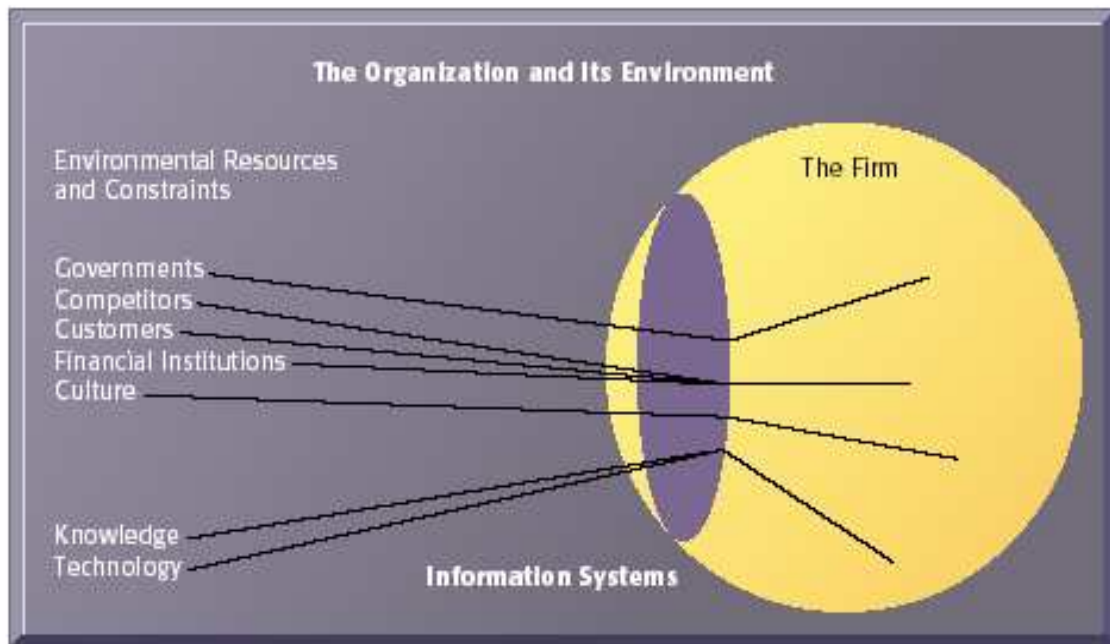
Other Differences Among Organizations:

- **Ultimate goals**

- **Different groups and constituencies**
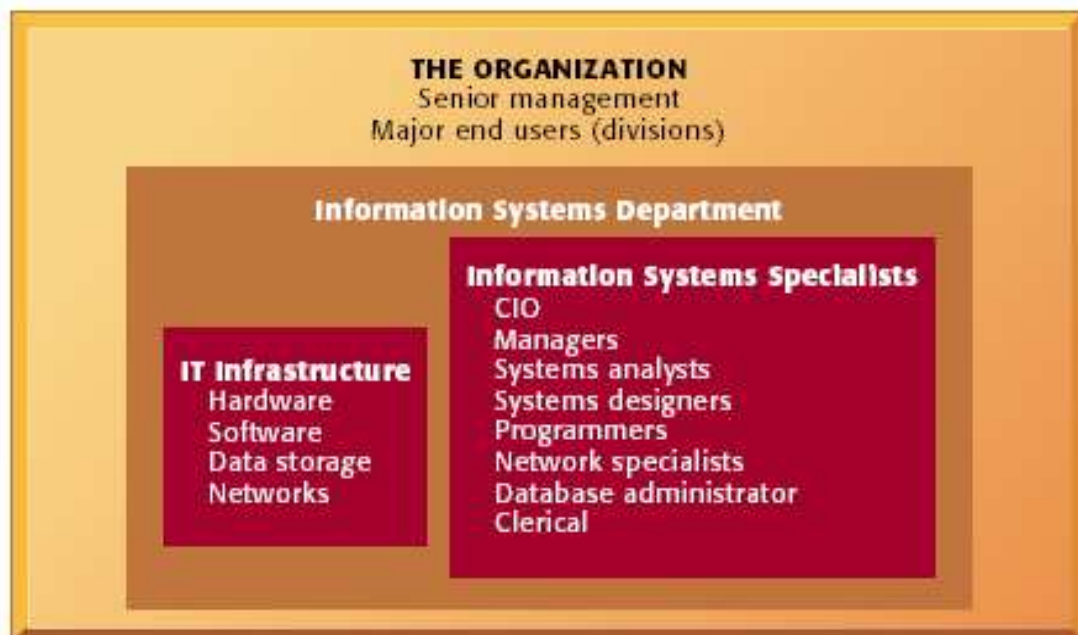
- **Nature of leadership**

- **Tasks and technology**

Organizing the IT Function

The information systems department is responsible for maintaining:

- **Hardware**

- **Software**

- **Data storage**

- **Networks**

- **Procedures**

Information Technology Services

Includes Specialists:

- **Programmers:** Highly trained, writers of the software instructions for computers

- **Systems analysts:** Translate business problems into solutions, act as liaisons between the information systems department and rest of the organization

- **Information system managers:** Leaders of various specialists

Includes Specialists: (Continued)

- **Chief Information Officer (CIO):** Senior manager in charge of information systems function in the firm

- **End users:** Department representatives outside the information system department for whom applications are developed

Economic Impacts:

- **IT changes both the relative costs of capital and the costs of information.**

- **Information systems technology is a factor of production, like capital and labor.**

Economic Impacts: (Continued)

- **Transaction cost theory: Firms seek to economize on the cost of participating in markets (transaction costs).**

- **IT lowers market transaction costs for firm, making it worthwhile for firms to transact with other firms rather than grow the number of employees.**

The Transaction Cost Theory of the Impact of Information Technology on the Organization
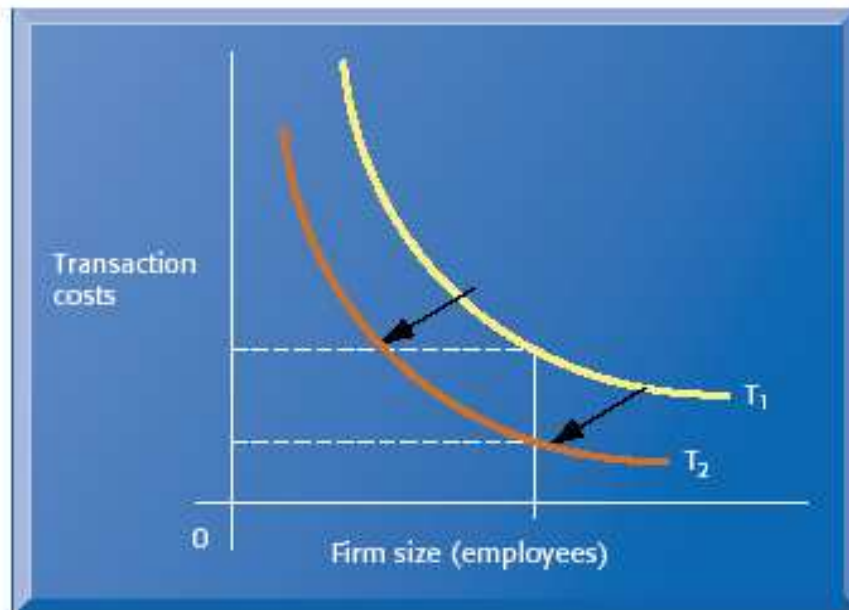

- **Agency theory: Firm is nexus of contracts among self-interested parties requiring supervision.**

- **Firms experience agency costs (the cost of managing and supervising).**

- **IT can reduce agency costs, making it possible for firms to grow without adding to the costs of supervising, and without adding employees.**

The Agency Cost Theory of the Impact of Information Technology on the Organization

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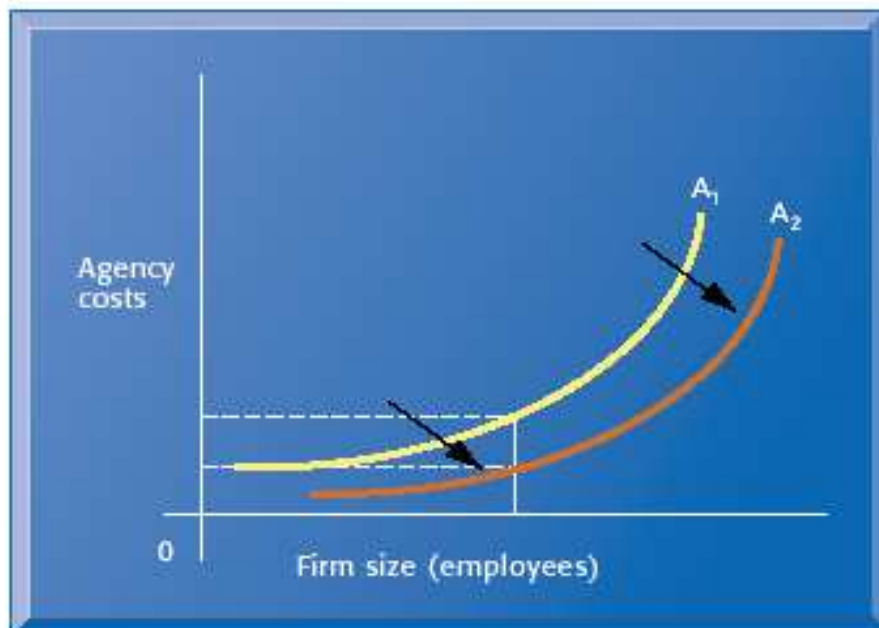
## Organizational and Behavioral Impacts

IT Flattens Organizations:

- **Facilitates flattening of hierarchies**

- **Broadens the distribution of timely information**

- **Increases the speed of decision making**

IT Flattens Organizations: (Continued)

- **Empowers lower-level employees to make decisions without supervision and increase management efficiency**

- **Management span of control (the number of employees supervised by each manager) will also grow**

HOW INFORMATION SYSTEMS IMPACT ORGANIZATIONS AND BUSINESS FIRMS
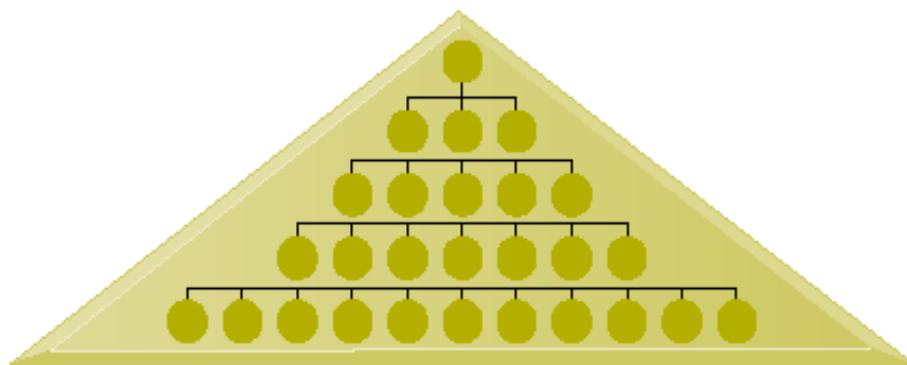
A traditional hierarchical organization with many levels of management
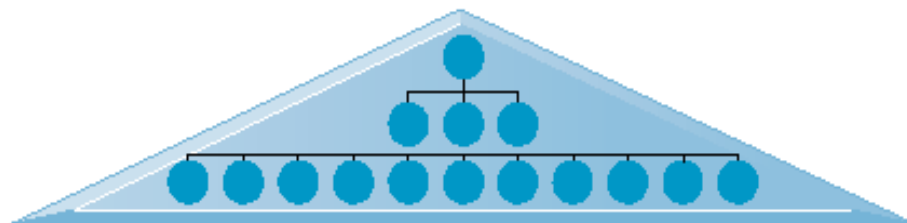
An organization that has been "flattened" by removing layers of management

Postindustrial Organizations and Virtual Firms

Postindustrial Organizations:

- **Authority increasingly relies on knowledge and competence.**

- **Information technology encourages task force-networked organizations.**

Virtual Firms:

- **Use networks to link people, assets, and ideas**

- **Can ally with suppliers, customers to create and distribute new products and services**

- **Not limited to traditional organizational boundaries or physical locations**

Increasing Flexibility of Organizations:

- **Information systems give both large and small organizations additional flexibility to overcome the limitations posed by their size.**

- **Small organizations use information systems to acquire some of the muscle and reach of larger organizations.**

## Increasing Flexibility of Organizations: (Continued)

- **Large organizations use information technology to achieve some of the agility and responsiveness of small organizations.**

- **Customization and personalization: IT makes it possible to tailor products and services to individuals.**

Understanding Organizational Resistance to Change:

- **Information systems become bound up in organizational politics because they influence access to a key resource.**

- **Information systems potentially change an organization's structure, culture, politics, and work.**

- **Most common reason for failure of large projects is due to organizational and political resistance to change.**

Organizational Resistance and the Mutually Adjusting Relationship between Technology and the Organization
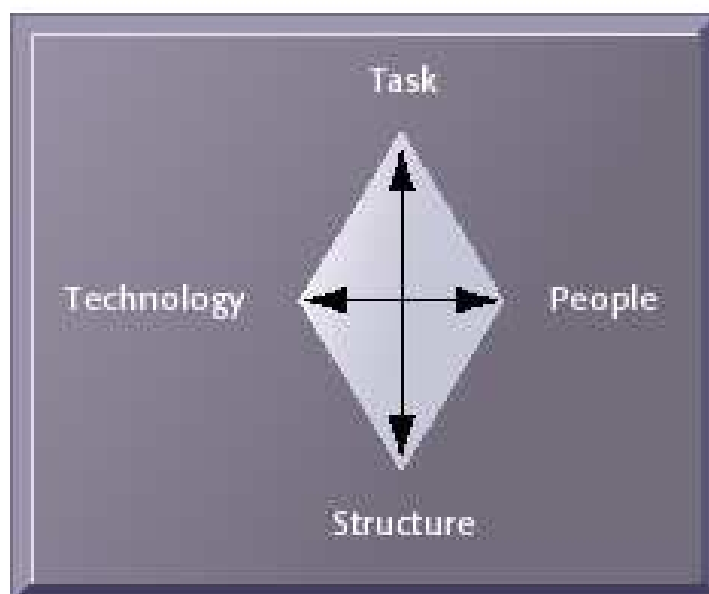
The Internet and Organizations

- **The Internet increases the accessibility, storage, distribution of information and knowledge for business firms.**

- **The Internet lowers the transaction and agency costs of firms.**

- **Businesses are rapidly rebuilding their key business processes based on Internet technology. Example: online order entry, customer service, and fulfillment of orders.**

THE IMPACT OF IT ON MANAGEMENT DECISION MAKING

The Role of Managers in Organizations

Classical Descriptions of Management:

- **Traditional description of management**

- **Focuses on formal functions: Plan, organize, coordinate, decide, control**

Behavioral Models:

- **Describes management based on observations of what managers actually do on the job**

Managerial Roles:

- **Expectation of activities that managers should perform in an organization**

Management Roles:

- **Interpersonal: Managers act as figureheads and leaders.**

- **Informational: Managers receive and disseminate critical information, nerve centers.**

- **Decisional: Managers initiate activities, allocate resources, and negotiate conflicts.**

Models of Decision Making

- **Rational model:** An individual manager identifies goals, ranks all possible alternative actions and chooses the alternative that contributes most to those goals
- **Organizational model:** Considers the structural and political characteristics of an organization
- **Bureaucratic model:** Whatever organizations do is the result of routines and existing business processes honed over years of active use
- **Political model:** What an organization does is a result of political bargains struck among key leaders and interest groups

Implications for the Design and Understanding of Information Systems

Factors to consider while planning a new system:

- Organizational environment

- Organizational structure, hierarchy, specialization, routines, and business processes

- The organization's culture and politics

Implications for the Design and Understanding of Information Systems (Continued)

- The type of organization and its style of leadership

- Groups affected by the system and the attitudes of workers who will be using the system

- The kinds of tasks, decisions, and business processes that the information system is designed to assist

Characteristics to be kept in mind while Designing Systems:

- Flexibility and multiple options for handling data and evaluating information

- Capability to support a variety of management styles, skills, and knowledge
  - Capability to keep track of many alternatives and consequences
  - Sensitivity to the organization's bureaucratic and political requirements

Business strategy decisions of the firms will determine the following:

- **Long-term goals of the firm**

- **The industries in which the firm competes**

- **The products and services a firm produces**

- **Competitors, suppliers, and customers of the firm**

Business-Level Strategy: The Value Chain Model

The most common generic business level strategies are:

- **Become the low-cost producer**

- **Differentiate your product from competitors' products**

- **Change the scope of competition by enlarging the market or narrowing it to a specialized niche**

Value Chain Model:

- **Highlights the primary or support activities that add business value**

- **A good tool for understanding strategy at the business firm level**

Primary Activities:

- **Directly related to the production and distribution of a firm's products or services**

Support Activities:

- **Make the delivery of primary activities possible**

- **Consist of the organization's infrastructure, human resources, technology, and procurement**

The Firm Value Chain and the Industry Value Chain
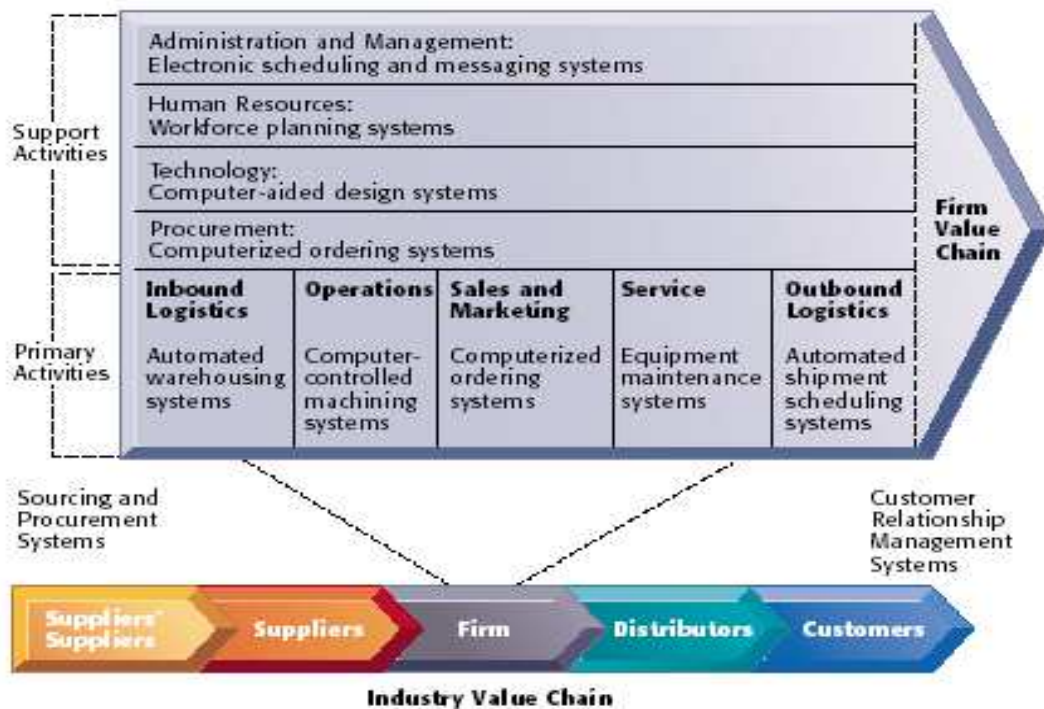
Strategic question:

- **How can IT be used at each point in the value chain to lower costs, differentiate products, and change the scope of competition?**

Value Web:

Internet-enabled Web of cooperating firms

- **Customer-driven network of independent firms**

- **Uses information technology to coordinate value chains of separate firms for collectively producing a product or service**
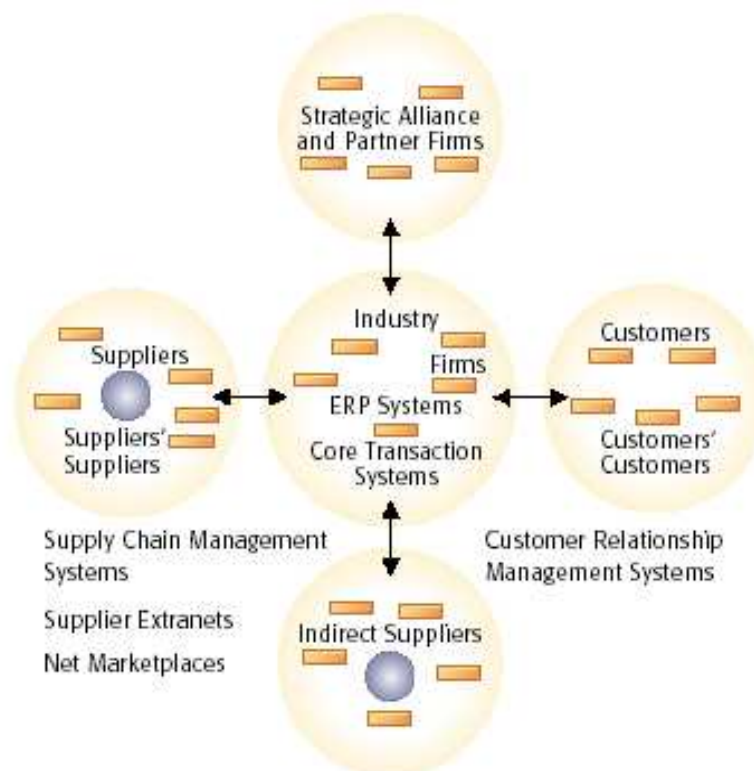
Information Systems Products and Services

Systems that Create Product Differentiation:

- **Firms can use IT to develop differentiated products.**

- **Create brand loyalty by developing new and unique products and services**

- **Product and services not easily duplicated by competitors**

Examples: Dell, Orbitz

Systems that Support Focused Differentiation:

- **Uses intensive analysis of customer data to support new ways of contacting and serving the customer**

- **Enables development of new market niches for specialized products or services**

Supply Chain Management and Efficient Customer Response Systems:

- **Link your firm's value chain to the value chains of your suppliers and customers**

- **Directly links consumer behavior back to distribution, production, and supply chains**

- **Example: Wal-Mart directly links customer purchases to suppliers in nearly real time.   It is the suppliers' job to ensure products are shipped to the store to replace purchased products**
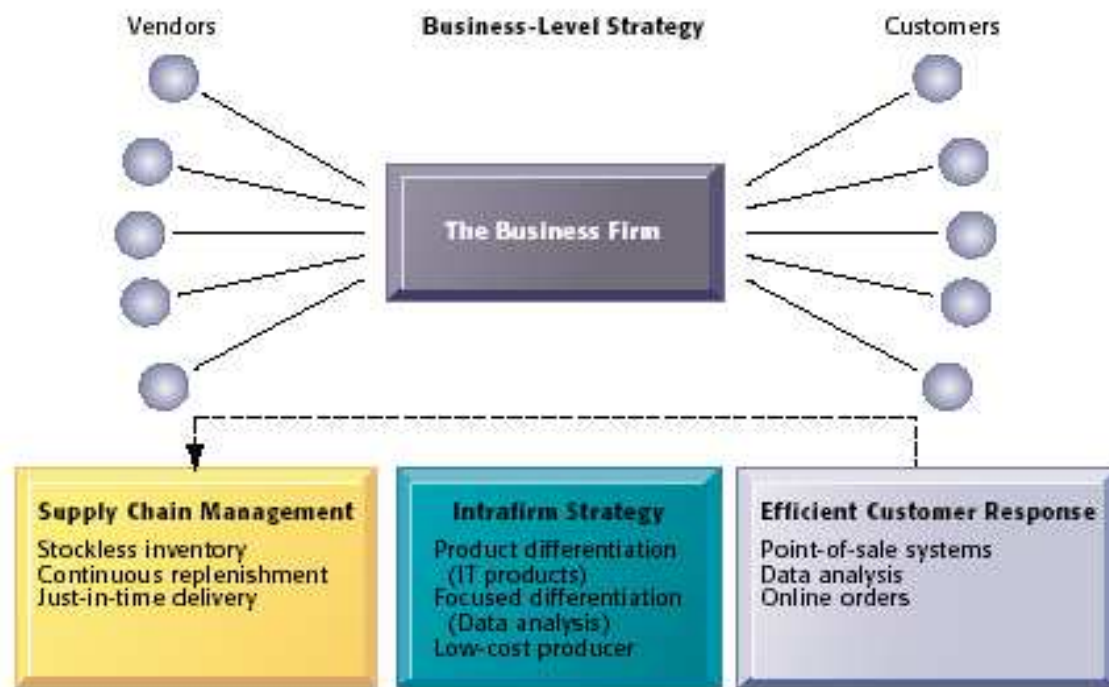
Switching Costs and Lock-in Effects

- **IT is used at the firm level to discourage customers from switching to other suppliers, and "locking" them into a firm's channels.**

- **Switching cost is the expense incurred by a customer or company for changing from one supplier or system to another.**

- **Example: Banks, Cellular (till personal numbers)**

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Firm-Level Strategy and Information Technology

Core Competency:

- **Activity at which a firm excels as a world-class leader**

- **Information systems encourage the sharing of knowledge across business units and therefore enhance firm competency**

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Industry-Level Strategy and Information Systems: Competitive Forces and Network Economics

Firms operate in a larger environment composed of other firms, governments, and nations

Information partnership:

- **Cooperative alliance formed between two or more corporations for sharing information to gain strategic advantage**

- **Help firms gain access to new customers, creating new opportunities for cross-selling and targeting products**

Porter's Five Forces Model

In the larger environment, there are five main forces or threats:

- **New market entrants**

- **Substitute products and services**

- **Suppliers**

- **Customers**

- **Other firms competing directly**

Porter's Competitive Forces Model
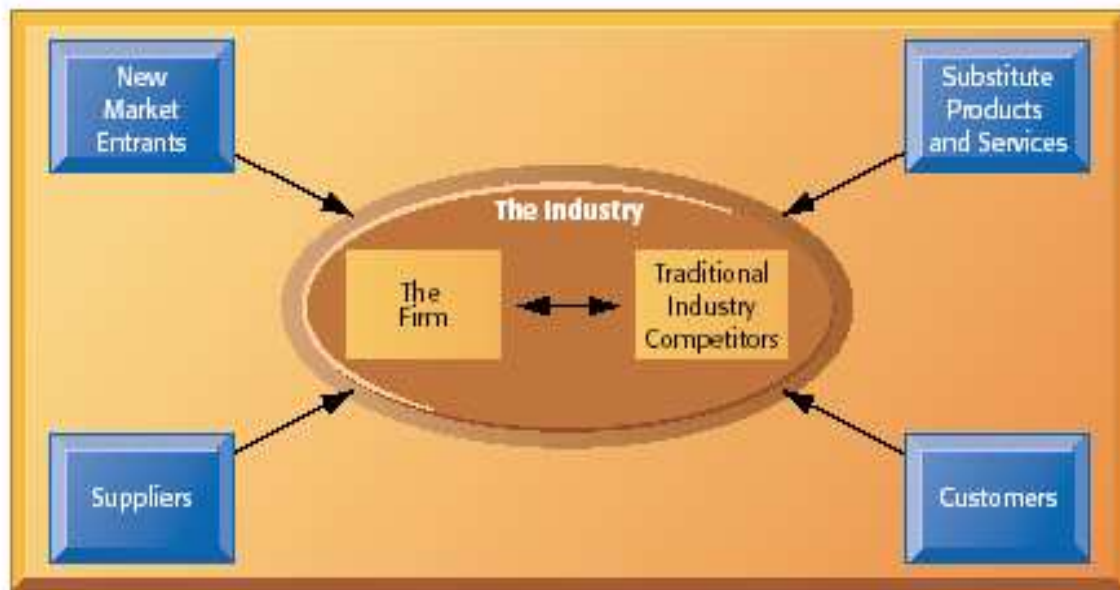
INFORMATION SYSTEMS AND BUSINESS STRATEGY

IT and the Internet can greatly change the strength of these competitive forces:

- **Encourage new entrants. Example: NetFlix vs. Blockbuster**

- **Increase customer bargaining power. Example: Expedia.com and others**

IT and the Internet can greatly change the strength of these competitive forces: (Continued)

- Decrease in supplier power. Example: eCampus.com increases the efficiency of used textbook market, reducing publisher profits

- Substitute products. Example: online music lowers value of record stores


Business Ecosystems:

IT plays a powerful role in creating new forms of business ecosystems.

- Business ecosystems are interdependent networks of suppliers, distributors, outsourcing firms, transportation service firms, and technology manufacturers.

Examples:

- **Microsoft: 1 billion PCs worldwide and hundreds of thousands of businesses rely on Microsoft's platform.**

- **EBay: Millions of people and thousands of business firms use this platform.**

- **Wal-Mart: Enterprise systems used by suppliers to increase their efficiency**

An Ecosystem Strategic Model
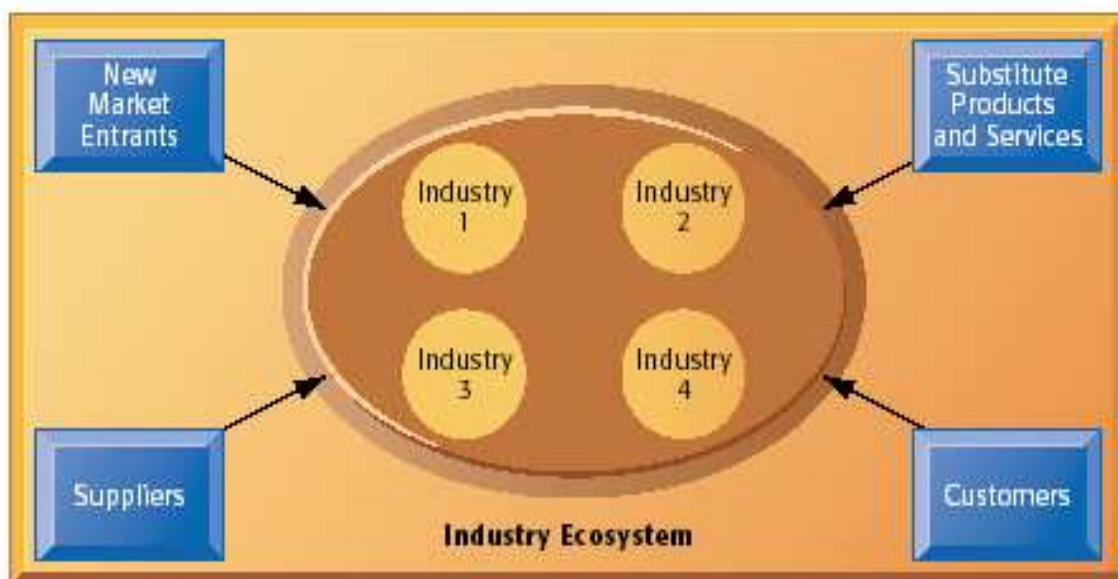
Network Economics:

- **IT products and services exhibit powerful network effects and create potential "winner take all" situations.**

- **Network effects occur when adding more resources to a process incurs little or zero cost, but large gains in output.**

- **Contrary to the law of diminishing returns typical of industrial and agricultural products**

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Network Economics: (Continued)

- **Example: Value of the Internet grows exponentially with the linear increase in users.**

- **Example: Because certain software can become a standard (like Windows operating systems or Windows Office), people can get locked into that standard and the value of Windows grows as more and more people use it.**

- **Good strategy: Use IT to build products and services that exhibit network effects.**

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Management Opportunities:

Firms face a continuing stream of IT-based opportunities to achieve strategic advantages

---

Management Challenges:

- **Some firms face big hurdles in implementing contemporary systems.**

- **Once an advantage is achieved, there are difficulties in sustaining the advantage.**

- **Organizations often cannot change fast enough to accommodate new technologies.**

Solution Guidelines:

Perform a strategic systems analysis

- **Understand the structure and competitive dynamics of the industry where your firm operates**

- **Understand the business, firm, and industry value chains**

- **Consider how your firm can manage "strategic transitions" as it seeks to implement systems that provide competitive advantages**

# IT Infrastructure and Platforms

Defining IT Infrastructure

- **Includes hardware, software, and services**

- **A set of physical devices and software applications that are required to operate the entire enterprise**

- **Your firm is largely dependent on its infrastructure for delivering services to customers, employees, and suppliers.**

- **You can think of infrastructure as digital plumbing, but its much more than that!**

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The Connection between the Firm, IT Infrastructure, and Business Capabilities
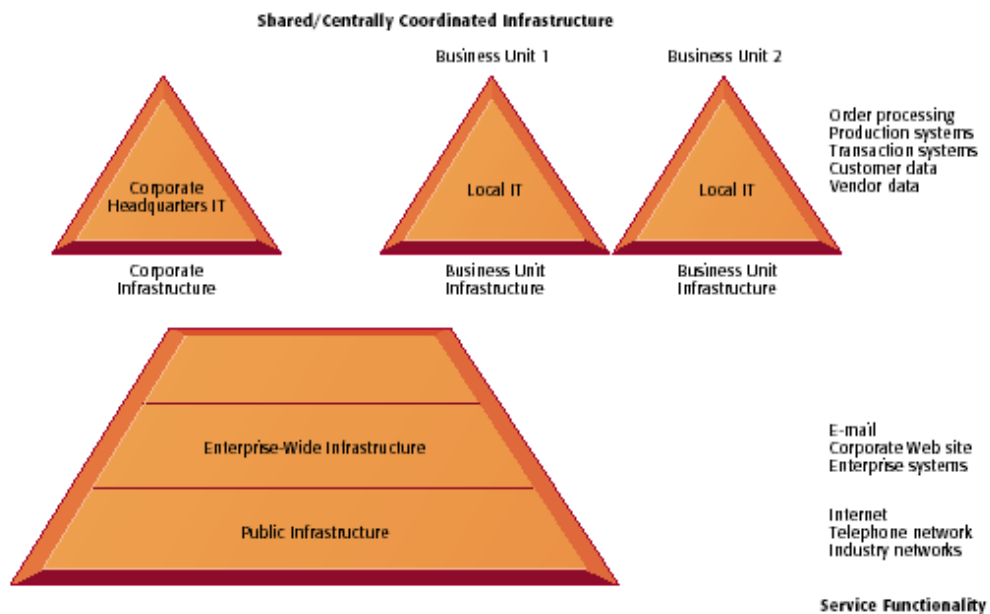

178
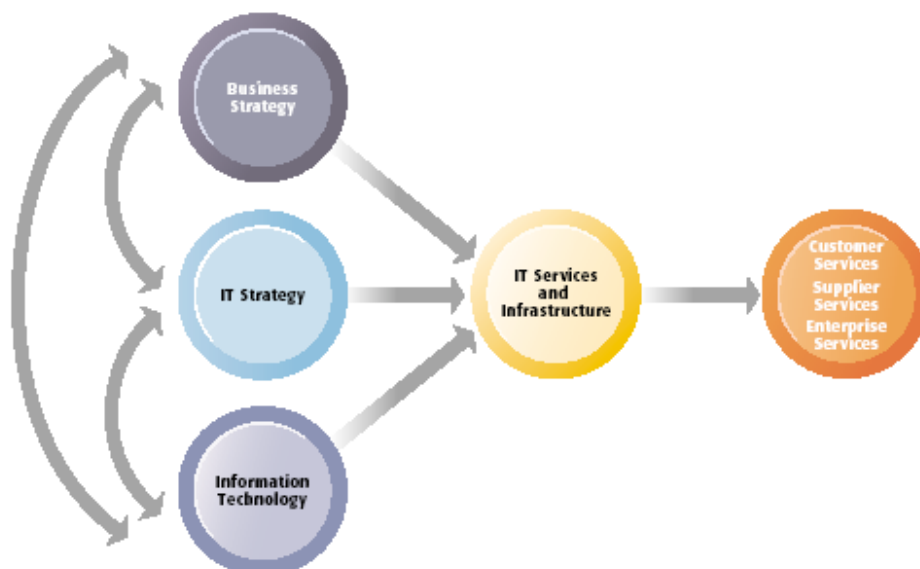
Levels of IT Infrastructure

Three major levels of infrastructure:

- **Public**

- **Enterprise**

- **Business unit**

Levels of IT Infrastructure

Shared/Centrally Coordinated Infrastructure

Business Unit 1

Business Unit 2

Corporate
Headquarters IT

Local IT

Local IT

Order processing
Production systems
Transaction systems
Customer data
Vendor data

Corporate
Infrastructure

Business Unit
Infrastructure

Business Unit
Infrastructure

Enterprise-Wide Infrastructure

Public Infrastructure

E-mail
Corporate Web site
Enterprise systems

Internet
Telephone network
Industry networks

Service Functionality

Evolution of IT Infrastructure: 1950–2005

- **Electronic accounting machine era: (1930–1950)**

- **General-purpose mainframe and minicomputer era: (1959 to present)**

- **Personal computer era: (1981 to present)**

- **Client/server era: (1983 to present)**

- **Enterprise internet computing era: (1992 to present)**

Eras in IT Infrastructure Evolution
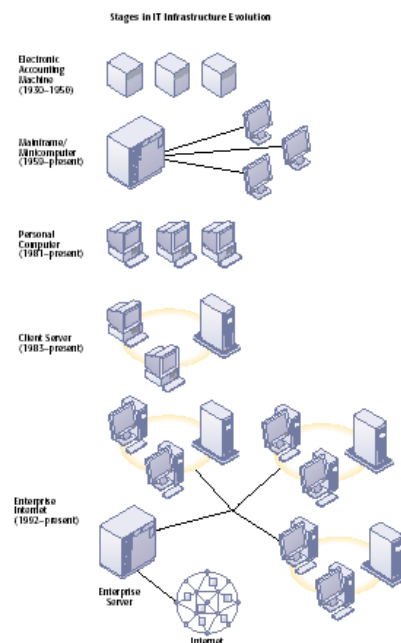
Technology Drivers of Infrastructure Evolution

- **Moore's law and microprocessing power**

- **The law of mass digital storage**

- **Metcalfe's law and network economics**

- **Declining communications costs and the Internet**
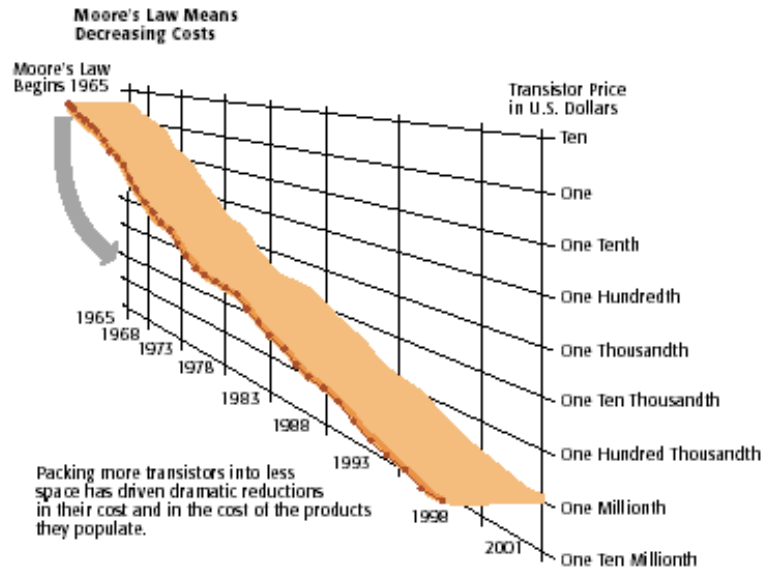
- **Standards and network effects**

Moore's Law and Microprocessor Performance

Falling Cost of Chips

Moore's Law Means
Decreasing Costs

Moore's Law
Begins 1965

Transistor Price
in U.S. Dollars

Ten
One
One Tenth
One Hundredth
One Thousandth
One Ten Thousandth
One Hundred Thousandth
One Millionth
One Ten Millionth

1965
1968
1973
1978
1983
1988
1993
1998
2001

Packing more transistors into less
space has driven dramatic reductions
in their cost and in the cost of the products
they populate.

185
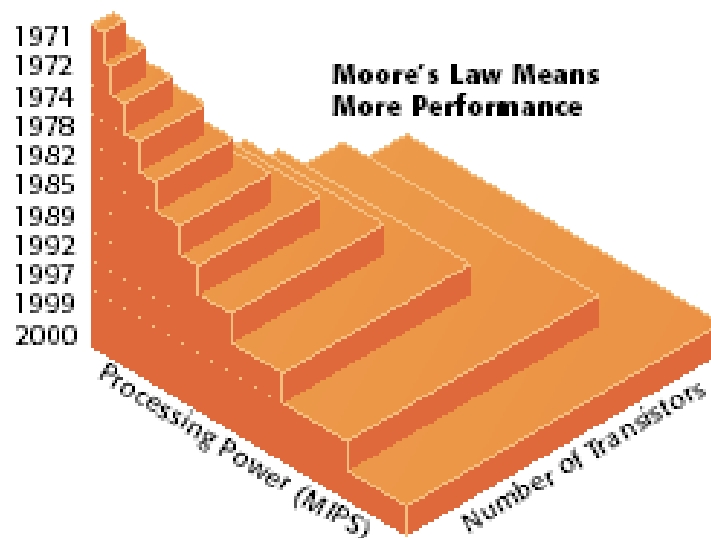
Examples of Nanotubes

186
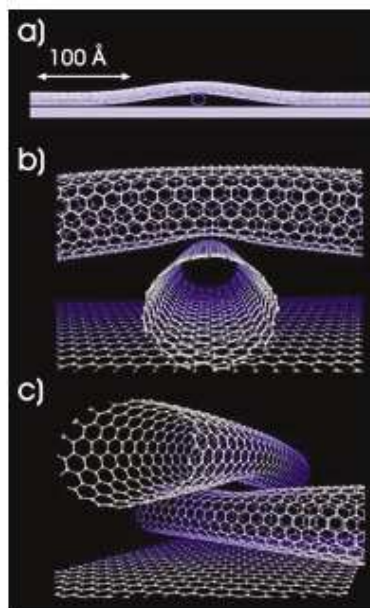
The Capacity of Hard Disk Drives Grows Exponentially, 1980–2004
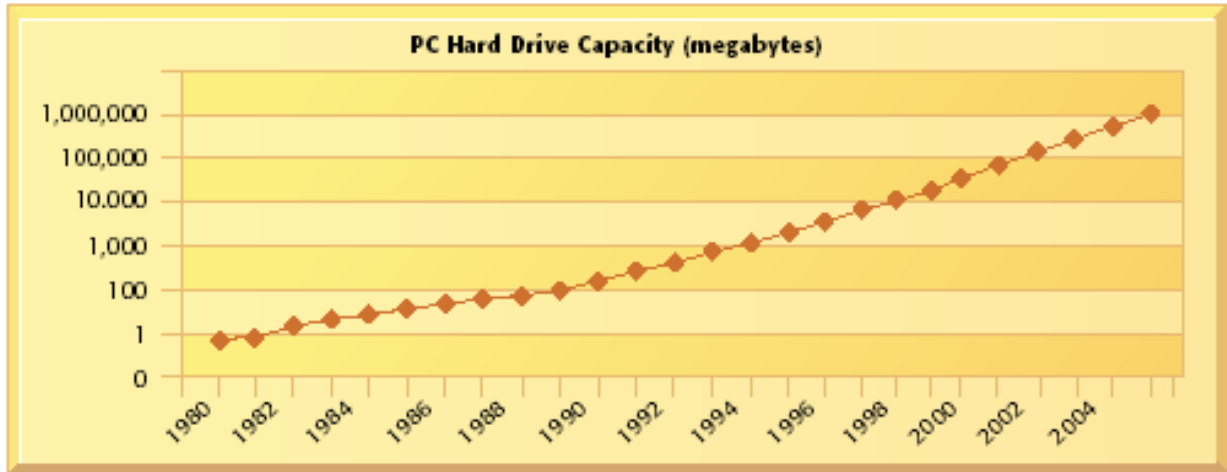
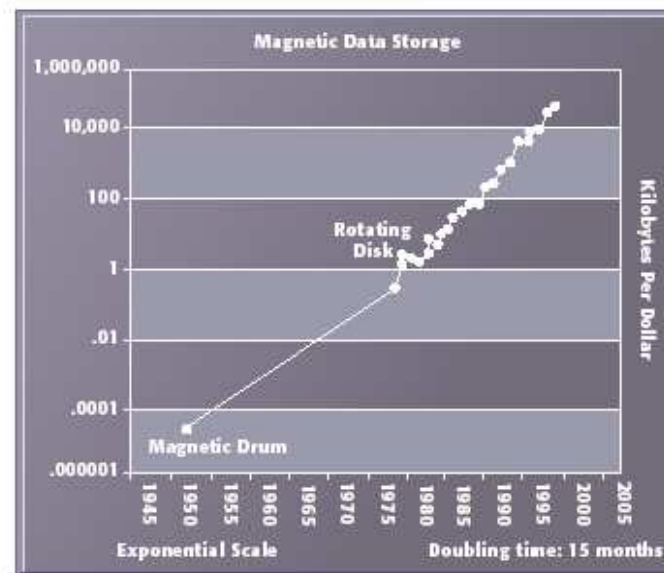**Source:** Authors.

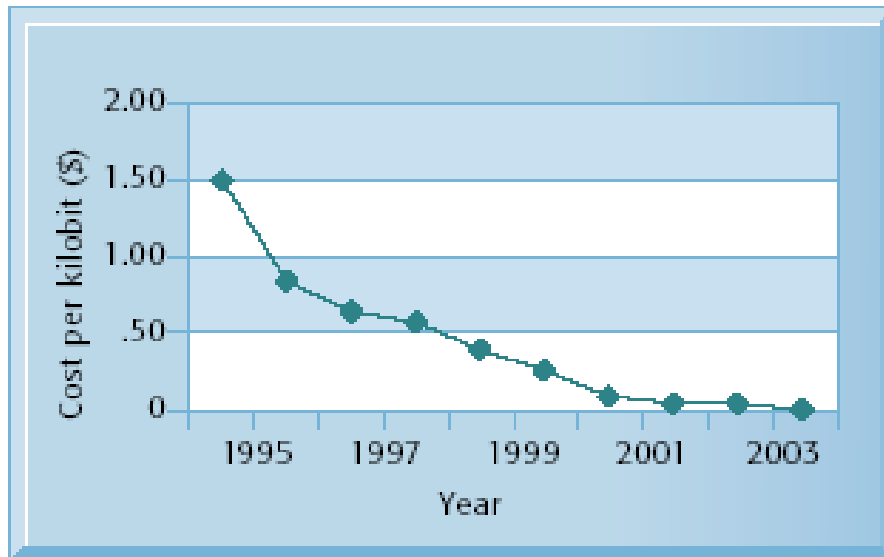# The Cost of Storing Data Declines Exponentially,1950–2004

Source: "Exponential Growth an Illusion?:
Response to Ilkka Tuomi," by Ray Kurzweil,
KurzweilAI.net, September 23, 2003. Used
with permission.

Exponential Declines in Internet Communications Costs

Source: Authors.

INFRASTRUCTURE COMPONENTS

Seven Key Infrastructure Components

- **Computer Hardware Platforms**

- **Operating System Platforms**

- **Enterprise Software Applications**
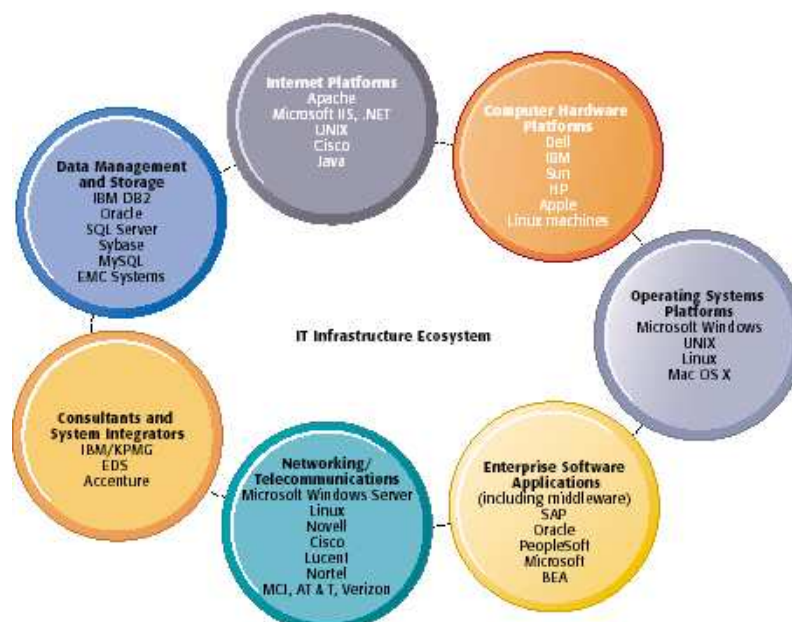
- **Data Management and Storage**

Seven Key Infrastructure Components (Continued)

- **Networking/Telecommunications Platforms**

- **Internet Platforms**

- **Consulting and System Integration Services**

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The IT Infrastructure Ecosystem

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Computer Hardware Platforms

- **$110 billion annually spent in the United States**

- **Dominance of Intel, AMD, and IBM 32-bit processor chips at the client level**

- **Server market increasingly dominated by inexpensive generic processors from the same manufacturers**

Purchase of Software Packages and Enterprise Software

Enterprise software packages: prewritten off-the-shelf software

Application Service Providers:

- **A business that delivers and manages applications and computer services from remote computer centers to multiple users using the Internet or a private network**

Purchase of Software Packages and Enterprise Software (Continued)

Application Service Providers:

- Rather than purchase hardware and software, firms can go onto the Internet and find providers who offer the same functionality over the entertainment, and charge on a per-user or license basis.

- Example: Salesforce.com provides customer relationship management and sales force management services to firms

Software Outsourcing of Custom Applications

- A firm contracts custom software development or maintenance of existing legacy programs to outside firms, often in low-wage countries.

- Example: Dow Chemical hired IBM for $1.1 billion to create an integrated communication system for 50,000 Dow employees in 63 countries.

- Why would Dow not build this system itself?

Changing Sources of Firm Software
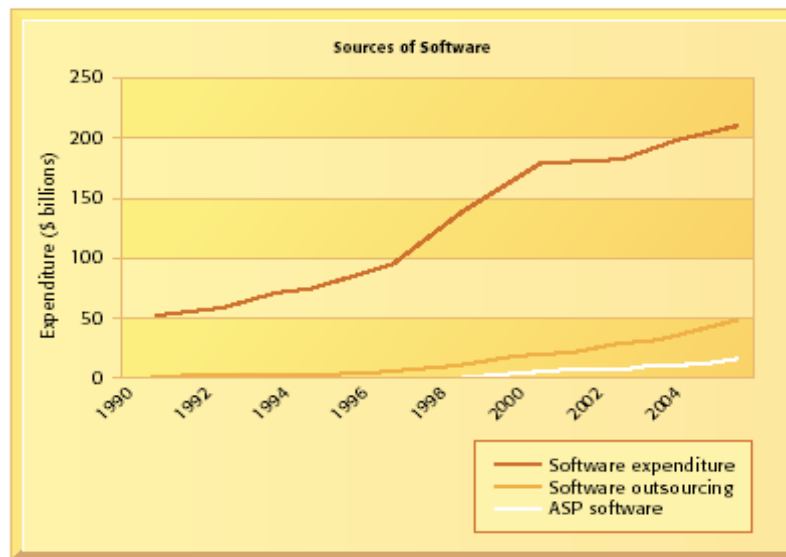
Sources: BEA National Income and Product
Accounts, Forrester Research, December 2003;
eMarketer Inc., "IT Spending 2004,"
www.emarketer.com; and author estimates.

MANAGEMENT OPPORTUNITIES, CHALLENGES, AND SOLUTIONS

## Management Opportunities:

Because of changes in hardware and software platforms, firms face significant new opportunities to obtain hardware and software capabilities that are more reliable, less costly, and more flexible than in the past.

Management Challenges:

- **Making wise infrastructure investments**

- **Choosing and coordinating infrastructure components**

- **Dealing with infrastructure change**

- **Management and governance**

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MANAGEMENT OPPORTUNITIES, CHALLENGES, AND SOLUTIONS

Competitive Forces Model for IT Infrastructure

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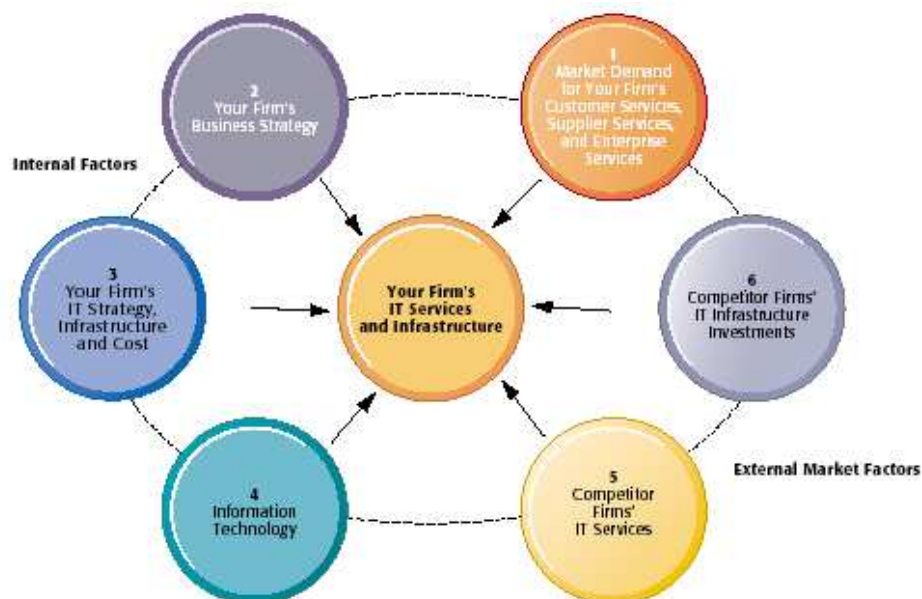
Starting out small:

- **Experiment with new technologies on a smaller scale before taking up a large-scale infrastructure project.**

Total cost of ownership of technology assets:
When calculating the costs of systems, be sure to include all the costs:

- **Hardware acquisition**
- **Software acquisition**
- **Installation**
- **Training**
- **Support**
- **Maintenance**
- **Infrastructure requirements**
- **Downtime**
- **Space and energy**

Telecommunications, Networks, and the Internet

**TELECOMMUNICATIONS AND NETWORKING IN
TODAY'S BUSINESS WORLD**

- **A networking and communications revolution led by Internet-based technologies**

- **1 billion instant messages per day**

- **4 billion e-mails each day**
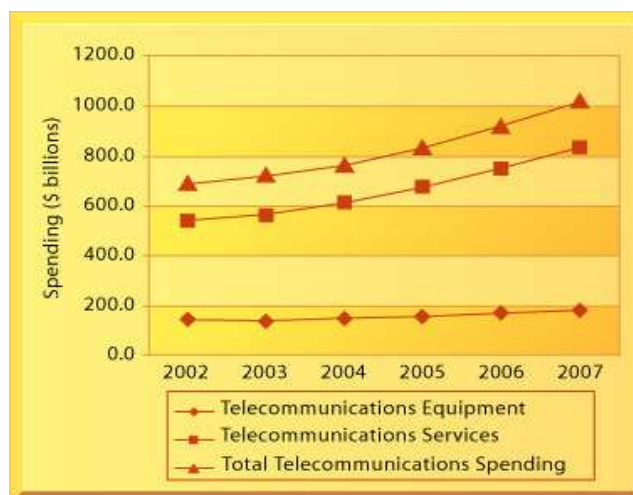
- **65 million music files downloaded**

- **Estimated 3.9 billion photos sent over the Internet**

- **$769 billion spent in the United States on telecommunications equipment and services**

- **Today, networking and the Internet are synonymous with doing business.**

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Telecommunications spending in the United States, 2002–2007

Source: Bureau of Economic Analysis,
National Income and Product Accounts, 2004;
and eMarketer and the Telecommunications
Industry Association, 2004

206

The Business Telecommunications Environment

- **Telecommunications environment provides connectivity by providing communication channels for text, voice, and video images.**

- **The network infrastructure for a large corporation consists of many different kinds of networks for both data and voice communication.**

- **Most of these different kinds of networks are moving towards a common Internet foundation.**

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Corporate Network Infrastructure
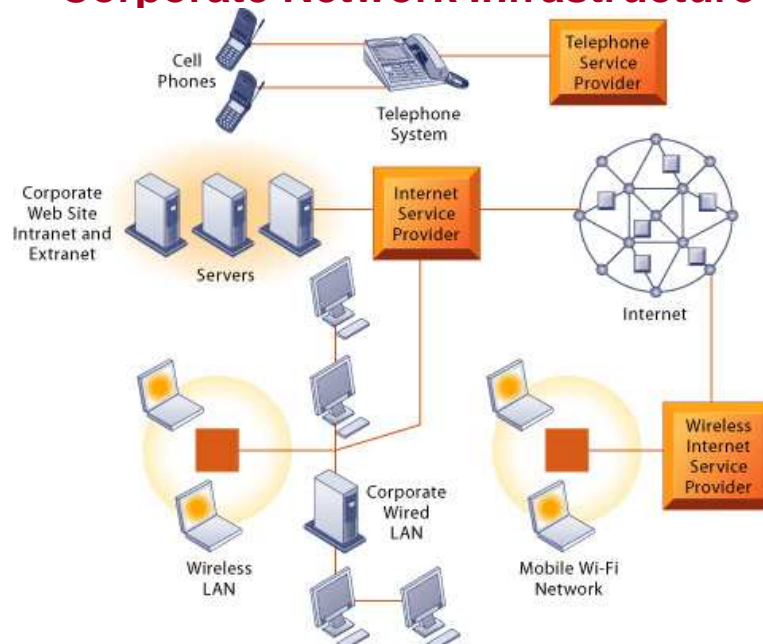
208

Networking and Communications Trends

The seven major trends in telecommunications:

- **Rapid technological innovation has resulted in a proliferation of new hardware devices and new alternatives for business communications.**

- **Continuing telecommunications deregulation has encouraged competition and created many alternatives.**

Networking and Communications Trends (Continued)

- **Distinctions between telephone, cable television, Internet, and satellite telecommunication are blurred.**

- **Growing dominance of Internet technologies in voice, video, and data communications**

- **Rapid growth in "last-mile" high-speed broadband connections to homes and businesses**

Networking and Communications Trends (Continued)

- **Rapid growth in wireless telephone, wireless computer networks, and mobile Internet devices**

- **Growing scope of communication-intense services and products**

The Business Value of Telecommunications and Networking

Business value impacts of the telecommunications and Networking are:

- **Declining transaction costs**

- **Declining agency costs**

- **Increased agility**

The Business Value of Telecommunications and Networking (Continued)

- **Higher quality management decisions**

- **Declining geographical barriers**

- **Declining temporal barriers**

- **The extremely rapid growth in business networking and telecommunications results from the extraordinary value of participating in networks like the Internet.**

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Metcalfe's Law

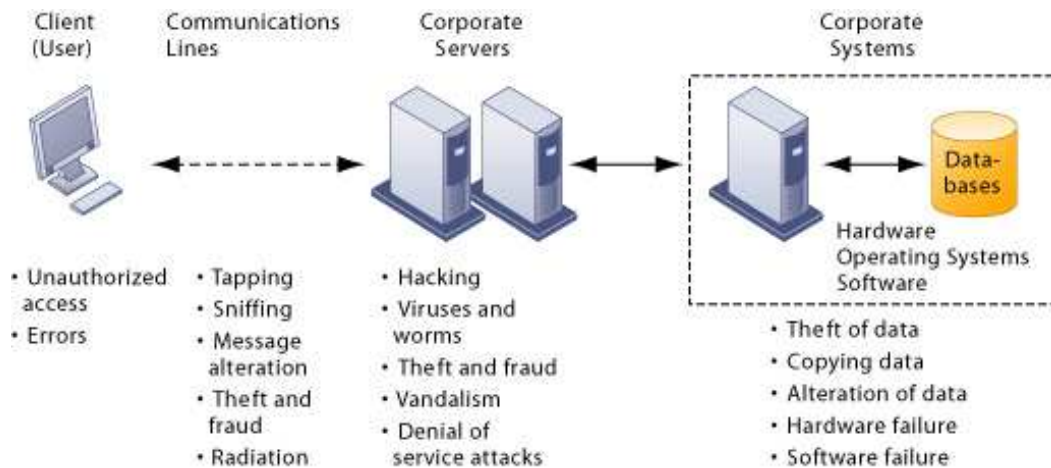

214
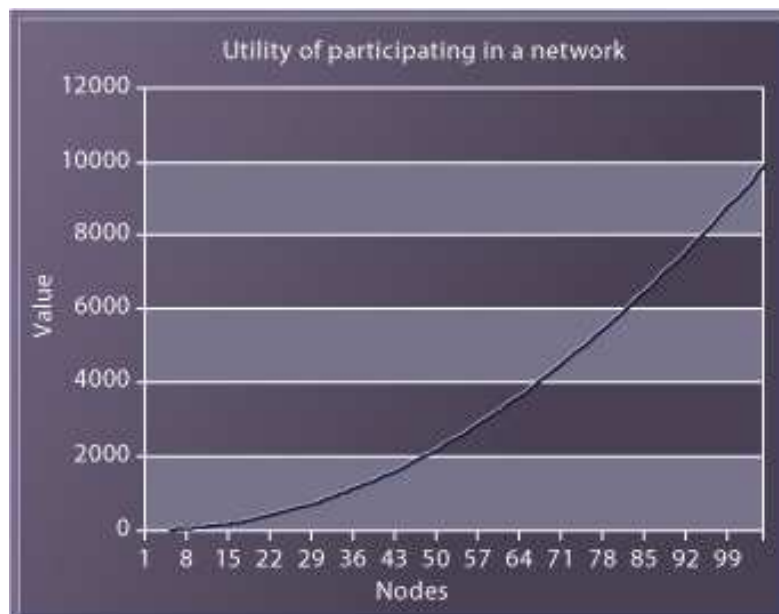
Internet Protocol (IP):

- **Responsible for the delivery of packets**

- **Includes the disassembling and reassembling of packets during transmission**

Security and Control

Why Systems Are Vulnerable

Contemporary Security Challenges and Vulnerabilities

Client (User)	Communications Lines	Corporate Servers	Corporate Systems

Hardware
Operating Systems
Software

- Unauthorized access
- Errors

- Tapping
- Sniffing
- Message alteration
- Theft and fraud
- Radiation

- Hacking
- Viruses and worms
- Theft and fraud
- Vandalism
- Denial of service attacks

- Theft of data
- Copying data
- Alteration of data
- Hardware failure
- Software failure

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Why Systems Are Vulnerable (Continued)

## Internet Vulnerabilities:

- **Use of fixed Internet addresses through use of cable modems or DSL**

- **Lack of encryption with most Voice over IP (VoIP)**

- **Widespread use of e-mail and instant messaging (IM)**

Wireless Security Challenges:

- **Radio frequency bands are easy to scan**

- **The service set identifiers (SSID) identifying the access points broadcast multiple times**

Wi-Fi Security Challenges
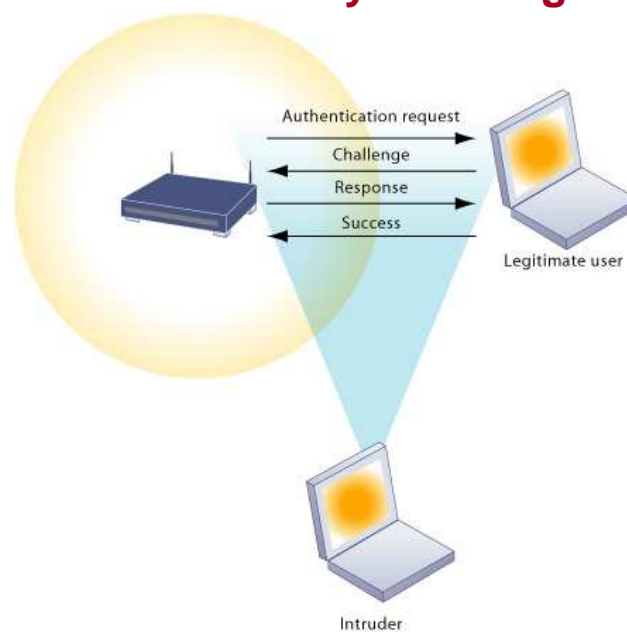
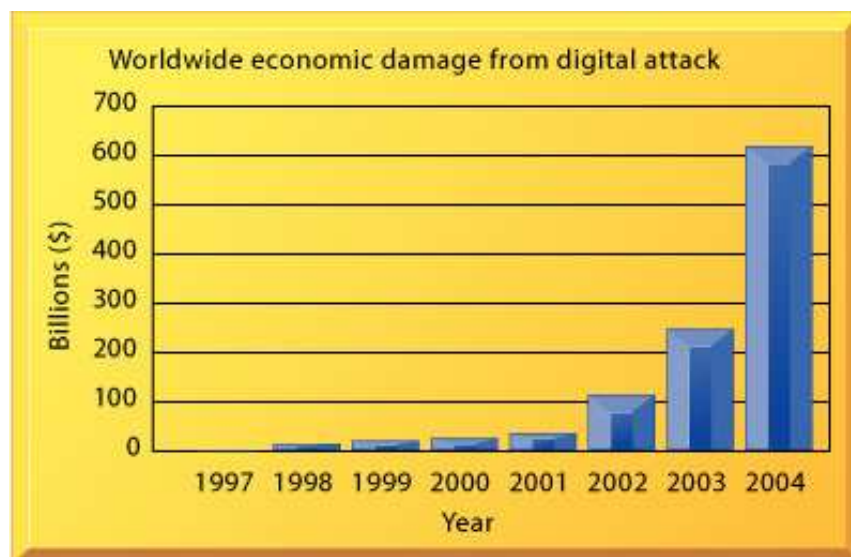## Malicious Software: Viruses, Worms, Trojan Horses, and Spyware

Hackers and Cybervandalism

- **Computer viruses, worms, trojan horses**

- **Spyware**

- **Spoofing and Sniffers**

- **Denial of Service (DoS) Attacks**

- **Identity theft**

- **Cyberterrorism and Cyberwarfare**

- **Vulnerabilities from internal threats (employees); software flaws**

Worldwide Damage from Digital Attacks

- **Inadequate security and control may create serious legal liability.**

- **Businesses must protect not only their own information assets but also those of customers, employees, and business partners. Failure to do so can lead to costly litigation for data exposure or theft.**

- **A sound security and control framework that protects business information assets can thus produce a high return on investment.**

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BUSINESS VALUE OF SECURITY AND CONTROL

Security Incidents Continue to Rise

Security incidents reported to CERT

Source: CERT Coordination Center, www.cert.org.
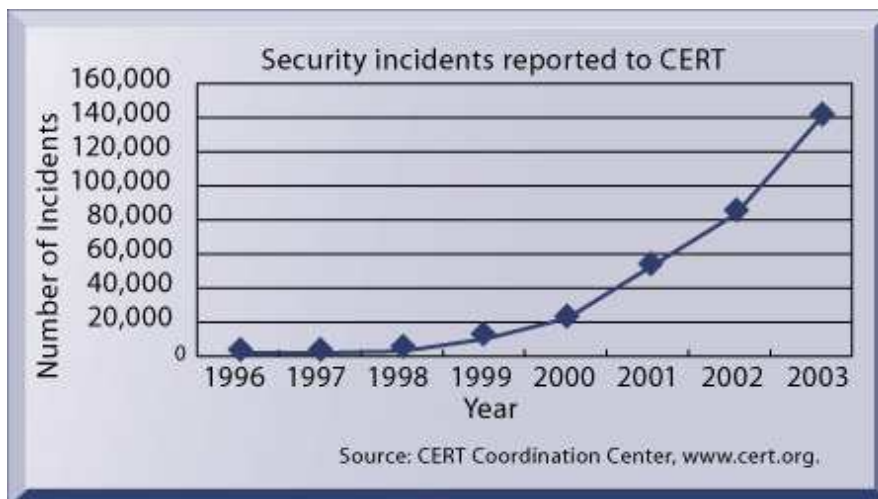
Source: CERT Coordination Center, www.cert.org, accessed July 6, 2004.

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Legal and Regulatory Requirements for Electronic Records Management

- **Electronic Records Management (ERM):** Policies, procedures and tools for managing the retention, destruction, and storage of electronic records

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Data Security and Control Laws:

- The Health Insurance Portability and Accountability Act (HIPAA)

- Gramm-Leach-Bliley Act

- Sarbanes-Oxley Act of 2002

Types of Information Systems Controls

General controls:

- **Software and hardware**

- **Computer operations**

- **Data security**

- **Systems implementation process**

Application controls:

- **Input**

- **Processing**

- **Output**

Risk Assessment:

- **Determines the level of risk to the firm if a specific activity or process is not properly controlled**

Security Policy:

Policy ranking information risks, identifying acceptable security goals, and identifying the mechanisms for achieving these goals

- **Acceptable Use Policy (AUP)**

- **Authorization policies**

Security Profiles for a Personnel System

SECURITY PROFILE 1

User: Personnel Dept. Clerk

Location: Division 1

Employee Identification
Codes with This Profile: 00753, 27834, 37665, 44116

Data Field Restrictions	Type of Access
All employee data for Division 1 only	Read and Update
• Medical history data	None
• Salary	None
• Pensionable earnings	None

SECURITY PROFILE 2

User: Divisional Personnel Manager

Location: Division 1

Employee Identification
Codes with This Profile: 27321

Data Field Restrictions	Type of Access
All employee data for Division 1 only	Read Only

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Ensuring Business Continuity

- **Downtime:** Period of time in which a system is not operational

- **Fault-tolerant computer systems:** Redundant hardware, software, and power supply components to provide continuous, uninterrupted service

- **High-availability computing:** Designing to maximize application and system availability

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Ensuring Business Continuity (Continued)

- **Load balancing:** Distributes access requests across multiple servers

- **Mirroring:** Backup server that duplicates processes on primary server

- **Recovery-oriented computing:** Designing computing systems to recover more rapidly from mishaps

Ensuring Business Continuity (Continued)

- **Disaster recovery planning:** Plans for restoration of computing and communications disrupted by an event such as an earthquake, flood, or terrorist attack

- **Business continuity planning:** Plans for handling mission-critical functions if systems go down

Auditing:

- **MIS audit:** Identifies all of the controls that govern individual information systems and assesses their effectiveness

- **Security audits:** Review technologies, procedures, documentation, training, and personnel

Management Opportunities:

Creation of secure, reliable Web sites and systems that can support e-commerce and e-business strategies

Management Challenges:

- **Designing systems that are neither overcontrolled nor undercontrolled**

- **Implementing an effective security policy**

Understanding the Business Managing Change

Two kinds of IS investments:

- **Projects with 12-24 month objectives**

- **Longer periods infrastructure investments**

Two ways for producing value:

- **Improvement in business processes to increase firm efficiency**

- **Improvements in management decision making**

Additional IS value from:

- **Strengthening firm strategically (ties to partners, customers, increasing flexibility, etc.)**

- **Enabling future implementation of new technologies**
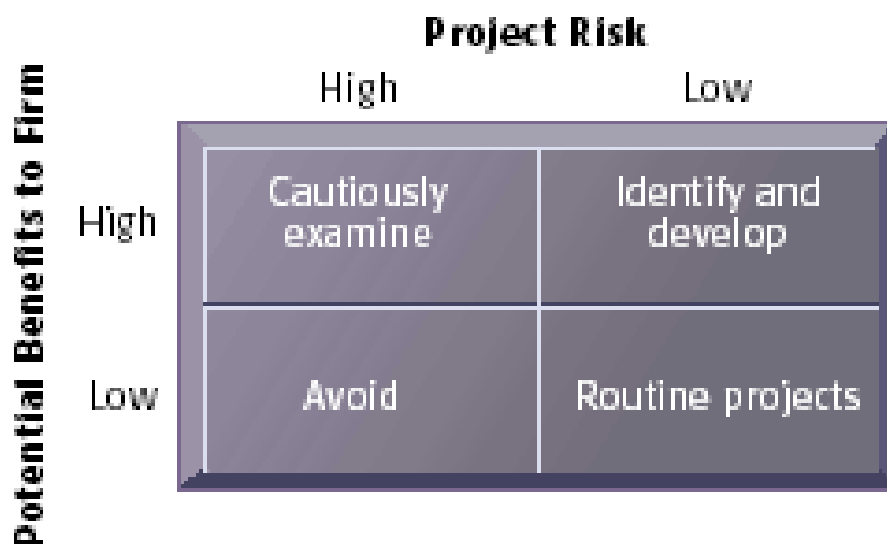
Strategic Considerations

Portfolio Analysis:

Seeks to develop

- **An overall understanding of where the firm is making information technology investments**

- **Based on inventory of all information systems projects and assets, including infrastructure, outsourcing contracts, and licenses**

- **Assigns risk and benefit profiles to IS investments**

A System Portfolio

Project Risk

	High	Low
High	Cautiously examine	Identify and develop
Low	Avoid	Routine projects

Potential Benefits to Firm

Scoring Models:

- **A quick and sometimes compelling method for arriving at a decision on alternative systems**

- **The most important outcome of a scoring model is not the score but agreement on the criteria used to judge a system.**

- **Best practice is to cycle through the scoring model several times, changing the criteria and weights, to see how sensitive the outcome is to reasonable changes in criteria.**

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THE IMPORTANCE OF CHANGE MANAGEMENT IN INFORMATION SYSTEMS SUCCESS AND FAILURE

Information Systems Problem Areas

Design:

- **System design may fail to capture essential business requirements or improve organizational performance.**

- **Information may not be timely: Information may be in a format that is difficult to understand or have a poor user interface.**

Data:

- **The data in the system may have a high level of inaccuracy or inconsistency, may be inaccessible or incomplete.**

Cost:

- **Some systems operate quite smoothly, but their costs to implement and run on a production basis may be way over budget.**

Operations:

- **The system does not run well or breaks down and information is not provided in a timely and efficient manner.**

- **System response time is too long.**

- **Operations problems can be attributed to technical features, but most stem from organizational factors.**

Change Management and the Concept of Implementation

- **Implementation: All organizational activities working toward the adoption, management, and routinization of a new system change agent**

Change Management and the Concept of Implementation (Continued)

- **The systems analyst who develops technical solutions and redefines the configurations, interactions, job activities, and power relationships of various organizational groups**

- **Acts as catalyst for the entire change process and is responsible for ensuring that all parties involved accept the changes created by a new system**

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Causes of Implementation Success and Failure
Information Systems Success or Failure Factors
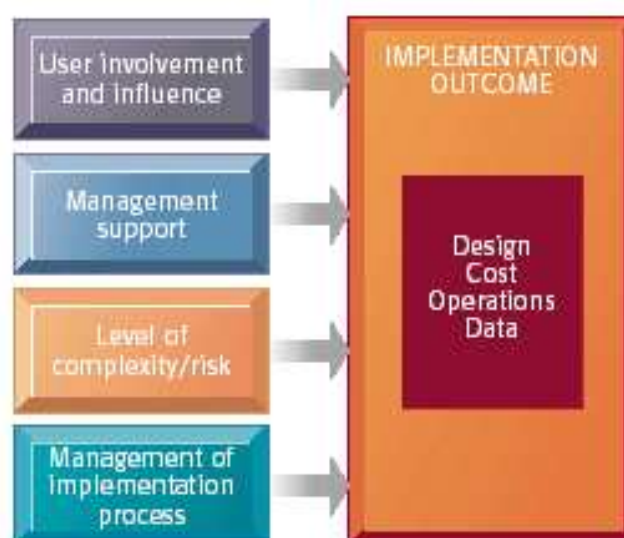
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User Involvement and Influence:

- If users are heavily involved in systems design, they have more opportunities to mold the system according to their priorities and business requirements and control the outcome.

- Involved users are more likely to react positively to the completed system.

User-Designer Communications Gap:

- Users can have limited understanding of other issues and solutions.

Management Support and Commitment:

Commitment of management to

- An information systems project usually results in a more positive perception and acceptance by users and the technical services staff.

Management Support and Commitment: (Continued)

- **Management backing also ensures that a systems project receives sufficient funding and resources to be successful**

- **All the changes in work habits and procedures and any organizational realignment associated with a new system depend on management backing**

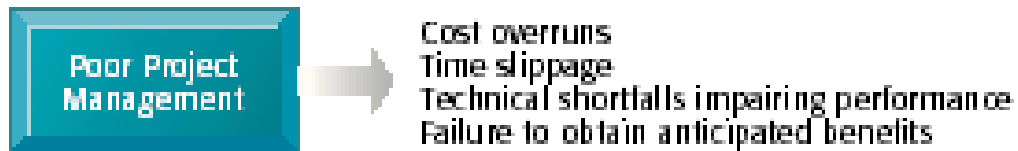## Level of Complexity and Risk:

The level of project risk is influenced by:

- **Project size**

- **Project structure**

- **Level of technical expertise of the information systems team**

Management of the Implementation Process

Consequences of Poor Project Management

Poor Project Management →
Cost overruns
Time slippage
Technical shortfalls impairing performance
Failure to obtain anticipated benefits

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Change Management Challenges for Business Process Reengineering, Enterprise Applications, and Mergers and Acquisitions

Successful implementation includes addressing employees' concerns about change

- **Resistance by key managers**

- **Changing job functions, career paths, recruitment practices**

- **Managing training**

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System Implications of Mergers and Acquisitions (M&As):

As are major growth engines for businesses, enabling firms to

- Gain market share and expertise very quickly

- Critical issues include the organizational characteristics of the merging companies and IT infrastructures

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System Implementation of Mergers and Acquisitions (M&As): (Continued)

- Realistic costs of integration

- Estimated benefits of economies in operation, scope, knowledge, and time

- Problematic systems that require major investments to integrate

- More than 70 percent of all M&As result in a decline in shareholder value

Controlling Risk Factors

Managing technical complexity:

- **Formal planning and control tools**

- **Increasing user involvement and overcoming user resistance**

Managing technical complexity: (Continued)

- **External integration tools: Ways to link the work of the implementation team to users at all organizational levels**

- **Counter implementation: Deliberate strategy to thwart the implementation of an information system or an innovation in an organization**

Formal Planning and Control Tools Help to Manage Information Systems Projects Successfully

HRIS COMBINED PLAN–HR	Da	Who	2005 Oct Nov Dec	2006 Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec	2007 Jan Feb Mar
DATA ADMINISTRATION SECURITY					
QMF security review/setup	20	EF TP			
Security orientation	2	EF IA			
QMF security maintenance	35	TP GL			
Data entry sec. profiles	4	EF TP			
Data entry sec. views est.	12	EF TP			
Data entry security profiles	65	EF TP			
DATA DICTIONARY					
Orientation sessions	1	EF			
Data dictionary design	32	EF WW			
DD prod. coordn-query	20	GL			
DD prod. coordn-live	40	EF GL			
Data dictionary cleanup	35	EF GL			
Data dictionary maint.	35	EF GL			
PROCEDURES REVISION					
DESIGN PREP					
Work flows (old)	10	PK JL			
Payroll data flows	31	JL PK			
HRIS P/R model	11	PK JL			
P/R interface orient. mtg.	6	PK JL			
P/R interface coordn. 1	15	PK			
P/R interface coordn. 2	8	PK			
Benefits interfaces (old)	5	JL			
Benefits interfaces (new flow)	8	JL			
Benefits communication strategy	3	PK JL			
New work flow model	15	PK JL			
Posn. data entry flows	14	WV JL			

RESOURCE SUMMARY		Who			
Edith Farrell	5.0	EF	2 21 24 24 23	22 22 27 34 34 29 26 28 19 14	
Woody Vinton	5.0	WV	5 17 20 19 12	10 14 10 2	4 3
Charles Pierce	5.0	CP	5 11 20 13	9 10 7 6 8 4 4 4 4 4	
Ted Leurs	5.0	TL	12 17 17 19	17 14 12 15 16 2 1 1 1	
Toni Cox	5.0	TC	1 11 10 11 11	12 19 19 21 21 17 17 12 9	
Patricia Knopp	5.0	PC	7 23 30 34 27	25 15 24 25 16 11 13 17 10	3 3 2
Jane Lawton	5.0	JL	1 9 16 21 19	21 21 20 17 15 14 12 14 8 5	
David Holloway	5.0	DH	4 4 5 5	5 2 7 5 4 16 2	
Diane O'Neill	5.0	DO	6 14 17 16	13 11 9 4	
Joan Albert	5.0	JA	5 6	7 6 2 1 5 5 1	
Marie Marcus	5.0	MM	15 7 2 1	1	
Don Stevens	5.0	DS	4 4 5	4 5 1	
Casual	5.0	CASL	3 4 3	4 7 9 5 3 2	
Kathy Mendez	5.0	KM	1 5	16 20 19 22 19 20 18 20 11 2	
Anna Borden	5.0	AB		9 10 16 15 11 12 19 10 7 1	
Gail Loring	5.0	GL	3 6 5	9 10 17 18 17 10 13 10 10 7 17	
UNASSIGNED	0.0	X		9 236 225 230	14 13
Co-op	5.0	CO	6 4	2 3 4 4 2 4 16	216 178
Casual	5.0	CAUL		2 3 4 3 3	
TOTAL DAYS			49 147 176 196 194	174 193 195 190 181 140 125 358 288 284	237 196 12

Designing for the Organization

- Systems development must address how the organization will change when the new system is installed, including installation of intranets, extranets, and Web applications

- Organizational impact analysis

Designing for the Organization: (Continued)

Allowing for the human factor

- **User performance standards**

- **Ergonomics**

Sociotechnical Design:

- **Explores workgroup organization and impacts from technical solutions**

- **Blends technical efficiency with sensitivity to human and organizational needs**

- **Raises productivity without sacrificing human and social goals**

Management Opportunities:

New information systems can produce extraordinarily high returns if system builders can

- **Manage the change process and**

- **Accurately calculate the costs and benefits of the investments**

Management Challenges:

- **Determining system benefits and costs when they are difficult to quantify**

- **Dealing with the complexity of large-scale systems projects**

Solution Guidelines:

Obtaining more value from information technology investments:

- **Full documentation of the firm's applications and IT infrastructure and periodic reviews of the firm's IT portfolio**

- **Use of appropriate metrics for monitoring project outcomes**

Solution Guidelines: (Continued)

- **Ensure IS investments are closely linked to business objectives. Clear identification of project risks and returns, with real options analysis**

- **Measure business value throughout the duration of new system projects and weed out underperforming projects if necessary**

Solution Guidelines: (Continued)

New approaches to project management:

- **Assuming an enterprise-wide focus, driven by the firm's strategic business vision and technology architecture**

- **Solving problems and meeting challenges as they arise rather than simply meeting formal project milestones**

- **Emphasize learning as well as planning, seeking ways to adapt to unforeseen uncertainties and chaos that, if properly handled, could provide additional opportunities and benefits**

Redesigning the Organization with Information Systems

Information systems plan:

- Identifies the direction of systems development, the rationale, the current situation, the management strategy, the implementation plan, and the budget

## Enterprise analysis (business systems planning):

- Examines the entire organization in terms of organizational units, functions, processes, and data elements; helps identify the key entities and attributes in the organization's data

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Strategic Analysis or Critical Success Factors (CSFs):

- Operational goals shaped by the industry, the firm, the manager, and the broader environment that are believed to assure the success of an organization

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Using CSFs to Develop Systems
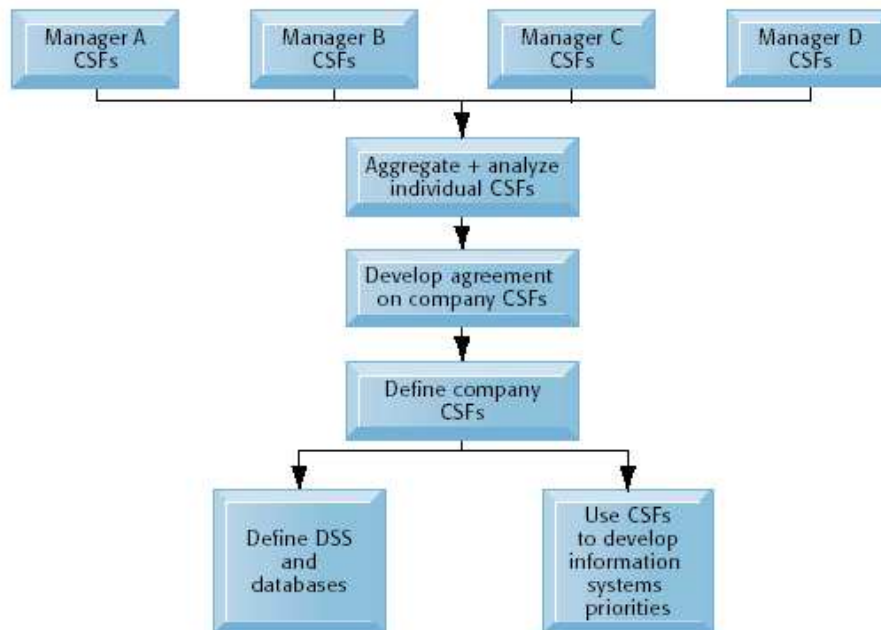
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Systems Development and Organizational Change

Four Kinds of Structural Change:

- **Automation:** Mechanizing procedures to speed up the performance of existing tasks

- **Rationalization of procedures:** The streamlining of standard operating procedures

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## Systems Development and Organizational Change)

Four Kinds of Structural Change: (Continued)

- **Business process reengineering:** Analysis and redesign of business processes to reorganize workflows and reduce waste and repetitive tasks

- **Paradigm shift:** Radical reconceptualization of the nature of the business and the nature of the organization

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Organizational Change Carries Risks and Rewards
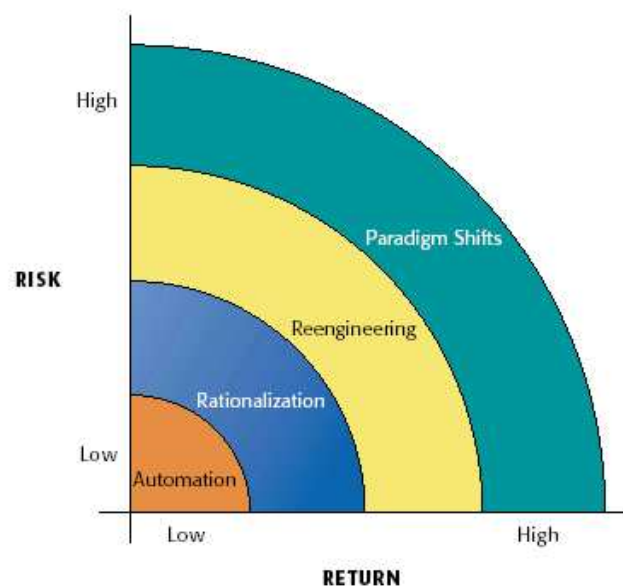
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Process Improvement: Business Process Management, Total Quality Management, and Six Sigma

Business Process Management (BPM):

- **Methodology and tools for revising the organization's business processes enabling continual improvements**

BPM and BPM software tools include:

- **Workflow management**

- **Business process modeling**

- **Quality management**

- **Change management**

BPM and BPM software tools include: (Continued)

- **Tools for recasting processes into standardized forms that can be continually manipulated**

- **Process mapping tools to document existing processes and create new models**

- **Process monitoring and analytics**

Total Quality Management and Six Sigma

Total Quality Management (TQM):

- **Sees achievement of quality control as an end in itself with responsibility shared by all people in an organization**

- **Focuses on a series of continuous improvements rather than large change**

Total Quality Management and Six Sigma

Six Sigma:

- A specific measure of quality, representing 3.4 defects per million opportunities

- Designates a set of methodologies and techniques for improving quality and reducing costs

- Uses statistical analysis to detect process flaws and make minor adjustments

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Benchmarking:

Setting strict standards for products, services, or activities and measuring organizational performance against those standards

- **Systems development:** The activities that go into producing an information system solution to an organizational problem or opportunity

- **Systems analysis:** The analysis of a problem that the organization will try to solve with an information system

- **Feasibility study:** As part of the systems analysis process, the way to determine whether the solution is achievable, given the organization's resources and constraints

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The Systems Development Process
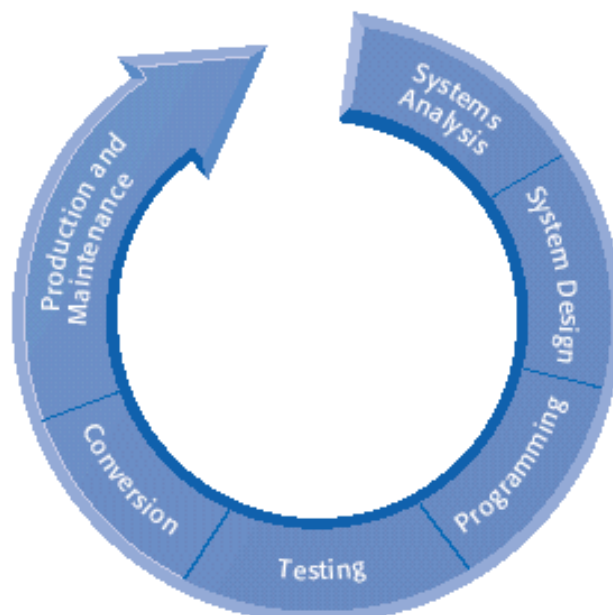
Establishing Information Requirements

Information requirements:

- A detailed statement of the information needs that a new system must satisfy

- Identifies who needs what information, and when, where, and how the information is needed

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Establishing Information Requirements (Continued)

Systems design:

- Details how a system will meet the information requirements as determined by the systems analysis

- Includes creating design specifications

Establishing Information Requirements (Continued)

The role of end users:

- **Users must have sufficient control over the design process to ensure that the system reflects their business priorities and information needs.**

- **Working on design increases users' understanding and acceptance of the system**

Completing the Systems Development Process

Programming:

- **Translating the system specifications prepared during the design stage into program code**

Testing:

- **The exhaustive testing to determine whether the system produces the desired results under known conditions**

Completing the Systems Development Process (Continued)

Unit testing:

- **Testing each program separately in the system (program testing)**

- **System testing: Testing the information system as a whole to determine if discrete modules function together as planned**

- **Acceptance testing: Provides the final certification that the system is ready to be used in a production setting**

Conversion:

- **Process of changing from the old system to the new system**

- **Four main conversion strategies**
  1. **Parallel strategy**

  2. **Direct cutover strategy**

  3. **Pilot study strategy**

  4. **Phased approach strategy**

Production and Maintenance

Production:

- **The stage after the new system is installed and the conversion is complete; during this time the system is reviewed by users and technical specialists to determine how well it has met its original goals**

- **May implement a post-implementation audit: Formal review process conducted after a system has been placed in production to determine how well the system has met its original objectives**

Production and Maintenance (Continued)

Maintenance:

- **Changes in hardware, software, documentation, or procedures to a production system to correct errors, meet new requirements, or improve processing efficiency**

Systems life cycle:

- **Traditional methodology with sequential, formal stages and a formal division of labor between end users and information systems specialists**

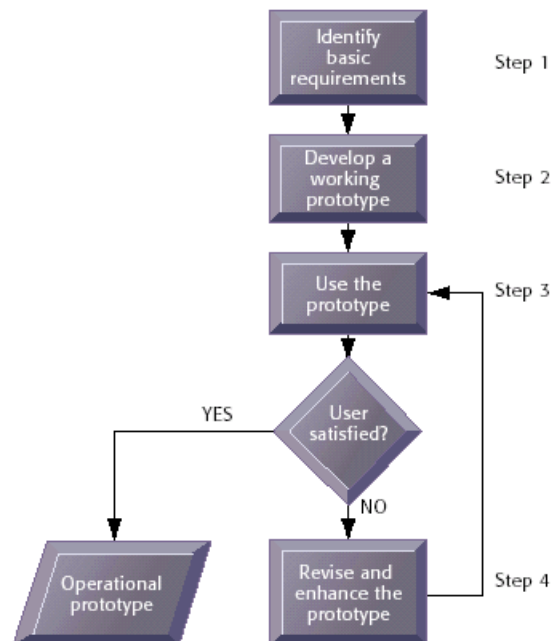## Prototyping / Iterative processes:

- **Building an experimental system quickly and inexpensively for demonstration and evaluation and used as a template for the final system**

Prototyping / Iterative Processes: (Continued)

- **Prototyping is most useful when there is some uncertainty about requirements or design solutions.**

- **Encourages end-user involvement and is more likely to fulfill end-user requirements**

- **Hastily constructed systems, however, may not accommodate large quantities of data or numbers of users.**

The Prototyping Process

End-User Development

End-User Development:

- **The development of information systems by end users with little or no formal assistance from technical specialists**

Fourth-Generation Languages:

- **Software tools that enable end users to create reports or develop software applications with minimal or no technical assistance**

Application Software Packages and Outsourcing

Application Software Package:

- Prewritten, precoded application software programs that are commercially available for sale or lease

- May include customization features allowing the software to be modified for an organization's unique requirements

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Application Software Package: (Continued)

- **Package evaluation criteria:** Functions, flexibility, user friendliness, hardware and software resources, database requirements, installation and maintenance efforts, documentation, vendor quality, cost

- **Request For Proposal (RFP):** A detailed list of questions submitted to vendors of software or other services to determine how well the vendor's product will meet the organization's specific requirements

The Effects on Total Implementation Costs of Customizing a Software Package

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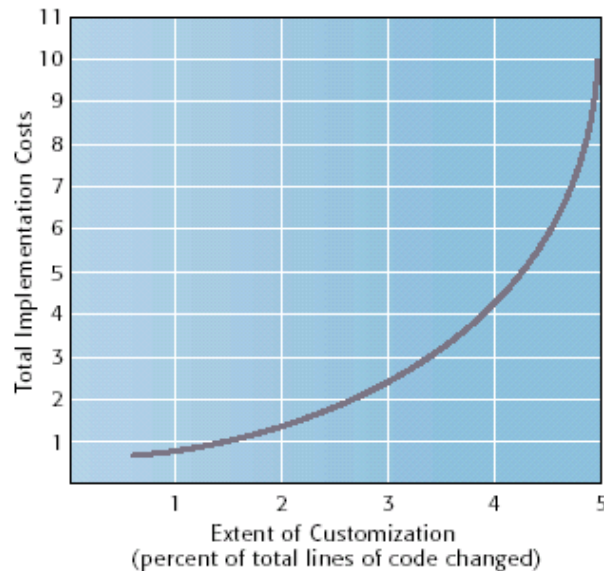
Outsourcing:

- **Contracting computer center operations, telecommunications networks, or applications development to external vendors**

- **Benefits from economies of scale and complementary core competencies**

- **Disadvantages may be hidden costs, loss of control**

Management Opportunities:

- **New information systems enable organizations to redesign their structure, scope, power relationships, workflows, products, and services.**

- **Building a new system creates an opportunity to redefine how the organization conducts its business, leading to higher levels of productivity and performance.**

Management Challenges:

- **Changing demands in application development in the digital firm era. Agility and scalability can be critical goals and success factors.**

- **New interorganizational system requirements, when networks of applications are managed by many different business partners**