Management Information Systems

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Experience:

Teaching & Research

- Sixteen Years@AustralianNationalUniversity&UC
- Twelve Years@Elsewhere

Industry

- Over 4 Years@HumanServices (Aust Govt IT Organization – one of the ten largest IS organizations in the world)

This Presentation

- Business Information Systems
- eBusiness
- Competitive Advantage

Pointers

- How are information systems transforming?
- Why are information systems so essential for running and managing a business today?
- What do we exactly mean by an information system? How does it work? What are its people, organization, and technology components?
- Different kind of people in Businesses and systems that manage eBusiness
- What is Competitive Advantage and what is the role of IS in achieving it

IT vs. IS

- What does IT give us?
  - Programs, Tools, Gadgets
- What does IS provide us?
  - Management of Businesses, Organizations and Society

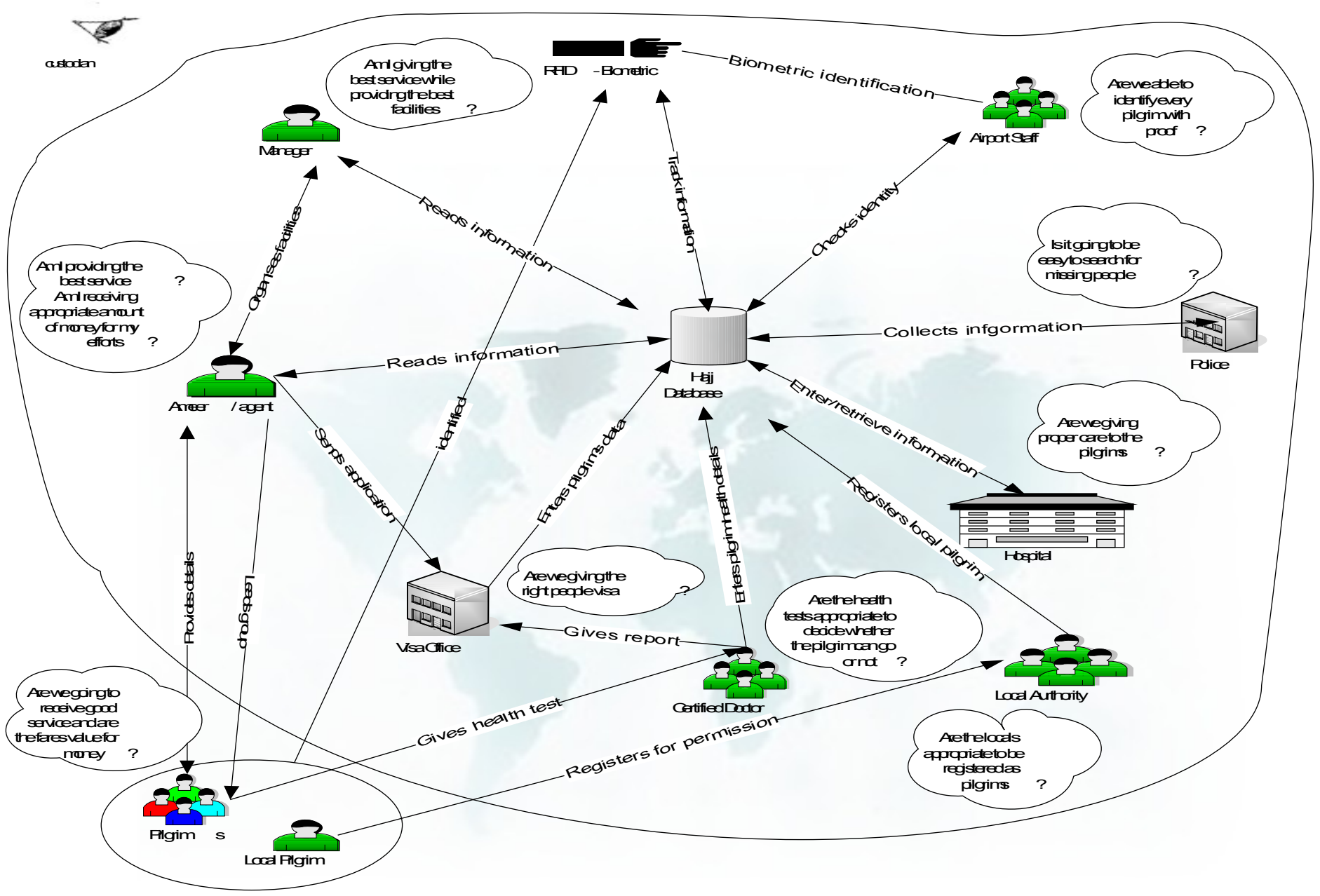
What Is an Information System?

- **Information technology:** The hardware and software a business uses to achieve objectives
- **Information system:** Interrelated components that manage information to:
  - Support decision making and control
  - Help with analysis, visualization, and product creation
    - Includes resources including personnel

Information Systems: Concepts and Definitions

- **Data**: Streams of raw facts
- **Information**: Data shaped into meaningful, useful form
- **Knowledge:** Something that can be applied to achieve results
- Examples:
  - Friday
  - 1st January
  - 26th January

Rich Picture : Hajj Management System



The New Yankee Stadium Looks to the Future

- **Problem:** Escalating salaries, travel costs, and ticket prices, more competing entertainment options.
- **Solutions:** Enhance fan experience by building state-of-the-art new stadium.

The New Yankee Stadium Looks to the Future

- **Cisco Systems supplied the technology for the new Yankee Stadium, including 1,100 high-definition monitors and videoconferencing equipment.**
- **Demonstrates IT's role in increasing value and revenue in any business.**
- **Illustrates the potential for technology to transform an organization.**

The Role of Information Systems in Business Today

How Information Systems Are Transforming Business

- In 2008, more than 75 million businesses had dot-com addresses registered.
- More than 106 million people receive their news online; 55 million Americans read blogs.
- Internet advertising continues to grow at more than 15 percent per year.
- New laws require businesses to store more data for longer periods.

The Role of Information Systems in Business Today

What's New in MIS?

New technologies

Cloud computing – hardware & software as services over internet
Software as a service (SaaS) – delivered as an internet service (books)
Mobile digital platform – iPhone, minimizing the use of traditional computers

People and behavior changes

Managers use social networks, collaboration.
Employees have access to powerful decision aids - dashboards.
Virtual meetings are accepted and used –video conferencing.

Organizations

Web 2.0 applications widely adopted – online communities using blogs
Telework gains momentum – internet, wireless laptops, iPhones, Blackberries
Collaboration across firms – STC, Mobily, Zein

Globalization Challenges and Opportunities: A Flattened World

- **Internet and global communications have greatly reduced economic and cultural advantages of developed countries (**US, Europe and others**).**
  - Drastic reduction of costs of operating and transacting on global scale - greatly reduced the advantage of US & others
  - Competition for jobs, markets, resources, ideas (US & Europe were competing for their economic life)
  - Dependence on imports and exports (33% of US economy results from foreign trade, 500 US firms drive their revenue from foreign operations, Half of Intel's revenue came from overseas)

New Products, Services, and Business Models:

With its stunning multitouch display, full Internet browsing, digital camera, and portable music player, Apple's iPhone has set a new standard for mobile phones. Other Apple products have transformed the music and entertainment industries.

The Role of Information Systems in Business Today

Business Drivers of Information Systems

- Businesses invest in IT to achieve six important business objectives.
  1. Operational excellence
  2. New products, services, and business models
  3. Customer and supplier intimacy
  4. Improved decision making
  5. Competitive advantage
  6. Survival

The Role of Information Systems in Business Today

Operational Excellence:

- **Improved efficiency results in higher profits.**
- **Information systems and technologies help improve efficiency and productivity.**
  - Example: Wal-Mart
    - Power of combining information systems and best business practices to achieve operational efficiency—and over $400 billion in sales in 2008
    - Most efficient store in world as result of digital links between suppliers and stores

The Role of Information Systems in Business Today

New Products, Services, and Business Models:

- **Information systems and technologies enable firms to create new products, services, and business models.**
  - **Business model:** how a company produces, delivers, and sells its products and services
- **Example: Music industry**
  - Drastic changes in business models in recent years
  - Apple: Successful innovations—iPod, iPhone, and so on

The Role of Information Systems in Business Today

Customer and Supplier Intimacy:

- **Customers who are served well become repeat customers who purchase more.**
  - **Mandarin Oriental hotel**
    - Uses IT to foster an intimate relationship with its customers, keeping track of preferences, and so on
  - **Emirates**
- **Close relationships with suppliers result in lower costs.**
  - **JCPenney (Portfolio)**
    - IT to enhance relationship with supplier in Hong Kong

Improved Decision Making:

- **If managers rely on forecasts, best guesses, and luck, they will misallocate employees, services, and inventory.**
- **Real-time data improves ability of managers to make decisions.**
  - **Verizon (Portfolio):** Web-based digital dashboard to update managers with real-time data on customer complaints, network performance, and line outages
  - A contrast: Jeddah floods

Competitive Advantage:

- **Often results from achieving previous business objectives**
- **Advantages over competitors:**
  - Charging less for superior products, better performance, and better response to suppliers and customers (Contrast – My experience @Electro)
  - **Toyota**: uses TPS (Toyota Production System) to achieve high levels of efficiency and quality (how quickly has Toyota responded to the recent faults)

Survival:

- **Businesses may need to invest in information systems out of necessity; simply the cost of doing business.**
  - **Keeping up with competitors**
    - Citibank's introduction of ATMs
  - **Federal and state regulations and reporting requirements**

Activities in an Information System?

- **Activities in an information system that produce information:**
  - **Input**
  - **Processing**
  - **Output**
  - **Feedback**

Functions of an Information System

An information system contains information about an organization and its surrounding environment. Three basic activities—input, processing, and output—produce the information organizations need. Feedback is output returned to appropriate people or activities in the organization to evaluate and refine the input. Environmental actors, such as customers, suppliers, competitors, stockholders, and regulatory agencies, interact with the organization and its information systems.

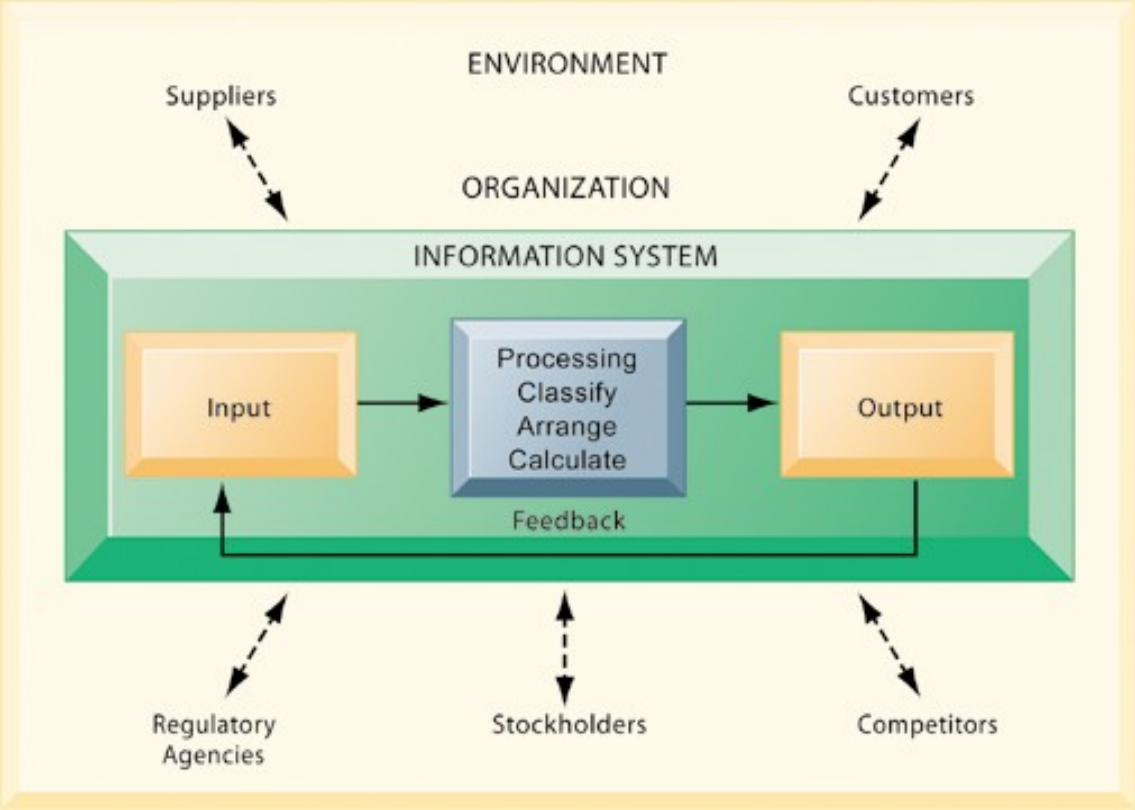


Figure 1-2

Three dimensions of information systems

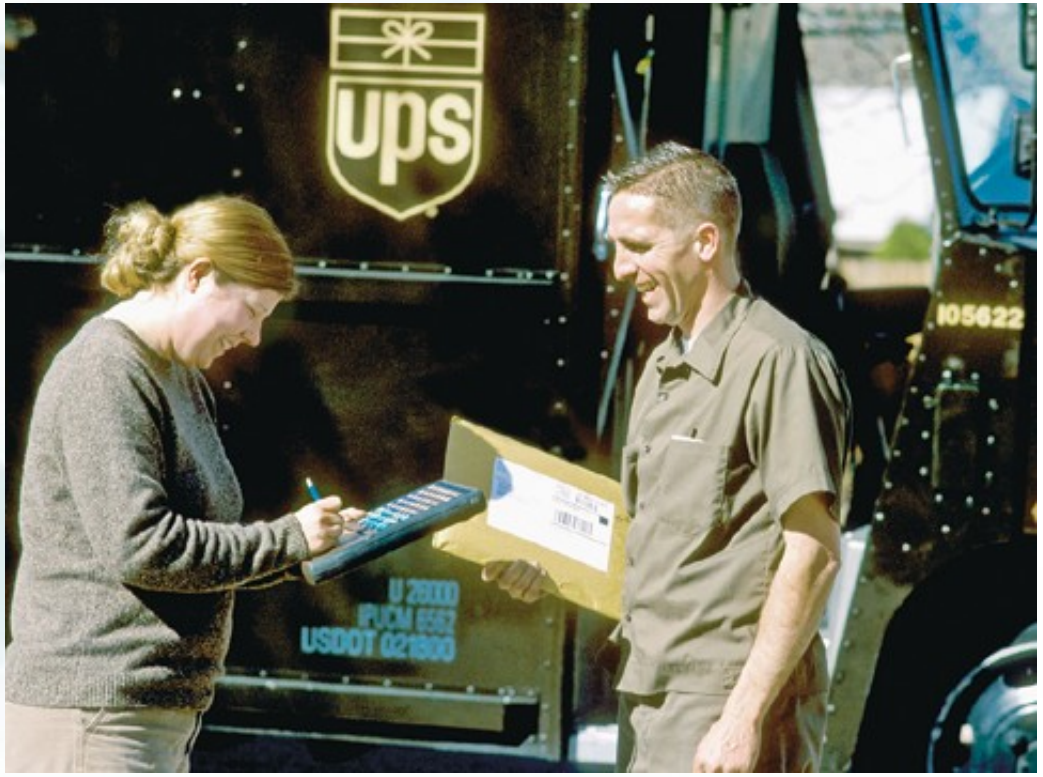
Using information systems effectively requires an understanding of the organization, people, and information technology shaping the systems. An information system provides a solution to important business problems or challenges facing the firm.

Figure 1-3

Portfolio

Interactive Session: Technology
UPS Competes Globally with Information Technology

Using a handheld computer called a Delivery Information Acquisition Device (DIAD), UPS drivers automatically capture customers' signatures along with pickup, delivery, and time card information. UPS information systems use these data to track packages while they are being transported.



A Model of the Problem-Solving Process

- **Problem solving: four-step process**
  1. **Problem identification**
  2. **Solution design**
  3. **Choice**
  4. **Implementation**

A Model of the Problem-Solving Process

1. **Problem identification includes:**
   - Agreement that problem exists
   - Definition of problem
   - Causes of problem
   - What can be done given resources of firm

A Model of the Problem-Solving Process

- **Typical organizational problems**
  - Outdated business processes
  - Unsupportive culture and attitudes
  - Political in-fighting
  - Turbulent business environment, change
  - Complexity of task
  - Inadequate resources

A Model of the Problem-Solving Process

- **Typical technology problems**
  - Insufficient or aging hardware
  - Outdated software
  - Inadequate database capacity
  - Insufficient telecommunications capacity
  - Incompatibility of old systems with new technology
  - Rapid technological change

A Model of the Problem-Solving Process

- **Typical people problems**
  - Lack of employee training
  - Difficulties of evaluating performance
  - Legal and regulatory compliance
  - Work environment, ergonomics
  - Poor or indecisive management
  - Lack of employee support and participation

A Model of the Problem-Solving Process

2. **Solution design**
   - Often many possible solutions
   - Consider as many as possible to understand range of solutions
2. **Choice:** Factors include
   - Cost
   - Feasibility given resources and skills
   - Length of time needed to implement solution

A Model of the Problem-Solving Process

4. **Implementation**
   - Building or purchasing solution
   - Testing solution, employee training
   - Change management
   - Measurement of outcomes
   - Feedback, evaluation of solution

- **Problem solving is a continuous process, not a single event**
  - Sometimes chosen solution doesn't work or needs adjustment

Problem Solving Is a Continuous Four-Step Process

During implementation and thereafter, the outcome must be continually measured and the information about how well the solution is working is fed back to the problem solvers. In this way, the identification of the problem can change over time, solutions can be changed, and new choices made, all based on experience.

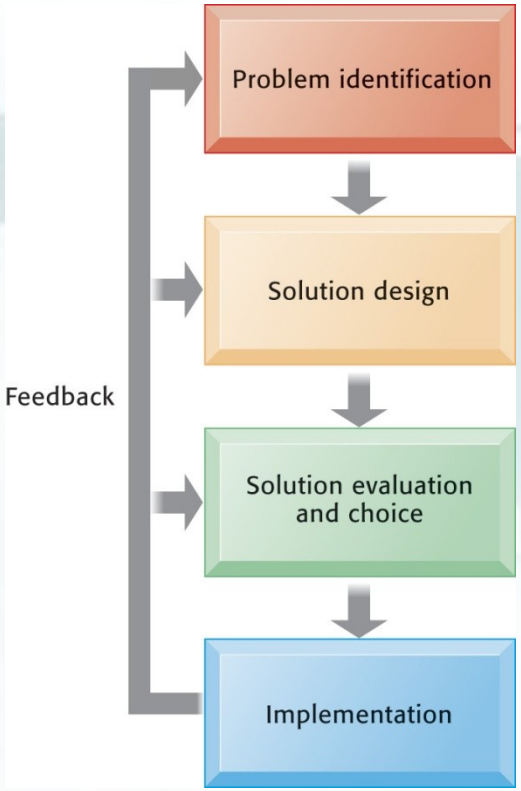


Figure 1-4

The Role of Critical Thinking in Problem Solving

- **Without critical thinking, easy to jump to conclusions, misjudge a problem, and waste resources**
- **Critical thinking:**
  - Sustained suspension of judgment with an awareness of multiple perspectives and alternatives

The Role of Critical Thinking in Problem Solving

- **Four elements of critical thinking:**

1. **Maintaining doubt and suspending judgment**
2. **Being aware of different perspectives**
    - Including technology, organization, and people perspectives
1. **Testing alternatives and letting experience guide**
2. **Being aware of organizational and personal limitations**

The Connection Between Business Objectives, Problems, and Solutions

- When firms cannot achieve business objectives these objectives become challenges.
- Information systems often present solutions, partially or fully, to these challenges.

E-Business

How Businesses Use Information Systems

Managing a Business and Firm Hierarchies

- Firms coordinate work of employees by developing hierarchy in which authority is concentrated at top.
  - Senior management
  - Middle management
  - Operational management
  - Knowledge workers
  - Data workers
  - Production or service workers
- Each group has different needs for information.

Levels in a Firm

Business organizations are hierarchies consisting of three principal levels: senior management, middle management, and operational management. Information systems serve each of these levels. Scientists and knowledge workers often work with middle management.

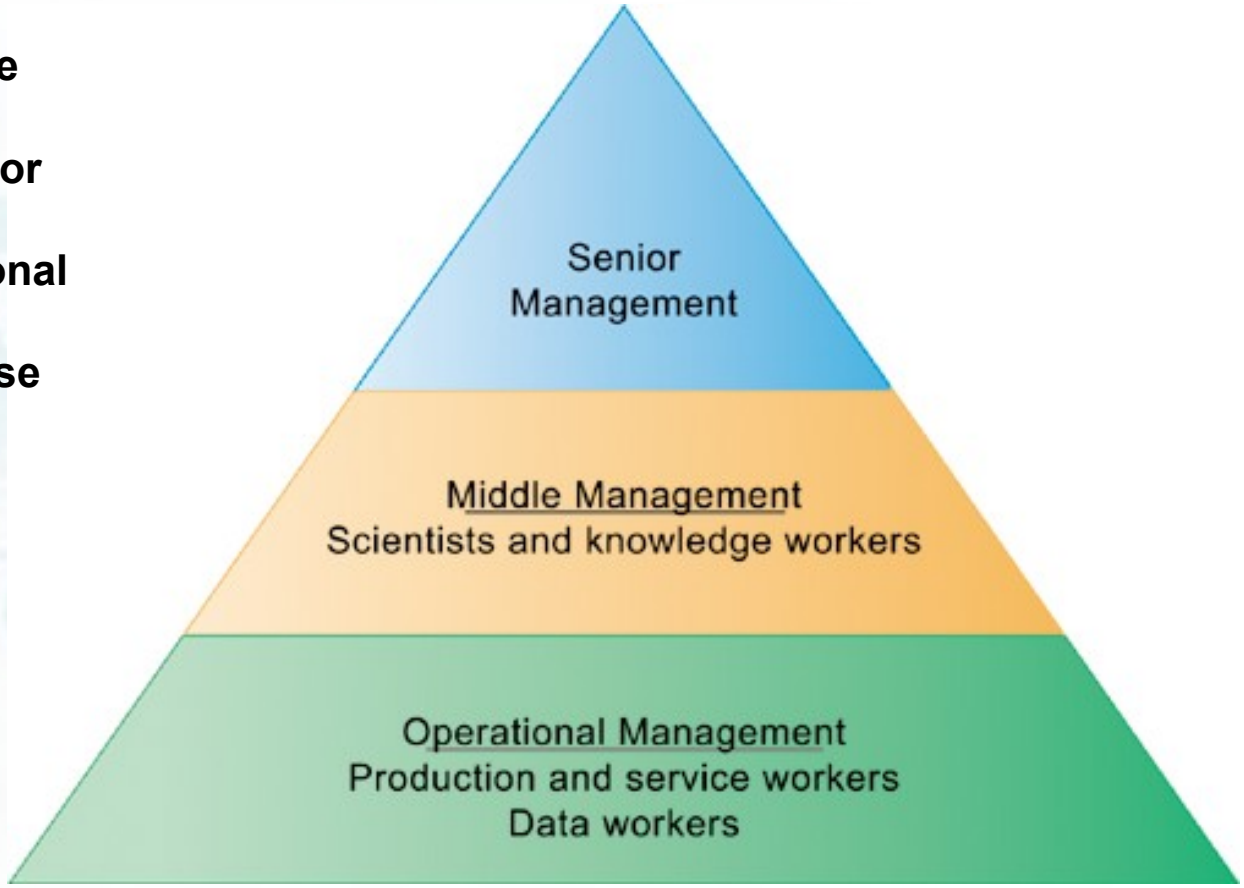


Figure 2-3

Management Skills

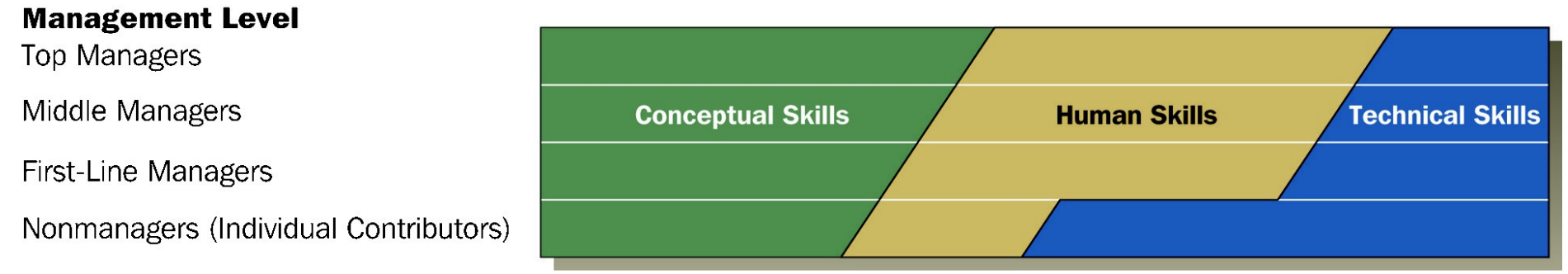


Exhibit 1.2

Components of a Business

The Role of Information Systems in a Business

- Firms invest in information systems in order to:
  - Achieve operational excellence.
  - Develop new products and services.
  - Attain customer intimacy and service.
  - Improve decision making.
  - Promote competitive advantage.
  - Ensure survival.

Types of Business Information Systems

Systems For Different Levels of Management

- **Transaction processing systems:**
  - Keep track of basic activities and transactions of organization (e.g., sales, receipts, cash deposits, payroll, credit decisions, flow of materials in a factory).
- **Management information systems and decision-support systems:**
  - Help with monitoring, controlling, decision making, and administrative activities.
- **Executive support systems:**
  - Help address strategic issues and long-term trends, both in firm and in external environment.

Types of Business Information Systems

- **Transaction processing systems:**
  - **Serve operational managers.**
  - **Principal purpose is to answer routine questions and to track the flow of transactions through the organization.**
    - **E.g., inventory questions, granting credit to customer**
  - **Monitor status of internal operations and firm's relationship with external environment.**
  - **Major producers of information for other systems.**
  - **Highly central to business operations and functioning.**

Types of Business Information Systems

- **Management information systems:**
  - **Provide middle managers with reports on firm's performance.**
    - **To monitor firm and help predict future performance.**
  - **Summarize and report on basic operations using data from TPS.**
  - **Provide weekly, monthly, annual results, but may enable drilling down into daily or hourly data.**
  - **Typically not very flexible systems with little analytic capability.**

Types of Business Information Systems

- **Executive support systems (ESS):**
  - **Serve senior managers.**
  - **Address strategic issues and long-term trends.**
    - **E.g., what products should we make in five years?**
  - **Address nonroutine decision making.**
  - **Provide generalized computing capacity that can be applied to changing array of problems.**
  - **Draw summarized information from MIS, DSS, and data from external events.**
  - **Typically use portal with Web interface to present content.**

Types of Business Information Systems

Systems That Span the Enterprise

- Enterprise applications
  - Systems that span functional areas, focus on executing business processes across the firm, and include all levels of management.
    - Enterprise systems
    - Supply chain management systems
    - Customer relationship management systems
    - Knowledge management systems

Systems That Span the Enterprise

Enterprise Systems

- Integrate data from key business processes into single system.
- Speed communication of information throughout firm.
- Enable greater flexibility in responding to customer requests, greater accuracy in order fulfillment.
- Enable managers of large firms to assemble overall view of operations.
- Alcoa used ERP to eliminate redundancies and inefficiencies in its disparate systems.

Systems That Span the Enterprise

Customer Relationship Management Systems

- Help manage relationship with customers.
- Coordinate business processes that deal with customers to optimize revenue and customer satisfaction, and increase sales.
- Combine sales, marketing, and service record data from multiple communication channels to provide unified view of customer, eliminate duplicate efforts.
- E.g., Saab CRM applications to achieve 360 degree view of customers resulted in greater follow-up rate on sales leads and increased customer satisfaction.

Systems That Span the Enterprise

Knowledge Management Systems

- Intangible knowledge assets
  - Knowledge about producing and delivering products
  - Source of value and advantage for firms
- Knowledge management systems:
  - Help capture, storage, distribute, and apply knowledge so that it can be leveraged for strategic benefit.
  - Include systems for:
    - Managing and distributing documents, graphics, other digital knowledge objects
    - Creating knowledge directories of employees with specialized expertise
    - Distributing knowledge

Systems That Span the Enterprise

Intranets and Extranets

- Technology platforms that increase integration and expedite the flow of information
  - Intranets:
    - Internal networks based on Internet standards
    - Typically utilize a portal
  - Extranets:
    - Intranets extended for authorized use outside the company for partners, customers
    - Facilitate collaboration

Systems That Span the Enterprise

E-Business, E-Commerce, and E-Government

- **E-business:**
  - Use of digital technology and Internet to drive major business processes
- **E-commerce:**
  - Subset of e-business
  - Buying and selling goods and services through Internet
- **E-government:**
  - Using Internet technology to deliver information and services to citizens, employees, and businesses

Components of a Business
Portfolio

Interactive Session: Technology
Virtual Meetings: Smart Management

- Read the Interactive Session and then discuss the following questions:

Will Web conferencing make business travel extinct?

What is the distinction between videoconferencing and telepresence?

What are the ways in which videoconferencing provides value to a business? Would you consider it smart management?

If you were in charge of a small business, would you choose to implement videoconferencing? What factors would you consider in your decision?

Chapter 3

Achieving Competitive Advantage with Information Systems

Porter's Competitive Forces Model

- **One way to understand competitive advantage**
- **Five competitive forces shape fate of firm**
  1. **Traditional competitors**
     - Competitors in market space continuously devise new products, new efficiencies, switching costs.
  1. **New market entrants**
     - Some industries have low barriers to entry:
       - E.g., food industry versus microchip industry
     - Newer companies may have advantages:
       - Newer equipment, younger workforce, and so on.

Porter's Competitive Forces Model

3. **Substitute products and services**
   - Substitutes customers can purchase if your prices too high.
   - E.g., Internet music service versus CDs.
3. **Customers**
   - Can customers easily switch to competitor's products?
   - Can customers force firm and competitors to compete on price alone (transparent marketplace)?
3. **Suppliers**
   - The more suppliers a firm has, the greater control it can exercise over suppliers.

Porter's Competitive Forces Model

In Porter's competitive forces model, the strategic position of the firm and its strategies are determined not only by competition with its traditional direct competitors but also by four forces in the industry's environment: new market entrants, substitute products, customers, and suppliers.

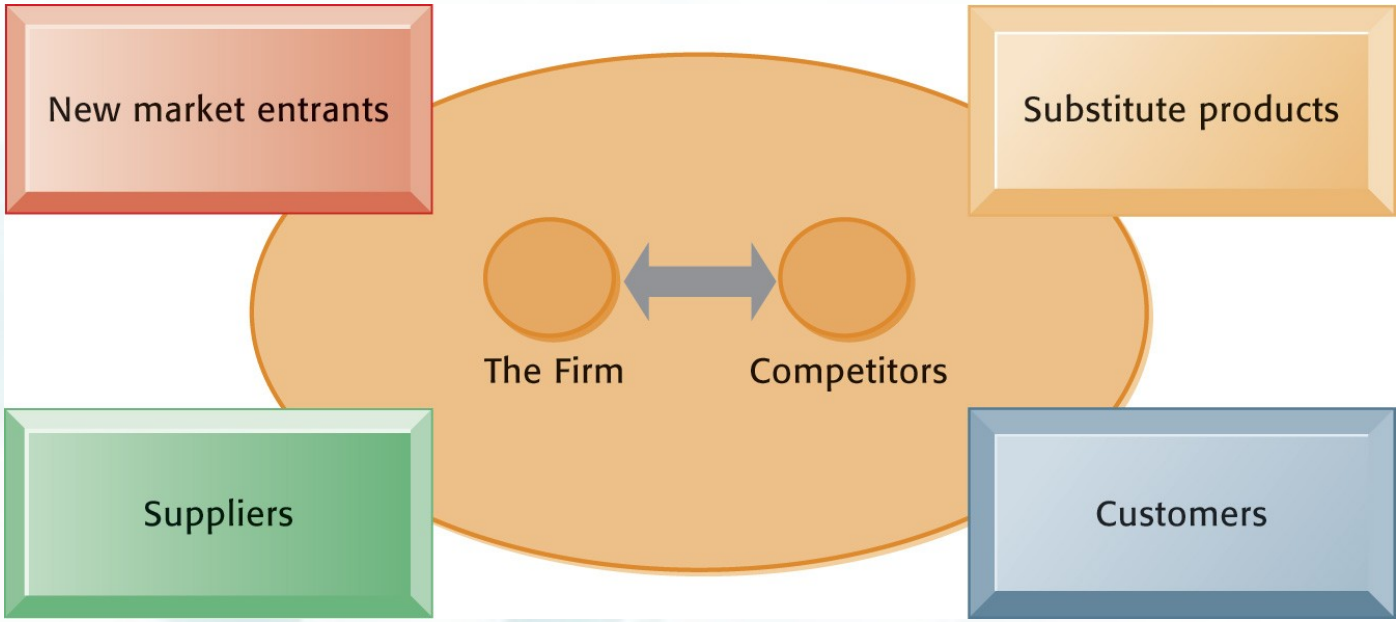


Figure 3-1

Information System Strategies for Dealing with Competitive Forces

- **Basic strategy: Align IT with business objectives**
  - 75 percent of businesses fail to align their IT with their business objectives, leading to lower profitability.
  - To align IT:
    - Identify business goals and strategies.
    - Break strategic goals into concrete activities and processes.
    - Identify metrics for measuring progress.
    - Determine how IT can help achieve business goals.
    - Measure actual performance.

Information System Strategies for Dealing with Competitive Forces

- **Low-cost leadership**
  - Use information systems to achieve the lowest operational costs and the lowest prices.
  - **E.g. Wal-Mart**
    - Inventory replenishment system sends orders to suppliers when purchase recorded at cash register.
    - Minimizes inventory at warehouses, operating costs.
    - Efficient customer response system.

Using Information Systems to Achieve Competitive Advantage

Supermarkets and large retail stores such as Wal-Mart use sales data captured at the checkout counter to determine which items have sold and need to be reordered. Wal-Mart's continuous replenishment system transmits orders to restock directly to its suppliers. The system enables Wal-Mart to keep costs low while fine-tuning its merchandise to meet customer demands.

Information System Strategies for Dealing with Competitive Forces

- **Product differentiation**
  - Use information systems to enable new products and services, or greatly change the customer convenience in using your existing products and services.
  - E.g., Google's continuous innovations, Apple's iPhone.
  - Use information systems to customize, personalize products to fit specifications of individual consumers.
    - **Dell**

Information System Strategies for Dealing with Competitive Forces

- **Focus on market niche.**
  - Use information systems to enable specific market focus, and serve narrow target market better than competitors.
    - **Analyzes customer buying habits, preferences**
    - **Advertising pitches to smaller and smaller target markets**
  - E.g., Hilton Hotel's OnQ System (Portfolio)
    - **Analyzes data collected on guests to determine preferences and guest's profitability**

Information System Strategies for Dealing with Competitive Forces

- **Strengthen customer and supplier intimacy.**
  - Strong linkages to customers and suppliers increase switching costs and loyalty
  - **Toyota**: uses IS to facilitate direct access from suppliers to production schedules
    - Permits suppliers to decide how and when to ship suppliers to Chrysler factories, allowing more lead time in producing goods.
  - **Amazon**: keeps track of user preferences for purchases, and recommends titles purchased by others

Interactive Session (Portfolio): People
How Much Do Credit Card Companies Know About You?

- **Read the Interactive Session and then discuss the following questions:**
  - **What competitive strategy are the credit card companies pursuing? How do information systems support that strategy?**
  - **What are the business benefits of analyzing customer purchase data and constructing behavioral profiles?**
  - **Are these practices by credit card companies ethical? Are they an invasion of privacy? Why or why not?**

The Internet's Impact on Competitive Advantage

- Enables new products and services
- Transforms industries
- Increases bargaining power of customers and suppliers
- Intensifies competitive rivalry
- Creates new opportunities for building brands and large customer bases

The Internet's Impact on Competitive Advantage

- **Existing competitors:** widens market, increasing competitors, reducing differences, pressure to compete on price
- **New entrants:** reduces barriers to entry (e.g., need for sales force declines), provides technology for driving business processes
- **Substitute products and services:** facilitates creation of new products and services
- **Customers' bargaining power:** bargaining power shifts to customer
- **Suppliers' bargaining power:** procurement over Internet raises power over suppliers, suppliers can benefit from reduced barriers to entry and elimination of intermediaries

What Is Quality?

- **Producer perspective:**
  - Conformance to specifications and absence of variation from specs
- **Customer perspective:**
  - Physical quality (reliability), quality of service, psychological quality
- **Total quality management (TQM):**
  - Quality control is end in itself
  - All people, functions responsible for quality
- **Six sigma:**
  - Measure of quality: 3.4 defects/million opportunities

How Information Systems Improve Quality

- **Reduce cycle time and simplify production process.**
- **Benchmarking**
- **Use customer demands to improve products and services.**
- **Improve design quality and precision.**
  - Computer-aided design (CAD) systems
- **Improve production precision and tighten production tolerances.**

Competing on Quality and Design

Computer-aided design (CAD) systems improve the quality and precision of product design by performing much of the design and testing work on the computer.