CHAPTER 1
INTRODUCTION TO
INFORMATION SYSTEMS

Management Information Systems, 10th edition,
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Introduction

• The first computers were as large as a room and used light-bulb-sized vacuum tubes for much of their circuitry

• Vacuum tubes were later replaced with transistors and chips made using silicon wafer technology

• This change resulted in a dramatic and long-term lowering of costs of manufacturing leading to the high growth in the demand for computers

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HISTORY OF INFORMATION SYSTEMS

• The earliest “mainframe” computers could only process a single task by a single user
  – 1946: ENIAC (Electronic Numerical Integrator and Calculator) was developed
  – 1951: first computer installed by the U.S. Census Bureau
  – 1954: first computer used by G.E.

• Over the last half century, hardware has seen many-fold increases in speed and capacity and dramatic size reductions

• Applications have also evolved from relatively simple accounting programs to systems designed to solve a wide variety of problems

Figure 1.1 Computer Scientists Harold Sweeney (left) and J. Presper Eckert (center) Demonstrate the UNIVAC Computer to Walter Cronkite as It Predicts the Winner of the 1952 Presidential Election
Multitasking

• IBM revolutionized the computer industry in the mid-1960s by introducing the IBM System/360 line of computers
• These computers were the first to perform multiple processing tasks concurrently

Smaller Computers

• The first small-scale systems, called minicomputers, were smaller and less powerful but could handle processing for small organizations more cheaply
• Even smaller microcomputers designed for individual use were later developed, first by Apple and Tandy Corp.
• In 1982, IBM introduced the first personal computer, or PC, in 1982, which has since become the standard for individual computing
INTRODUCTION TO COMPUTER ARCHITECTURE

- Most computers have similar architectures that combine software and hardware
- Software includes the operating system which controls the computer hardware and application software, such as word processing, spreadsheets, etc.
- Hardware includes, processors, memory and peripheral devices
Computer Hardware

• The **processor** manages the input and output devices, data storage devices, and operations on the data

• The **central processing unit** (CPU) controls all the other components

• **Two types of memory are:**
  – **Random access memory** (RAM) acts as the temporary workspace for the CPU
  – Permanent data storage devices such as **CD-ROM**, **floppy** and **hard disk drives**
INTRODUCTION TO COMMUNICATIONS ARCHITECTURE

- **Modem**: a hardware device that sends the computer’s digital signals by modulating an analog carrier wave
- Data rates for various communications systems:
  - Telephone lines: 56 kbps
  - Cable modem: up to 2 Mbps
  - WiFi: 11 Mbps
  - Local Area Networks: 10 to 100 Mbps
- Wireless has recently taken off because it’s cheap and easy to install

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THE EVOLUTION IN COMPUTER APPLICATIONS

• An information system is a conceptual system that enables managers to control and monitor a firm’s physical systems used to transform input resources into output resources

Figure 1.7 The Physical System of the Firm
Transaction Processing Systems

• A **transaction processing systems** is shown in Figure 1.8
• It gathers data from the firm’s physical system and environment and enters it into its database
• The software also transforms the **data** into **information** for the firm’s managers and other individuals in the firm’s environment

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**Figure 1.8** A Model of a Transaction Processing System
Management Information Systems

- **Management information systems** (MIS) transform the *data* in frontline systems, such as transaction processing systems into *information* useful to managers.

- Typical MIS modules are report-writing software, and models that can simulate firm operations.

- Information from the MIS is then used by organizational problem solvers as an aid in decision-making, as illustrated in Figure 1.9.

- Firms can also interact with suppliers or others to form **inter organizational information systems** (IOS), in which the MIS supplies information to the other members of the IOS as well as the firm's users.

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**Figure 1.9** An MIS Model

![MIS Model](http://www.deden08m.wordpress.com)
Virtual Office Systems

- **Office automation** - the use of electronics to facilitate communication, began with **word processing**
- Subsequent applications include electronic mail, voice mail, electronic calendaring, and audio and video conferencing
- These **personal productivity systems** now account for a large portion of a firm's use of the computer as a communications vehicle
- With improvements in networking, the concept of a **virtual office** has developed, in which office activities can be performed without the need for an employee to be in a specific location

Decision Support Systems (DSS)

- A DSS is a system used to assist managers in making decisions to help solve a specific problem
- Figure 1.10 shows the 3 sources for the information to be delivered to users: a relational database, a knowledge base, and a multidimensional database
- Two additional types of DSS-related software are:
  - **group decision support systems**: used in aiding a group of managers work out decisions, and
  - **artificial intelligence**: in which a program is created for a computer to logically analyze a problem on its own
Enterprise Resource Planning Systems (ERP)

- Over time, firms began to use many different kinds of information systems throughout the firm
- During the 1990s firms began to see the value in integrating all of these systems so that they could function as a coordinated unit
- **ERP systems** are computer-based systems aimed at meeting this need that enable the management of all of a firm’s resources on an organization-wide basis
MANAGERS AS INFORMATION SYSTEM USERS

- Managers exist at various managerial levels and within various business areas of the firm.
- What level an IS is developed for influences how it operates (see Figure 1.11).
- The 3 primary management levels are (see Figure 1.12):
  1. Strategic planning level
  2. Management control level
  3. Operational control level

Figure 1.11 Management Level Can Influence Both the Source and Presentation Form of Information
What Managers Do

• Managerial Functions (Managers do the following):
  – *Plan* what they are to do
  – *Organize* to meet the plan
  – *Staff* their organization with resources
  – *Direct* them to execute the plan
  – *Control* the resources, keeping them on course (see Figure 1.13)

• Managerial Roles:
  – Mintzberg’s framework is made of 10 roles that managers play, grouped into interpersonal, informational, and decisional activities (see Table 1.1)
**Figure 1.13** Management Level Can Influence the Relative Emphasis on the Management Functions

- **Strategic planning level**
  - Control
  - Direct
  - Staff
  - Organize

- **Management control level**
  - Plan
  - Control
  - Direct
  - Staff

- **Operational control level**
  - Plan
  - Control
  - Organize
  - Direct
  - Staff

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THE ROLE OF INFORMATION IN MANAGEMENT PROBLEM SOLVING

• While a problem can be harmful or potentially harmful to a firm in a negative way, it can also be beneficial or potentially beneficial in a positive way.
• The outcome of the problem-solving activity is a solution.
• A decision is a particular selected course of action.
• Simon described problem-solving as being made up of four phases:
  – Intelligence activity
  – Design activity
  – Choice activity
  – Review activity
Management Skills

- Communications
- Problem solving

How can an information specialist help?

Problem Solving Information Comes in Many Forms

Internal Sources
- Written Media
  - Computer Reports
  - Letters & Memos
  - Electronic mail
  - Periodicals

External Sources
- Oral Media
  - Scheduled Meetings
  - Unscheduled Meetings
  - Telephone
  - Voice Mail
  - Tours
  - Business Meals

Problem Solving

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16
Management Knowledge

- Computer literacy
- Information literacy
- What’s the difference?

The CBIS Model

Problem → Decisions → Problem Solution

Information

Computer-based Information System (CBIS)
- Accounting Information System
- Management Information System
- Decision Support Systems
- The Virtual Office
- Knowledge-based Systems
Information Services

Information specialists have full-time responsibility for developing and maintaining computer-based systems.
Justifying the CBIS

- Justify in the same manner as any other large investment
- Economic
  - Cost reduction
  - Reduced inventory investment
  - Increased productivity (CAD/CAM)
- Noneconomic
  - Perceived value

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Achieving the CBIS

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Reengineering the CBIS

- Business Process Reengineering (BPR)
  - Reworking systems
  - Good system features retained
  - Becoming development methodology of choice

Roles Played by the Manager and by the Information Specialist

<table>
<thead>
<tr>
<th>Phase</th>
<th>Manager</th>
<th>Information Specialist</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planning</td>
<td>Define problem</td>
<td>Support</td>
</tr>
<tr>
<td>Analysis</td>
<td>Control</td>
<td>System Study</td>
</tr>
<tr>
<td>Design</td>
<td>Control</td>
<td>Design system</td>
</tr>
<tr>
<td>Implementation</td>
<td>Control</td>
<td>Implement system</td>
</tr>
<tr>
<td>Use</td>
<td>Control</td>
<td>Make available</td>
</tr>
</tbody>
</table>
THE FUTURE OF INFORMATION TECHNOLOGY

• The future of information technology will be driven by the following two trends:
  – Ongoing cost reductions and increased power of information technologies
  – Convergence between computers and communications

• To take advantage of these new possibilities, managers must learn to incorporate information systems into decision making

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