

CHAPTER 1

INTRODUCTION TO

INFORMATION SYSTEMS



Management Information Systems
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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

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

Figure 1.2 A Personal Computer



Source: Dell Computer Corporation.

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

Figure 1.4 IBM NetVista Microcomputer

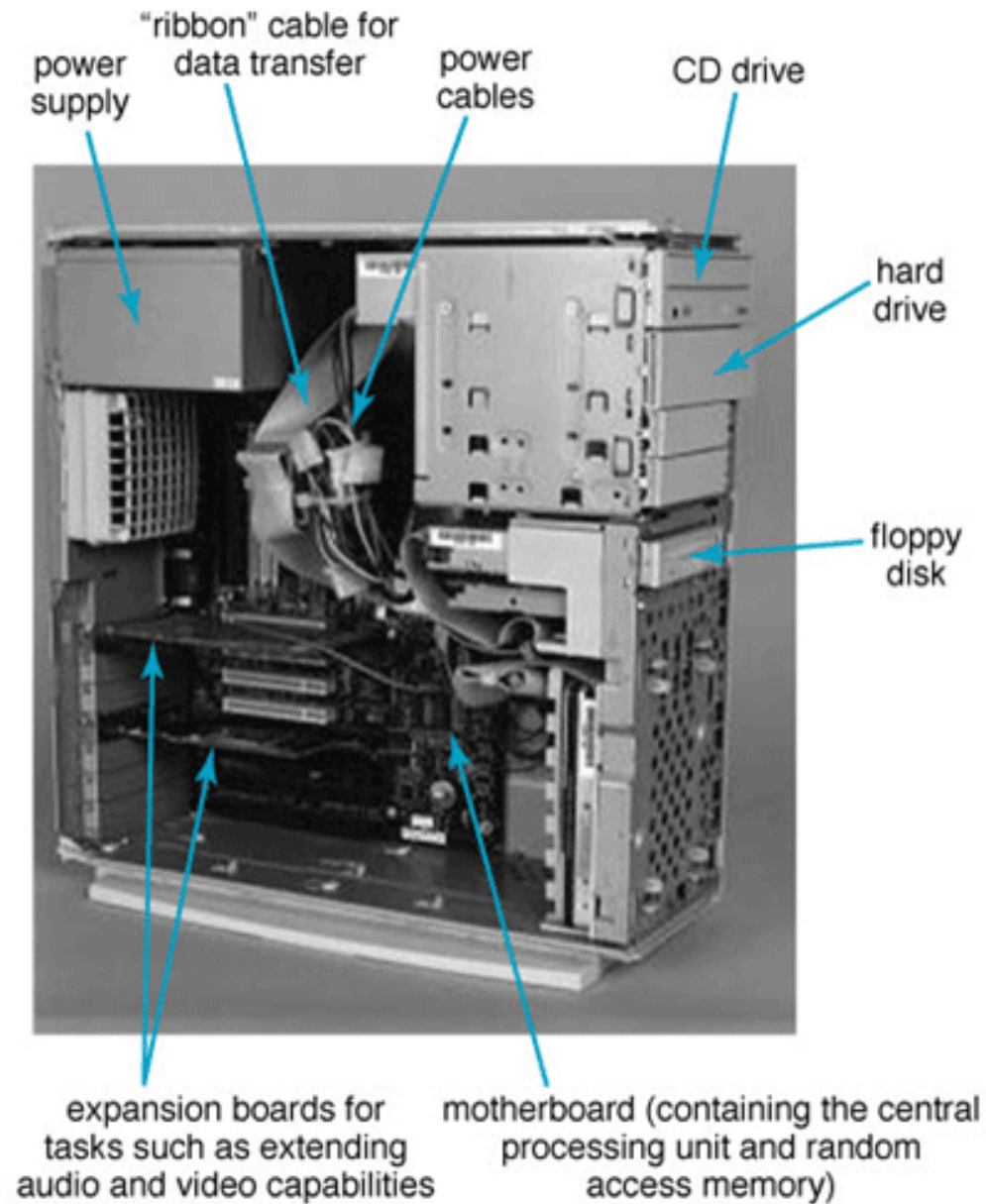


Source: IBM Corporation. Photo courtesy of International Business Machines Corporation.

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**

Figure 1.5 Computer Hardware Components

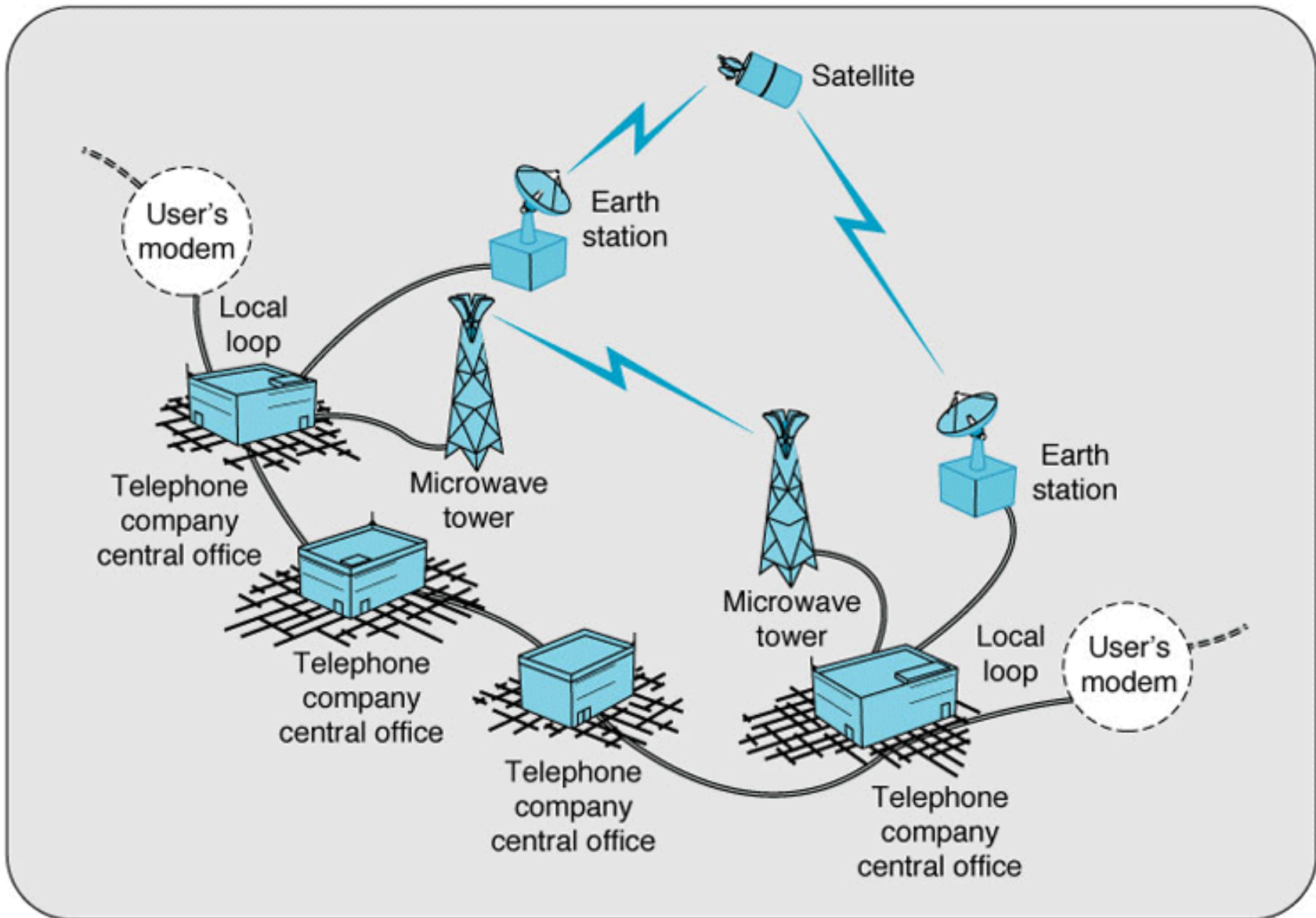


Source: James A. Foltis Photography.
<http://www.deden08m.com>

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

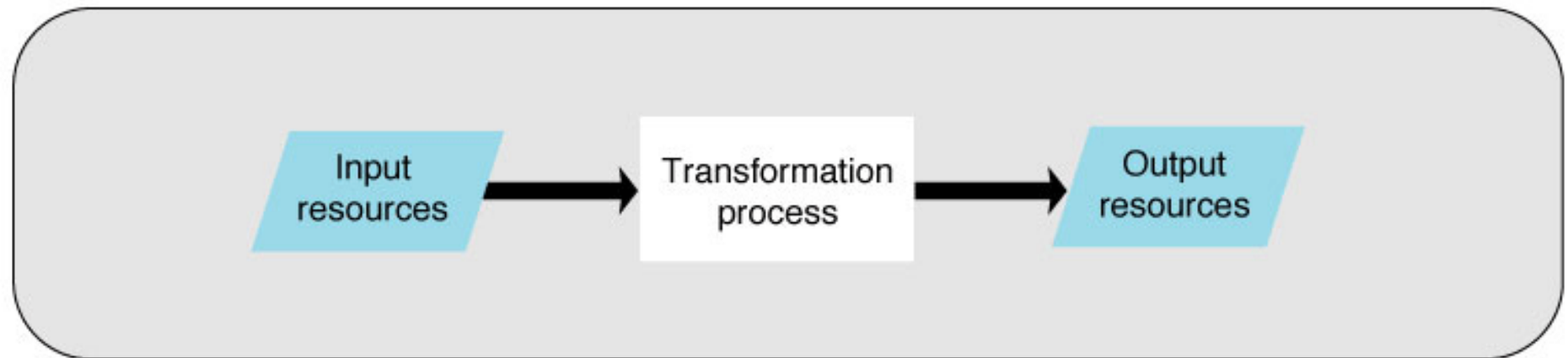
Figure 1.6 Communications Architecture



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

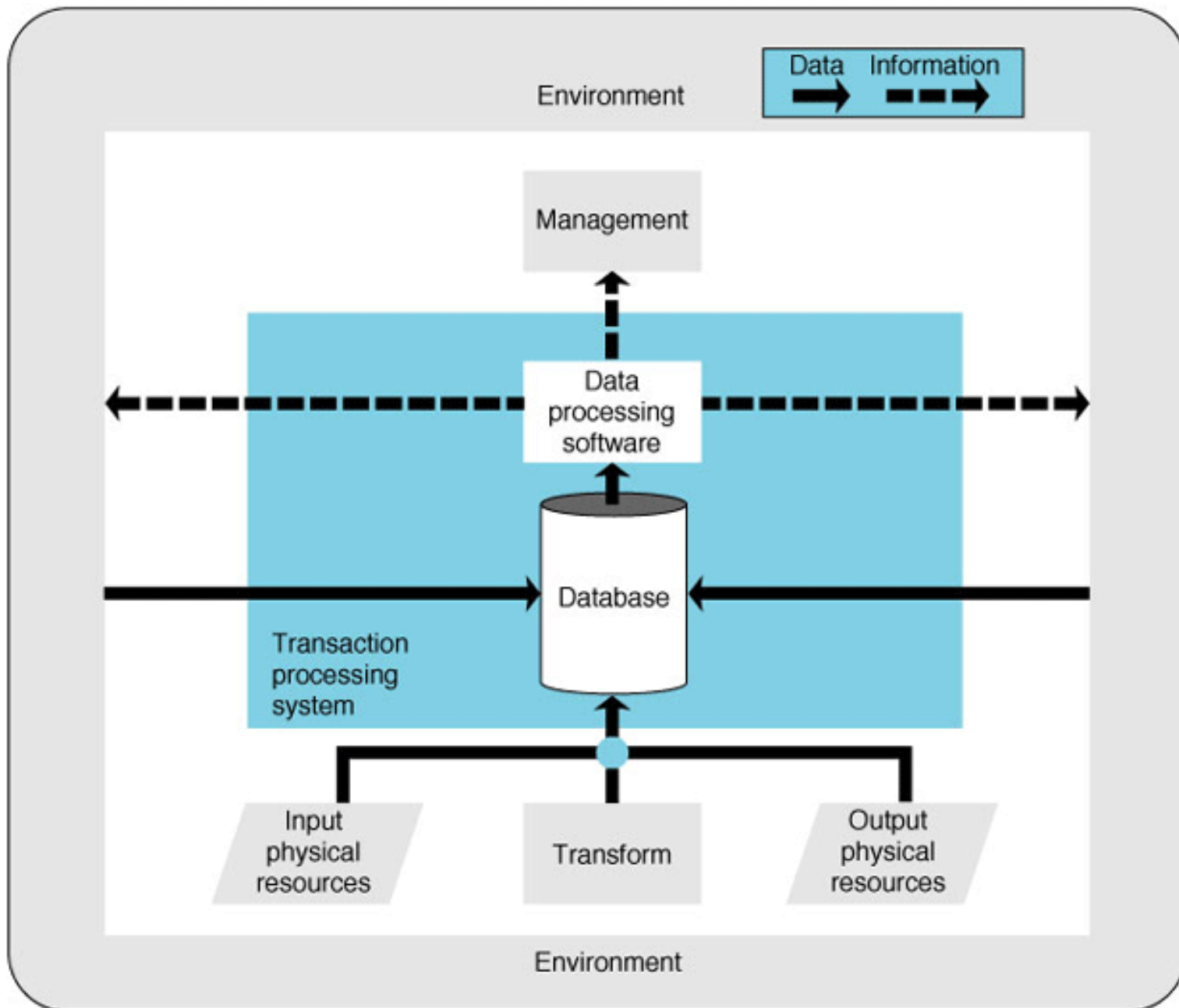
Figure 1.7 The Physical System of the Firm



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

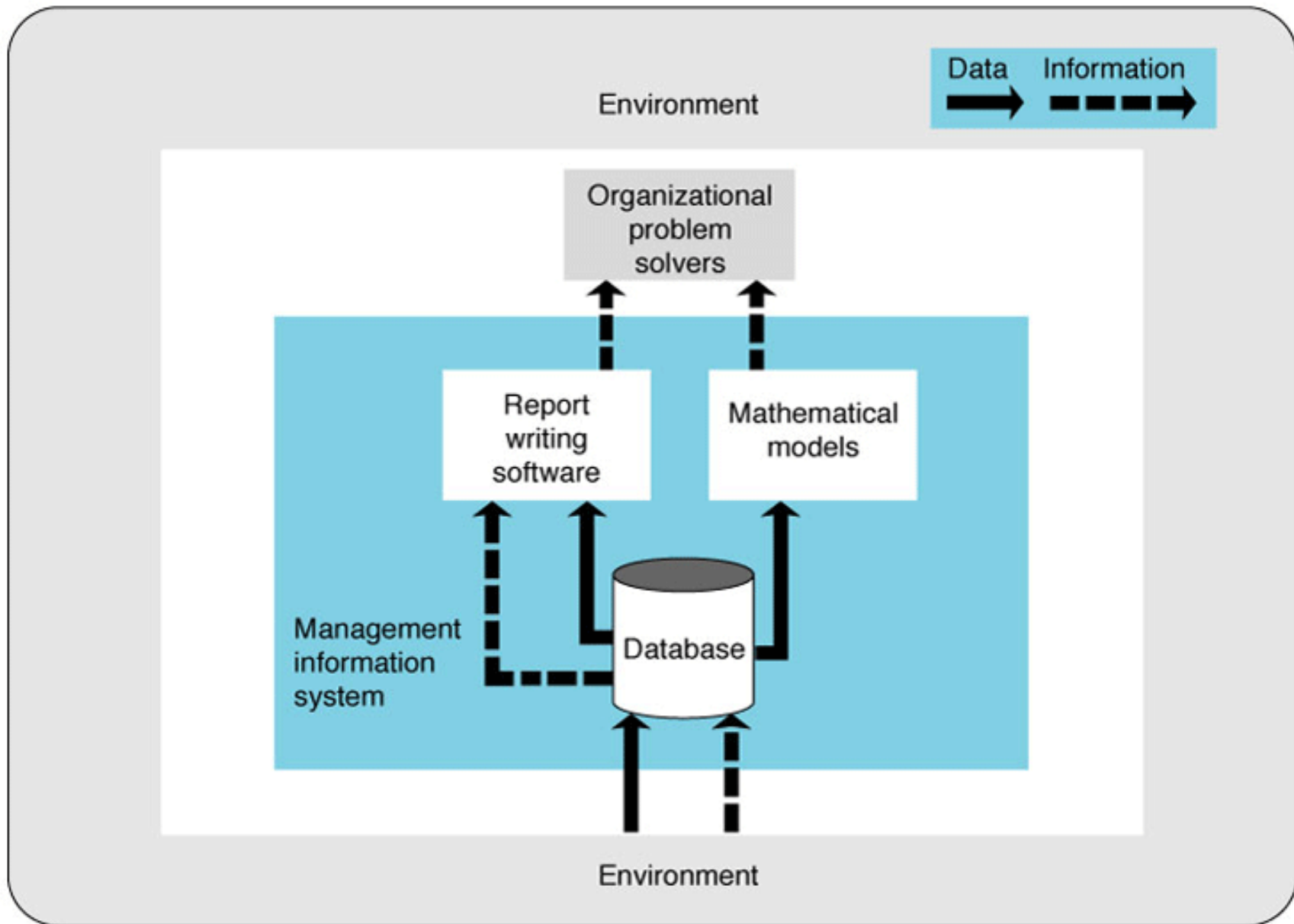
Figure 1.8 A Model of a Transaction Processing System



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

Figure 1.9 An MIS Model



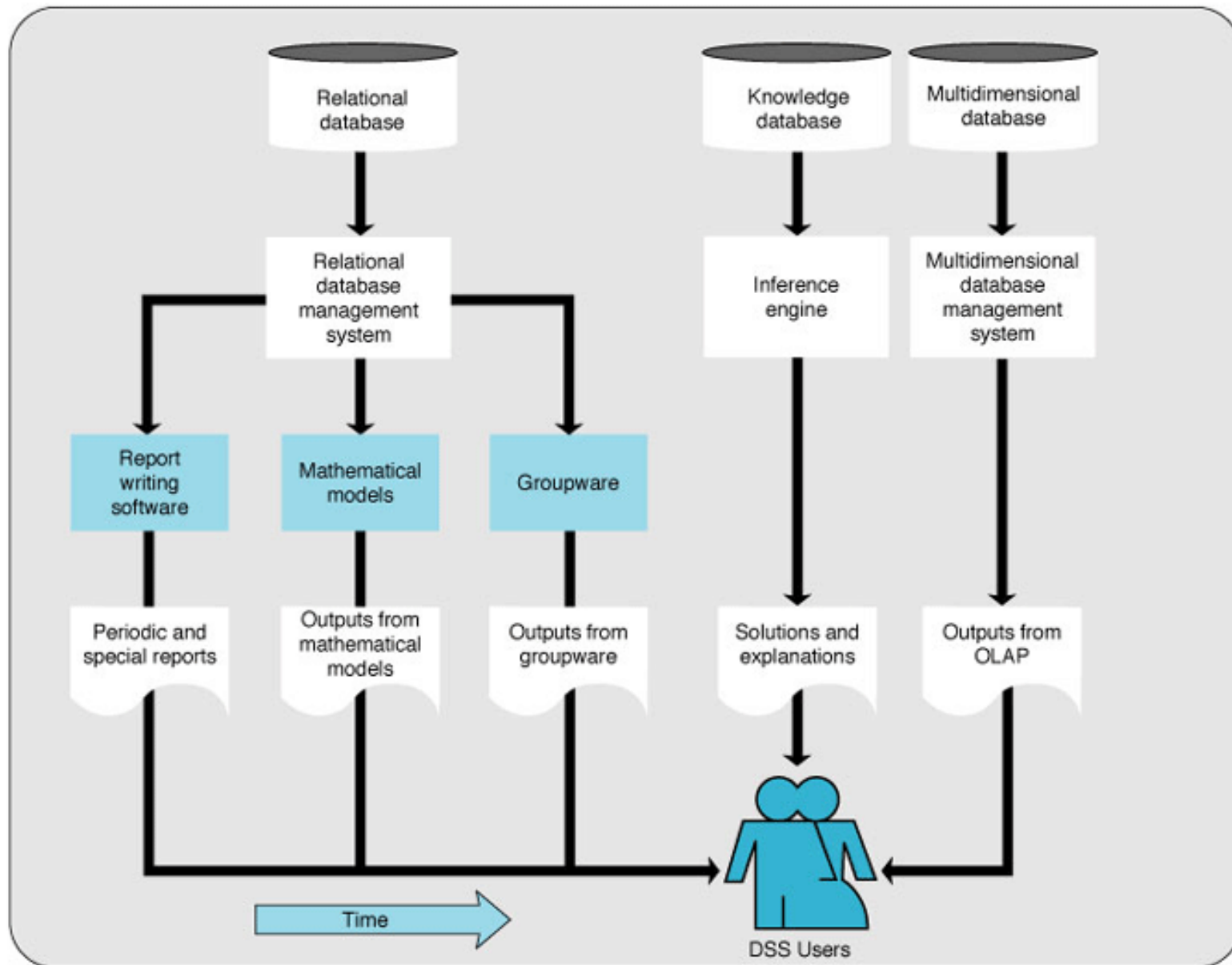
Virtual Office Systems

- **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

Figure 1.10 A DSS Model



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

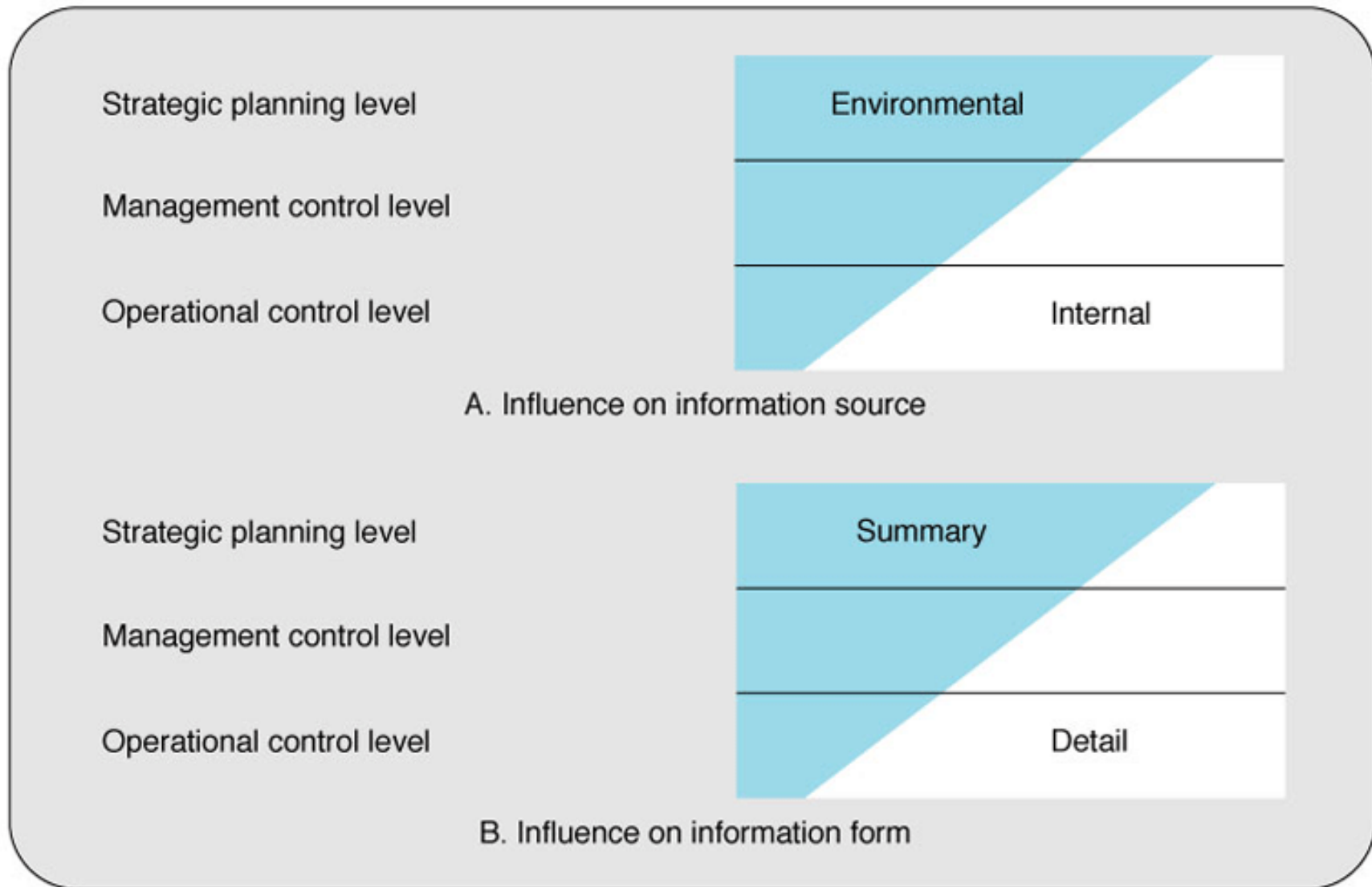
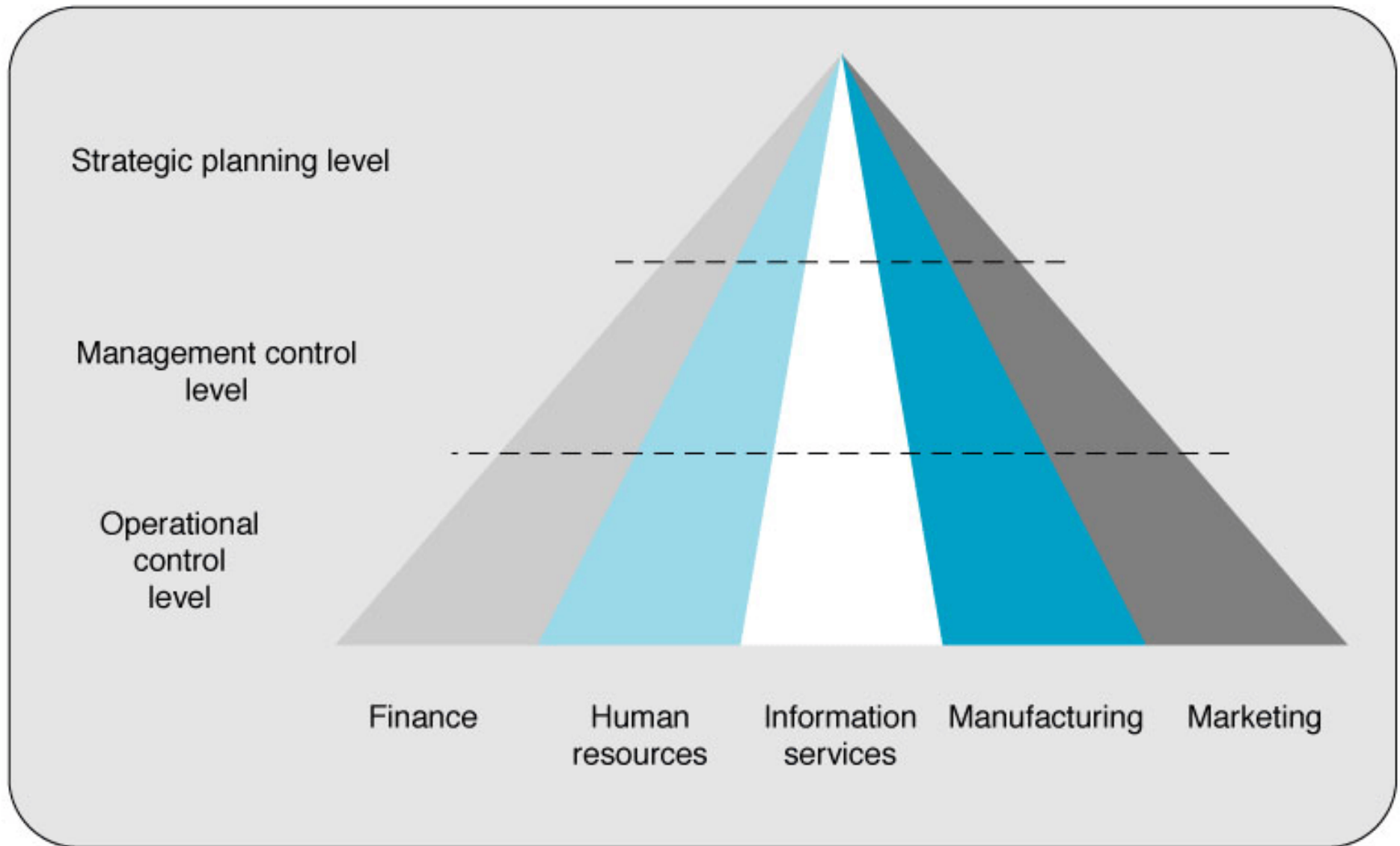


Figure 1.12 Managers Can Be Found on All Levels in All Business Areas of the Firm



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

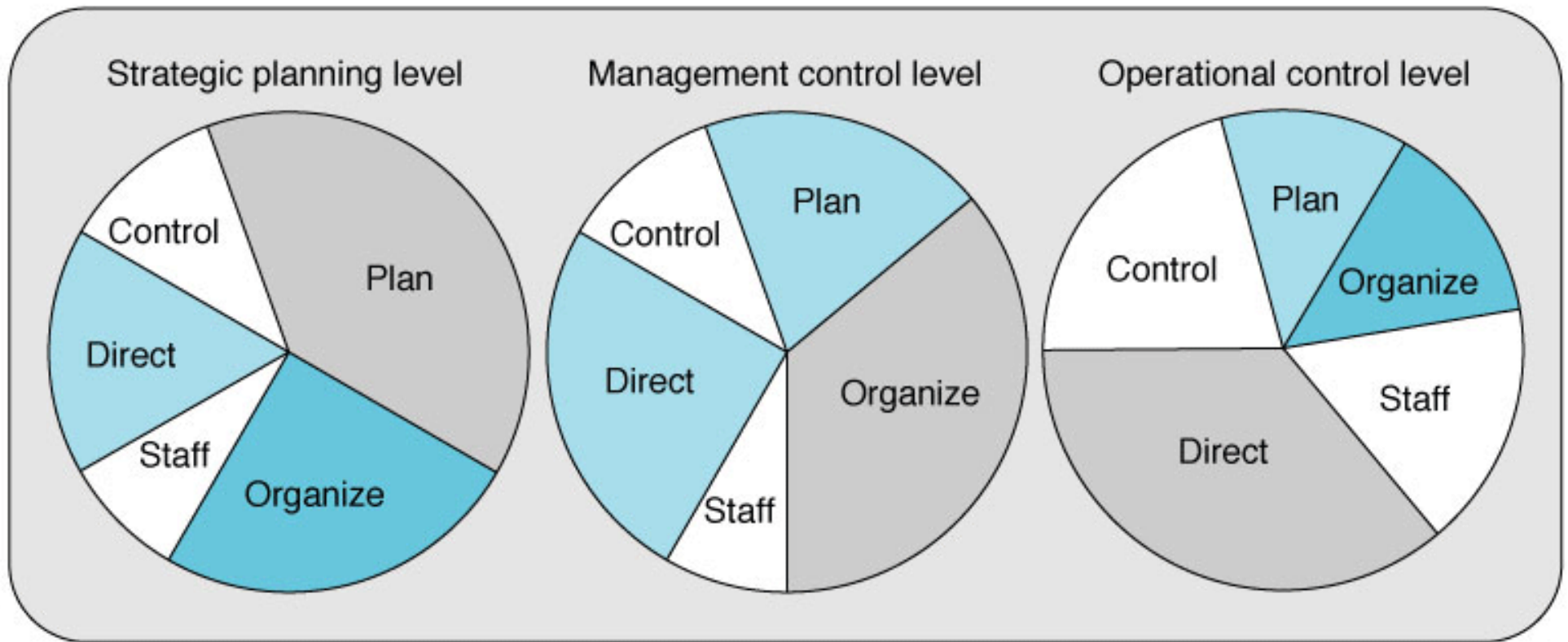


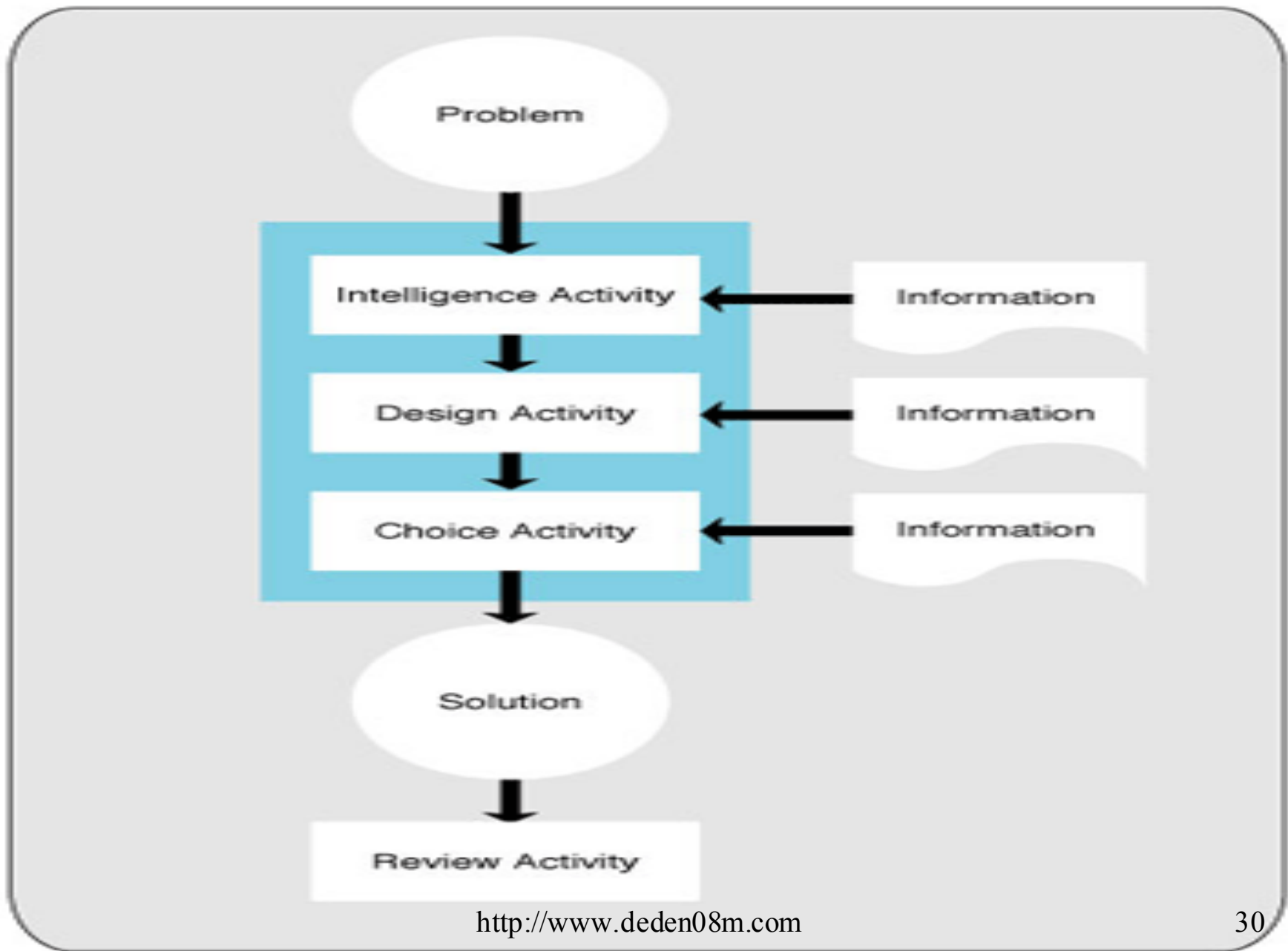
Table 1.1

Mintzberg's Managerial Roles	
INTERPERSONAL ROLES	<p><i>Figurehead</i> The manager performs ceremonial duties, such as giving visiting dignitaries tours of the facilities.</p> <p><i>Leader</i> The manager maintains the unit by hiring and training the staff and providing motivation and encouragement.</p> <p><i>Liaison</i> The manager makes contacts with persons outside the manager's own unit—peers and others in the unit's environment—for the purpose of attending to business matters.</p>
INFORMATIONAL ROLES	<p><i>Monitor</i> The manager constantly looks for information bearing on the performance of the unit. The manager's sensory perceptors scan both the internal activity of the unit and its environment.</p> <p><i>Disseminator</i> The manager passes valuable information along to others in the unit.</p> <p><i>Spokesperson</i> The manager passes valuable information along to those outside the unit—superiors and persons in the environment.</p>
DECISIONAL ROLES	<p><i>Entrepreneur</i> The manager makes rather permanent improvements to the unit, such as changing the organizational structure.</p> <p><i>Disturbance handler</i> The manager reacts to unanticipated events, such as the devaluation of the dollar in a foreign country where the firm has operations.</p> <p><i>Resource allocator</i> The manager controls the purse strings of the unit, determining which subsidiary units get which resources.</p> <p><i>Negotiator</i> The manager resolves disputes both within the unit and between the units and its environment.</p>

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

Figure 1.14 Information Supports Each Problem-Solving Phase

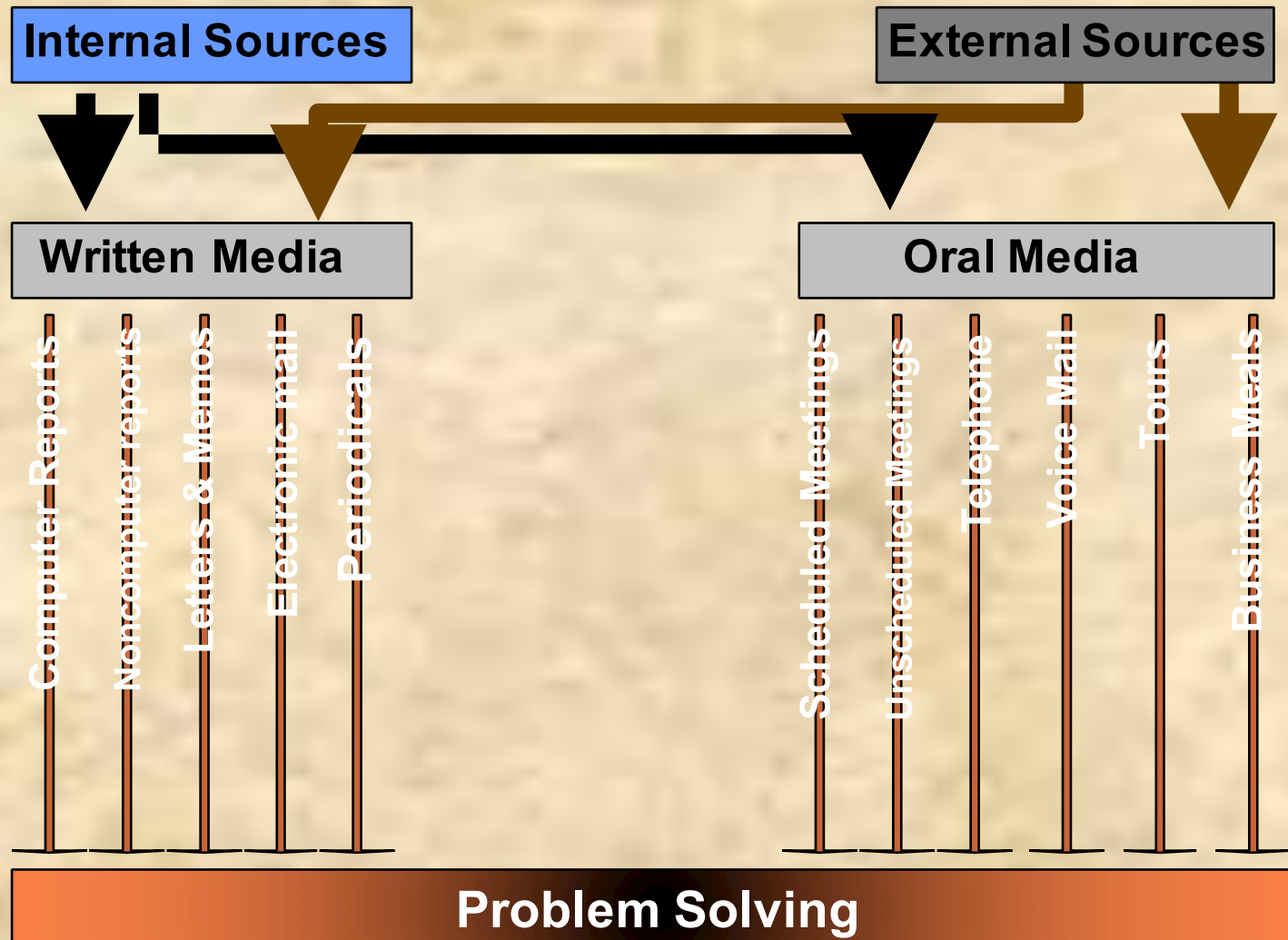


Management Skills

- **Communications**
- **Problem solving**

**How can an
information
specialist help?**

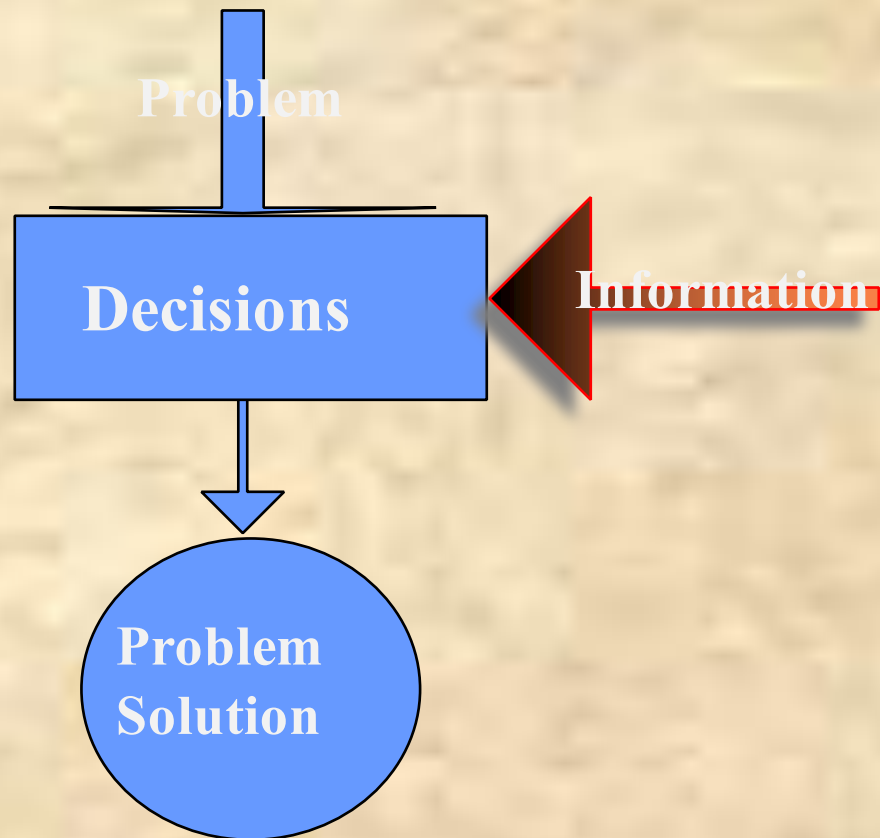
Problem Solving Information Comes in Many Forms



Management Knowledge

- **Computer literacy**
- **Information literacy**
- **What's the difference?**

The CBIS Model



Computer-based Information System (CBIS)

Accounting Information System

Management Information System

Decision Support Systems

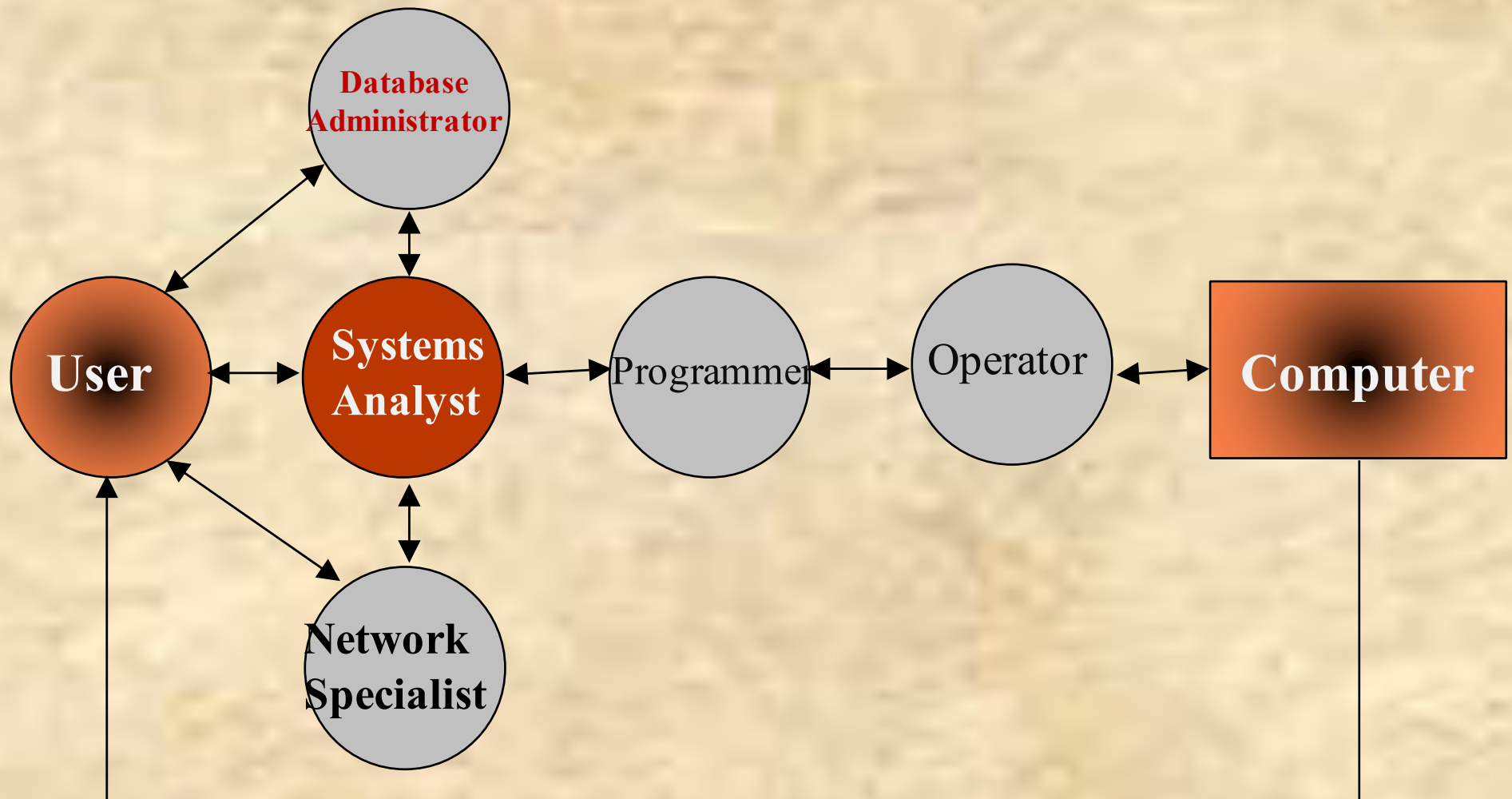
The Virtual Office

Knowledge-based Systems

Information Services

Information specialists have
full-time responsibility for
developing and maintaining
computer-based systems

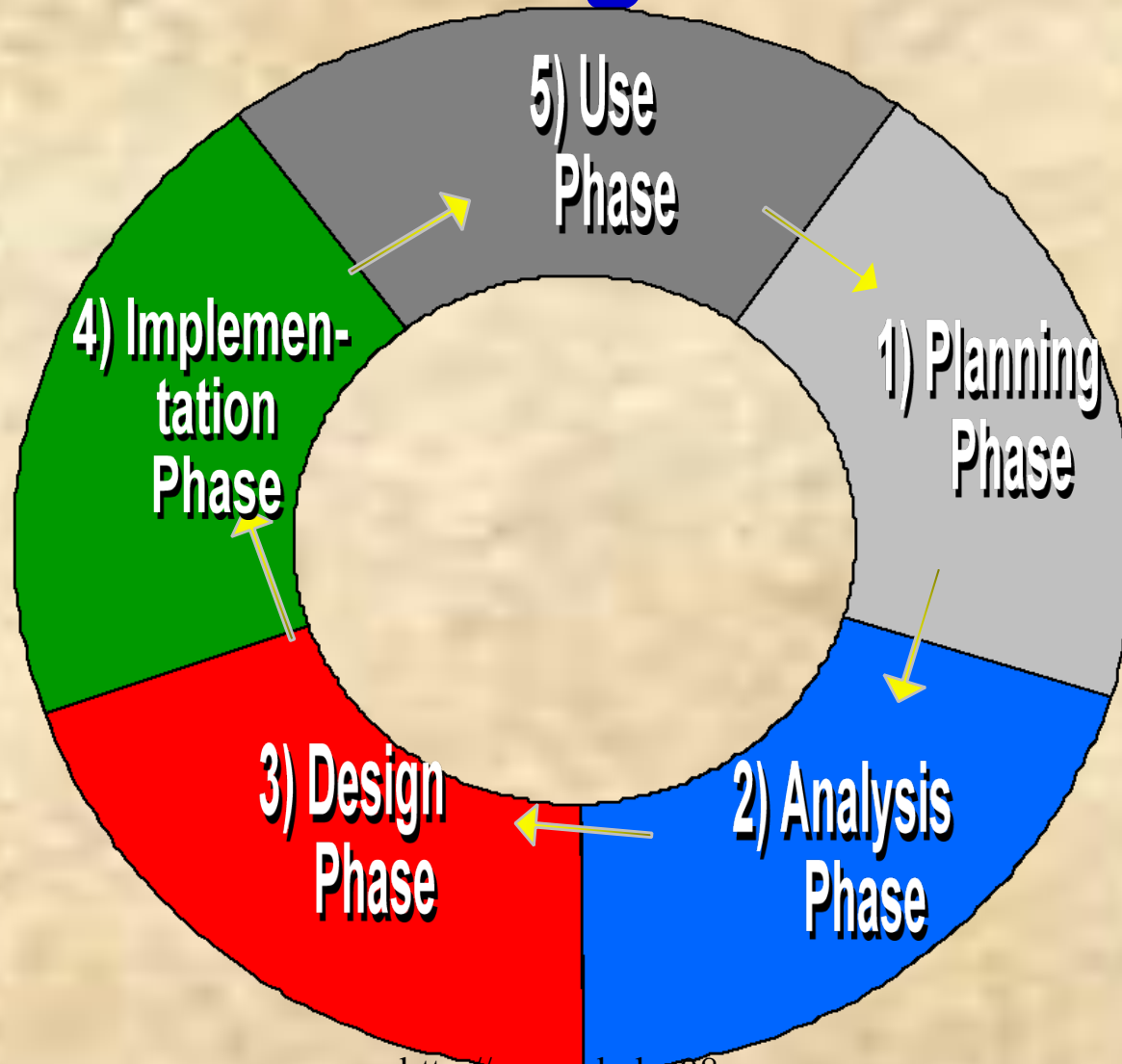
Traditional Communication Chain



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**

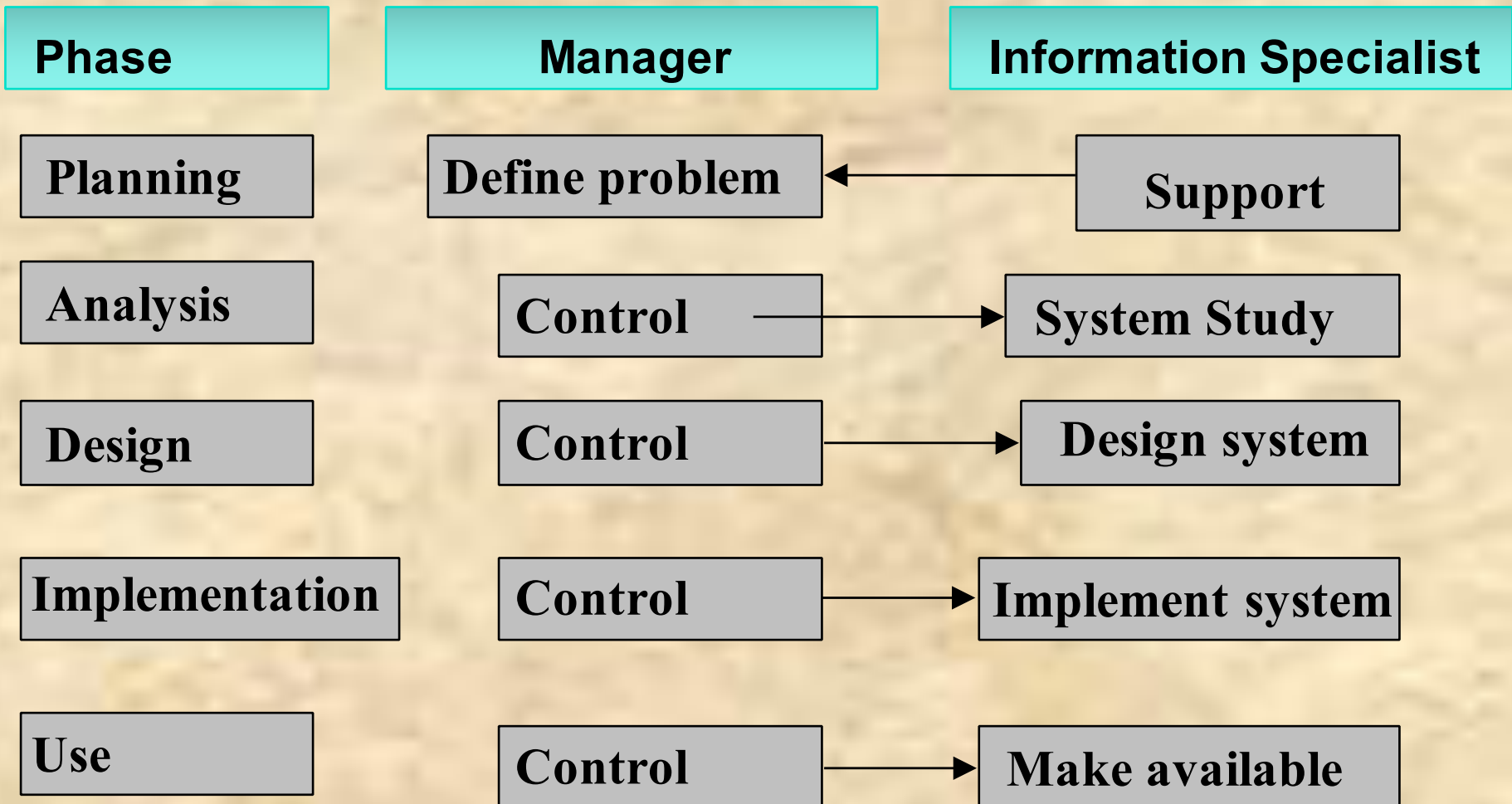
Achieving the CBIS



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



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

END OF CHAPTER 1