**Third Edition**

# MANAGEMENT
# INFORMATION
# SYSTEMS

**Raymond McLeod, Jr.**

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## Third Edition

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The dedication of a computer book to Thomas J. Watson, Jr., president of IBM during its early computer years, would be justified based on that fact alone. I have another, more personal, reason. I was an IBM sales trainee in the San Antonio office when Mr. Watson paid a visit and addressed the employees. He was asked about the progress of a contest to sell punched card machines, and he replied that he "didn't know" about the contest, explaining his concern at the top level with problems of a longer-term nature. At first, I was surprised that this man I so admired didn't know everything. I later came to appreciate the courage that it took to admit a lack of knowledge when it would have been so easy to say "Oh, it's going quite well." That has been one of the important lessons of my life— that when you don't have the answer it is a sign of intelligence, not ignorance, to say "I don't know." I owe that lesson to Mr. Watson.

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# Part One

# INFORMATION MANAGEMENT

Managers have always used information to perform their tasks, so the subject of management information is nothing new. What *is* new is the current availability of better information. The innovation that makes this possible is the electronic computer.

The computer is a relatively new tool, since it became popular only about thirty years ago. It was first applied to business tasks mainly as an accounting tool. More recently, the value of the computer as a producer of management information has been recognized. The term *management information system (MIS)* was coined to describe this new area of computer application. The term MIS was quickly adopted by the business world, although there has been considerable controversy about what it actually means. Originally the term was restricted to systems producing information for managers. Today, the term is generally used to describe the firm's overall computer system. A new term, *decision support system (DSS)*, refers to any computer application that helps the manager make decisions.

More and more firms are using computers to produce information. Computers, even small, inexpensive ones, are capable of generating large volumes of information. These information-producing systems are designed by computer professionals working closely with the persons who are to use the information—the users. In some cases, the users are designing the systems themselves.

The control that the MIS designers have over the firm's information system is called *information management*. This term implies that information is a resource, and it can be managed. The objective of Part One is to introduce the topic of information management.

# Chapter 1

# Introduction to Information Management

## Introduction

This book regards information as one of the basic resources available to the manager—just as valuable as human, material, or financial resources. Information is especially valuable because it *represents* the other, tangible, resources. This representation becomes more important as the scale of operation increases.

The manager of a small newsstand in the lobby of a hotel can manage by observing the tangible ingredients—himself or herself, the merchandise, the cash register, the room, and the customer flow. As the scale increases to a firm with several hundred or several thousand employees, with operations scattered over a wide area, the manager relies less on observation of the physical operation and more on information representing that operation. He or she uses many reports or information displays to reflect the firm's condition. It is easy to imagine the almost complete reliance that the chairman of the board of General Motors or Texaco or Sears must place on information. These executives probably regard information as their most valuable resource.

If information is recognized as a resource, then it follows that information, like other resources, can be managed. The other resources (personnel, money, material, and machines) are acquired and assembled to be available for use when needed. Very often the assembly process entails converting an essentially raw material into a refined form, such as training an employee or constructing a piece of special machinery. Once these resources are assembled, the manager is responsible for using them in the most efficient way. The manager attempts to minimize the amount of time during which resources are idle and to keep them functioning at their highest efficiency. Finally, the manager must replace these resources at a critical time—before inefficiency or obsolescence affects the entire organization.

The management of information as a resource follows the same pattern. The manager is responsible for gathering raw data and processing it into usable information. He or she must assure that appropriate individuals within the organization receive the information in the proper form at the proper time so that it can assist in the management process. And finally, the manager must discard out-of-date, incomplete, or erroneous information and replace it with information that is usable. This activity is called *information management*.

## Importance of Information Management

Interest in information management has increased during recent years—not only in the world of business but in all areas where resources must be managed. Two main reasons account for this: the increasing complexity of the management task and improved decision-making tools.

### Increasing complexity of the management task

Management has always been a difficult task, but it is more so today than ever before. One reason is the sheer *size of organizations*. In addition to an increase in the number of organizations (especially the very small ones), the large ones have grown larger. For example, sales of *Fortune 500* firms increased from $1,219 billion in 1978 to $1,759 billion in 1984, while assets increased from $899 billion to $1,409 billion. These increases were accomplished with a reduction in the number of employees from 15.8 million to 14.2 million. Similar reductions in the labor force were felt throughout U.S. industry during the early eighties as firms

turned increasingly to automation and felt the effects of recession and inflation. *Economic influences* contribute to the complexity of management.

Another factor is the *increasing complexity of technology* employed within the organization. The effort to keep pace with technology must be continuous. It is possible today to buy a pocket calculator more powerful than one of the first room-sized computers—and at a fraction of the cost. Fifteen years ago, only large firms could afford to purchase or lease computers. Today computer technology is more readily available. The lack of a computer with sufficient power and capacity is no longer a deterrent to solving a problem. More likely, the deterrent will be the difficulty of formulating a solution in terms of instructions that the computer can follow. Today, managers throughout many companies can access a central computer through typewriterlike terminals in their offices. In some companies, managers have small computers by their desks, as in Figure 1-1. Very often, these



**Figure 1-1**  Many managers have computing equipment in their offices.

small computers are linked to a central computer to form an integrated problem-solving network. The computer is not the only example of increasing technological complexity. Increasing mechanization is occurring in almost every part of the firm; examples include factory robots and automated merchandise storage and movement.

In addition to this increase in the scale and complexity of operations, the manager's *time frame* for action is shrinking. Managers must act quickly in response to pressures from customers, competition, and stockholders. The entire span of business operations is moving more rapidly today than ever before; sales representatives cover their territories by jet, sales orders arrive at headquarters by satellite transmission, and filled orders are shipped the same day.

This desire to operate in the most efficient manner has been strengthened by the increasing competition for the consumer's dollar. *Competitive pressure* is applied not only by firms headquartered within the firm's own country, but in other countries as well. This effect of international competition is most clearly seen in the U.S. steel industry where a 6.2 cent loss was recorded in 1982 for each sales dollar. This compares to a 5 cent profit in 1975 before imports from other countries, notably Japan, began to take their toll.

Not all environmental pressures favor production; some, ironically, favor *non*production. This is true in the case of products and services that society, or some part of it, finds undesirable. Thus, *social pressure* adds another dimension to the task of business decision making. Decisions must be based on economic factors, but social costs and payoffs must be considered as well. Plant expansion, new products, new sales outlets, and similar actions affecting the local and national community must all be weighed in terms of their short- and long-term impacts.

All of these factors—organization size, economic influences, technology complexity, shrinking time frames, and competitive and social pressure—influence the management task.

## Availability of decision-making tools

Even as the manager's task has become more complex, there has been a movement under way to improve the effectiveness of decision making. Central to this movement are quantitative techniques and electronic devices such as computers. During the 1950s, efforts to solve business problems with advanced mathematics were called *operations research (OR)*. These efforts were usually designed to solve manufacturing problems. During the 1960s, the term *management science* became popular, as quantitative methods were applied on a broader scale—in finance and marketing, for example. The increasing popularity of the computer in the late sixties and seventies led to attempts to harness the power of this electronic giant for mathematical computations. Terms such as *management information system (MIS)* and *decision support system (DSS)* represent currently popular means of assisting the manager with computer-produced information. MIS refers to the overall application of the computer in a firm, with the emphasis on supporting management's information needs. DSS refers to efforts applied in a more focused way—on a particular problem faced by a particular manager.

## The Modern Manager

A manager is anyone who is responsible for directing the use of any types of resources. The resources can be personnel, equipment, money, or even information. Such a broad definition involves many people that are not ordinarily regarded as managers—pastors, band directors, senators, football coaches, and so on.

### Where managers are found

Managers can be found practically everywhere, but it is important to recognize that they exist on various levels within an organization. Managers at the top, such as the president and vice presidents, are often called *executives*. The top level has been referred to as the *strategic planning level*, recognizing the impact that decisions have on the entire organization for years to come. Middle-level managers include regional managers, product directors, and division heads. Their level has been called the *management control level*, recognizing the responsibility to put plans into action and to ensure that goals are met. Lower-level managers include department heads, supervisors, and group leaders, and are responsible for accomplishing the plans and tactics specified by managers on upper levels. The lower level has been called the *operational control level* in recognition of the fact that it is where the operations of the organization occur.

In addition to these organizational levels, managers can be found in various *functional areas* such as marketing, manufacturing, finance, and personnel. Some of the names of the functional areas are unique to particular industries, whereas some names are universally applied. For example, you would find an underwriting division only in an insurance company, but you could find a personnel department in any organization. Figure 1-2 illustrates how managers can be grouped by level and functional area in a manufacturing firm.

### What managers do

It is important to recognize both differences and similarities that exist between the various levels of management and functional areas. Some managers perform well on one level, but not on others. The same can be said for the functional areas. A good accounting department head might fail miserably as a sales department head. Even in light of the obvious differences, it is generally agreed that all managers perform the same functions or play the same roles. It has long been recognized that *management functions* include planning, organizing, staffing, directing, and controlling. All managers perform these functions to some degree, although perhaps with varying emphasis. More recently the idea of *managerial roles* has become popular—viewing the manager's duties in major categories such as interpersonal, informational, and decisional.

Even though managers have been performing their functions and playing their roles for many years, there is more and better support today than ever before. Modern managers utilize the available tools and procedures to increase their
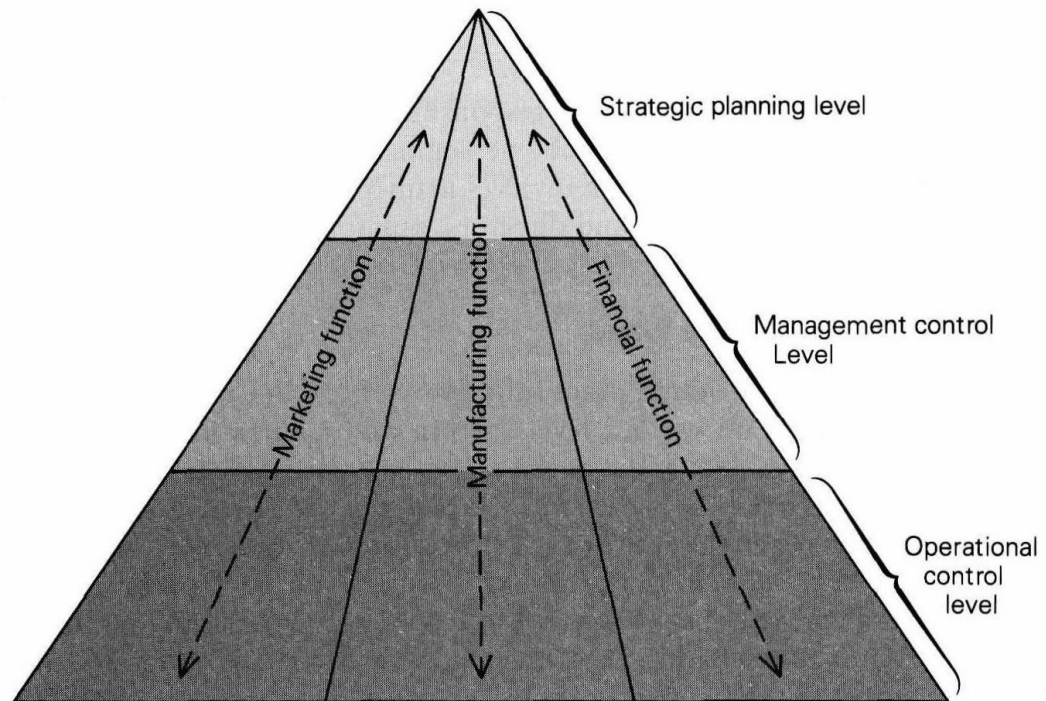
**Figure 1-2**  Managers can be found on all levels and in all functional areas of the organization.

effectiveness and likelihood of success. The tools and procedures combine with basic management skills to achieve levels of performance that were impossible only a few years ago. For example, a modern manager can use the computer as a tool to transmit messages electronically throughout the organization; such a procedure was not feasible for the manager of the sixties or even seventies.

## Management Skills

It would be possible to list many skills that a successful manager should possess, but two stand out as being basic— decision making and communications. Managers on all levels and in all functional areas must decide on strategies, tactics, and operations, and they must communicate with persons reporting to them, to other managers, and to persons outside the organization.

If the idea of computer-based decision support can be criticized as having a fundamental weakness, it is perhaps the overemphasis on decision making. Managers do things in addition to making decisions. If records were kept of how managers spend their time, the time spent actually making decisions would be quite small, whereas the time spent in gathering information from many types of communications would be quite large.

### Communications

Managers receive and transmit information orally and in writing. *Oral communications* include conversations that occur during meetings, while touring facili-

ties, when someone unexpectedly walks into the manager's office, and on the telephone. The scene for oral communications can also involve business lunches, social events, and conventions. *Written communications* include reports prepared by computer and by other means, memos, letters, and periodicals. Figure 1-3 shows the manager receiving information by means of these media and using the
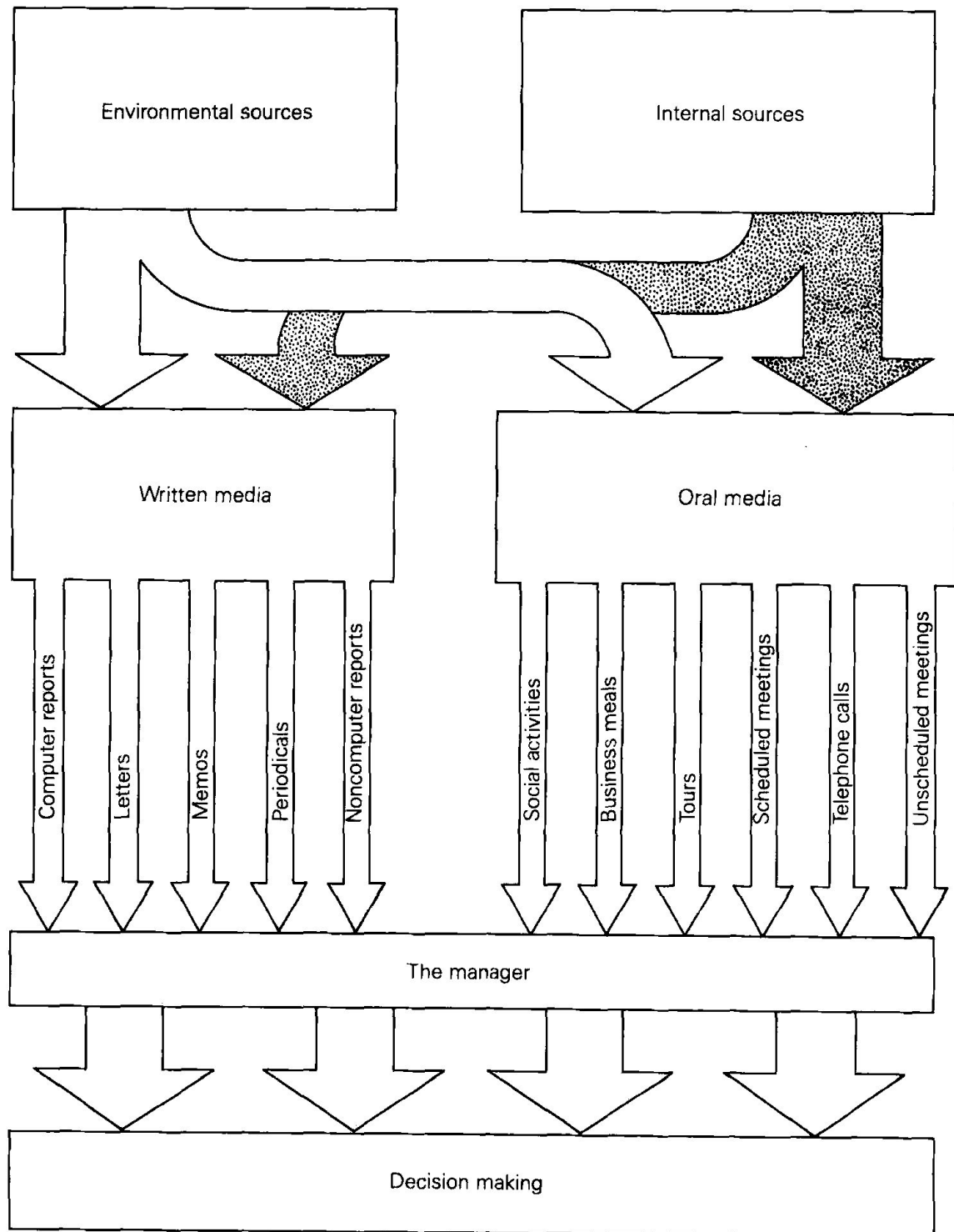


**Figure 1-3** The manager receives oral and written information from sources outside and inside the firm for use in decision making.