



INTRODUCTION TO MANAGEMENT INFORMATION SYSTEMS

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Preface

It is now generally recognized that future significant gains in productivity in business will have to come from new ways of managing people. The electronic computer and new organizational forms will play important roles in the new managerial styles. The most apparent change that will be observed, however, will be the new managers trained to "think systems."

Management systems will become the foundations for coordinated group effort. Individual contributors and new managers will share increased responsibilities based upon their technical competences. For individuals, increased information means greater control over their jobs. For managers, competency in conceptualization of systems and strategies will replace political skills as the basis for holding a position.

The development of management information systems has continued and spread inexorably despite a flood of articles denying the present existence or future possibility of the MIS. The purpose of this text is (a) to relate the systems approach and information systems to the functions of managing, and (b) to demonstrate the process of designing an MIS. It is intended as a text in a first course in managing with MIS. Therefore, it is suitable for a general management program, computer science majors, accounting majors, or public administration majors. As an introductory text, it is a practical approach. A subsequent course would provide more theory and more case studies.

The authors wish to express their appreciation to the many companies that supplied exhibits and assistance to make this book more relevant. Mr. Paul M. Peterson, Vice-president of Administration, STP, Inc.; Mr. Paul A. Strassman, Xerox Corp.; Mr. James Roberts, Assistant Manager of MIS, Motorola, Inc.; and Dr. Robert E. Markland, U. of Missouri provided us with special assistance.

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vi Preface

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R. G. Murdick

J. E. Ross

Contents

Preface	v
1 The Meaning and Role of MIS	1
2 Management, Information, and the Systems Approach (Part 1)	19
3 Management, Information, and the Systems Approach (Part 2)	37
4 Information Systems for Functional Operations	65
5 What the Manager Should Know About MIS Hardware	91
6 Planning for MIS Development	119
7 MIS Design: Developing the Gross Design	143

8	MIS Design: Detailed System Design	181
9	Implementation and Evaluation of the New MIS	217
appendix	Systems Design Techniques	243
case	International Medical Instruments, Inc.	279
	Selected References	319
	Index	325

chapter one

The Meaning and Role of MIS

CHAPTER 1 explains basic terms for a management information system (MIS), shows simple examples, and outlines the general process of developing an MIS.

When you have finished studying

THE MEANING AND ROLE OF MIS

you should be able to

1. Explain the meaning of a *system* in your own words
2. Explain what is meant by an *operating system* within a company
3. Explain in your own words the meaning of *management information system*
4. List the principal steps in MIS development
5. Tell how the MIS organization fits within the company.

The manager of the 1980s will require more prompt and selective information than ever before to deal with complexity and change. Supplying such information is what the management information system is all about.

THE AGE OF SYSTEMS

INTERRELATEDNESS OF COMPONENTS OF SOCIETY

The Industrial Revolution, starting in the 1700s, brought about the mechanization of production in large-scale factories. Large business organizations arose. People, business, government, and national resources all became interdependent. Automation of information processing has paralleled automation of manufacturing. This present late 20th century period might well be called the Age of Systems.

We are concerned with systems that we can control for the good of humankind such as

- National transportation system
- National water system
- World ecological system
- National political system
- World and national health systems
- Organization systems (including business organizations)

WHAT IS A SYSTEM?

A system is essentially a group of things that are interrelated to accomplish some purpose. The fact that businesses, in particular, have become so complex has required us to operate them as systems, not just by segments such as selling, accounting, manufacturing, etc. This book is directed toward the development of *management information systems* (MIS), which make it possible to manage all types of complex systems

3 The Meaning and Role of MIS

such as businesses, government agencies, or service organizations such as hospitals.

WHAT IS INFORMATION?

Since business systems are based on information flow, information must be defined at this point. If we consider reports that are stored in files, or technical symbols and reports that are meaningless to the reader, or reports whose contents have not been organized in a meaningful way, we are dealing with *data*. *Information* is differentiated from data because it is tables, text symbols, or inputs that are meaningful, is being used by a person, and *is affecting the behavior* of the user.

THE MANAGER OF TOMORROW

SAME RESOURCES

The business manager of tomorrow will be working with the same basic resources as the manager of today—people, money, materials, machines.

NEW TECHNOLOGY

Changes in physical systems such as the factory production system, the physical distribution system, the data processing system, or the engineering development and test system are occurring rapidly with the accelerating progress in technology. The manager of tomorrow will live and work in a push-button world of color video surrounded by automatically controlled physical operations. He will be able to pick up the phone at home and ask questions of a distant computer.

GREATEST CHANGE —THE SYSTEMS VIEW

The really great change in managing, however, will be the change in the way we look at all organization and physical operations. This change will be in the development of system concepts. That is, all aspects of the total business, including people, their activities, the physical parts of the business, suppliers, customers, government, and the public will be integrated by management far beyond today's primitive level.

Why will such great changes in the conceptual framework of busi-

Time was when the data processing manager ran a computer department which sometimes amounted to an extension of the accounting department. Payroll checks, financial statements and general ledger work were the order of the day.

But times have changed. Businessmen no longer look at the computer as a super-adding machine, spewing out just basic financial data. They look to it as an information tool for the entire company, providing tighter control over their assets.

Ted Garvey of IBM explains: "We stress the need for management involvement in the creation of an information system plan, which is also an integral part of the business plan."

Source: "The Changing Role of the DP Manager," International Business Machines Corp.

ness occur? How will managers be able to handle the increasing complexity of business? Why will the manager be able to make better decisions that will lead to better total business system results? The answer is that the information utilized by the manager will be of far better quality, more timely, more selective, and more available. The “better quality” means that the information will be more nearly complete, more reliable, and processed to be available in many arrangements. The manager will be able to think rapidly through many approaches and solutions to complex problems because of such information. Providing this information will be a system of scanning the environment, an internal data bank and model bank, and computers beyond the imagination of old-time managers.

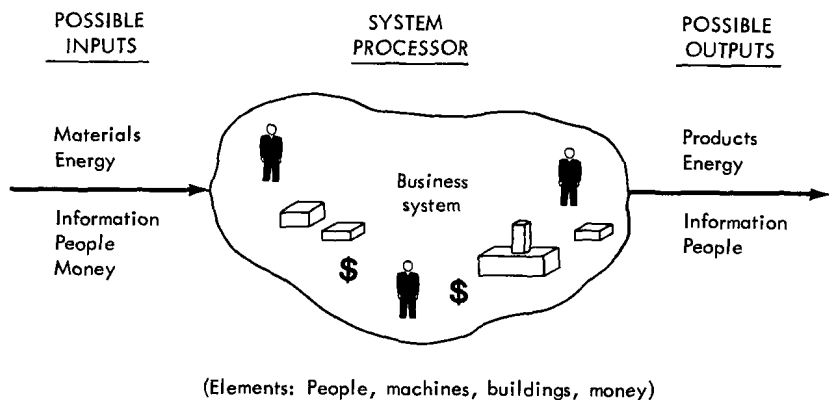
A FURTHER EXPLANATION OF SYSTEM

MORE ABOUT
WHAT A
SYSTEM IS

Very simply, a system is a set of elements, such as people and things, that are related to achieve mutual goals. Systems that we deal with have inputs from the environment and send outputs into the environment. The system itself is a *processor* that changes inputs into outputs. Figure 1-1 summarizes this. What we cannot show in Figure 1-1 without making it unreadable is the network of communications among system elements, i.e., the information systems.

We may now show the essentials of the system for a number of managed institutions to make the meaning of *system* clearer. We have tabulated these essentials in Figure 1-2. In the case of a business firm, remember that goals vary from producing or selling products to generating consulting reports to training people for careers. We have given the example of a manufacturing firm in Figure 1-2.

Figure 1-1 The system as a processor.



5 The Meaning and Role of MIS

<i>System</i>	<i>Basic Goals</i>	<i>Elements</i>	<i>Inputs</i>	<i>Outputs</i>
1. Department store	Provide the right goods at the right time	People, buildings, machines, money	Purchased goods, money, energy, information	Goods, services, information
2. Bank	Store money for customers, provide loans, trust services, checking services, and credit	People, buildings, machines, money	Money, information, energy	Money, services, information
3. Management consulting firm	Provide advice to customers	People, buildings, machines	Information, money, energy	Reports, services
4. University	Generate and disseminate information, develop leaders, provide community services	People, buildings, machines	People, money, information, energy	People, information, services
5. Electric utility	Provide energy in the form of electricity	People, buildings, machines	Energy, information	Energy in the form of electricity
6. Hospital	Provide health care, conduct research, teach doctors and nurses	People, buildings, machines	People, materials, energy, money, information	People, bodies, reports, services

Figure 1-2 Some systems and their basic characteristics.

OPERATING INFORMATION SYSTEMS

INFORMATION FOR OPERATIONS

For a system to accomplish its goals, there must be communication among its elements. In business, the communication systems that are developed to make the basic operations of the company possible are called *operating* information systems.

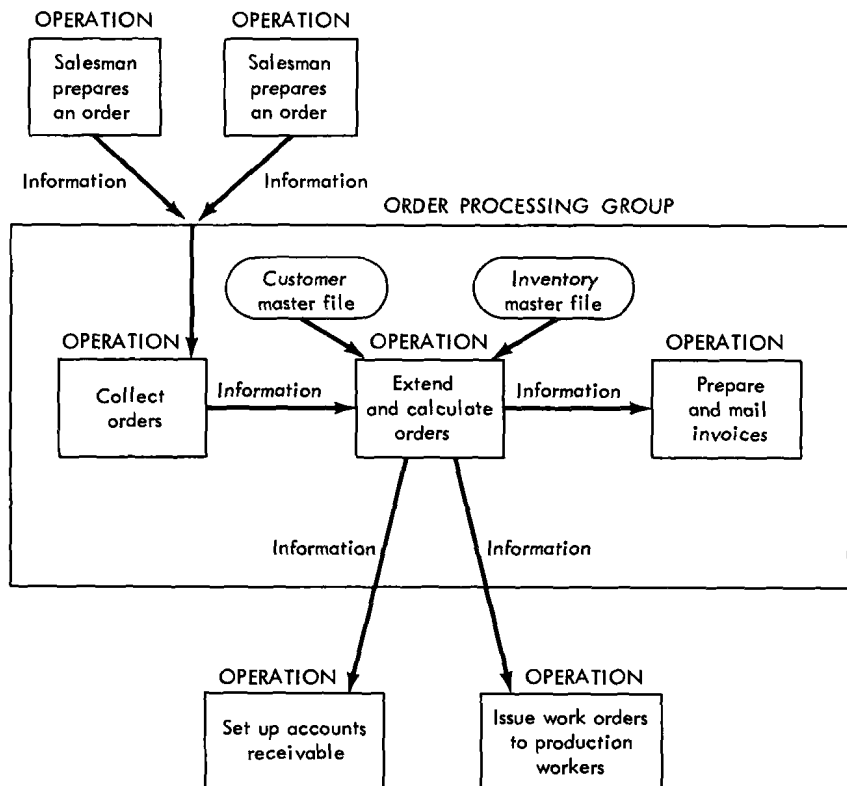
For example, in a manufacturing system, there must be an information system for planning and control of day-to-day production. In the order processing system, forms, communication channels, and procedures must be set up to accept orders for products that the company sells.

In Figure 1-3, we have shown a very simplified version of an order processing operation. We have described the system as a set of operations performed by people and the information system that relates to the operation. Let's see how this works:

6 Chapter One

<i>Operation</i>	<i>Input Flow of Information</i>	<i>Output Flow of Information</i>
1. Collect orders from all salesmen and put on standard forms	Order forms, telegrams, phone calls giving customers' orders	Customers' orders on standard form
2. Extend and calculate orders after checking discounts and availability of products	Discounts allowed per units available per inventory master file customers' orders	Prices, discounts, net prices, and units available and to be shipped for each order
3. Prepare and mail invoices	Prices, discounts, net prices, and units to be shipped to each customer shown on a standard form	Invoice to customer on a standard form to bill him for his order

Figure 1-3 Order processing and information flow.



7 The Meaning and Role of MIS

In Figure 1-3, we have shown a flow of information *into* the system (orders from salesmen) and a flow of information *out* of the system (billings for accounts receivable and items ordered and to be shipped). We can draw a box around the system to separate the system from operations outside the order processing system.

In summary, we have shown a set of related operations and the operating information system. In the next few paragraphs, we shall show how the *management* information system differs from the operating information system.

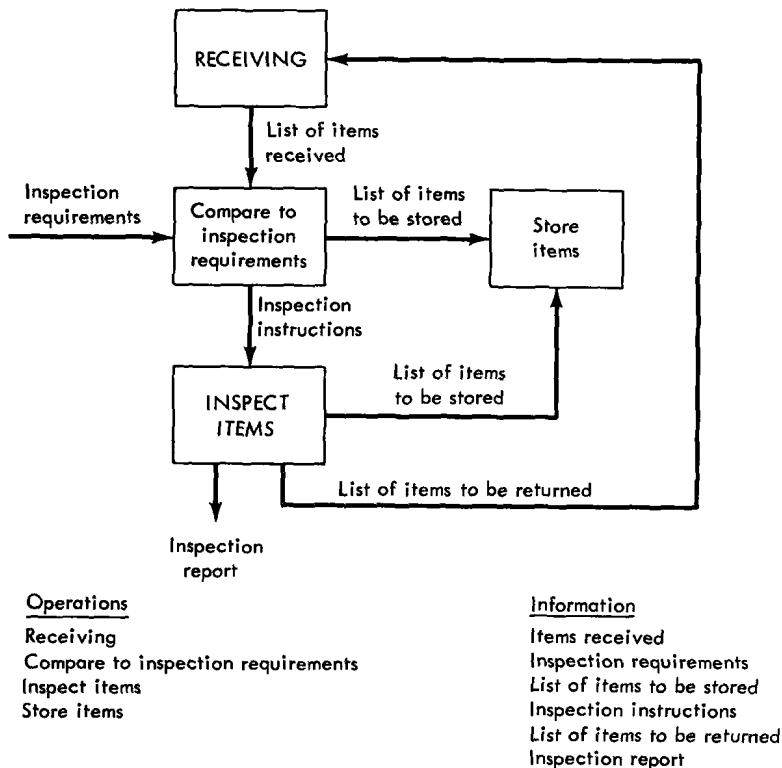
In Figure 1-4, we present a simple inspection control system for items purchased. The operations and information flows are listed.

THE MANAGEMENT INFORMATION SYSTEM (MIS)

MANAGERS PLAN,
CONTROL, MAKE
DECISIONS FOR
THE LONG TERM

Managers have always had the responsibility for solving the larger and the unusual problems of the company. Managers are concerned with planning, controlling, and decision making on a broader scale than people engaged in elemental activities of the company. For example, plan-

Figure 1-4 Purchase inspection information system.



ning for production resources for one year up to five years ahead is vastly different from planning the arrangement of materials and the operation of a lathe for the next four hours.

In the past, managers sought information from miscellaneous—haphazard—sources and processed the information on a personal basis. Too often they failed to ask for information concerning the impact of a decision in one area on other areas of the company.

Three changes are now occurring in progressive companies:

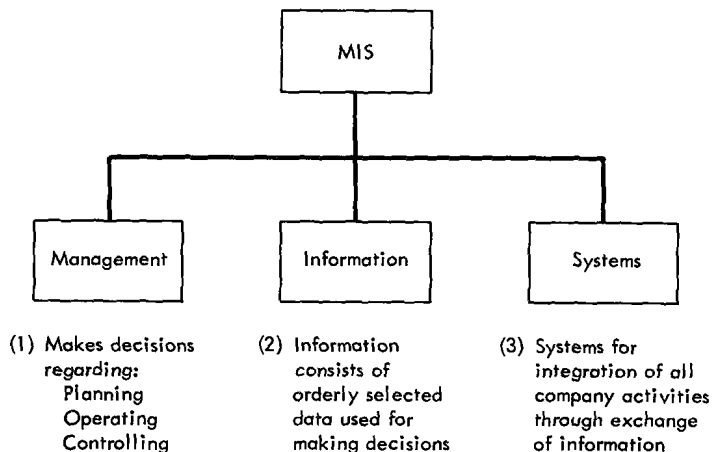
MIS: Managers
Need
Information
About the
Business System

1. *Management* has become system-oriented and more sophisticated in management techniques.
2. *Information* is planned for and made available to managers as needed.
3. A *system* of information ties planning and control by managers to operational systems of implementation.

The combined result of these concepts is the management information system (MIS). The purpose of an MIS is to raise the process of managing from the level of piecemeal spotty information, intuitive guesswork, and isolated problem solving to the level of systems insights, systems information, sophisticated data processing, and systems problem solving. Managers have always had “sources” of information; the MIS provides a *system* of information. It thus is a powerful method for aiding managers in solving problems and making decisions. In Figure 1-5 we have presented *the basic meaning of an MIS*.

As shown in Figure 1-5, the MIS has the purpose of assisting *managers* to make decisions. While all workers make decisions, managers’ decisions are concerned with planning for, directing, and controlling work groups. They make decisions on longer-term and broader-scale issues than

Figure 1-5 The basic meaning of an MIS.



9 The Meaning and Role of MIS

the individual machine operator, clerk, technician, professional, or staff consultant.

The Three
Components
of MIS

Second, the MIS has the purpose of providing *selected* data, i.e., information, to managers at a time when they are useful in aiding the managers to make decisions. In fact, parts of the MIS may be designed to *provide* decisions for repetitive classes of problems.

Third, the MIS provides information to all managers so that all company activities may be tied together to operate the company as a *system*.

MIS: Managerial
Part of the
Total Business
Information

How is the MIS related to operating information systems? The operating information systems are concerned with the transactions necessary to conduct the daily affairs of the business. The MIS is connected to the operating information system but does not monitor every transaction or detail. Rather, the MIS is *for managers*. It passes on summary (consolidated) information, selective reports for planning and control of operations, and exceptional circumstance reports for planning, controlling, and decision making appropriate to each level of management (Figure 1-6).

MIS: Selective
Information
for Managers

EXAMPLE OF AN MIS

Decision
Information
Flow at
Ralston
Purina

The Ralston Purina Company produces pet foods and foods for people. The entire marketing, planning, and budgeting process at the Consumer Products Group of Ralston Purina takes place each year in the spring and summer. This group developed an MIS that processes raw *data* into reports containing meaningful *information*. With this information provided, managers at the division level and group level find out how different promotional budgets and product recipes will affect profits and cash flow.

Inputs to the MIS consist of data on proposed new products and sales, which go into the brand accrual models shown in Figure 1-7.

The output of the brand accrual models consists of the monthly sales volume for each product and brand for the year ahead. Also costs and dollar sales are computed by the mathematical formulas of the model when it is stored in the computer. Next the computer consolidates the data for each brand into a projected earnings statement for product managers to evaluate.

The data on all the brands in a single division are combined, and selected information is prepared in the form of reports for the division manager.

Data Are
Combined into
Summary
Information

Finally, the assumptions and consequences developed by all the division managers are brought together for the Consumer Products Group manager.

Even at this stage of our book, it is evident that managers may be greatly aided by a *system of information* that relates marketing, produc-

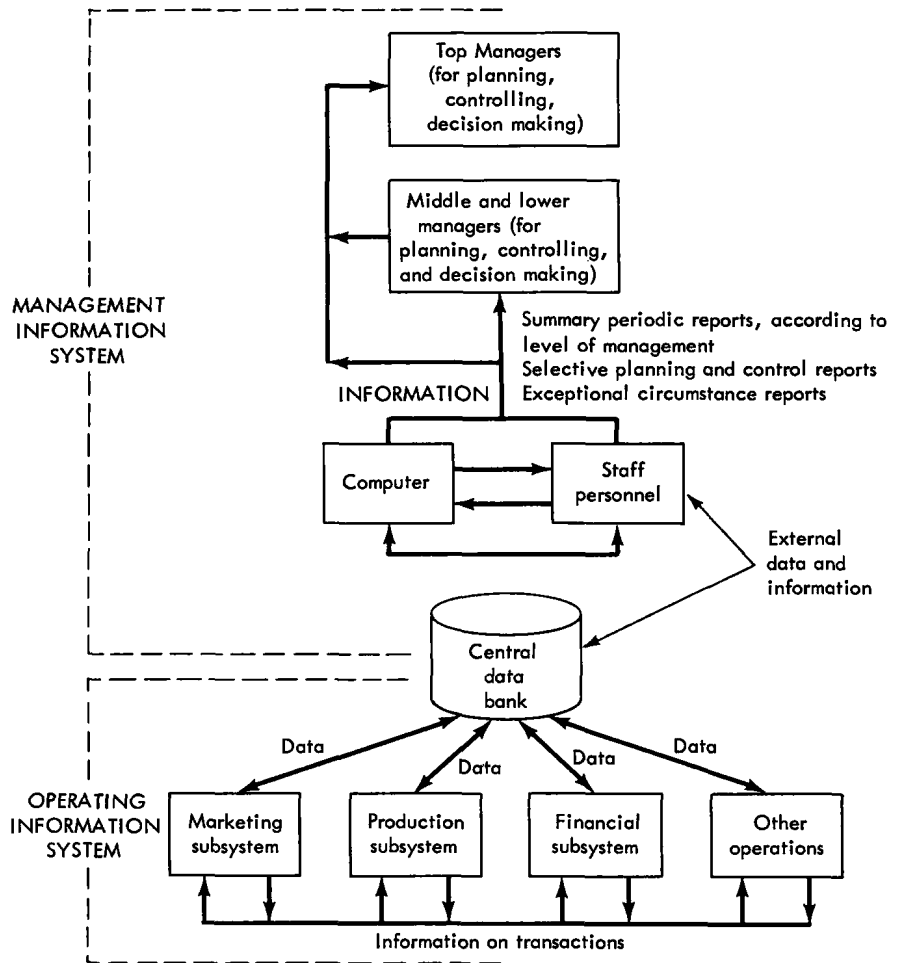


Figure 1-6 MIS related to operating information systems.

tion, and manufacturing information data by means of mathematical formulas (models), computer computations, and computer-developed reports. Such an MIS provides relevant information on alternative plans and permits managers to ask the question, "What will happen if I do this . . . or that?"

THE PROCESS OF MIS DEVELOPMENT

BASIC STEPS IN DEVELOPING THE MIS

This book consists of two major parts. One part is devoted to explaining the ideas related to an MIS. The other part is devoted to instructing you how to develop and implement an MIS. The basic steps in developing an MIS, as seen from the manager's viewpoint, are shown in the table on page 11.