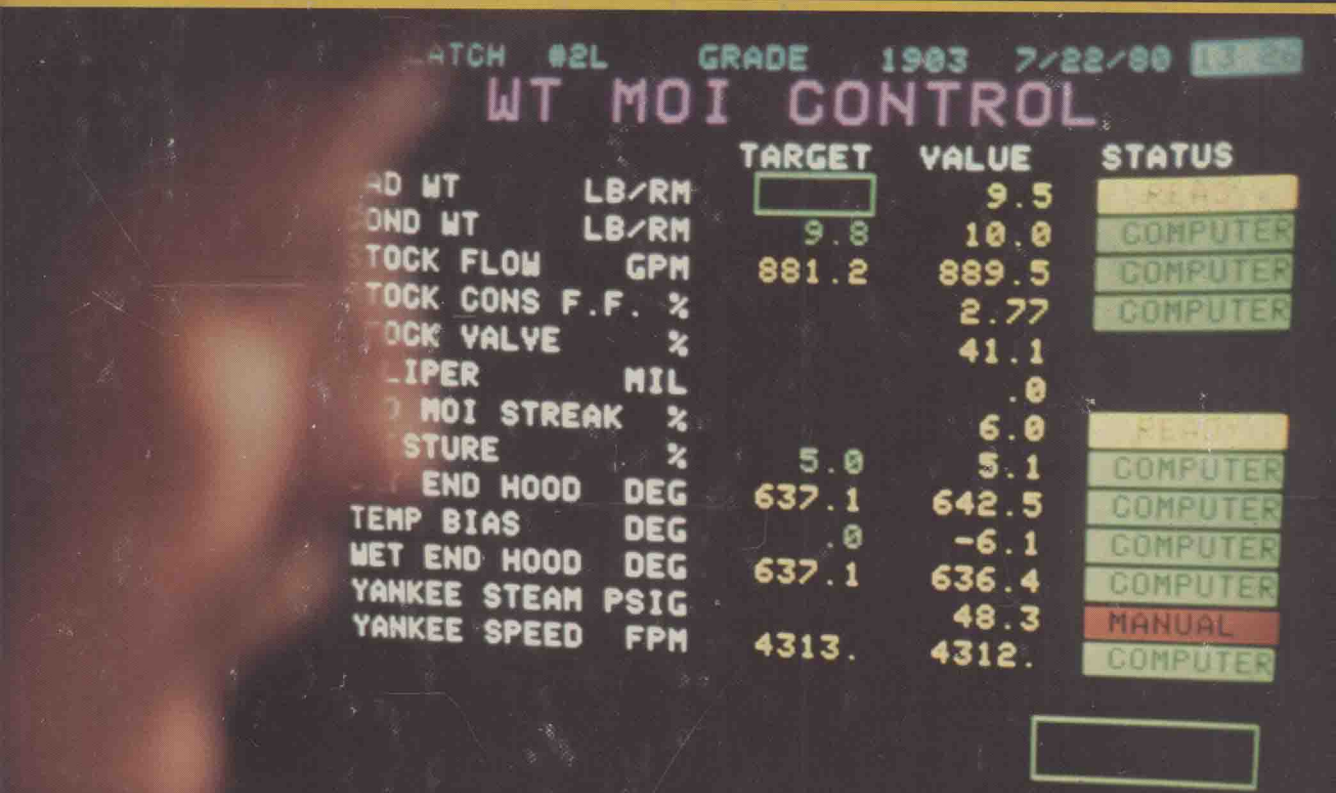
INFORMATION SYSTEMS IN MANAGEMENT



Second Edition

JAMES A. SENN

INFORMATION SYSTEMS IN MANAGEMENT

SECOND EDITION

James A. Senn
State University of New York, Binghamton

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INFORMATION SYSTEMS IN MANAGEMENT

PREFACE

TO THE STUDENT

Being able to process data and use information effectively is vital to business and government organizations. Without the capability to process data about sales, inventories, income, taxes, and the like, it would be impossible for a business to exist very long. Similarly, if government organizations could not obtain information about citizens and the effect of programs, regulations, and laws on citizens, they would quickly cease to function. Because data and information are so important to organizations, any improvement in the way they are handled is going to improve both the organization and the services it provides.

The most significant improvement associated with data and information in the twentieth century has been the introduction of the electronic computer. Computer-based processing systems were first introduced into business and government organizations in the 1950s. Since then, their use in all types of organizations and commercial enterprises has grown at an astounding rate. As a result, there is hardly an individual in the United States today who is unaffected by computer systems and the data and information they process.

In this book, you will see how data and information are used in organizations and how they are processed by modern computer systems. You probably have many questions about information and data processing. We will be looking at answers to many of them: What is data processing? What is information processing? What is a computer system and how does it work? What can computers do? How can you control computers rather than be controlled by them? What is coming and where are we going in automated data processing? These questions underlie many business activities today. To be competitive in the business community you need to be able to answer them.

The approach taken in writing this book is that you are going to be a user of information systems rather than an engineer who will be designing electrical/mechanical components. Therefore, many examples are presented to give you a good understanding of how information systems are actually used. Many aids are included to help you learn about the field of information systems more quickly. For example, each chapter starts with key questions that will help guide your reading. Each chapter also begins with a short episode describing a situation or idea of interest to people in business and government. Some are amusing and others are of general interest and importance. At the end of each chapter are sets of key words and review questions to help you further pinpoint your reading and learning. Many application problems are included to emphasize real-world situations involving computer-based information systems. By working through them and developing answers or strategies as requested, you will not only be learning the terminology and concepts of information processing, but you will be making decisions about situations that occur constantly in organizations. You will be acting as a user of information systems and learning how to use information processing tools and techniques. That is, after all, what it's all about.

TO THE INSTRUCTOR

This textbook deals with the relation between data, information, and computer processing as it occurs in a wide variety of organizations. A unifying theme is the application of computer-based processing systems as tools in business and man-

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agement. There are few chapters devoted to management *per se.* Instead, I have chosen to weave the general theme of management into all of the discussions in each chapter. In other words, concepts and application settings are developed in a way that gives your students a realistic view of how computer-based processing systems are used in organizations.

This text is designed to be used in a semester or quarter course in transaction and information processing. Your students need not have prior knowledge of programming languages to use this book (a summary of programming principles and languages is provided in Chapter 7). If your students do have experience in programming, however, you will be able to develop a more in-depth perspective on the role of information in management and decision making.

I have written this text in a modular fashion, permitting you to emphasize certain aspects of transaction and information processing according to your classroom needs. For example, the computer systems and transaction processing modules could easily be (and have been) studied before the management information module. Chapter supplements provide additional details or emphasis for some topics addressed in the chapter itself. If your students need a better foundation in general management principles you may want them to read the supplement at the end of Chapter 4. But if they have had management courses before, you could omit the management supplement. Similarly, the supplement on number systems may be used or omitted, depending on your preference.

The management information module is devoted to pertinent information, systems, and management topics. The terminology and concepts of information, systems, and control have been carefully developed. This module also draws attention to the role and functions of management in modern enterprises, emphasizing the decision-making responsibility and functions of management.

The computer systems module discusses the key hardware components, operating concepts, and software systems used in data processing. Since this and all other modules emphasize managerial applications, I have not dwelt on elegant architectural topics. Rather, the concern is on what managers need to know about using computers in processing transactions or receiving reports and information to make decisions.

The transaction processing module focuses on how data are captured, stored, and processed in recurring business settings. File storage structures and processing modes are presented with emphasis on when and why they should be used. A supplement introduces management users to ideas on how to improve the quality of the data used in their organizations.

Computers as tools in management control and decision making are dealt with in the management information systems module. After reviewing the impact of computer-based processing systems on organizations, the book explores management information systems from both a functional and a design perspective. Chapters 12 and 13 deal with databases and database management systems in MIS. Both current features and needed developments are explored.

The analysis and design module investigates the structure of management information systems and transaction processing procedures. Too often, systems are improperly designed and implemented, and in other cases they are not designed at all but thrown together almost haphazardly. These problems are discussed in some detail and ways to deal with them are pointed out. Besides concepts and techniques of analysis and design, this module points out the importance of evaluating information systems, both in an operational sense and in economic cost/benefit terms. The behavioral aspects of implementing information systems are also explored. Finally, Chapter 18 addresses the future of information systems to technology, including the impact of the problems of society. The essence of the discussion in this chapter is "Where do we go from here?"

Because it is important to be able to deal with information systems in real settings, I have included four classroom-tested case studies in the book. Each case, based on a real company, can be used as a term project for analysis and design or for class discussions to drive home salient points about transaction and information processing. I have found it useful to begin with one or two of the cases in the first part of the course and then return to the same cases for additional analysis and discussion later on as further insight is developed into the purposes and tools of transaction and information processing systems. It has been most useful to devote a substantial amount of class time to each case, discussing the different points of interest. By having the students decide what the problems are and how they should deal with them, they usually think through the situations much more carefully. Discussing their viewpoints in class gives the students an opportunity to hear other ideas and suggestions, which can also be a learning experience. The cases, as with all of the learning tools in the book, are intended to give the students a practical, applications-oriented view of information systems.

I would like to thank the following reviewers for their helpful comments: Robert A. Barrett, Indiana University–Purdue University at Fort Wayne; William M. Brant, Trenton State College; Paul H. Cheney, Iowa State University; Hubert E. Dunsmore, Purdue University; James V. Hansen, Brigham Young University; Kate Kaiser, McGill University; Alan Wayne Madison, Clemson University; Dennis G. Severance, University of Michigan–Ann Arbor; John F. Schrage, Southern Illinois University; and Nancy Stern, Hofstra University.

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1

Introduction to Information Processing

KEY QUESTIONS

What are data?
Why process transaction data?
How does information processing differ from transaction processing?
What role does information processing play in management of organizations?
What is a computer system?
How do decision support systems differ from information systems?
What is word processing? Office automation?

THE 800TH LIFETIME

The Industrial Revolution in the United States dramatically altered the lifestyle and pace of activity of every citizen. The series of changes that began at that time has continued to accelerate at an astounding rate. In demonstrating the rate of change, Alvin Toffler states in Future Shock *that if the last 50,000 years of man's existence were divided into lifetimes of approximately sixty-two years each, there would have been 800 such lifetimes. Of these 800, fully 650 were spent in caves.*

*Only during the last seventy lifetimes has it been possible to communicate effectively from one lifetime to another—as writing made it possible to do. Only during the last six lifetimes did masses of men ever see a printed word. Only during the last four has it been possible to measure time with any precision. Only in the last two has anyone anywhere used an electronic motor. And the overwhelming majority of all the material goods we use in daily life have been developed within the present, the 800th lifetime.**

The 800th lifetime—the last 62 years—had seen the introduction of most of the machines, equipment, and consumer goods in use at the present time. These changes have been brought about in just 1/800th (0.00125) of the last 50,000 years of the history of humanity. Behind this continually accelerating rate of change is the great power plant of technology. Technological innovation has been significant in developing the conveniences we know today. We are now in the midst of a second industrial revolution, a technological revolution that is reaching deeper into the roots of civilization than

*Alvin Toffler, *Future Shock* (New York: Random House, 1970), p. 13.

the revolution in the 1800s. And we feel its impact more and more each day.

The fuel for this technological revolution is information. Information as an abundant resource entered history after the year 1500 with the invention of movable type. Production of tremendous volumes of information grew rapidly in the generations that followed. In the 1950s, after the introduction of the electronic digital computer, the production of information skyrocketed and triggered the staggering proliferation of knowledge that we are witnessing today. This was, in part, due to the computer's great speed, flexibility, and unique analytical capabilities. The result was the collection of more information on more activities and events *that, when combined with other tools that had been developed, propelled most of the world into this new industrial revolution. Indeed, knowledge and information became the fuel, the power, and the initiator of change and revolution.*

Business and government organizations have been involved in data processing and information processing since the early days of commerce. One of the keys to successful business and government ventures is to have good management. But in order to have good management, it is also necessary to have the proper information to tell managers about the status of their business, competition, suppliers, the economy, and so on. In a very real sense then, we might say that virtually all organizations "run" on information.

However, in order to have information, data about events and activities must be processed first. Thus there is a strong relationship between data processing and information processing.

Today data processing and the use of information are well-accepted ideas in the business and government communities. But this has not always been so. It used to be that the term *data processing* brought to mind the image of a human data processor: A person with a green eyeshade wearing thick wire-rimmed glasses. This person was tucked away in some dimly lit back room, working amid stacks of papers and books, with a dusty old adding machine and many worn-down pencils. Above was a single bare light bulb suspended from the ceiling by a single strand of electric wire. On the data processor's wrists were plastic sleeve guards, yellowed with age. The image of this "data processor," this necessary evil who recorded accounting data about the business, and the little room in which he or she worked, is how some people still view data and information processing.

As we will see throughout this book, however, data and information processing are quite different today: Data processing and information processing, as the terms are used in modern organizations, are quite different from one another. Neither is viewed as a "necessary evil" by the well-educated and experienced manager; rather, they are recognized as two important tools—as two activities that can improve the performance of an enterprise and make it more successful. The ways in which data and information processing occur have also changed from the old image of the eyeshades and worn-down pencils. In this first chapter, we briefly investigate the meanings of data processing and information processing and place them in perspective in the modern organization.

DATA AND INFORMATION PROCESSING

The foundation of both data processing and information processing is *data,* facts that describe persons, places, things, ideas, or events. In business, it is common to speak of the sales of a firm during a particular year, the amount of profit, the number of employees of the firm, and so on. More specifically, we might describe a business' size on the basis that its sales last year were $25 million, or that its sales for this past year increased 17 percent over last year while inflation was running 11 percent. Or we may base a description on the fact that the firm employs 22,000 people, 1800 of whom are middle managers and 100 of which are classified as upper management. All of these facts are data that in some way describe the business.

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