

ANALYSIS AND DESIGN OF INFORMATION SYSTEMS

JAMES A. SENN



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PREFACE

TO THE STUDENT

Although the computer is now commonplace in industry, government, medicine, and even politics, people still stand in awe of it. And they also tend to turn to persons who understand the power of the computer.

Systems analysts exert a significant influence over the organization in which they work. Based on their recommendations, new systems are installed and old ones displaced. Through information generated as a result of the systems that analysts develop, managers may decide the course of action for a new or existing product. The analyst may also be responsible for reports used in selecting a strategy determining the fate of the entire organization. On some days, an experienced systems analyst may touch a portion of each of these situations.

In this book, we will discuss each of the activities associated with developing a computer-based information system. You will see how to identify system requirements, including methods of collecting requirements data, interaction with managers and users, and documentation of system details through various methods. We will discuss the design of such new system features as reports and displays, including the use of color and graphics. Together, we will examine methods for detecting errors in input data and for preventing unexpected user activities from producing unintentional results. This text does not teach computer programming, but it does describe the responsibilities of the systems analyst who will later turn design specifications over to a programmer for development of the necessary software.

Not all systems require computer data processing. Similarly, not all user requests for information systems work should lead to a system development project. This book shows both how to analyze organization and business systems to determine whether improvement or change is needed and how to determine whether computer assistance is desirable.

It is not assumed that you have an extensive business background or that you even intend to pursue a career in information systems. You may be a business person who expects to interact with systems analysts or computer programmers and want to have a better understanding of their work so that you can work more effectively with them. Or you may want to collect knowledge so you can manage analysts responsible for a project in your department.

Some of you might also be computer programmers or computer engineers planning to move into the area of systems analysis in the future. In the latter case, your expertise in computer programming will be a useful supplement to the methods of systems analysis and design as we will discuss them.

Among the tools built into the book, you will find a set of questions at the beginning of each chapter that addresses the most important issues in the chapter. You can use the questions to guide your reading. After finishing the chapter, look back and see if you can answer the questions. Keywords and a summary are at the end of every chapter to highlight further the main points of the reading. By this time, you should be able to answer the review questions which follow.

Throughout the book there are many examples and over two hundred illustrations that demonstrate what systems analysts do to determine the feasibility of developing a computer-based system. Sometimes, their decisions are against developments altogether. These examples are based on real situations in which the author has been involved as a consultant, analyst, or designer of a system. Programmers have also taken specifications of the designs discussed in the chapter and turned them into working systems.

The concepts and theories underlying systems analysis and design are woven through the book so that you develop an understanding of why certain questions must be addressed or how various decisions are made. Emphasis is placed on practical aspects of system development—decisions that analysts must face every day when working on a project. Through the many examples and illustrations, you will gain a detailed understanding of the work of the systems analysts. If you take the time to work through the application problems at the end of each chapter you will acquire principles that will stay with you, and gain experience in making some of the decisions that can help you in actual business situations in the future. Developing the answers to the questions which are based on real life problems will not always be easy and may involve more than just a minute or two of thought. For that there is no apology. The amount of time you invest will determine the future payoff you can gain.

TO THE INSTRUCTOR

Systems analysis is one of the most difficult activities to teach students in a classroom environment. So much of systems analysis and design depends on tools, experience, and situations that are difficult to recreate in the typical classroom. Frequently when this area is taught in a college or university classroom the emphasis is on theory, and insufficient attention is given to applications.

This book is intended to go beyond classroom theory and concepts. It is practice-oriented with examples, applications, and proven techniques that *demonstrate* systems analysis and design. In addition, actual organization and business settings are used in the examples to show how systems concepts can apply to many different types of enterprises.

The text is designed to be used in a semester or quarter course in systems analysis and design. Although your students may not be computer or information systems majors, they should have had a course in either computer programming or introduction to computers. Therefore, basic operations of computer systems are not discussed.

The text is written in a fashion that is most logical for the student. The early chapters focus on feasibility studies and requirements determination, the later chapters are oriented toward design specification and implementation. Software design and testing specification are discussed in detail with repeated emphasis on maintaining the goal objectives.

Questions in project management and the selection of computer hardware and software, discussed in Chapters 14 and 15, are raised in virtually every aspect of systems development, and students may find it helpful to refer to these chapters repeatedly throughout the course.

Particular emphasis is placed on the problems of design involving online systems, the use of microcomputers, and small business systems. Another aspect considered is the development of formal database systems. Data communication and teleprocessing, increasingly common in information systems of all sizes, distributed or not, are examined in detail. A separate chapter is devoted to the design decisions the analyst must address in selecting equipment, choosing communication lines, and acquiring communication facilities.

It is important for the students to follow the development of lifelike systems as they study different analysis and design concepts. To assist you in achieving this objective, I have captured a live systems project and included portions of it through the text. The case study, which has been classroom tested repeatedly, involves an order entry/accounts receivable system that is common in many organizations. After each major topic in the text, the concepts and techniques are applied to the case study which include a feasibility study and a detailed investigation. Data flow diagrams, data dictionary entries, and decision tables are assembled to document the system. In the output and input design areas, reports, display screens, and interactive menus are shown to indicate how the previous user-

requirements are translated into design specifications. Master and transaction file specifications and processing methods are also shown in detail. Since the system requires data communication, the design assembled to provide necessary transmission is also shown. By the time the students read the implementation of the system, they will have a good understanding of how the principles and practices of systems analysis and design are applied. As an aside, they will also have learned about the order and accounts receivable side of businesses as well.

A single case study is not sufficient to meet most instructor requirements. Consequently, a companion applications guide has been prepared to accompany the text. The guide has additional self-testing questions and problems to assist your students in mastering the material. But in addition, several other case studies are included for student use. They may be used in several ways. You may choose to use them as discussion vehicles throughout your course. After each major topic, your class may be asked to describe how they would deal with a specific aspect of the situation, using ideas, tools, techniques, and methods they have read about or discussed in class.

Another popular method of using the cases is to divide your class into 5- to 8-person project groups. Each project then works independently throughout the quarter or semester to develop a system to meet the user-requirements described in the case. I have found that the teams become very competitive and put in more time and effort on their own than you might expect. Many times they visit vendors to obtain equipment specification and pricing details. They also visit other computer installations to see how similar systems have been handled. At the end of the course, they present their system design to the class in a formal manner, complete with visuals and even prototype demonstrations in some cases. It is an effective teaching method, but more than that, it is rewarding to see how far they have progressed in a single course.

Accompanying software (for selected microcomputers) will be available with this text. Two types of software have been prepared. One type is a computer assisted instruction set. Through an interactive program, students are prompted with multiple-choice questions or system situations and asked to respond using information from specific text chapters. A question set has been developed for each chapter in the text. This self-instructional package will allow students to assess their understanding of each text chapter while freeing the instructors' time for work with the project teams or with individual students.

The other type of software demonstrates computer-based systems. For instance, students can interact with an on-line system to see first-hand menus, top-down operation, input validation, error trapping, and output generation. The software is intended to allow your classes to be independent of any campus computer facilities. It will be updated continually based on comments from persons using it in classroom environments.

The entire text and its accompanying tools have been developed to give the students a practical, applications-oriented understanding of systems

analysis and design. It applies equally well to large main-frame and small personal computers. The up-to-date analyst should be familiar with both.

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James A. Senn

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