

MANAGING HOSPITAL INFORMATION SYSTEMS

Stephen L. Priest

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Preface

The intent of this book is to provide users of management information systems (MIS) with an understanding of the operation of the MIS department. It presents a perspective of the MIS executive (the person responsible for guiding MIS development) and the role of the executive as he or she relates to the MIS user. A successful MIS requires a team effort from all vocations within the organization, including the MIS executive as well as users of the MIS. Administrators, nurses, physicians, technicians, technologists, accountants, programmers, analysts, and others within a hospital all play an essential role in an MIS. This text is written for them. It has minimal computer jargon and attempts to present, by situation, the MIS responsibilities of both the MIS executive and user departments.

The book is not a definitive reference for the well-informed MIS executive who needs to supplement his or her understanding of MIS specifics. There are many references provided for that purpose. It can, however, be used by an MIS executive concerned with educating user departments to MIS and user responsibilities. Users who have been given the responsibility for working with the MIS department can learn about their role in an MIS project and the responsibilities of the MIS department and executive. It will provide insights of what is expected of the user and explain reasons for many MIS policies and procedures.

Where once computers and information were needed by only a few persons with redundant information needs, there now exists potential MIS applications for every department and every level of hospital operation. As the hospital's information needs change and computer hardware and software make rapid technologic advances, so too do the roles of the people responsible for the growth and use of the MIS. The concerns and impacts of these roles are presented in scenarios throughout the book.

The text discusses MIS concepts and concerns that are applicable both to hospitals with their own in-house MIS department, as well as to those hospitals that use outside vendors for their MIS needs. Indeed, it is the author's experi-

ence that many hospitals use a combination of in-house and outside vendor services. However, more important than the method for acquiring MIS services is that hospitals recognize the need to understand, manage, and control the current and future growth of their information needs.

The book relates what is expected of the MIS and user departments through continual reference to interaction. Computers are no longer the concern just of the MIS department. Users must participate in many MIS decisions. This participation can begin with an understanding of the roles of the user, the MIS executive, and the MIS department.

This book discusses areas that hospital administrators, MIS personnel, and end users of an MIS must consider when beginning or expanding MIS services. It attempts to put into end-user and MIS executive perspective the management and operational role of the MIS department within a hospital structure.

For many years, data processing was considered a minor department, usually buried within the confines of the financial chain-of-command and serving the sole purpose of offering clerical replacement services. Today, the growth of systems engineering and computer technology allows an MIS department to increase the effectiveness and efficiency of virtually every department within a hospital by providing services accessible to all departments and personnel within the organization. Users must be able to obtain from the MIS department the services that meet their needs.

The importance of MIS services and the fact that information must now be a hospital-wide resource have been recognized by increased status on the hospital's organizational chart, with the result that the MIS department is now accessible to all users.

A major resource used in preparing this text was a course taught by the author at Northeastern University (Boston, Mass.) titled "Management Information Systems: Planning and Controlling MIS Development." This course is offered to students in both data processing and non-data processing majors and is designed to acquaint them with the role of the MIS executive within the organization. In the course, the author blends his experience in establishing and maintaining an MIS department with current literature on MIS. The primary emphasis is on real life situations, both positive and negative, combined with textbook theory. Case study discussions are used extensively in an effort to apply principles to realistic situations.

Chapter 1 discusses the history of MIS and defines the role of the MIS executive, the position of the MIS department in the organization, and the need for user involvement and interaction. Chapters 2 and 3 present various methodologies for quantitatively selecting MIS hardware and software. A methodology is presented for the evaluation of a hospital's application and information needs, with emphasis on the author's experience. Various examples are presented to show quantitative and subjective approaches and how they affect both the user

and MIS staff. Explained is the methodology used in putting together a request for proposal (RFP), including specific vendor response formats and quantitative analyses of vendor responses.

Chapter 4 discusses the implementation of an MIS. The author presents case studies citing problems in implementing systems and theory versus practical techniques.

MIS executives spend much time planning and gaining an understanding of the needs of the hospital, yet the MIS department is evaluated on the quality and quantity of output and its respective cost and effect on patient care. How does the executive know projects are on schedule? Are programming hours spent correcting errors or on application development? Is program documentation timely, accurate, and useful? Is the hardware functioning correctly? Is it time to upgrade hardware? Is there additional time available in data entry for new applications? Are the users of the MIS services being satisfied? Are MIS department costs reasonable? These questions and others are addressed in Chapter 5.

Chapter 6 discusses both the centralized and distributive approaches regarding the use and control of MIS resources. It offers concepts on how the management, systems/programming, and computer operation resources can be considered on a department by department basis. Chapter 7 covers project priorities, cost-benefit analysis, and long-range planning. The need for formal methodologies to select and prioritize projects and the importance of follow-up performance evaluations in ensuring proper allocation of MIS resources are emphasized.

Chapter 8 presents eight case studies that demonstrate many of the ideas discussed in the text. The theme throughout these studies is that there must be user and MIS staff interaction in order to have a successful MIS: case study 1 explains the planning that went into the development of one MIS department and the methodology used to transfer financial applications from a shared-service vendor to this newly created department. The study explains many of the problem areas encountered during the implementation and the uniqueness of the computer's location; case study 2 discusses the development of an operating room scheduling and statistical system; case study 3 discusses how participation in a computer user group resulted in two hospitals sharing an inventory package; case study 4 describes the interaction used by various hospital disciplines to develop a regional cancer registry; case study 5 shows how routinely collected patient data were used to aid administrative decision making; case study 6 describes a method used to select a key-to-disc data entry system, RFP concerns, vendor-support problems, and a follow-up cost-benefit study; case study 7 describes how one report is used to monitor data entry productivity; case study 8 discusses the cost benefits of using computer-output microfiche for medical and financial reporting.

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To attempt to name those many people who have contributed to my understanding of MIS would be impossible because I owe such a debt of gratitude to the many who have shared their ideas, opinions, facilities, and time with me. Be assured that the many examples and ideas expressed in this text are but a reflection of the people whom I have been so fortunate to know and work with.

The underlying theme of this text is that the success of an MIS comes only when users accept the system in partnership with the MIS staff. Through coauthors of my many articles I have tried to practice and demonstrate this philosophy. I thank my many friends and coauthors for the opportunity to work with them and for their ideas, willingness, sacrifices, initiative, and patience necessary for the many successes we have been fortunate to share.

I would like to acknowledge the contributions of two exceptional individuals who have made it possible for me to learn and experience the efforts necessary for successful use of MIS.

Robert A. Johnson has been both a mentor and leader. He has provided me direction and the opportunity to experience firsthand many of the situations discussed in the book. To him I am very much indebted.

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Introduction and Background

USERS OF A MANAGEMENT INFORMATION SYSTEM (MIS)

There are a number of books and articles available that discuss individual MIS topics from the perspective of either the MIS department or the end user (the department or person using the MIS). However, none has combined and blended these topics into a text that relates to both the MIS department and end user. Such is the ambitious intent of this book. It is to get the MIS department and end user to recognize the other's concerns in the development and use of the MIS.

The terms *end user* and *user* are used interchangeably throughout the text. The terms imply the ultimate user of an MIS. MIS end users are a diverse cross section of the hospital family: nurses, secretaries, technicians, clerks, department heads, physicians, the chief executive officer (CEO), and his or her aides.

Any manager, planner, or professional whose job will be changed in the future by an MIS should understand what is in this text and the role he or she plays in the success or failure of the MIS. Not all information systems have been a success. Many have failed to achieve the advantages that a computerized MIS should bring. It has become clear in surveying the disappointments and the success stories that effective involvement and interaction of the end users is critical for success. To achieve this result there are certain things the users must understand about MIS concepts. It is a new world for many users and often a bewildering one because of the complexity and jargon that can accompany an information system. Often end users understand neither the principles of MIS nor their own essential role in MIS development and use.

This book explains to users what they should know about MIS and what role they should play in its design and evolution. It attempts to do so without using the jargon that makes computerized information systems complex. It is important that all end users comprehend the simple concepts that are described.

Many users have fears about the introduction of an MIS. Their jobs will be changed by its use. The best way to overcome this fear is by understanding the concepts described in this text and by involvement in the definition, design, installation, and control of an MIS.

The text provides the MIS executive, the person most responsible for developing and controlling the hospital MIS, with various techniques that can minimize the communication gap that can sometimes exist between the MIS staff and end user. It shows the end user the reasons for many of the MIS approaches and presents scenarios of both the pitfalls and successes of an MIS. It even suggests that maybe the end user should manage many of the MIS resources.

The text stresses that in order for a hospital to continually maintain and use MIS resources, both the end user and MIS staffs must be held accountable for the success or failure of any information system.

Today, MIS opportunities can extend beyond the scope of the MIS executive's management control. This is cause for both the executive and end user to examine the role and responsibility that each has in the growth and use of the MIS.

This text is not intended to provide definitive methods for determining if a hospital should maintain an extensive in-house MIS staff or whether it should acquire outside computer services. It does, however, recognize that MIS growth is inevitable for most hospitals, and as such it should be properly planned and managed. The text will present approaches that can help determine the extent and type of MIS services a hospital should be considering. Today technological advances in hardware and software can have a direct impact on all operating departments, with an effect often resulting in changes in quality of patient care, and the cost of hospital services. Where on-line processing was once only for hospitals with large budgets and many beds, today's technology offers areas on-line, batch, outside vendor services, in-house staff, and/or a combination of various MIS services that can be a valid consideration of any size hospital—whether the hospital is considering first-time involvement or expansion of existing MIS services. Hopefully, this text will provide end users, CEOs, MIS executives, and other general and senior management executives with insight into the concepts and concerns of MIS planning, control, and management.

DEFINITION OF MIS

Based on the specialty from which it is approached, the term "MIS" can mean different things to different people. To the executive, an MIS is a system that collects, stores, retrieves, and processes information that is used or desired

by user departments to help them in their operations, planning, and control. A CEO may view the MIS as a computer system that provides information to support decision making. The laboratory manager may view the MIS as a system that allows the monitoring and control of patient test requests and results. A hospital can thus have many definitions for the MIS, depending upon its use within the organization.

An MIS can be both a manual and an automated system. As a practical matter, MIS implies "computer," but only to the extent that the computer is one tool used in achieving an effective MIS.

Many people relate an MIS to a data base system in which all the hospital's information data elements are stored and retrieved from one area. This concept appears desirable in principle, and it is certainly the aim of every hospital to have its data located in one easily accessible area, but in practicality, one usually finds many unique and separate MISs within the organization. A hospital MIS can include laboratory, payroll, pharmacy, and other reporting applications. Each reporting application may also be called an MIS.

An MIS can provide information to all levels of the organization. It can aid executives in their strategic, decision-making roles. It provides supervisors and first-level managers with a method of structured procedures that allow control of costs and turnaround time. Operating personnel use an MIS for clerical independence and elimination of redundant tasks such as payroll processing and patient test orders.

There are other definitions of an MIS that make a distinction between an MIS and systems that support decision making.^{1,2} They present the MIS functions as restricted to structured and transaction-oriented tasks, whereas a decision support system (DSS) is a dynamic system that involves subjective action by the end user. They argue that the two disciplines (MIS and DSS) should be separate on the organizational chart. This author agrees that one can define the two disciplines separately but believes that future (and current) software and hardware technology will allow the MIS and DSS to use the same data bases, with both being accessible at any level of the organization. The purpose of this text is not to argue either definition but to make the reader aware that the field of MIS services is changing so rapidly and being so refined that to agree on one specific definition is very difficult. For this text, *an MIS is any information system that uses computer storage and retrieval of data elements.*

For many hospitals, a single, comprehensive MIS may be neither practical nor realistic. The financial resources of a hospital can often restrict and make long-term computer hardware and software investments unrealistic. In addition, the diversification and idiosyncrasies of department needs often make the simplification of all hospital data elements into one data base very difficult. However, in some areas, such as patient accounting and nursing, end users may venture to obtain a single MIS that satisfies both departments' needs. There are

hospitals that are committed to achieving a total MIS, with application modules such as patient and employee records.^{3,4} However, they have yet to achieve an all-encompassing, hospital-wide MIS.

The commitment to selecting, installing, and maintaining one comprehensive MIS is an endeavor beyond the capabilities of many hospitals. Even in hospitals capable of an MIS endeavor, the planning and extensive involvement required from a multitude of users make this attempt most difficult. Thus, as various end users recognize a need for an MIS in their departments, the result has usually been a multiple of information systems within the organization.

HISTORY OF MIS

Today, the name *MIS department* is often associated with the name *data processing (DP) department*. This interplay of names did not come into being, however, until data were formally recognized as a hospital resource for information management. When computers simply processed huge quantities of numerical data and produced various reports, they were indeed strictly "processing data." The financial officer usually used the computer as a clerical replacement and little as a management tool. Many financial officers had little DP education and background. The computer applications were esoteric to the DP staff, and computer programmers understood the potential and limits of computer operations from a hardware and software perspective, not from the users' viewpoint.

Since most applications were financially oriented, control of the DP department, in most instances, automatically fell under the hospital financial officer. Indeed, many financial officers knew little of their responsibilities to DP, and programmers knew nothing about communication between the two areas as each stood aloof, confident in their own separate areas. This type of environment succeeded only in the continuation of applications designed solely to replace clerical functions.

As more people became educated in computers, the computer mystique diminished, and the term *management information systems (MIS)* began to appear. People began to realize that the data in the computer could be useful to all levels of management, not just to those interested in structural and redundant tasks. At one time, system problems were always blamed on the computer. "The computer made a mistake" was a common answer, or in some instances, the computer people would blame the user for providing poor input or not understanding what he or she was asking for. Today we know that people make mistakes: either the programmer instructed the system incorrectly, a data entry person entered incorrect data, the user did not explain clearly what was wanted, or the user supplied incomplete or inaccurate data.

Frequently, the control of data flow between user and DP areas was nonexistent. The user department supplied source documents to DP by "throwing them over the fence" and waiting for accurate reports to return. What resulted was that neither the users nor DP ever knew exactly what went over the fence because there were no interdepartmental controls. In the beginning phases of DP, there were no systems people, only hardware- and software-oriented programmers, and report use was a concern only of the end user.

When DP was developing into the MIS department, it was thought that the user was ultimately responsible for computer output. The user was the expert in understanding the output, and the final responsibility for completeness and accuracy was placed on the user department. This led to further standoffs between DP and the user department. DP would reverse user complaints and place burden of proof on the user. This "ultimate" responsibility practice did not work. It again led to strictly clerical functions in order to minimize dependence on DP.

The path to the successful MIS department can be realized when the ultimate responsibility for user and DP activities is shared by both departments. This means that both the end-user and MIS departments have to be held accountable for the success or failure of an information system. Instead of constant complaints to senior management that the other department is not doing its job, there should be a mutually agreeable approach that allows the MIS and user departments to sit down together and amiably discuss why a problem occurred and how it will be corrected. This step is critical for the continual success of an MIS department.

Senior management, through educational programs that provide it with an understanding of MIS concepts and through the experiences gained from the successes and failures of MIS applications, now realizes that the missing link to a successful MIS department is often the communication that comes from its involvement in MIS happenings. Senior and line management have to recognize that successful information systems are a result of user and MIS departments working in partnership. Once this link is recognized, it releases a powerful tool to management—data. Through communicating and understanding each other's needs, strengths, and responsibilities, data are now accessible for management needs; hence, we enter the age of MIS.

THE MIS EXECUTIVE

Who is this MIS executive? What type of background and person is necessary for leadership of the MIS department? Let's view the MIS executive position from both the executive and senior management perspectives (senior management being defined as the MIS executive's fellow administrative officers).

Of primary importance to senior management is the MIS executive's knowledge of the total hospital, its objectives, and user department needs and concerns. Senior management expects this person to provide guidance and recommendations concerning the allocation and use of MIS resources. In order to do this, the executive must be fully aware of the hospital's goals and plans.

The chief concern of the executive is the ability to develop a sensitivity to user department operations and concerns. The successful executive realizes that the MIS department can best respond to user needs through a real understanding of these needs and responsibilities. Conversely, users aware of MIS commitments toward a successful MIS will not hesitate to initiate discussions of system problems, and this team approach can further ensure a successful MIS. The MIS department serves the organization through effective, two-way communications with user departments.

Showing user departments an interest in understanding their needs and problems also prevents barriers to communication and "finger pointing." Users and MIS departments must be partners in system selection, design, and implementation. This relationship must occur whether a system is developed in-house or acquired elsewhere.

Senior management seeks an MIS executive who displays effective oral and written communication skills, since this individual will be continually required to make clear the directions and intent of the MIS department. The successful executive must have marketing and public relations skills and be able to make senior management, users, and the community aware of MIS performance and capabilities.

Senior management is output report-oriented and often may not be aware of internal MIS happenings. Therefore, the executive must make effective presentations to senior management that make clear the availability and utilization of MIS resources and how they can address the MIS needs of the total organization.

Some MIS executives may consider technical skills more important than communication skills. While senior management is looking to communicate with the executive, an executive may frequently be more concerned with keeping up with "state-of-the-art" hardware and software. This technical knowledge allows the MIS executive to communicate with those MIS personnel who are technically oriented. This dichotomy of views between senior management and the executive usually arises when the MIS executive has a strong programming and computer operations background. Executives weak in communication skills such as oral presentations, writing, and understanding business concepts can increase their skills through advanced degrees in business and management. These skills can also be improved by the continual practice of delegating technical problems to an MIS supervisor and concentrating on problems that require communication with the user.