MANAGEMENT GUIDE TO HEALTH CARE INFORMATION SYSTEMS

Richard M. Sneider

AN ASPEN PUBLICATION

MANAGEMENT GUIDE TO HEALTH CARE INFORMATION SYSTEMS

Richard M. Sneider, PhD
Sneider & Associates, Limited
Newton, Massachusetts

AN ASPEN PUBLICATION
Aspen Publishers, Inc.

1987

Rockville, Maryland
Royal Tunbridge Wells

Library of Congress Cataloging-in-Publication Data

Sneider, Richard M.
Management guide to health care information systems.

"An Aspen publication."
Includes bibliographies and index.
1. Information storage and retrieval systems—Hospitals. 2. Information storage and retrieval systems—Medical care. I. Title. [DNLM: 1. Health Services—organization & administration. 2. Hospital Communication Systems. 3. Information Services—United States. 4. Information Systems—organization & administration. WX 26.5 S671m]
RA971.6.S63 1987 362.1'0684 87-14519
ISBN: 0-98189-855-1

Editorial Services: Marsha Davies

Library of Congress Catalog Card Number: 87-14519
ISBN: 0-87189-855-1

Printed in the United States of America

1 2 3 4 5

Preface

This book represents the culmination of 16 years of experience in health care and in information systems and should serve as a useful reference for today's information system professional. Where possible, the information in this book is based on the best surveys and research published to date. The primary sources of information include major magazines and proprietary surveys performed by third parties. This information has been added to the experience Sneider & Associates has garnered working with hospitals, vendors, and information systems for over six years.

The book is designed to be a practical guide rather than a scholarly work, although all of the standards of scholarly research have been adhered to in referencing and footnoting information. Also included is information from an ongoing research project whose purpose is to identify all of the information system vendors of products to hospitals. The research has taken the form of quarterly surveys of the marketplace. The primary result of this research has been the publication by our firm of an annual directory of information system products. (If a particular vendor has been overlooked, it is with the greatest regret. It is Sneider & Associates' intention to present an unbiased and objective review of the market, and apologies are given to those vendors.)

The book also reflects the experience of hundreds of seminar attendees who have participated in seminars given by Sneider & Associates over the last three years. By producing seminars throughout the country for hospitals of all sizes, a unique view of the market and of internal and external influences was gained.

Health care professionals involved in developing and selecting projects or in managing information system activities, chief executive officers, chief financial officers, vice-presidents in charge of information systems,

and management engineers will find the book useful for assessing their hospitals' activities and for identifying potential solutions to current management problems. Consultants and vendors will find it useful for determining major vendors and their products.

The book covers major financial system products and major departmental system products. Students in MBA programs with a focus on health care will also find the book useful. A prototype of this book was utilized as a basis for an MBA graduate course (entitled "MIS in Healthcare") offered in the spring of 1985 at Boston University.

In the first chapter information systems are defined and their role within institutions is discussed. The reporting relationship between the data processing department and the information system function is discussed. Staff size as it relates to data processing is also discussed. Guidelines for budgeting, as well as statistical information, are also presented. Other information resources available are highlighted. Finally, there is a discussion of consultants and the typical engagements they may be offered.

The status of automation within hospitals, covering hardware in use, software, and the basic approaches to data processing is discussed in Chapter 2. A description of networking and bedside terminals is also provided. At the end of the chapter is a glossary of networking terminology.

In Chapter 3, there is a detailed discussion of the five largest vendors of information systems, followed by a discussion of other major players in the market. Special attention is given to hardware manufacturers.

Chapter 4 contains a definition of hospital information systems (HISs) and an historical perspective on them. Descriptions of major system interactions and the components of a hospital information system are provided.

Chapter 5, contains a discussion of the functionality, benefits, and leading vendors of patient accounting, general accounting, and patient care systems. The discussion includes the numbers of customers of the systems and the age of the products. Shared service vendors are also discussed.

In Chapter 6, automation available for the major departments is covered. The functionality, benefits, and leading vendors are covered for each major departmental area.

Cost accounting and its ultimate goal of product line management is discussed in Chapter 7. A definition of product line management and clinical costing is provided.

The potential impact of HISs on an institution's related costs and quality of care is discussed in Chapter 8. A review of the major studies that have been done in this area, including conclusions about the impact of information systems, is provided.

Presented in Chapter 9 is a summary of the current state of artificial intelligence in medicine. In addition, the overall trends involving artificial intelligence in medicine are highlighted.

In Chapter 10, there is a discussion of the direction of HISs. The technological trends and their impact on today's systems are highlighted. A summary, along with conclusions based on the author's research, is provided.

The appendix contains lists of vendors (including addresses) so that interested individuals can follow up the discussions.

Acknowledgments

I would like to thank all of those who have given me their input and personal support in the writing of this book. In particular, I would like to acknowledge the assistance of Denise Sullivan, market analyst with my firm, and the emotional support of my fiancee, Diane Wolf, without both of whom this work would have suffered substantially in quality.

Table of Contents

Chapter 1

Organization of the Information Systems Function

SCOPE OF INFORMATION SERVICES

The organizational trend in health care is to consolidate information intensive departments under the information systems function. These departments include the information systems (IS) department (or sometimes called the data processing department), telecommunications/PBX, office automation, management engineering, physician systems, and biomedical/clinical engineering. If there is a chief information officer (CIO), additional departments for consolidation may be considered, including admissions, materials management, and medical records. A more detailed discussion of the CIO occurs at the end of this chapter.

The typical IS or data processing department handles financial systems as well as patient care systems. Departmental systems such as the laboratory or radiology may or may not be included. The defining line consists of traditional nonclinical systems. These systems support the flow of medical information but are not involved in the actual diagnostic process. In some large teaching institutions, there is a clinical information systems department and a financial information systems department. Another variation involves the consolidation of hospital and university data processing.

With the evolution of telephony into digital communications, there are significant advantages to including telecommunications under the same umbrella as the information systems. Especially when local area networks are being considered, a substantial overlap exists between telecommunications and the information systems. The sophistication of telecommunications have reached such proportions that a traditional switchboard manager may not appreciate the complexity of the systems during acquisition.

Office automation (OA) may include centralized word processing and transcription. The office automation plan should be an integral part of the total information systems plan of a health care institution. However, the reporting location of the OA department itself is a matter of institutional preference. The technology has become so sophisticated that there are significant economic savings available to knowledgeable and technically sophisticated buyers. Personal computers with word processing software are normally less costly than equivalent dedicated word processing equipment. Furthermore, the evolution into electronic mail systems and the transmittal of interpretations and results are facilitated if the word processing equipment and software are compatible with the overall network.

There are significant advantages to including a management engineering function with data processing. Management engineering, sometimes called industrial engineering, works at improving manual procedures with the goal of increasing productivity. Manual procedure changes have been estimated to have the potential to improve productivity from 7 to 10 percent. Through the use of information systems as a change agent, hospitals can better achieve such improvement. Furthermore, ergonomic design is an important part of any system's development. By properly designing the user interface, systems can be made more user friendly and more efficient. Often, where a traditional systems analyst within data processing will try to replicate existing procedures in the change to automation, management engineers will consider revising those procedures.

Under the current reimbursement system, many hospitals are providing automated services for medical staff. Provision of these services should be closely tied to the data processing function, including planning and support of operations. Discussions with physicians indicate there is a general preference for working in institutions with advanced patient care systems.

Larger institutions normally have a clinical engineering or biomedical department that is given the responsibility for the maintenance and support of clinical instrumentation. These departments can also maintain and support terminals, printers, and other equipment associated with information systems, and thus it is natural for them to fall under the same umbrella as the institution's information systems.

Departments that are less technologically oriented but more information intensive may also report under this function, including materials management, admissions, and medical records. The inclusion of these departments is largely a matter of institutional preference.

REPORTING RELATIONSHIPS

The reporting relationship of the information systems function is determined by a number of factors. As shown in Table 1-1, the most common location for the function is within the financial area. However, the trend appears to be to bring the information systems function outside of the financial area and have it report to the chief executive officer. This is a normal evolution as information systems begin to support not only financial operations, but also patient care.

The organization of a data processing department in a medium to large institution is shown in Figure 1-1. Depending upon the organizational structure and the titles within the institution, the head of the data processing department will either be at a directorial or a vice-presidential level. The head of the department will be supported by a steering committee (indicated by a dotted line). The role of the steering committee is to make decisions, usually including those concerning identification of projects and their prioritization. It also supports and reviews the data processing budget and is responsible for information systems planning and updating the information systems plan. It is generally composed of individuals at the senior management level, normally senior vice-presidents and the CEO. The steering committee is a decision-making body rather than a working organization and should be composed of individuals who represent the major users or potential users of IS. Common problems with steering committees include lack of knowledge about hospital information systems and too few members.

In addition to the steering committee, user task forces may be established. A task force is a specialized, goal-oriented focus group. It is made

Table 1-1 Responsibility of Data Processing Department (in Percent)

	Location of Responsibility			
Bed Size	*Chief Executive Officer*	*Chief Financial Officer*	*Chief Operating Officer*	*Other*
1–99	46	50	-	4
100–199	20	67	3	10
200–299	7	70	12	12
300–399	11	48	18	22
400–499	27	54	18	-
500+	6	52	21	21

Source: Computers in Health Care, p. 58, Cardiff Publishing Company, ©December 1986.

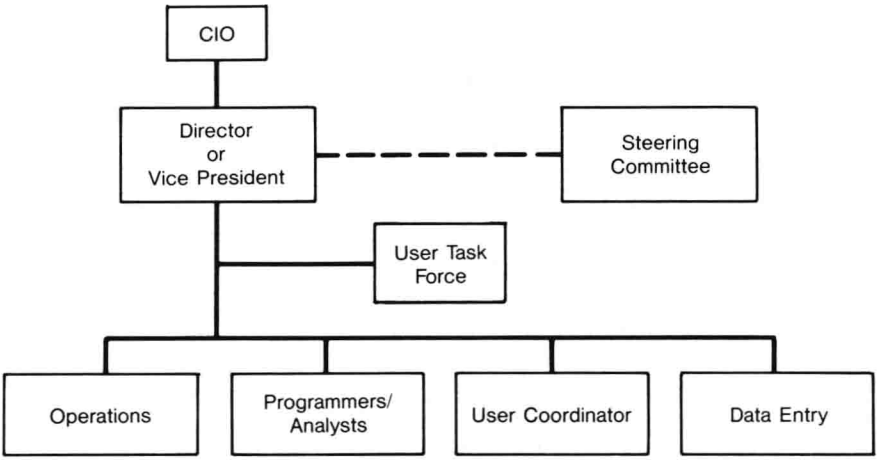

Figure 1-1 Functional Organization of a Data Processing Department

up of senior staff who are usually directly involved in the impacted area. Typical projects may include system selection, system implementation, and planning. Recommendations for assigned topics are made to the steering committee and the information systems head. The projects are designed to foster user involvement. Task forces should be composed of less than 20 members, and probably even less than 10.

More traditional operations and data entry departments are sometimes combined. While systems are being run, operators may also support the data entry activity and be cross-trained to do so. Having operators help in data entry is especially useful where there is a high level of automation, for then data entry requirements are minimal and the requirement for attended operation of the basic systems is minimized. Advanced systems usually need 24-hour, 7-day coverage.

The role of programmers and analysts varies depending on the amount of development that occurs. In those institutions whose systems are shared service or primarily turnkey, the role of the analyst takes on more importance.

User coordinators constitute the primary liaison between the technical people in the information systems department and the hospital end users. They are responsible for training, system modification requests, identification of needs, and ensuring that documentation for the user is current. They have a varied background; the most successful ones, for some reason, tend to come from the laboratory or from the nursing department.

DATA PROCESSING STAFF SIZE

The size of the data processing staff is a function of approach, level of automation, and size of institution (see Table 1-2). A breakdown of data processing staff by approach and job title is found in Table 1-3. Teaching hospitals, owing to their complexity and the amount of custom development, require twice as many people as nonteaching hospitals. A total self-development approach requires the most number of people, followed by the package software approach. A minimum number of staff is required by the shared service approach.

Under the shared service approach, the data processing staff is responsible for basic data entry and operations. There is a limited technical requirement, and vendor coordination becomes the key. Administrative and management interaction with the rest of the institution is required.

The next highest number of staff is required by the turnkey approach. In addition to data entry and operations requirements, greater technical ability is needed. At a minimum, the staff should be knowledgeable in hardware selection and maintenance.

The package software approach requires an advanced technical staff that can install and maintain applications and develop the appropriate interfaces between the applications. Vendor selection, both for software and hardware, is also of great importance.

DATA PROCESSING SALARIES

Data processing salaries tend to be lower in health care than in other industries. According to research done in 1985, for similar data processing budget sizes health care data processing managers and heads of data processing departments were paid an average of $10,000 less. Sala-

Table 1-2 Average Number of Data Processing Employees by Hospital Size

Bed Size	*1984*	*1985*	*1986*
50–200	4.5	5.3	5.9
201–350	9.5	11.0	12.2
351–500	11.5	13.1	16.7
501–650	18.4	24.8	26.8
650+	28.3	28.5	31.1

Sources: Hospitals, p. 87, November 16, 1985, and *Hospitals*, p. 124, March 20, 1987, ©American Hospital Publishing Company.

Table 1-3 Number of Staff by Hospital Size and Type

	Analysts	*Programmers*	*Operators*
Teaching hospitals			
Under 400 beds	7	9.8	8
Over 400 beds	8	15.5	11.8
Nonteaching hospitals			
Under 400 beds	1.2	2.5	5.0
Over 400 beds	3.5	4.75	8.0

Source: Hospitals, p. 109, American Hospital Publishing Company, ©February 20, 1986.

ries are dependent on hospital size, geographic location, data processing approach, and overall data processing budget. Depending on the number of years of experience, the head of the data processing (DP) department with an annual budget of over $3 million will average between $63,000 and $68,000 per year in an IBM environment (Table 1-4). The midpoint of the salary ranges in Table 1-4 is probably a good estimate of the average DP salary, for that position and size budget. A study by a health care research group indicated that the mean for DP executives and all hardware types was close to $45,000. The range by bed size was $30,417 to $56,667. (Table 1-5) Data suggests that DP executives with IBM experience command higher salaries. To accurately establish guidelines for your institution, local salary surveys should be performed.

Table 1-4 Average Annual Salary Ranges by Budget Size (in Thousands of Dollars)

	Budget		
Data Processing Personnel	*Under $1 Million*	*$1–3 Million*	*Over $3 Million*
Data processing executive	$39-43	$50-56	$63-68
Assistant data processing executive	29-35	42-46	49-61
Programming supervisor	30-33	38-41	42-48
Information center manager	22-30	31-34	37-42
Systems programmer	22-34	33-40	39-44
Data base administrator	24-32	32-36	39-43
Programmer/systems analyst	24-28	27-34	31-35
Programmer	22-27	22-29	24-31
Information center programmer	19-23	23-30	27-31
Communications analyst	22-33	27-35	34-39
Nurse analyst	18-28	27-34	30-34

Source: Healthcare Computing & Communications, p. 49, Health Data Analysis, Inc., ©January 1987.

Table 1-5 Data Processing Executive Average Salary by Bedsize

Bedsize	*Average Salary*
1–99	$30,417
100–199	$42,000
200–299	$43,256
300–399	$46,667
400–499	$53,636
500+	$56,667
All hospitals	$45,060

Source: Computers in Healthcare, p. 59, Cardiff Publishing Company, ©December 1986.

BUDGETING DATA PROCESSING

Many different approaches are utilized in budgeting for data processing. These range from the cost per patient-day to the percentage of operating expenditures. Currently in the industry, the percentage of operating expenditures tends to be the most widely used approach. There is no standard reference for level of expenditures. Statistics range from 2 to 4 percent of the operating budget. This of course varies by approach, with facilities management being the most expensive, followed in order by shared service, turnkey, and self-development. Although self-development may appear to be the least costly alternative, it is also the least functional. The average breakdown of expenditures is about 50 percent for staff, 25 percent for hardware- and software-related expenses (including licenses and maintenance), and the remainder for supplies, outside expenses, and related costs. Shared service users will spend more on hardware and software. Conversely, self-development–oriented institutions will spend more on salaries.

A recent study (see Table 1-6) shows that approximately one quarter of hospitals spend under 1.5 percent of the total hospital budget on data processing, while three quarters spend under 3 percent, the median being 2.5 percent. A similar study sponsored by the Healthcare Financial Managers Association showed the average to be between 3 and 4 percent. The wide variation in these studies is probably due to the treatment of capital expenditures. Capital expenditures can effectively double the operating budget (Table 1-7).

The developed guidelines are based on adding in hardware expenditures on an amortized basis if they are not included in the normal operating budget. Other costs that need to be included are personnel, supplies, hardware, software, maintenance, and departmental systems expenses.