A MANAGER'S COMPLETE GUIDE TO EFFECTIVE INFORMATION SYSTEMS

A Questionnaire Approach

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Preface

This book is a landmark publication, the first to report research findings on the evaluation of information systems (IS) controls. But more importantly, the evaluation has resulted in identifying the key problem areas confronting the typical IS manager. The identification of these problems has led to the development of appropriate managerial guidelines to overcome them, or at least to reduce them to a tolerable level. Thus, the book is a much-needed guide that can assist the IS manager in planning and controlling the IS organization. It is an excellent reference that should be on every IS manager's desk as an aid in reaching desired organization goals and objectives.

The research methodology consisted in applying an information systems questionnaire to twenty-four organizations (twelve large corporations and twelve small companies). The questionnaire was divided into two parts: general controls (Questionnaire 1) and application controls (Questionnaire 2). The most recent guidelines of the AICPA (American Institute of Certified Public Accountants) were utilized to develop the complete IS questionnaire, hence it follows a logical structure for evaluating general and application controls of IS organizational systems activities and computer operations. Its structure enables it to identify important problems confronting the IS manager.

Besides a guide and reference for the typical IS manager, this book is an excellent source to assist project managers, operations supervisors, and others under the control of the IS man-

ager. In fact, any person holding a managerial position in the field of information systems (e.g., data processing) would benefit from this guide. This text is useful also as a teaching instrument in an industrial or academic environment. An environment in which the fundamentals of IS management are taught can use this guide as a means of improving the planning, organizing, directing, and controlling of information systems.

This guide follows a logical framework for merging research on information systems and their related problem areas with managerial guidelines to overcome or reduce these problems. The structure is as follows:

- *Part I. Introduction to the Complete Information Systems Questionnaire*
  Chapter 1 details how the relationship of the IS manager to the complete IS questionnaire is set forth and tells how the questionnaire can be utilized to uncover major problem areas of the typical information system.
- *Part II. General and Application Controls: Questionnaires 1 and 2*
  Chapter 2 presents Questionnaire 1 on the general controls over IS organizational activities, and chapter 3 Questionnaire 2 on the application controls over IS operations. Both questionnaires follow recent AICPA guidelines for general and application controls.
- *Part III. Research on General and Application Controls: Questionnaires 1 and 2*
  Based upon the complete IS questionnaire (Questionnaires 1 and 2) presented in Part II, research results are given in Chapter 4 for general controls of large corporations and small companies. Similarly, research findings are set forth in Chapter 5 for application controls for large and small organizations.
- *Part IV. Guidelines for Effective Management of the Complete Information Systems Organization*
  In Chapter 6, managerial guidelines to assist the typical IS manager in effective planning of systems projects and computer operations are offered. In like fashion, Chapter 7 gives an IS manager's guidelines for effective information systems organization. Important guidelines for directing and motivating IS personnel are the subject matter of Chapter 8, while managerial control guidelines for improving security, documentation, and the like are found in Chapter 9. Overall, this part of the guide focuses on managerial guidelines that have successfully been used by the

typical IS manager for effective administration of the information system.

- *Part V. A Managerial Look at Effective Auditing Practices*
  In Chapter 10, the final one, the accent is on a review of current auditing practices and managerial guidelines to improve auditing practices.
- *Appendixes A and B*
  A description of general controls is given in Appendix A, and a description of application controls in Appendix B.

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Introduction to the Complete Information Systems Questionnaire

The Relationship of the Information Systems Manager to the Complete Information Systems Questionnaire

ISSUES EXPLORED

- What are the principal causes of the lack of control over IS organizational operations?
- What is the relationship of effective IS standards to effective IS controls?
- What types of controls are found in a typical information system?
- What are the real purpose and use of a comprehensive information systems questionnaire (Questionnaires 1 and 2) for IS management?

OUTLINE

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In the early years of data processing (DP) the recruitment source of IS managers was such areas as accounting, finance, and engineering. Essentially, these managers were able to relate the overall business to the computer. In many cases they advanced to top management ranks. However, as DP became more specialized, the IS managers were promoted from within the department and thus brought to the job little or no broad-based business experience. As a result the IS managers' jobs came to involve developing DP budgets, managing lower-level DP managers, interfacing with top management, and many other activities. IS managers got caught up in a trap of spending their time "playing systems analyst." This not only hurt them but also decreased the potential of everyone within the department.

To overcome this problem, IS managers must stand back and assess their proper place in the overall company and prepare their organizations for changing times. They must also be willing to manage their people more effectively and provide incentives for those who have the desire and potential to bring business and information processing together. In other words, IS managers must make the transition from hardware/software specialists to generalists with an accent on user needs in the functional areas of the organization. This last point is particularly pertinent to younger managers appearing in the functional departments since they bring with them an increasing understanding and ap-

preciation of computers. Therefore, IS managers must be able to provide these innovative new managers with the type of information processing services they request, which include the push toward the newer decision support systems[1] and distributed data processing systems.[2]

This chapter begins with an exploration of the current status of the typical IS manager and then examines the lack of control over organizational activities and operations. The need to improve current operations, which is fundamentally the focus of this text, is stressed. A starting point for improving information systems would be developing effective IS standards, which are essential to developing effective IS controls. The value and relative cost of information are then examined, since this relationship determines the control points necessary in a system.

Next, internal controls are discussed from both general and accounting viewpoints. Within this broad framework, general and application controls, along with their appropriate subcontrols, are outlined and discussed. *General controls* include those related to the information systems department, systems and procedures, built-in hardware and system software, computer center, and security. On the other hand, *application controls* relate to input, processing, output, data base, and data communication. The final sections of the chapter examine the relationship of IS managers to a complete information systems questionnaire, that is, relating to both general controls and application controls (Questionnaire 1 and Questionnaire 2, respectively). The use of the complete IS questionnaire is helpful to improve IS organizational systems activities and computer operations.

The IS Manager Today

In the present environment it is essential that the IS manager integrate his or her information services into the organization's strategic plans as well as its management structures and processes. If information resources are to be in the mainstream— as a functional service department—the IS manager must move away from the technical mode and into the managerial functions

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[1] Robert J. Thierauf, *Decision Support Systems for Effective Planning and Control: A Case Study Approach* (Englewood Cliffs, N.J.: Prentice-Hall, 1982).

[2] Robert J. Thierauf, *Distributed Processing Systems* (Englewood Cliffs, N.J.: Prentice-Hall, 1978).

of planning, organizing, directing, and controlling IS activities. Logically, the IS manager is linked to every business function. Because the current group of managers were trained as technicians and have spent their entire careers in information systems, they have had no opportunity to familiarize themselves with the business as a whole. Several approaches have been taken to improve this situation.

For a short-term approach, many organizations are placing a non-IS specialist in charge of the IS function with an assistant to keep up with the technological changes. As an example, a bank places technical staff with end-users for a period of time. They become a resource for that department, but also they have an opportunity to learn business methods. The contact with users and top management provides increased visibility. Companies with high turnover have little opportunity to observe and groom existing talent. One firm, for example, feels that IS personnel switch jobs not only because of money. They change employers because they feel that they are in dead-end jobs and hope for a better situation elsewhere. This suggests the approach of cross-training, especially in several areas of a large organization, which provides variety and a sense of participation in the organization. Therefore, in order to provide competent IS management for the organization and to tap the currently unutilized resources in the IS department, top management must recognize the potential that exists. They must also provide opportunities for their employees in terms of predetermined career paths.

Lack of Control over Information Systems

Besides improving the caliber of IS managers currently, another important dimension to IS management emerges when we ask: What are the signs that indicate lack of control over information systems? To understand why control is lacking, one must first take a look at IS plans. Typically, the IS plans developed establish priorities among requests from the functional areas of the organization while attempting to "integrate" the common elements of these requests. Frequently these plans call for short-sighted solutions—more equipment, more software, and more people. Too often they simply do not work because they underemphasize the importance of information as a critical resource. Also, they do not take into account the organization's compre-

hensive information needs and the direction in which it should be headed.

If the following questions sound familiar, it is likely that the company is not taking an enlightened approach to managing its information systems and meeting user needs.

- Does the information systems function constantly need additional resources—hardware, software, and people—yet fail to provide a significant improvement in IS services?
- Are system development projects constantly late, over budget, and inconsistent with original objectives? Also, do implementation estimates seem excessive?
- Are your information systems being used simply as a means for processing operational data instead of as a tool for management?
- Is there a reluctance to request information from IS that would be helpful but not critical, because of the time and people required?
- Is there user disenchantment with services of the IS department?
- Is there growing concern over the ability to outperform the competition and respond to new business opportunities by having the necessary critical information and systems flexibility?

Going beyond the foregoing to a broader context, what information does the organization really need to manage effectively and compete in the market place? How does the organization make sure it is managing the technology—and not the other way around? How can the organization use information systems to capitalize on evolving business opportunities? These issues of maximizing the effectiveness of information systems are a critical top management concern. But equally important, they are of the utmost concern to IS management.

After identifying management areas of concern—from narrow to broad—an effective starting point is the establishment of strategic plans in these areas. Basically, strategic IS plans are concerned with the broad, overall deployment of the organization's IS resources to accomplish desired IS objectives. These strategic plans are supported by specific IS projects and programs that comprise the necessary activities and resources to accomplish them. In turn, these IS projects and programs become the basis for shorter-term IS operational plans. Short-range plans become the standards for controlling operations, that is, they are the selected criteria against which actual IS results are measured to evaluate current performance. This sequence of management activities—IS strategic plans, translated into IS projects and programs, which then become the basis for

short-range operational plans—provides the means for controlling IS organizational systems activities and computer operations on a current basis. Lack of control over daily IS operations indicates that the sequence is not functioning as it should.

The Need to Improve Control over Information Systems

Often perceived as a continuing attempt "to hit a moving target," managing information systems demands an effective response to changing business needs, changing technological capabilities, and ever differing user needs. While these factors as well as many others are occurring outside the IS organization, a whole host of influences are found in the IS organization. For example, many IS managers have wondered what really goes on in their departments. They cling to the belief that what goes on in the computer center is some sort of magic and cannot be analyzed by mere mortals such as themselves. However, with skillful sleuthing and a knowledge of what clues to look for, it is possible to evaluate the quality of the computer center after one visit. To ensure the greatest honesty, that visit should be unannounced. Many IS managers have wondered the same thing about the systems and programming efforts under their control. Can these areas also be reviewed so that deviations from standards can be pinpointed and corrected? Again the answer is yes. Identifying the areas for review is the first step in both situations. To assist in the review process, a two-part complete questionnaire (Questionnaires 1 and 2) for general and application controls of a typical information system is explored in this chapter and the remainder of the text.

This comprehensive IS questionnaire is designed to pinpoint areas where IS organizational systems activities and computer operations are not operating as desired. When specific problem areas have been identified, appropriate recommendations can be made to improve control over the IS department. Before discussing the relationship of Questionnaires 1 and 2 to internal controls, however, it will be helpful to examine IS standards and IS controls, including their underlying principles and importance.

The IS Manager and Effective IS Standards

The need to improve IS operations starts with the establishment of effective IS standards. Effective management of standards

requires continuous, ongoing effort to keep up with changes in the organizaion's needs and the introduction of new technology. Successful IS management depends on the availability of appropriate standards as its most effective tools to meet its goals. Furthermore, measurement of the impact of standards is necessary to determine whether or not they remain effective.

Principles of Effective IS Standards

In the setting of effective information systems standards, IS management must follow the principle of *setting high performance standards*. Managers must demand a high level of performance from their employees as well as themselves in order to be successful. Mediocrity should never be acceptable, and standards should challenge people to operate at close to their best abilities. In other words, IS personnel should be encouraged at all times to stretch their capabilities to meet challenging tasks. This approach relies to a large degree on applying creativity to the IS tasks at hand.

A most important principle that IS management can follow is the principle of *being effective and then efficient*. Management must remember that what is done is much more important than how it is done. Too often, IS standards focus too narrowly on "the right way" to do systems-related work, but IS standards should be broad enough to provide useful guidelines for determining project or activity priorities. In this way, standards can raise the level of effectiveness and the efficiency of the IS organization.

The principle of *involving personnel in setting standards* is also important. It is imperative that the standards be accepted as meaningful, useful, and fair by those who are expected to meet them. An effective way to gain this acceptance is for management to state clearly the reasons for the development of a set of standards and to define how the standards are to be used. It can then delegate to key IS personnel the responsibility for defining the specific details of the standards. This approach ensures broad participation and greatly increases acceptance.

IS managers should review all standards to make sure that they conform to the principle of *appropriate degree of flexibility*. Every effort requires a balance between cost and quality, and standards provide a flexible frame of reference for this judgment. They should not be defined or interpreted so narrowly that they hamstring the managers and become a substitute for a careful and deliberate consideration of a specific situation.