

**Fifth Edition**

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# **ACCOUNTING INFORMATION SYSTEMS**



**George H. Bodnar**

**William S. Hopwood**

# ACCOUNTING INFORMATION SYSTEMS

Fifth Edition

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## PREFACE

The Fifth Edition of *Accounting Information Systems* is intended for introductory and advanced courses at either the undergraduate or graduate level. The text stresses information, communication, and networking technology with state of the art applications relating to EDI, EFT, and paperless accounting systems, applied within the context of transaction cycles and internal control structure. Transaction cycles are a conceptual approach to the study of accounting information systems. Our text was the first to emphasize a transaction cycle approach to the study of accounting information systems. Detailed material on business functions and internal control structure is central to the textbook organization.

The viability of the transaction cycle approach is evident as one considers the enormous technological change that has occurred since the first edition of this text was published in 1980. While technical knowledge gained a decade ago has little current value, knowledge concerning transaction cycles gained a decade ago has increased in importance. An understanding of transaction cycles is fundamental to contemporary auditing, professional, and legal considerations relating to an organization's internal control structure. Each transaction cycle is subject to loss exposures. Management should develop detailed control objectives for each transaction cycle. Such control objectives provide a basis for analysis and audit of an organization's internal control structure as well as a basis for managing the loss exposures which are associated with an organization's dependence on information systems.

Transaction cycles are a specific subtopic on the *Content Specification Outline* for the Auditing section of the Uniform CPA Examination. Both the Certified Internal Auditor Examination and the Certificate in Management Accounting Examination also regularly test understanding of materials pertaining to transaction cycles. Our text contains an extensive CPA, CMA and CIA examination problem set (both multiple choice and essay questions), with complete answers and explanations in the Instructor's Manual.

The author's believe that "hands on" experience is essential to the contemporary Accounting Information Systems course. Accordingly, our text is bundled with *ONEKEY*, a stand-alone general ledger microcomputer software package. This complimentary software is accompanied by the Rabare Company case, and an integrated set of classroom-tested questions and problems that facilitate a complete and fully integrated microcomputer-based review of the accounting cycle.

*ONEKEY* was developed to provide two major benefits to the instructor:



1. *ONEKEY* requires minimum start-up learning time. Classroom experience has shown that students and instructors can learn to use *ONEKEY* in about 15 minutes, without reading the user manual or having any previous computer experience.
2. Although *ONEKEY* contains all the major components of a complex real-world accounting system, it is simplified for classroom use so that students can focus on learning accounting concepts. Students gain all the conceptual advantages of working with a real system without having to be overburdened with volumes of user manuals and mazes of complicated commands and functions.

## Outline of the Text

**Part 1** supplies foundation chapters that survey information technology, transaction processing, transaction cycles, internal control, computer security, systems development, and decision making and reporting systems. Chapters 1 and 2 serve as a general introduction to the entire book, and include flowcharting and other systems documentation techniques. Chapter 3 provides a comprehensive survey of computer-related technology, including both mainframe and microcomputer hardware and software, as well as communications and networking. Chapter 4 discusses the basic structure of accounting systems and includes a comprehensive illustration, the Rabare Company case. (See “The Rabare Company Case” later in the Preface for more details on this important feature). Chapters 5 and 6 lay a basic foundation in internal controls and computer security. Principles of internal control are illustrated in Chapters 7 and 8 in terms of fundamental transaction cycle application systems such as sales order and purchasing. Finally, Chapter 9 provides a one-chapter summary of the systems development life cycle, and Chapter 10 surveys information and managerial decision making.

**Part 2** covers contemporary information technology, with separate chapters on file processing and data management concepts (Chapter 11) and distributed information systems and electronic business data interchange (Chapter 12). Chapter 12 discusses state of the art applications relating to EDI, EFT, and paperless accounting systems.

**Part 3** covers contemporary applications of information technology. Chapter 13 stresses control principles in computer-based application systems. Discussion includes paper-based batch and on-line systems, and contemporary paperless processing systems. Chapter 14 discusses quick response sales and manufacturing systems—state of the art applications of information technology from an EDP auditing viewpoint.

**Part 4** covers the systems development life cycle, with separate chapters on systems planning and analysis (Chapter 16), systems design (Chapter 17), and systems implementation, operation, and control (Chapter 18).

## New Features

Major revisions to the Fifth Edition include the following:

### *New Instructional Aids*

Each chapter contains:

Learning Objectives  
 Chapter Glossary  
 Ten Question Chapter Quiz  
 Review Problem

### *Integrated Treatment of Contemporary Information Technology*

Fewer chapters cover more. To the fullest extent pedagogically possible, all reference to past information technology and practices have been eliminated. We describe what is, and what will be. Network architectures, DDP, paperless systems (EDI, EFT, quick response systems) are presented as basic rather than as advanced topics.

### *Revision and Enlargement of the Rabare Company Case*

Two distinct case assignments are available. Case A requires posting the special journals and inputting several general journal transactions to complete the accounting cycle. Case B—which is more rigorous—adds extra transactions which students must interpret, code, and post to either the special journals or the general journal.

### *Integrated Microcomputer Software Assignments*

These classroom-tested assignments allow the instructor to stress the integrated nature of microcomputer software packages commonly used by accountants. Problems 42 and 43 in Chapter 10 have the student use a microcomputer spreadsheet software package to prepare a common size income statement and a common size balance sheet for the Rabare Company. As the ONEKEY files are in dBase format (i.e., .DBF files), students are able to use the translate facilities of dBase or their spreadsheet software package to convert the Rabare Company's statement into a form that may be directly imported into their spreadsheets. Problem 39 in Chapter 15 carefully explains and demonstrates a simple but effective dBase program that an auditor might use when auditing the Rabare Company's ONEKEY accounting system, then asks students to develop and code similar dBase audit programs for the Rabare Company's data files. Again this is possible as the ONEKEY files are in dBase format.

In addition to the above Rabare case-related assignments, several other microcomputer spreadsheet assignments are included in the text. Problem 34 in Chapter 4 provides four days of sales data for the campus bookstore (problem 33), and asks students to design a cash sales journal and record these data using a microcomputer spreadsheet package. Problem 35 extends this assignment to include file linking to another spreadsheet which contains a sales report summary. Problem 44 in chapter 10 is an investment problem, which allows exploration of spreadsheet formulas to compute present value, internal rate of return, sum-of-the-years-digits depreciation, and double-declining balance depreciation for an investment over a six-year period. Finally, in problem 17 in Chapter 18, students may prepare a spreadsheet to calculate charging rates for a computer operations department.

## **The Rabare Company Case**

This comprehensive case illustration of a microcomputer-based accounting system is an important optional feature of the Fifth Edition. A complimentary microcomputer software package, ONEKEY, is bundled with

this textbook for student use. This package includes all the data files and programs that are discussed in the Rabare Company case in Chapter 4 and is a complete, stand-alone system. *ONEKEY* is in object code and thus does not require any other commercial software to operate on IBM-compatible computers. *ONEKEY* fits on a single, low-density disk (No hard drive required), is easy to use, and is free to the student. A complete user manual to *ONEKEY* follows Chapter 4 in the text.

The material covered in the Rabare case is essential to complement an accounting major's study of Accounting Information Systems because it deals with important systems aspects of accounting that are often not treated in depth in introductory or intermediate accounting courses. Performing all of the steps in the accounting cycle for the Rabare Company case using *ONEKEY* is an excellent way for students to develop and test their understanding of the fundamental aspects of accounting information systems.

The following table summarizes the two different accounting transaction cycle assignments in the Rabare case. The sequence of problems required to do Case A is listed in the first column of the table. Case B includes the additional problems listed in the second column. Students can be instructed to refer to this table when given either of the case assignments.

<b>Rabare Company Problem Assignments</b>	
<b>Case A</b>	<b>Case B—also do</b>
Chapter 7—problem 72. Post sales transactions to the accounts receivable ledger.	Chapter 7—problem 75. Enter additional transactions in the sales journal.
Chapter 7—problem 73. Pay vendors for October's purchases. This problem <i>must</i> be done before problems 74 (and 76 if doing case B).	No additional problem.
Chapter 7—problem 74. Post purchase transactions to the accounts payable ledger.	Chapter 7—problem 76. Enter additional transactions in the purchases journal.
Chapter 8—problem 55. Post cash receipts transactions to the accounts receivable ledger.	Chapter 8—problem 62. Enter additional transactions in the cash receipts journal.
Chapter 8—problem 56. Process payroll journal.	No additional problem.
Chapter 8—problem 57. Reconcile bank statement.	No additional problem.
Chapter 8—problem 58. Use the additional data at the end of the case to bring all accounts up-to-date. Post the journals. Run programs to post the general journal and to update cost of goods sold.	Chapter 8—problem 63. Enter additional transactions in the general journal.
Chapter 8—problem 59. Prepare financial statements.	No additional problem.

The Rabare Company case and *ONEKEY* software can also be used as discussion or problem material in the technology chapters because *ONEKEY*

has many sophisticated features that allow query and processing of the basic data files.

See the Instructors Manual for more information concerning the Rabare Company case and the related problem assignments that appear throughout the text.

## Suggested Teaching Approaches

There is no single, “best” approach to teaching systems. Our text is designed to allow for any one of several approaches to be followed.

1. **General coverage of computer technology, transaction processing, internal controls, systems development, and reporting systems.** Although the Fifth Edition contains eighteen chapters, it is not necessary to cover all of them to deal adequately with the areas of internal controls, reporting systems, information technology, and systems development. Each of these areas is covered in a comprehensive survey chapter designed to act as stand-alone coverage for those not wishing to pursue a special emphasis. Instructors should assign Chapters 1 and 2 as a general introduction to all major topics in the book. After this, students can complete the five functional areas in five comprehensive survey chapters:
  - A. Chapter 3 provides a complete foundation in computer technology, and its topics include hardware and software issues relating to personal computers, midrange computers, and mainframes, as well as communication networks.
  - B. Chapter 4 provides a summary of transaction processing and related technology.
  - C. Chapter 5 provides comprehensive coverage of internal controls.
  - D. Chapter 9 surveys the theory and practices relating to systems development.
  - E. Chapter 10 surveys reporting practices as they relate to Accounting Information Systems.

Most instructors will probably want to cover Chapters 3, 4, and 5, since these chapters are essential for auditing. But many instructors will also want to cover systems development, and Chapter 9 will allow them to provide their students with a one-chapter survey of this important area. Still other instructors will want to cover reporting practices as they relate to Accounting Information Systems, and this material is covered in Chapter 10.

The additional chapters beyond the foundation chapters give the instructor considerable flexibility in providing concentrated coverage in a particular area. Various concentrations are discussed in the following sections.

2. **An emphasis on internal control and flowcharting.** The Fifth Edition provides considerable support for this approach. Depending on one's interests, the instructor can cover internal control in great detail by covering Chapter 5. This chapter examines internal control structure and is equivalent to the internal control chapter found in many other systems books. Many instructors might find that no additional coverage of controls is necessary beyond this point.



The instructor can then cover Chapter 6, which provides comprehensive treatment of computer and information security. There are also two full chapters (7 and 8) that deal specifically with internal accounting controls for revenue, expenditure, production, and finance cycle application systems. These chapters make extensive use of document flowcharts and case materials. In addition, there is a rich set of CPA exam questions included in the problem materials.

Overall, more than 300 questions, problems, and cases on the topic of internal controls are contained in the chapters related to this topic.

- 3. An emphasis on systems development.** Part 4 provides a comprehensive treatment of systems development. However, the concepts of the life cycle, structured analysis, and even logical data flow diagrams are introduced in Chapters 1 and 2. Again, this allows the instructor great flexibility, since many will find the introductory material to provide adequate coverage of systems development. However, those desiring more in-depth coverage of the systems life cycle have the option of choosing this focus right from the beginning.

Chapter 9 provides a complete introduction to systems development and discusses all major phases of the life cycle, emphasizing structured development, modularity, and documentation. This chapter should be adequate for a comprehensive introduction to the topic.

Those who wish to cover the systems life cycle and systems development more thoroughly may want to include Chapters 16 through 18, which examine systems planning, analysis, design, implementation, operation, evaluation, control, and auditing. Some instructors may wish to cover only one or several of these topics.

All chapters relating to systems development and the life cycle include a wide variety of questions, problems, and cases.

- 4. An emphasis on information technology.** Six chapters are devoted to computer-related technology and computer-based systems. Chapter 3 provides the basic foundation in information technology. Chapters 11 and 12 provide more advanced topics including database systems and distributed information systems. Chapter 13 covers the fundamental procedures for transaction processing common to all automated systems. Chapter 14 deals with completely paperless accounting systems that rely on electronic data interchange, source data automation, and specialized networking technology. Chapter 15 deals with auditing computerized systems.
- 5. An emphasis on decision support and reporting.** The introductory chapters treat the entire information system from the decision support view. Managers and other recipients of information are treated as more than just receivers of the system's output. They are integral components of the system itself. This is supported by Chapter 10, which provides a thorough coverage of reporting systems from the standpoint of decision support.

Part 4, relating to systems development, treats the user as the reason for the system's existence. Decision analytic techniques such as decision flow diagrams and input/output matrices are used extensively.

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# **Part One**

## **Introduction To Accounting Information Systems**

### **1**

## **ACCOUNTING INFORMATION SYSTEMS: AN OVERVIEW**

### **Learning Objectives**

Careful study of this chapter will enable you to:

- Understand the related concepts of transaction cycles and internal control structure.
- Describe the organizational structure of the information system function in organizations.
- Discuss applications of information technology in organizations.
- Characterize the development of information systems.

## **ACCOUNTING INFORMATION SYSTEMS AND BUSINESS ORGANIZATIONS**

Organizations depend on information systems in order to stay competitive. Information is just as much a resource as plant and equipment. Productivity, which is crucial to staying competitive, can be increased through

better information systems. Accounting, as an information system, identifies, collects, processes, and communicates economic information about an entity to a wide variety of people. Information is useful data organized such that correct decisions can be based on it. A system is a collection of resources related such that certain objectives can be achieved.

An **accounting information system** is a collection of resources, such as people and equipment, designed to transform financial data into information. This information is communicated to a wide variety of decision makers. Accounting information systems perform this transformation whether they are essentially manual systems or thoroughly computerized.

## Information and Decisions

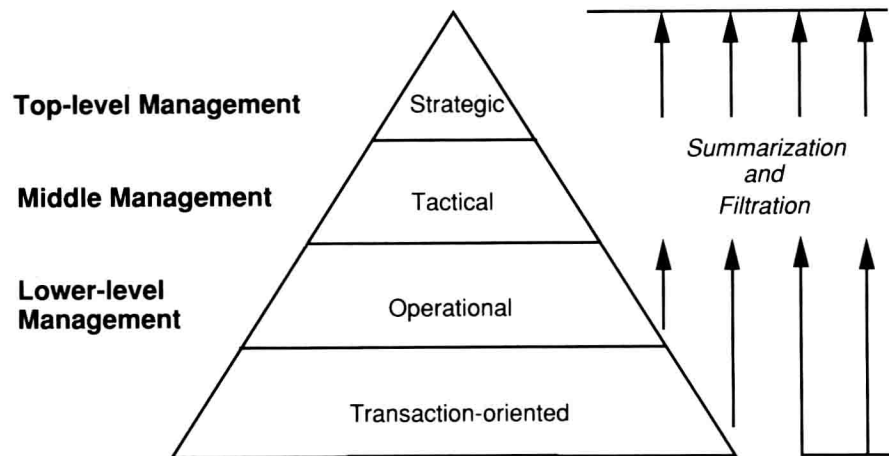
An organization is a collection of decision-making units that exist to pursue objectives. As a system, every organization accepts inputs and transforms them into outputs that take the form of products and services. A manufacturing firm transforms raw material, labor, and other scarce resource inputs into tangible items, such as furniture, that are subsequently sold in pursuit of the goal of profit. A university accepts a variety of inputs, such as faculty labor and student time, and transforms these inputs into a variety of outputs in pursuit of the broad goals of education and the promotion of knowledge. Conceptually, all organizational systems seek objectives through a process of resource allocation, which is accomplished through the process of managerial decision making. Information has economic value to the extent that it facilitates resource allocation decisions, thus assisting a system in its pursuit of goals. Indeed, information may be the most important organizational resource.

The users of accounting information fall into two broad groups: external and internal. External users include stockholders, investors, creditors, government agencies, customers and vendors, competitors, labor unions, and the public at large. External users receive and depend on a variety of outputs from an organization's accounting information system. Many of these outputs are of a routine nature. Accounts payable transactions with suppliers, for example, require outputs such as purchase orders and checks from an organization's accounting information system. Customers receive bills and make payments, which are processed by the accounting information system. Employees receive paychecks and other payroll-related data; stockholders receive dividend checks and routine information concerning stock transactions.

The information needs of external users are varied. The publication of general-purpose financial statements, such as balance sheets and income statements, and other nonroutine outputs assist in meeting these needs. Stockholders, investors at large, creditors, and other external users utilize a firm's general-purpose financial statements to evaluate past performance, predict future performance, and gain other insights into an organization.

Internal users comprise managers, whose requirements depend on their level in an organization or on the particular function they perform. Figure 1.1 is a schematic of the different levels of managerial interest in information. The diagram emphasizes that there are different information needs and demands at different managerial levels in an organization. The accounting information system summarizes and filters the data available to





**Figure 1.1** Pyramid of Information Levels in an Organization.

decision makers. By processing the data, the accounting information system influences organizational decisions.

Figure 1.2 presents information characteristics relevant to lower-level, middle, and top-level managers in an organization. Top-level management is generally concerned with long-run strategic planning and control. Accounting reports to top-level management accordingly consist largely of aggregated and summarized items such as total quarterly sales by product line or division. Middle managers need more detail, such as daily or weekly sales by product line, as their scope of control is narrower. Lower-level managers

	Lower-Level Managers	Middle Managers	Top-level Managers
Characteristics of Information	Operational Control	Management Control	Strategic Planning
Source	Largely Internal	----->	External
Scope	Well-Defined, Narrow	----->	Very Wide
Level of Aggregation	Detailed	----->	Aggregate
Time Horizon	Historical	----->	Future
Currency	Highly Current	----->	Quite Old
Required Accuracy	High	----->	Low
Frequency of Use	Very Frequent	----->	Infrequent

**Figure 1.2** Information Qualities.

typically receive information relevant only to their particular subunit, such as the total sales of Department A. Personnel in the lower levels of an organization, such as clerks processing payroll or sales transaction data, constantly interact with the detailed transaction data itself.

The production of useful information is constrained by the environment of an accounting information system and the cost-benefit structure inherent in users' decisions. The uncertainty of the environment in which information is developed and presented means that estimates and judgments must be made. No information system can ignore the practicality of presenting information. If information costs more to provide than it is worth to the user, it is not practical to provide this information.

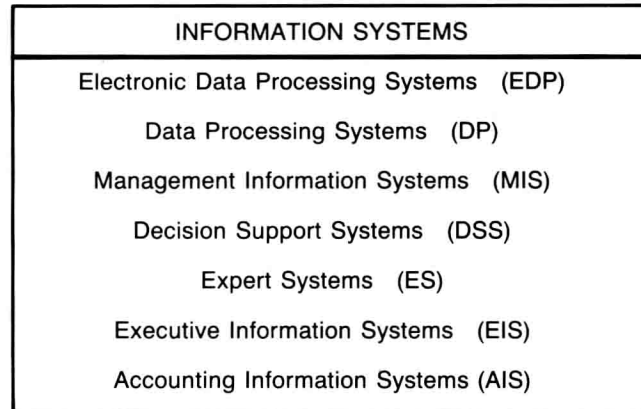
From an organization's viewpoint, a distinction might be drawn between two broad classes of accounting information: mandatory and discretionary. Various government agencies, private agencies, and legislation set statutory requirements for record keeping and reports. Reports, for example, are required for federal and state income taxes, social security taxes, and by the Securities and Exchange Commission, Federal Trade Commission, and the like. In addition, certain basic accounting functions are essential to normal business activity. Payroll and accounts receivable are prime examples. These functions must be performed in any organization if the organization is to survive. Budgetary systems, responsibility accounting systems, and specific reports for internal management are examples of discretionary information. Conceptually, information should satisfy a cost-benefit criterion. Although the criterion theoretically applies to all the outputs of an accounting information system, the typical organization does not have control over all its information requirements. In meeting mandatory information requirements, the primary consideration is minimizing costs while meeting minimum standards of reliability and usefulness. When the provision of information is discretionary, the primary consideration is that the benefits obtained exceed the costs of production.

## Information Systems

The term *information system* suggests the use of computer technology in an organization to provide information to users. A "computer-based" information system is a collection of computer hardware and software designed to transform data into useful information. As indicated in Figure 1.3, one might distinguish several types of computer-based information systems.

**Data Processing.** **Electronic Data Processing (EDP)** is the use of computer technology to perform an organization's transaction-oriented data processing. EDP is a fundamental accounting information system application in every organization. As computer technology has become commonplace, the term **Data Processing (DP)** has come to have the same meaning as EDP.

**Management Information Systems.** **Management Information System (MIS)** describes the use of computer technology to provide decision-oriented information to managers. An MIS provides a wide variety of information beyond that which is associated with DP in organizations. MIS recognizes



**Figure 1.3** Types of Information Systems.

that managers within an organization use and require information in decision making, and that computer-based information systems can assist in providing information to managers.

**Functional MIS Subsystems.** Many organizations apply the MIS concept to specific functional areas within the organization. Terms such as Marketing Information System, Manufacturing Information System, and Human Resources Information System indicate the tailoring of the MIS concept to the development of specific information systems to support decision making in a particular, well-defined organization subunit.

**A Marketing Information System** is an MIS that provides information to be used by the marketing function. Much of the information is provided by the organization's accounting information system. Examples are sales summaries and cost information. Other information must be collected from the organization's environment. Examples of environmental information would include consumer preference data, customer profiles, and information on competitor's products.

**A Manufacturing Information System** is an MIS that provides information to be used by the manufacturing function. Much of the information is provided by the organization's accounting information system. Examples are inventory summaries and cost information. Other information must be collected from the organization's environment. Examples of environmental information would include raw material data, potential new vendor profiles, and information on new manufacturing techniques.

**A Human Resource Information System** is an MIS that provides information to be used by the human resource (i.e., personnel) function. Much of the information is provided by the organization's accounting information system. Examples are wage and payroll tax summaries and benefit information. Other information must be collected from the organization's environment. Examples of environmental information would include government regulation data and general labor market information.

**A Financial Information System** is an MIS that provides information to be used by the finance function. Much of the information is provided by the organization's accounting information system application. Examples are cash flow summaries and payment information. Other information must

be collected from the organization's environment. Examples of environmental information would include interest rate data, lender profiles, and information on credit markets.

The functional MIS subsystems discussed above are found in many organizations. Any well-defined application area in an organization might develop its own MIS. An Internal Audit Information System might be developed for use by the internal audit function. A Corporate Quality Information System might be developed for use by an organization's corporate quality group.

It is important to note that functional MIS subsystems are not physically independent. They share common information system resources in an organization. In particular, they all depend on an organization's accounting information system for important inputs concerning the results of operations and other matters. Functional MIS subsystems represent a logical rather than physical way of implementing the MIS concept in organizations.

**Decision Support Systems.** In a **Decision Support System (DSS)**, data are processed into a decision-making format for the end user. A DSS requires the use of decision models and specialized databases, and differs significantly from a DP system. A DSS is directed at serving ad hoc, specific, non-routine information requests by management. DP systems serve routine, recurring, general information needs. A DSS is designed for specific types of decisions for specific users. A familiar example is the use of spreadsheet software to perform "what if" analyses of operating or budget data, such as sales forecasting by marketing personnel.

**Expert Systems.** An **Expert System (ES)** is a knowledge-based information system that uses its knowledge about a specific application area to act as an expert consultant to end users. Like DSS, an ES requires the use of decision models and specialized databases. Unlike DSS, an ES also requires the development of a **knowledge base**—the special knowledge that an expert possesses in the decision area—and an **inference engine**—the process by which the expert makes a decision. An ES attempts to replicate the decisions that would be made by an expert, human decision maker in the same decision situation. An ES differs from a DSS in that a DSS assists a user in making a decision, whereas an ES makes the decision.

**Executive Information Systems.** An **Executive Information System (EIS)** is tailored to the strategic information needs of top-level management. Much of the information used by top-level management comes from sources other than an organization's information systems. Examples are meetings, memos, television, periodicals, and social activities. But some information must be processed by the organization's information systems. An EIS provides top-level management with easy access to selective information that has been processed by the organization's information systems. This selective information concerns the key success factors that top-level management has identified as being critical to the organization's success. Actual versus projected market share for product groups and budget versus actual profit and loss data for divisions might be key success factors for a top-level executive.