

USE OF ACTIVITY-BASED COSTING IN THE PUBLIC SECTOR

by

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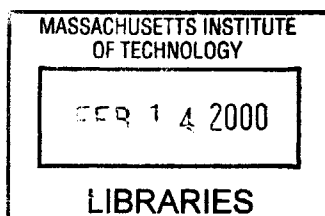
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ABSTRACT

Activity-based costing (ABC) is widely used by private sector manufacturers and service providers, in order to establish accurate costs of producing individual products and providing individual services. ABC argues that activities consume resources to generate products and services. It focuses on the allocation of the costs of overhead resources to products and services, which was traditionally performed on an arbitrary basis. In effect, the main task with ABC is to identify, for overhead or indirect costs, the relevant activities that consume the costs and the basis for allocating the costs of these activities to the various products and services.

Activity-based costing works is useful in two situations: areas with large and growing expenses in indirect and support costs, and areas with a large variety in products, customers, and processes. Since government is characterized by a significant number of services or products, which are provided using the same organizational support, administration, and overheads, the use of ABC in government could be appropriate.

This thesis will start by describing the characteristics of the four stages of cost systems development that organizations may experience. It will then describe governmental accounting and financial reporting and identify the stage of cost systems development reached by governmental cost systems. In a third step, the thesis will explain the steps to be followed in the implementation of ABC and operational feedback systems. Finally, the thesis will describe ABC efforts in government, both at the local and federal level.

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CHAPTER ONE

STAGES OF COST SYSTEMS DEVELOPMENT

Robert S. Kaplan and Robin Cooper, in *Cost & Effect: Using Integrated Cost Systems to Drive Profitability and Performance*, identify four stages for the development of cost systems within companies (see Exhibit 1). Although the authors focus on industrial production and consequently the private sector in their analysis, their conclusions can be readily expanded to governmental entities.

In this chapter, we will describe the different stages of cost systems as they fit in the private sector. We will begin by explaining the mechanics of accounting system modules.

ACCOUNTING SYSTEM MODULES

Contemporary accounting systems consist of an integration of separate modules. The central module is the general ledger, which is a database organized around the organization's chart of accounts. The chart of accounts provides details about six basic categories of general ledger accounts: assets, liabilities, equity, revenues, cost of goods sold (or cost of sales in service organizations), and operating expenses. The general ledger takes transactions in double-entry format (debits and credits) either directly or through another module, posts information about each transaction in the appropriate general ledger accounts, and generates the four primary periodic financial statements, namely income statement, balance sheet, statement of retained earnings, and cash flow statement (21, pp. 91-96).

ACCOUNTS RECEIVABLE MODULE

This module is organized around the customer. It generates sales orders, whenever customers place orders with the company, billing statements (either periodically or soon

after the sale), and customer status reports either periodically or as needed. It also generates aging reports that show how many accounts (and their dollar amounts) are less than 30 days old, how many are between 31 and 60 days old, and how many are more than 90 days old. This aging information is critical for the effective management and collection of receivables.

ACCOUNTS PAYABLE MODULE

This module is organized around vendors. It generates purchase orders to vendors, checks to vendors at time of payment, discrepancy reports (to show differences between the items and amounts on purchase orders sent to vendors and the invoices received from them), and aging reports to support the management of payables. The module also generates cash requirement forecasts by due date, in order to minimize interest costs without jeopardizing vendor relations.

PAYROLL MODULE

This module processes employee time sheets and generates payroll checks and statements to employees and taxing authorities. The amounts shown on these statements are based on each employee's pay rate, overtime provisions, authorized deductions (for health insurance for example), income tax information (federal, state, and local), and current social security tax rates and ceilings.

INVENTORY MODULE

This module provides information needed both for financial reporting and for management purposes. It calculates the cost of goods sold for the firm's income statement and the inventory level reported on the firm's balance sheet. As a management tool, the inventory module generates inventory status reports, which provide detailed periodic counts of inventory items, in order to support the management of both purchasing and production. The inventory module also calculates the economic order

quantity, i.e., the order size that minimizes the sum of holding costs and ordering costs, and generates periodic usage reports, which provide important information about how much material has been used in each production center for the purpose of waste minimization.

FIXED ASSETS AND JOB-COSTING MODULES

The fixed assets module accounts for the depreciation of existing capital assets and the purchase of new ones. The job-costing module is used to keep track of the costs of labor, material, equipment, subcontracting, and overhead, and profitability on a job-by-job basis.

STAGE I COST SYSTEMS

According to Kaplan and Cooper, Stage I systems are not useful for financial reporting because of two major flaws in their design. The first flaw is the poor internal controls for recording transactions so that transactions are either not recorded or recorded incorrectly. The second flaw is the use of incorrect algorithms for allocating overhead costs to products and for updating old standard costs to current price levels. These incorrect algorithms introduce errors into the accounts, resulting in book values of inventory that can almost never match physical inventory. The characteristics of Stage I cost systems can be summarized as follows:

- Extensive amounts of time and resources required to consolidate different reporting entities within the company and to close the books each accounting period
- Unexpected variances occurring at the end of each accounting period when physical inventories are reconciled against book values
- Large writedowns of inventory after internal and external audits
- Many postclosing adjusting entries to the financial accounts
- A general lack of integrity and auditability of the system.

Most companies are beyond Stage I cost systems as they can easily acquire and install modern general ledger systems that avoid the aforementioned problems (17, pp. 10-13).

STAGE II COST SYSTEMS

Stage II cost systems (see Exhibit 2) are adopted by most companies in the private sector.

They have the following characteristics:

- They meet financial reporting requirements
- They collect costs by responsibility centers rather than by activities and business processes
- They report highly distorted product costs
- They have nonexistent or highly distorted customer costs
- They provide feedback to managers that is too late, too aggregate, and too financial.

Stage II cost systems are adequate for valuing inventory for financial reporting purposes and for preparing periodic financial reports. In effect, these systems have common data and account definitions across different business units, which allow managers to compare and consolidate financial results across multiple business units and divisions. They generate financial statements that comply with standards established by financial reporting, government, regulatory, and tax authorities. In fact, the systems for data recording and processing have great integrity so that they satisfy auditability and internal control standards.

However, Stage II cost systems also report individual product costs, using the same simple and aggregate methods used for external financial reporting, to value inventory and measure the cost-of-goods sold. Moreover, Stage II systems provide financial feedback to managers and employees on the same reporting cycle used to prepare the aggregate organizational financial statements. Stage II systems are thus inadequate for estimating the cost of activities, business processes, products, and services, and for providing useful feedback to improve business processes. On one hand, the poor costing

defect results from the assignment of costs to products. The methods used to allocate overhead and indirect costs to products for inventory valuation may be adequate for the aggregate inventory accounts on the balance sheet and the cost-of-goods-sold account on the income statement. Errors in product costing at the individual product-unit level cancel each other out as products are agglomerated together at the balance sheet and income statement levels. In addition, whatever their defects in the method of cost assignment, the systems use the same method each year and thus satisfy auditors and financial accountants who prefer consistency to accuracy.

Many Stage II cost systems allocate indirect and support costs to products using direct labor measures (hours or dollars). These systems are easy to operate since information on direct labor has to be collected anyway to pay and monitor the direct labor workforce. Direct labor-based overhead allocation systems made sense 50-80 years ago because direct labor was a significant portion of a company's total manufacturing conversion cost. As automation was introduced into production processes, companies began using machine-hour allocation bases in their product costing systems. In the same sense, some companies shifted some of the costs of material acquisition activities (such as purchasing, receiving, inspection, handling, and storage) to a materials overhead pool that can be allocated to purchased items based on a percentage markup over purchase cost. Some companies also attempted to improve their Stage II cost systems by defining more cost centers, to match the increased diversity of different production processes and machines in their plants.

However, using additional overhead allocation bases such as material cost and machine hours, and increasing the number of cost centers still do not reflect the economics of companies with complex processes, multiple products and services, and diverse customers, because they assume that factory indirect and support costs vary with the physical volume or number of the units produced. They fail to recognize that many expensive factory resources are supplied to handle the production of batches of items (activities required for setup, ordering, receiving, moving, and inspecting products) and

to design and sustain the products the plant is capable of producing (activities required to design, improve, and maintain individual products). In brief, Stage II costs systems fail to capture the economics of production batches and product variety.

Another flaw in Stage II cost systems, resulting in poor costing of products, activities, and services is that certain cash expenditures, reported in financial statements below the line under marketing and selling, administrative, distribution, and research and development are not assigned to cost objects because periodic financial reporting does not require this assignment.

On the other hand, the poor feedback for learning and improvement defect results from the fact that financial reports prepared by Stage II cost systems are delayed for several days or weeks after the close of an accounting period because of the complexities associated with closing the books. Since managers and operators need timely and accurate reports to take corrective actions, Stage II cost systems are consequently inadequate for learning and improvement. The following quote from a financial officer describes the previous argument:

To understand the problem of delayed and aggregate financial information, you could think of the department manager as a bowler, throwing a ball at pins every minute. But we don't let the bowler see how many pins he has knocked down with each throw. At the end of the month, we close the books, calculate the total number of pins knocked down during the month, compare this total with a standard, and report the total and the variance back to the bowler. If the total number is below standard, we ask the bowler for an explanation and encourage him to do better next period. We're beginning to understand that we won't turn out many world-class bowlers with this type of reporting system (16, pp. 6-7).

Furthermore, the periodic performance reports for many operating departments contain extensive cost allocations, so that managers are held accountable for performance that is

neither under their control nor traceable to them. The costs of corporate- or factory-level resources, such as the heat or lighting in the building are allocated arbitrarily to individual departments although the departments are not responsible for these costs. Each department must know its true cost, not an arbitrary cost, contaminated or influenced by the costs of other departments over whom the department in question has no control (17, pp. 14-18).

STAGE III COST SYSTEMS

Stage III systems for financial reporting, cost measurement, and performance management comprise (see Exhibit 2):

- A traditional, but well-functioning financial system that performs basic accounting and transactions-capturing functions, and prepares monthly or quarterly financial statements for external users, using conventional methods for allocating periodic production costs to cost-of-goods sold and inventory accounts.
- One or more activity-based cost systems that take data from the “official” financial system, as well as from other information and operating systems, to measure accurately the costs of activities, processes, products, services, customers, and organizational units.
- Operational feedback systems that provide operators and all front-line employees with timely, accurate information, both financial and nonfinancial, on the efficiency, quality, and cycle times of business processes.

Companies that operate with a Stage III cost system usually keep their existing Stage II cost system for the purpose of external financial reporting. In effect, these companies need a basic financial system to capture the transactions occurring continually throughout their operations, to assign these transactions to accounts in a general ledger system, and to aggregate and process them to prepare the statutory periodic financial statements.

Since Stage II systems are already adequate for financial reporting, it is illogical to eliminate them, although they are not suitable for managerial decision-making and for employees' learning and improvement. Given the availability, in the 1990's, of networked client-server systems, the processing of available information into specialized managerial accounting systems is not a difficult or expensive task. Development times do not exceed a few months, and total resource costs are in the order of tens to hundreds of thousands of dollars. Information technology, in its most recent form, allows companies to establish two customized cost and performance measurement systems for managerial purposes:

1. **Activity-based cost systems** to provide accurate information about the costs of activities and business processes, and the costs of individual products and services.
2. **Operational control and learning systems** to provide new and more timely feedback to employees, including non-financial and perhaps financial information, for their problem-solving and improvement activities.

The first of the aforementioned systems, namely activity-based cost systems, serve to set priorities for process improvement activities and help managers make strategic decisions. However, since ABC systems are not useful for short-term operational decisions and control, a second managerial financial system is required to provide day-to-day feedback on the performance of business processes: an innovative cost system for learning and improvement. The installation of both systems can be done without significant investments in new hardware or software. In fact, the data and information usually exist in the legacy Stage II system and in other information systems within the organization. What needs to be done is to develop protocols for accessing the required data from multiple organizational systems and download the data into the local network and workstations where the customized processing for ABC and operational feedback occurs (17, pp.19-22).

STAGE IV COST SYSTEMS

In this stage, the ABC and operational feedback systems are integrated and together provide timely, relevant, and accurate information for managers and for external constituencies (see Exhibit 3). No fundamental conflict exists between the product costs calculated by the activity-based cost system and the external requirements for objective, consistent valuations of inventory and cost-of-goods sold. The cost drivers in the ABC system can be used to assign indirect and support costs to products for financial reporting. Expenses that have been assigned to individual product units, but which cannot be allocated to inventory according to generally accepted accounting principles, regulatory requirements, or tax rules are automatically eliminated in the preparation of financial reports. For instance, the cost of carrying inventory and of making product improvements may have been assigned to products in the ABC model, but these expenses are not inventoriable and thus have to be stripped away. A simple attribute field for each assigned activity can flag these non-inventoriable expenses so that the system eliminates them from product costs in inventory accounts. On the other hand, the ABC system may not transfer some facility-sustaining expenses to product units, although these expenses have to be assigned to the product units according to financial, regulatory or tax reporting requirements. In this case, the Stage IV system corrects the allocation so that it includes the facility-sustaining expenses.

The actual expenses required for the preparation of periodic financial reports can be found in the feedback systems that capture data continually from daily operations. The financial elements in operational feedback systems can be aggregated together periodically and given to the financial accountants in order to prepare external financial reports. Thus, the operational feedback system becomes integrated with the system preparing periodic external financial reports. Note here the major shift in perspective from Stage II cost systems to Stage IV cost systems. In effect, in Stage II systems, managerially relevant information for costing of activities and products had to be derived

and extracted from financial accounting reports. Whereas in Stage IV systems, the information obtained from managerial systems (ABC and operational feedback) is provided to accountants who reconcile these information with statutory needs. In Stage II systems, financial accounting and external reporting are prime, whereas in Stage IV systems, the emphasis is on maximizing the benefits to decision-making managers and front-line employees who work continually to improve business processes.

The integration, in Stage IV cost systems, of the information provided by the ABC and operational feedback systems is critical for business process improvement. In effect, the ABC system becomes the basis for the organization's budget, which establishes the supply and usage of resources in all business units. The activity-based budget derived from the ABC system is then used by the operational feedback system to compare and analyze the actual expenses incurred by each of the business units throughout the year. In return, the operational feedback system provides the ABC system with information about the most recent efficiencies and capacity utilization of operations. The ABC cost driver rates are consequently updated – quickly and reliably when the organization has improved its operating efficiencies (17, pp. 23-24).

PROGRESSIVE JOURNEY FROM STAGE II TO STAGE IV

It is recommended to move progressively from Stage II to Stage IV cost systems, by experimenting with ABC and operational feedback systems in Stage III. In fact, any attempt to migrate directly from an obsolete Stage II cost system to a new, integrated Stage IV system will fail for two reasons. First, the requirements for simplicity, objectivity, and auditability for the financial reporting statements inevitably compromise the fundamental design principles of the ABC system so that it does not provide valid estimates of the costs of activities and business processes and of the cost of resources used for products and services.

Second, calculating actual cost driver rates for the most recent period (monthly) as the basis of feedback to front-line operators and employees about the efficiency of their operations uses the ABC information in an inappropriate and incorrect manner. Operators would, as in Stage II systems, get distorted and delayed information about the efficiency of their operations, rather than the more accurate, timely information from a Stage III operational feedback system.

The installation by companies of sophisticated, extensive, and expensive enterprise-wide systems may be an encouragement to direct migration from Stage II to Stage IV cost systems. In effect, these systems can capture information from anywhere in the world, and make aggregated versions of the data available, on-line and in real time, to all authorized managers and employees. Having on-line, accessible, real-time, and consistent data available in an integrated fashion throughout the organization offers the latter an easy path to Stage IV cost-system capabilities. However, once the organization understands the conceptual theory underlying activity-based costing and activity-based management, it becomes clear that daily, actual cost drivers are not the desired information sought from an ABC system. In effect, rather than obtaining distorted information as provided by Stage II systems once a quarter or once a year, managers would obtain distorted information daily. The data and information from enterprise-wide systems are only an input to activity-based costing and operational feedback systems; they are not a substitute.

Thus, companies need the experimentation and learning that occur with Stage III financial systems. They need to understand how to structure their activity-based systems for their particular managerial purposes, need to solve some technical measurement issues, and eventually, need to explore the structure of the financial and non-financial feedback they provide to employees for their learning and improvement activities. It is essential not to abandon the security of the Stage II financial system while reaching out to a Stage III system (17, pp. 25-27).

In the next chapter, we will describe governmental accounting and financial reporting. From the description of these disciplines, we will conclude that municipalities' cost systems are still at the Stage II level, which is financial-reporting driven.

CHAPTER TWO

GOVERNMENTAL ACCOUNTING AND FINANCIAL REPORTING

In this chapter, we will describe the principles of governmental accounting and financial reporting, and identify the stage of cost system development in which governmental accounting falls.

GENERAL OVERVIEW

Formal standard-setting in the governmental accounting and financial reporting arena began in 1934 with the National Committee on Municipal Accounting and has evolved through the establishment, in June 1984, of the Governmental Accounting Standards Board (GASB). The GASB, like its private-sector counterpart, the Financial Accounting Standards Board (FASB), functions under the auspices of the Financial Accounting Foundation (FAF). The GASB was established in accordance with an agreement concerning the structure for a governmental accounting standards board (better known as the structural agreement), presented in the GASB's Rules of Procedure, which sets forth the relative jurisdictions of the two boards.

The structural agreement clearly establishes the GASB as the primary accounting and financial reporting standard-setting body for state and local governments. In addition, the American Institute of Certified Public Accountants (AICPA) reaffirmed the GASB's authority by designating it as the "body to establish financial accounting principles for state and local government entities", following the AICPA's Ethics Rule 203 (4, p. 1).

USERS OF FINANCIAL REPORTS

As we stated previously, the GASB is responsible for establishing and improving accounting and financial reporting standards at the state and local government level. In developing a theoretical base for the creation of future standards, the GASB established external financial reporting objectives. Even though the GASB's focus for these objectives was limited to external financial reporting, it should be remembered that a primary objective of any accounting system is to provide information that can be disseminated to users through financial reports. Therefore, a financial reporting objective can directly influence the accounting system from which the information was derived.

Accountability was identified by the GASB in its 1987 Codification of Governmental Accounting and Financial Reporting Standards, Section 100.176, as "the paramount objective from which all other objectives must flow". Accountability was defined in the 1987 Codification, Section 100.156 as the requirement for "governments to answer to the citizenry – to justify the raising of public resources and the purposes for which they are used." The GASB identifies three groups of external financial report users:

1. Citizens, including taxpayers, voters, public interest groups, and the media.
2. Legislative and oversight bodies, including state legislatures, county boards, city councils, school boards, and boards of trustees.
3. Investors and creditors, including individual and institutional investors, securities underwriters, bond rating agencies, and bond insurers.

Governments' management was not identified by GASB as a primary user group of external financial reports because it can obtain the required information from other internal sources. However, management is actually one of the primary users of external reports as these reports can provide quick access to certain key information.

USES OF FINANCIAL REPORTS

The 1987 Codification, Section 100.132, identifies four (4) different uses of external financial reports in assessing accountability and making social and economic decisions:

1. Comparing actual financial results with legally adopted budgets.
2. Assessing financial condition and results of operations.
3. Assisting in determining compliance with finance-related laws, rules, and regulations.
4. Assisting in evaluating efficiency and effectiveness (4, p. 2).

FINANCIAL REPORTING CHARACTERISTICS

The 1987 Codification, Section 100.162 of the GASB identified six (6) essential characteristics that must be inherent in any report that effectively communicates financial information. These characteristics are:

- Understandability
- Reliability
- Relevance
- Timeliness
- Consistency
- Comparability (4, p. 3)

UNDERSTANDABILITY

The financial reports issued should not be exclusively addressed to knowledgeable users. Average users must also be able to use the reports so that public accountability is effectively stressed.

RELIABILITY

The information presented in external financial reports should be verifiable and free from bias. The GASB stated that for a report to be reliable, “it needs to be comprehensive”.

RELEVANCE

For a financial report to be relevant, it must contain information that meets the needs of the financial statement's users. Relevance also involves timeliness and reliability.

TIMELINESS

A financial report should be issued on a timely basis in order to be useful to financial statement readers. The time period within which a report should be issued depends on the type of information presented. For instance, the Government Finance Officers Association (GFOA) considers a comprehensive annual financial report to be timely if it is issued within six months of the government's fiscal year end. However, the GFOA strongly encourages the issuance of reports within a shorter period, varying from three to five months.

CONSISTENCY

Financial reports should be prepared using a basis of accounting, which is consistent from transaction to transaction and from period to period. Any change in accounting principles should be disclosed.

COMPARABILITY

The GASB provides that "differences between financial reports should be due to substantive differences in the underlying transactions or in the governmental structure rather than due to the selection of different alternatives in accounting procedures or practices." No two governments' annual reports are identical from a pure comparability standpoint; however, reasonable comparability can be achieved within the context of standard procedures and practices.

FINANCIAL REPORTING OBJECTIVES

The 1987 Codification, Sections 100.177-.179 identifies three primary financial objectives for external financial reporting, including the paramount objective of accountability discussed above:

- Financial reporting should assist in fulfilling government's duty to be publicly accountable and should enable users to assess that accountability.
- Financial reporting should assist users in evaluating the operating results of the governmental entity for the year.
- Financial reporting should assist users in assessing the level of services that can be provided by the governmental entity and its ability to meet its obligations as they become due.

The aforementioned objectives can be further broken down to nine basic objectives of external financial reporting:

1. Financial reporting should provide information to determine whether current-year revenues were sufficient to pay for current year services.
2. Financial reporting should demonstrate whether resources were obtained and used in accordance with the entity's legally adopted budget; it should also demonstrate compliance with other finance-related legal or contractual requirements.
3. Financial reporting should provide information to assist users in assessing the service efforts, costs and accomplishments of the governmental entity.
4. Financial reporting should provide information about sources and uses of financial resources.
5. Financial reporting should provide information about how the governmental entity financed its activities and met its cash requirements.
6. Financial reporting should provide the necessary information to determine whether the entity's financial position improved or deteriorated as a result of the year's operations.

7. Financial reporting should provide information about the financial position and condition of a governmental entity.
8. Financial reporting should provide information about a governmental entity's physical and other non-financial resources having useful lives that extend beyond the current year, including information that can be used to assess the service potential of those resources.
9. Financial reporting should disclose legal or contractual restrictions on resources and risks of potential loss of resources (4, pp. 6-7).

ACCOUNTING PRINCIPLES

The GASB's 1987 Codification of Governmental Accounting and Financial Reporting Standards established twelve basic principles, which categorize the Board's authoritative guidance on the application of generally accepted accounting principles (GAAP) for state and local governments (4, pp. 10-21).

PRINCIPLE 1: ACCOUNTING AND REPORTING CAPABILITIES

This principle serves as a foundation for the eleven remaining principles. The 1987 Codification, Section 1100.101 requires that:

A governmental accounting system must make it possible both: (a) to present fairly and with full disclosure the financial position and results of financial operations of the funds and account groups of the governmental unit in conformity with generally accepted accounting principles, and (b) to determine and demonstrate compliance with finance-related legal and contractual provisions.

Thus, the need to determine and demonstrate legal compliance should also be considered in the design and implementation of any government's accounting system. The latter

should both allow the government to comply with legal and contractual provisions and either prepare reports in conformity with GAAP or compile GAAP conversion information within the system at year-end. If a GAAP-conversion approach is used, selected data are collected to adjust non-GAAP information to determine GAAP amounts.

PRINCIPLES 2 THROUGH 4: FUND ACCOUNTING

The 1987 Codification, Section 1300 provides:

Governmental accounting systems should be organized and operated on a fund basis. A fund is defined as a fiscal and accounting entity with a self-balancing set of accounts recording cash and other financial resources, together with all related liabilities and residual equities or balances, and changes therein, which are segregated for the purpose of carrying on specific activities or attaining certain objectives in accordance with special regulations, restrictions, or limitations.

Funds used in the government model are divided into three broad categories, namely governmental, proprietary, and fiduciary. These funds are supplemented by account groups, which are self-balancing groups of accounts established to account for general fixed assets and unmatured general long-term debt not reported in the funds. Two account groups are provided for in this model: the general fixed assets account group (GFAAG) and the general long-term debt account group (GLTDAG).

Governmental funds comprise activities usually associated with a typical state or local government's operations, such as public safety or public health. The focus of governmental funds is on the measurement of the sources and uses of **current** financial resources. This measurement focus is unique in that, in general, only current expendable financial resources are accounted for in the governmental fund category. Thus, the use of

account groups to account for non-current or non-financial resources such as general fixed assets and unmatured general long-term liabilities is required.

The proprietary fund category imitates the private sector in that the measurement focus prescribed for proprietary funds is based on the commercial model, which uses a flow of economic resources approach. With this approach, the focus of the proprietary funds is on the measurement of net income (e.g., revenues, expenses). This measurement focus allows the proprietary funds to report all assets and liabilities associated with an activity.

The fiduciary fund category shares similar characteristics with both the governmental and proprietary fund types. However, this category was established for situations in which the government is acting in a fiduciary capacity as a trustee or agent.

The aforementioned fund categories, namely governmental, proprietary, and fiduciary can be further subdivided into seven fund types for accounting and financial reporting purposes (1987 Codification, Section 133.104):

GOVERNMENTAL FUNDS

1. The General Fund: used to account for all financial resources except those required to be accounted for in another fund.
2. Special Revenue Funds: used to account for the proceeds of specific revenue sources (other than expendable trusts or for major capital projects) that are legally restricted to expenditure for specified purposes.
3. Capital Projects Funds: used to account for financial resources to be used for the acquisition or construction of major capital facilities (other than those financed by proprietary funds or trust funds).
4. Debt Service Funds: used to account for the accumulation of resources, and the payment of, general long-term debt principal and interest.

PROPRIETARY FUNDS

1. Enterprise Funds: used to account for operations (a) that are financed and operated in a manner similar to private business enterprises – where the intent of the governing body is that the costs (expenses, including depreciation) of providing goods or services to the general public on a continuing basis be financed or recovered primarily through user charges; or (b) where the governing body has decided that periodic determination of revenues earned, expenses incurred, and/or net income is appropriate for capital maintenance, public policy, management control, accountability, or other purposes.
2. Internal Service Funds: used to account for the financing of goods or services provided by one department or agency to other department or agencies of the governmental unit, or to other governmental units, on a cost-reimbursement basis.

FIDUCIARY FUNDS

1. Trust and Agency Funds: used to account for assets held by a governmental unit in a trustee capacity or as an agent for individuals, private organizations, other governmental units, and/or other funds. These include (a) expendable trust funds, (b) non-expendable trust funds, (c) pension trust funds, and (d) agency funds (2, pp. 11-12).

The 1987 Codification, Section 1300 establishes, regarding the number of funds to be used by a government, that:

Governmental units should establish and maintain those funds required by law and sound financial administration. Only the minimum number of funds consistent with legal and operating requirements should be established, however, because unnecessary funds result in inflexibility, undue complexity, and inefficient financial administration.

PRINCIPLES 5 THROUGH 7: FIXED ASSETS AND LONG-TERM LIABILITIES

The 1987 Codification, Section 1100.105 states that:

A clear distinction should be made between (a) fund fixed assets and general fixed assets and (b) fund long-term liabilities and general long-term debt.

- a) Fixed assets related to specific proprietary funds or trust funds should be accounted for through those funds. All other fixed assets of a governmental unit should be accounted for through the general fixed assets account group.
- b) Long-term liabilities of proprietary funds and trust funds should be accounted for through those funds. All other unmatured general long-term liabilities of the governmental unit should be accounted for through the general long-term debt account group.

Thus, proprietary and trust funds report all assets and liabilities within the individual funds, while governmental funds, with their current financial resources measurement focus, generally report only current assets and liabilities.

VALUATION OF FIXED ASSETS

Fixed assets should be accounted for at a cost or, if the latter is not practicably determined, at an estimated cost. Donated fixed assets should be recorded at their estimated fair value at the time received. (1987 Codification, Section 1400). The determination of the cost of fixed assets is affected by the classification of these assets. All fixed assets should be reported based on the consideration given or received, including ancillary charges, whichever can more objectively be determined. Normal ancillary charges include freight and transportation charges, closing costs, title and legal fees and installation charges. However, the ancillary charges beyond the construction costs for certain assets reported in the proprietary or trust funds must include capitalized

interest. Note that if the historical cost of fixed assets cannot be determined because of the lack of adequate fixed asset records, other appropriate methods may be employed to estimate their original historical cost, provided these methods are deemed acceptable by the 1987 Codification.

DEPRECIATION

The 1987 Codification, Section 1400 provides, regarding the depreciation of fixed assets:

- a) Depreciation of general fixed assets should not be recorded in the accounts of governmental funds. Depreciation of general fixed assets may be recorded in cost accounting systems or calculated for cost finding analyses; and accumulated depreciation may be recorded in the general fixed assets account group.
- b) Depreciation of fixed assets accounted for in a proprietary fund should be recorded in the accounts of that fund. Depreciation is also recognized in those trust funds where expenses, net income, and/or capital maintenance is measured.

Since depreciation is an allocation of the net costs of the fixed asset over its estimated useful life, it has no effect on the flow of current financial resources measurement focus used for the governmental funds, given that it neither provides financial resources nor does it require the use of financial resources. This distinction is one of the fundamental differences between the models for the governmental and proprietary funds. The cost of a fixed asset is allocated systematically and rationally to the period in which the asset is used within the flow of economic resources model. The flow of current financial resources model, however, measures the financial resources used in the acquisition of a fixed asset as an expenditure and measures any financial resources provided when the asset is disposed as another financing source.

PRINCIPLE 8: BASIS OF ACCOUNTING

The 1987 Codification, Section 1600 deals with the principle of accrual basis in governmental accounting. It states:

The modified accrual or accrual basis of accounting, as appropriate, should be used in measuring financial position and operating results.

- a) **Governmental fund** revenues and expenditures should be recognized on the modified accrual basis. Revenues should be recognized in the accounting period in which they become available and measurable. Expenditures should be recognized in the accounting period in which the fund liability is incurred, if measurable, except for unmatured interest on general long-term debt, which should be recognized when due.
- b) **Proprietary fund** revenues and expenses should be recognized on the accrual basis. Revenues should be recognized in the accounting period in which they are earned and become measurable. Expenses should be recognized in the period incurred, if measurable.
- c) **Fiduciary fund** revenues and expenses should be recognized on the basis consistent with the fund's accounting measurement objective. Non-expendable trust and pension trust funds should be accounted for on the accrual basis; expendable trust funds should be accounted for on the modified accrual basis. Agency fund assets and liabilities should be accounted for on the modified accrual basis.
- d) **Transfers** should be recognized in the accounting period in which the interfund receivable and payable arise.

PRINCIPLE 9: THE BUDGET AND BUDGETARY ACCOUNTING

The 1987 Codification, Section 1100.109 provides:

- a) Every governmental unit should adopt an annual budget(s).
- b) The accounting system should provide the basis for appropriate budgetary control.
- c) Budgetary comparisons should be included in the appropriate financial statements and schedules for governmental funds for which an annual budget has been adopted.

BUDGETING

A general fund budget is generally prepared each year. Departments and/or agencies submit requests to the chief executive or budget office. An executive budget is prepared accordingly and submitted to the legislative body, which acts on the budget through the passage of appropriation bills or ordinances. The bills or ordinances may be subject to subsequent executive veto or amendatory veto. However, when signed into law, the bills or ordinances establish revenue, expenditure/expense and obligation authority. Moreover, this authority may be extended to budgetary execution and management in the form of allotments, suballocations, contingency reserves, encumbrance controls, and transfers. If the general fund budget is subject to the normal annual budgetary process, it is classified as an appropriated budget.

Special revenue funds usually follow a similar process, although some differences may exist. For instance, a budget associated with a grant may fall outside the category of an annual appropriated budget (the grant may extend beyond the fiscal year). In this case, the legislative body may approve a long-term budget.

Capital projects funds may be subject to either annual or long-term (i.e., project-length) budgets. Long-term budgets associated with capital outlays and the method of financing

those plans are referred to as capital budgets. These budgets may extend from two to ten years, depending on the complexity of the capital projects.

Proprietary funds usually require annual budgets due to their business-like operating cycle. Proprietary fund budgets may be flexible budgets, or financial plans, based on several levels of activity, unlike governmental fund budgets, which generally are limited to fixed-dollar amounts.

Annual appropriated budgets are not common for fiduciary funds, although some governments may adopt annual budgets for expendable, non-expendable, and pension trust funds. Because of their custodial nature, agency funds generally are not subject to the budgetary process.

BUDGETARY CONTROL

When an annual appropriated budget is approved by the legislative body and signed into law, it sets maximum expenditures that cannot be exceeded legally. However, individual appropriated budgets may also establish the legal level of control. The level at which expenditures are legally controlled varies in practice, but the department or agency level is common. At this level, a department or agency head may be held accountable for expenditures incurred without subjecting the department or agency to undue constraints. Other controls may be imposed at the function level, fund level or the fund-type level. Controls can also be established legally at the department's division level or even at the object level within a department's division. Although these methods create a high level of assurance that monies are spent as legally intended, they leave management with little flexibility. Finally, in order to insure budgetary compliance, annual appropriated budgets should be formally integrated into the accounting system as the 1987 Codification, Section 1700.119 requires.

BUDGETARY REPORTING

At a minimum, budgetary comparisons should be presented in the general purpose financial statements for governmental funds with annual appropriated budgets. These comparisons should be presented using the basis on which the budgets were adopted (cash for instance). Moreover, budgetary comparisons for all appropriated funds should be presented as individual statements or schedules to demonstrate legal compliance.

PRINCIPLES 10 AND 11: CLASSIFICATION AND TERMINOLOGY

The 1987 Codification, Section 1800 provides, regarding the classification of transfers, revenues, expenditures, and expense accounts:

- a) Interfund transfers and proceeds of general long-term debt issues should be classified separately from fund revenues and expenditures or expenses.
- b) Governmental fund revenues should be classified by fund and source. Expenditures should be classified by fund, function (or program), organization unit, activity, character, and principal classes of objects.
- c) Proprietary fund revenues and expenses should be classified in essentially the same manner as those of similar business organizations, functions, or activities.

GOVERNMENTAL FUNDS: REVENUES

The primary level of revenue classification in this type of funds is by fund and source. Normally, the revenue sources include taxes, licenses and permits, intergovernmental revenues, charges for services, fines and forfeits and miscellaneous revenues.

GOVERNMENTAL FUNDS: EXPENDITURES

The major levels of classification are by fund, function, organizational unit, activity, character, and object class. The function level provides information for a group of related

activities. Standard function classifications include general government, public safety, highways and streets, sanitation, health and welfare, culture and recreation, and education. These functions vary in importance and nature, based on the government's activities.

The organizational unit-level corresponds to the government's organizational chart, and is thus useful from control and accountability perspectives. Not only are organizational directors held accountable for the performance of all their assigned activities, but they may also be legally responsible for complying with the appropriated budget if the level of control is at the department or agency level.

The activity level allows the evaluation of various performance measures. By evaluating the economy and efficiency of an activity, government officials are in a better position to make decisions on such issues as privatization.

The character classification is based primarily on the period the expenditures are expected to benefit. There are four character classifications: the current classification representing benefits for the current period; the capital outlays classification representing benefits for the current and future periods; the debt service classification representing prior, current and future benefits; and the intergovernmental expenditures classification representing transfers of resources to another government unit outside the reporting entity.

Finally, the object classification is a grouping of types of items purchased or services obtained. For instance, operating expenses could include personal services, contractual services, and commodities.

PROPRIETARY FUNDS: REVENUES

The proprietary funds share the same primary revenue classifications as the governmental funds by source. One important distinction is that governments should also to similar private sector organizations for industry practice and other guidance in classifying proprietary fund revenue sources.

PROPRIETARY FUNDS: EXPENSES

Expenses of proprietary funds should be classified in a manner consistent with industry practices and standards. Emphasis should be placed on showing a cost of sales/services amount and the appropriate display of operating and non-operating expenses.

PRINCIPLE 12: FINANCIAL REPORTING

The 1987 Codification, Section 1800, provides, regarding interim and annual financial reports:

- a) Appropriate interim financial statements and reports of financial position, operating results, and other information should be prepared to facilitate management control of financial operations, legislative oversight, and, where necessary or desired, for external reporting purposes.
- b) A comprehensive annual financial report covering all funds and account groups of the reporting entity, including introductory section; appropriate combined, combining, and individual fund statements; notes to the financial statements; required supplementary information; schedules; narrative explanations; and statistical tables, should be prepared and published.
- c) General-purpose financial statements of the reporting entity may be issued separately from the comprehensive annual financial report. Such statements should include the basic financial statements and notes to the financial statements that are essential to fair presentation of financial position and results of operations. Those statements may also be required to be accompanied by supplementary information, essential to financial reporting of certain entities.
- d) A component unit financial report covering all funds and account groups of a component unit, including introductory section; appropriate combined, combining, and individual fund statements; notes to the financial statements;

required supplementary information; schedules; narrative explanations; and statistical tables may be prepared and published, as necessary.

- e) Component unit financial statements of a component unit may be issued separately from the component unit financial report. Such statements should include the basic financial statements and notes to the financial statements that are essential to fair presentation of financial position and results of operations. Those statements may also be required to be accompanied by supplementary information, essential to financial reporting of certain entities.

CLASSIFICATION OF GOVERNMENTAL ACCOUNTING

From the description of the principles of governmental accounting and financial reporting, we can make the following four observations:

- **Governmental accounting systems meet financial reporting requirements.** In fact, since accountability in financial reporting is considered by the GASB as the “paramount objective from which all other objectives must flow”, we can safely affirm that governmental cost systems are financial-reporting driven by excellence.
- **Governmental accounting systems collect costs by responsibility centers rather than by activities and business processes.** This observation stems from the fact that expenditures in all categories of funds are generally classified at the functional or organizational level rather than the activity level, although the GASB allows expenditures to be traced to activities. In this sense, Mayor Stephen Goldsmith of Indianapolis (12, pp. 59-60) observes that most governments do not think in terms of business units or costs. The standard governmental accounting system tracks the amount of money spent on salaries, equipment, capital investments, and professional service contracts, but does not break down any of these costs by the individual activities of government. In brief, the standard governmental accounting principles

“prevents city managers from stealing money, but does nothing to stop them from wasting it”.

- **Governmental accounting systems report highly distorted services costs.** This is due to the fact that full cost estimates are typically determined by allocating indirect or overhead expenses to city services using a multiplier on direct labor costs. These costs are easy to obtain since information on direct labor has to be collected anyway to pay and monitor the direct labor workforce. This method of guess-estimating the cost of city programs and services makes it difficult to believe in them (26, p. 27).
- **Governmental accounting systems provide feedback to managers that is too late and too financial.** This is due to the fact that comprehensive financial annual reports are usually issued within three to six months (timeliness according to the Government Finance Officers Association) of the close of an accounting period. This period is too long for government managers, who rely heavily on information from the external financial reports, to take corrective actions. Note that financial feedback is virtually the only form of feedback government managers receive. The following quote from a city government official explains the lack of feedback:

We discovered that no one in city government thought, worked, or managed in terms of measurable outcomes. In a monopoly, with little opportunity for customer pressure and with pay systems based on tenure, no imperative exists to measure performance (12, p. 63).

The aforementioned observations are specifically the characteristics of Stage II cost systems as described in Chapter 1, which leads to the conclusion that governmental cost systems are Stage II systems, i.e. financial-reporting driven. A logical step for governmental cost systems would therefore be to migrate to the third level of cost system development (Stage III), which is characterized by:

- A traditional, but well-functioning financial system that performs basic accounting and transactions-capturing functions, and prepares monthly or quarterly financial statements for external users, using conventional methods for allocating periodic production costs to cost-of-goods sold and inventory accounts.
- One or more activity-based cost systems that take data from the “official” financial system, as well as from other information and operating systems, to measure accurately the costs of activities, processes, products, services, customers, and organizational units.
- Operational feedback systems that provide operators and all front-line employees with timely, accurate information, both financial and nonfinancial, on the efficiency, quality, and cycle times of business processes.

CHAPTER THREE

ACTIVITY-BASED COSTING AND OPERATIONAL FEEDBACK

This chapter explores the concept of activity-based costing and the steps to be followed in order to implement it in an organization. It also describes the operational feedback system, which is an integral part of a Stage III cost system along with the activity-based cost system.

WHAT IS ABC?

Activity-based costing, which is common to the private manufacturing industry, is a tool that helps break down a business into its core activities. In this sense, each activity becomes a cost focal point, a discrete operating unit with processes subject to analysis and potential for redesign. ABC provides a technique for cost control that assigns costs – both direct and indirect – to product and services, based on the consumption of resources by the activities that enter into the production of these products and services. In effect, unlike traditional Stage II costing systems, which assumed that it was products and services that consumed resources, ABC argues that activities consume resources and produce products and services based on this consumption of resources. On the other hand, ABC allows multi-product manufacturers to establish more accurate costs of producing individual products. Inaccurate knowledge of the overhead and indirect resources used by each product historically resulted in inaccurate costing and bad strategic decisions as to which products should be produced. To solve this inaccuracy problem, ABC focuses on the allocation of the costs of overhead resources, which had traditionally been done on very arbitrary and ad hoc bases (3, pp. 57-58; 7, p 74; 9, p. 88).

ABC imposes a new kind of thinking. Unlike traditional (or Stage II) cost systems, which are the answer to the question, “How can the organization allocate costs for financial reporting and for departmental cost control?”, ABC deals with the following questions:

1. What activities are being performed by the organizational resources?
2. How much does it cost to perform organizational activities and business processes?
3. Why does the organization need to perform activities and business processes?
4. How much of each activity is required for the organization’s products, services, and customers? (17, p. 79)

A properly constructed ABC model, which is an economic map of the organization’s expenses and profitability, based on organizational activities, provides the answers to the above questions. This economic map of operations is achieved by revealing to the organization the costs of activities and business processes, which leads to the knowledge of the cost and profitability of individual products, services, customers, and operating units. Note that the economic map is critical for companies producing many new products, introducing new processes, reaching new customers, and satisfying many more customer demands, as it is easy for such companies to get lost, economically. Companies operating in stable environments, with mature products and stable customer relationships can operate with a Stage II cost system, or perhaps with no cost system at all.

The economic map produced by Stage II cost systems averages resource costs between **high- and low-volume** products and between **simple and complex** products. Stage II systems flatten the different resource consumption pattern between these different types of products. Kaplan and Cooper (17, pp. 80-81) make the following comparison:

The map produced by Stage II cost systems looks like the Great Plains in the U.S. Midwest – the terrain looks the same wherever you look. Managers don’t know where to devote their energy and attention. The map produced by a Stage III ABC system looks like the southeastern part of California, and makes visible the Sierra Madre peaks of profitable products and the Death Valley craters of losses.

Managers now have directions about where and how their scarcest resources – energy, time, and attention – should be committed to bring the losses to at least sea level (breakeven), and eventually to modest hills of profitability.

MOTIVATION FOR ABC SYSTEMS

The following example provides a basis for comparing ABC with traditional Stage II cost systems, which distort cost systems. Consider a factory which produces just two products, P-1 and P-2, and has two machines, E (for expensive), which costs \$50 per hour to use, and C (for cheap), which costs \$10 per hour to use. Product P-1, which is more complex than product P-2, needs 1 hour of E and 1 hour of C per unit (i.e., 2 hours in total). Product P-2 on the other hand requires 0.5 hour of E and 1.5 hour of C per unit (i.e., 2 hours in total). Thus, if 1,000 units of each product are produced, then each product uses 2,000 hours of machine time, making a total of 4,000 machine hours. Overhead costs for machines C and E are \$20,000 ($\$10 \times 2,000$) and \$100,000 ($\$50 \times 2,000$), respectively, which yields a total of \$120,000 of factory overhead. Assume, for simplicity, that no other overhead is incurred and that direct labor is \$10 per unit of both products and raw material is \$20 per unit of both products.

Traditional cost accounting systems lump the entire overhead into a single pool and allocate it to the products by some basis, machine hours in this case. In our example, the \$120,000 of total overhead is divided by 4,000 total machine hours, generating an application rate of \$30 per machine hour. Since each product consumes two machine hours, it is assigned \$60 of overhead per unit. Adding the direct labor per unit and raw material per unit yields a total cost of \$90 per unit.

The designers of an ABC system would recognize that the overhead generated by machines C and E are vastly different and that the factory's two products, which have varying degrees of complexity, use disproportionate amounts of these machines. These facts are ignored by traditional cost accounting, which results in the distortion of costs for

both products. ABC deals with this problem by making the two machines separate cost pools. The cost of these separate overhead pools is then assigned to the products by the allocation basis or **cost driver**, which is machine hours in our case. Note that cost pools in an ABC system may be allocated to products using different allocation bases (cost drivers). As each product or service uses the activity driver, it consumes more overhead costs and is consequently assigned more overhead from the cost pool.

Continuing with our example, the ABC system would use two overhead application rates, \$10 per machine hour for machine C and \$50 per machine hour for machine E. These rates are used to assign overhead costs to each product, resulting in radically different product costs:

$$\mathbf{P-1: 1\text{hour} \times \$50/\text{hour} + 1\text{hour} \times \$10/\text{hour} + \$10(\text{labor}) + \$20(\text{raw material}) = \$90}$$

$$\mathbf{P-2: 0.5\text{hour} \times \$50/\text{hour} + 1.5\text{hour} \times \$10/\text{hour} + \$10(\text{labor}) + \$20(\text{raw material}) = \$70}$$

The different product costs clearly indicate that there is a cost shifting or cross-subsidization of products, as P-2 is effectively subsidizing P-1. In effect, traditional Stage II cost systems systematically underestimate the cost of resources required for complex, low-volume products and overestimate the resource cost of simple, high-volume products.

As long as all players in the P-1 and P-2 market have similar costing systems (even if these were poor), no individual player is at significant advantage or disadvantage on the playing field. However, once one of the competitors in the market improves its cost systems, the rest of the players can be at a serious disadvantage because a systematic distortion is present in their own cost calculations (15, pp.51-54).

Cost shifting or cross-subsidization of products, as well as its strategic implications, applies to numerous other situations within an organization. These include:

- Low-volume products that use as much material handling and machine set-up as high-volume products.
- New products that use large amount of manufacturing overhead, such as engineering design time and manufacture of prototypes.
- Products that require differing amounts of post-sale servicing (15, pp. 56-57).

Activity-based costing extend traditional Stage II cost systems by linking resource expenses to the variety and complexity of products produced, not just the physical volume produced. To better understand the contrast, we must examine the structure of a traditional Stage II cost system. In such a system, factory overhead costs are first allocated to production cost centers. Then, the costs accumulated in production cost centers are assigned to the products processed through each center. Cost drivers, like direct labor dollars, direct labor hours, machine hours, units produced, or materials processed are used to perform this allocation of production cost center costs to products. Stage II cost systems provide a simple, inexpensive way to meet the financial reporting requirement to allocate factory overhead costs to production.

ABC, in contrast, traces resource expenses to activities and then uses activity-cost drivers to trace activity costs to products. ABC systems are developed through a series of four sequential steps. First, developing the activity dictionary. Second, determining how much the organization is spending on each of its activities. Third, identifying the organization's products, services, and customers, and finally, selecting activity cost drivers that link activity costs to the organization's products, services, and customers (17, pp. 85-97; 5, pp. 82-97).

STEP 1: DEVELOPING THE ACTIVITY DICTIONARY

An ABC system focuses on why the organization is spending money rather than on how to allocate costs. In developing an ABC system, the organization first identifies the activities performed by its indirect and support resources, which include scheduling,

purchasing, customer administration, and improving products. Activities are described by verbs and associated objects, such as schedule production, move materials, purchase materials, inspect items, respond to customers, improve products, introduce new products, etc. The identification of activities leads to the construction of an activity dictionary that lists and defines every major activity performed in the organizational unit. In some initial applications of ABC, engineers and accountants defined activities at a very microlevel, perhaps at an individual task level, leading to several hundred or more activities. This was both expensive and confusing. Now, ABC project teams use rules of thumb, such as ignoring activities that use less than 5% of an individual's time or a resource's capacity. Activity dictionaries can be relatively brief (10 to 30 activities), especially where the primary focus of the ABC system is to estimate product and customer costs. In other applications, activity dictionaries still contain hundreds of activities. In such applications, the aim is for the system to serve as a foundation for process improvement and process redesign efforts. The number of activities, therefore, is a function of the purpose of the model, and the size and complexity of the organizational unit being studied.

Interviewing, or the process of obtaining activity information by questioning the people most directly involved, is considered a crucial step in the process of developing the activity dictionary of an organizational unit. The biggest advantage of the interview technique is that the direct person-to-person contact usually provides the best understanding of the job. Providing the interviewee with a questionnaire prior to the interview allows the respondent to think about the questions that will be asked and to gather the necessary information. The interview would start by describing the ABC program to the interviewee: What will be the deliverables? What's the scope? Who is involved? What is the role of the interviewee? Who is giving support? What progress has been made?

The next step in the interview would be the explanation of the process, in which the interviewee is informed about the data requirements of ABC. The ABC process is

described and its dependence on the interviewee's knowledge and input is emphasized. It should be made clear to the interviewee at this stage that the interviewer is not looking for absolute precision, but simply for good-quality information. The most useful questions to be asked are the following (10, pp. 40-41):

- Who?
 - ✓ Ask whom the interviewee relies on to perform his job.
- What?
 - ✓ What is the purpose of the interviewee's functional area?
 - ✓ What distinct, significant activities does he/she perform?
 - ✓ What resources are used (e.g., computers, and systems)?
 - ✓ What are the inputs and outputs of each activity?
- Where?
 - ✓ Where do inputs and outputs from each activity come from or go to?
- When?
 - ✓ When are these activities performed?
- Why?
 - ✓ Why is the activity performed (i.e., in response to what stimulus)?
- How?
 - ✓ How much time is spent on each activity?
 - ✓ How does the activity start and stop?

Through the interview process, a preliminary definition of activities is developed. The final output of the process is a listing of all activities with a narrative text that describes each activity: the activity dictionary. Note that there are other sources for collecting an organizational unit's activity data, such as: the analysis of job classification, the review of computer records, the observation of activities, the consultation of a panel of experts, the review of diaries and logs, and the review of check sheets (5, pp. 88-89).

ANALYSIS OF JOB CLASSIFICATION

The number of staff assigned to each job classification is extracted from the organization's chart in order to calculate the number of full-time equivalent employees. The total hours are broken down by job classification into normal and overtime. The analysis determines what each job classification does and how much time is allocated to each activity.

During the process, a functional description of the organizational unit is developed to identify its mission. Next, the staffing level, including job grade/classification is determined. Typically, this information is obtained from staffing charts and job descriptions and validated through interviews with department managers. The activities performed by each job category and the percentage of time spent by each job category on a specific activity is defined.

REVIEW OF COMPUTER RECORDS

The current computer systems that support activities are reviewed in order to determine the availability and level of data available from the computer system and identify the frequency of data collection and the integrity of the data.

OBSERVATION OF ACTIVITIES

A physical observation of the unit being analyzed should be performed in order to identify recurring activities. This observation is not a detailed time-and-motion study; it is merely the nonscientific process of watching the activity being performed.

REVIEW OF DIARIES AND LOGS

Logging is a semi-formal technique of recording what an employee does. The employee records the daily activities in a log or semi-reporting diary. This method allows the analyst to gather information on the activities performed and the percentage of time spent

on each. However, it requires diligence on the employee's part, and many employees simply lack the skill and discipline to record their activities in clear, concise language.

CONSULTATION OF A PANEL OF EXPERTS

In case the department under study exists in an unstable environment, or the activity analysis is being applied to newly created activities, a panel of experts can develop a definition of activities based on their experience. Activity information can be obtained by assembling a group of employees from the area being analyzed or supervisors from other divisions performing similar activities.

REVIEW OF CHECK SHEETS

A check sheet records the number of activity occurrences. It is used to gather activity data, based on sample observations in order to detect patterns. Check sheets answer the question "How often do certain events happen?"

STEP 2: DETERMINING HOW MUCH THE ORGANIZATION IS SPENDING ON EACH OF ITS ACTIVITIES

In this step, the ABC system maps from resource expenses to activities, using resource cost drivers. The resource cost drivers link spending and expenses, as captured in the organization's financial or general ledger system, to the activities performed. As the internal training manual of an organization states:

The resources represent the cost base for the model. A resource comprises a distinct and homogeneous grouping of existing costs fulfilling a similar function or, in the case of people, having a similar work profile. The sum of all resources for a model equals the total cost for an organization, with a set time frame (Roche Vitamins Activity-Based Management Manual).

Classifying resource expenses by activities performed represents a drastic change in thinking about expenses. Data from the organization's financial system categorizes expenses by spending code, such as salaries, fringe benefits, overtime, utilities, indirect materials, travel, telecommunications, computing, maintenance, and depreciation. The resource cost drivers collect expenses from the financial system and drive them to the activities being performed by the organizational resources. Thus, after going through this step, organizations learn, usually for the first time, the dollar amounts they are spending on their activities. The selection of resource cost drivers and the estimation of the quantity of each resource cost driver can be done through employee surveys. In these surveys, individuals other than the front-line employees actually involved in production are asked to fill in a form showing the activity dictionary, by estimating the percentage of time they spend on any activity (at least 5%) on the list. For non-personnel resources, the ABC team relies on direct measurement (how much power, computer, or telecommunications time) or estimates the percentage of the resource used by each activity in the dictionary. Kaplan and Cooper (17, p. 89), argue regarding the accuracy of this resource allocation to activities:

One does not need extensive time-and-motion studies to link resource spending to activities performed. The goal is to be approximately right than precisely wrong, as are virtually all traditional product costing systems. Many traditional standard cost systems calculate product costs out to six significant digits (\$5.71462 per unit) but, because of arbitrary allocation procedures, the first digit is wrong.

Having traced resource costs to activities, the ABC team proceeds to classifying activities along a cost-hierarchy dimension: unit, batch, product, customer, and facility sustaining (17, pp. 90-91).

UNIT-LEVEL ACTIVITIES

These are activities that have to be performed for every unit of product or service produced. The quantity of unit-level activities performed is proportional to production and sales volumes. Examples in the manufacturing industry include drilling holes in metal parts, grinding metal, and performing 100% inspection.

Traditional Stage II costs systems, which use allocation bases such as labor hours, machine hours, units produced, or sales dollars to assign indirect costs to cost objects, rely exclusively on unit-level cost drivers.

BATCH-LEVEL ACTIVITIES

These are activities that have to be performed for each batch or setup of work performed. The resources required for a batch-level activity are independent of the number of units in the batch. Activity-based cost systems measure and assign the cost of handling batch-level activities to the products, customers, or services that triggered the activity. Examples of batch-level activities in the manufacturing industry are handling production orders, moving materials, and setting-up machines.

PRODUCT- AND CUSTOMER-SUSTAINING ACTIVITIES

Product sustaining activities are performed to enable the production of individual products or services to occur. Customer-sustaining activities enable an organization to sell to an individual customer, but are independent of the volume and mix of the products and services sold and delivered to the customer. Examples of product- and customer-sustaining activities, again in the manufacturing industry, include maintaining and updating product specifications, special testing and tooling for individual products and services, and technical support provided for individual products and to service individual customers.

Product- and customer-sustaining activities can be easily traced to the individual products, services, and customers for whom the activities are performed. However, the

quantity of resources used in these types of activities are, by definition, independent of the production and sales volumes, and quantity of production batches and customer orders.

FACILITY-SUSTAINING ACTIVITIES

These activities provide general production or sales capabilities (plant manager and administrative staff for example) that cannot be traced to individual products, services, or customers. Facility expenses can be assigned directly to the individual facility, but should not be allocated down to individual products, services, or customers.

The ABC cost hierarchy, applicable to manufacturing, marketing, and research and development expenses, enables all organizational expenses to be mapped to a particular hierarchical or organizational level where cause and effect can be established. For instance, a customer-sustaining expense is not allocated to the products or services purchased by the customer because this expense is incurred independent of the volume and mix of products or services acquired by the customer. The customer-sustaining expense can be eliminated or controlled only by operating at the customer level, i.e., dropping the customer or changing the level of support provided to the customer. The expense cannot be eliminated by changing the volume or mix of the individual products and services the customer acquires.

STEP 3: IDENTIFYING THE ORGANIZATION'S PRODUCTS, SERVICES, AND CUSTOMERS

After identifying, in steps 1 and 2 of building an ABC system, the activities being performed and the cost of performing these activities, the ABC project team must **identify all the organization's products, services, and customers**. This step allows the organization to evaluate whether its activities are worth doing, and whether it is getting

paid adequately for performing these activities, by linking the activity costs to products, services, and customers who are the ultimate beneficiaries of the organization's activities. Many practitioners of activity-based costing skip this step and focus only on how to make activities and processes more efficient, although it is necessary to evaluate the viability of these activities and processes in the first place.

STEP 4: SELECTING ACTIVITY COST DRIVERS THAT LINK ACTIVITY COSTS TO PRODUCTS, SERVICES, AND CUSTOMERS

Linking activities to products, services, and customers is done using activity cost drivers. An activity cost driver is a quantitative measure of the output of an activity. An example is shown below:

Activity	Activity Cost Driver
Run Machines	Machine Hours
Set Up Machines	Setups or Setup Hours
Schedule Production Jobs	Production Runs
Receive Materials	Material Receipts
Support Existing Products	Number of Products
Introduce New Products	Number of New Products Introduced
Maintain Machines	Maintenance Hours
Modify Product Characteristics	Engineering Change Notices

All activities triggered by the same event can use the same activity cost driver, in order to economize on the number of different activity cost drivers. For example, the activities of preparing production orders, scheduling production runs, performing part inspections, and moving materials can use the same activity cost driver: number of production runs.

There are three types of activity cost drivers: transaction, duration, and intensity (17, pp. 95-97)

TRANSACTION DRIVERS

These drivers count how often an activity is performed. Examples of transaction drivers include number of setups, number of receipts, and number of products supported. Transaction drivers can be used when all outputs make essentially the same demands on the activity. For instance, scheduling a production run, or processing a purchase order may take the same time and effort independent of which product is being scheduled, or which material is being purchased.

Transaction drivers are the least expensive type of cost driver. However, they can be the least accurate because they assume that the same quantity of resources is required every time an activity is performed. This is equivalent to assuming that the activity is homogeneous across products. For instance, the use of a transaction driver like the number of setups assumes that all setups take the same time to perform. This assumption can be valid when the variation in resource use by individual cost objects is small. If this variation is large, more accurate cost drivers are needed.

DURATION DRIVERS

These drivers represent the amount of time required to perform an activity. They should be used whenever a significant variation exists in the amount of activity required for different outputs. For example, simple products may require only 10-15 minutes to set up, while complex products may require six hours for setup. Using a transaction driver, like number of setups, will overcost the resources required to set up simple products and undercost the resources required for complex products. Duration drivers include setup hours, inspection hours, and direct labor hours.

In general, duration drivers are more accurate than transaction drivers (transaction drivers can be more accurate when the work involved is unrelated to the duration of the activity

cost driver). However, they are more expensive to implement given that an estimate of the duration is required each time an activity is performed. Thus, the choice between duration and transaction cost drivers depends on balancing the benefits of increased accuracy against the costs of increased measurement.

INTENSITY DRIVERS

These drivers directly charge for the resources used each time an activity is performed. They are useful when duration drivers are not sufficiently accurate. A duration driver, like setup cost per hour, assumes that all hours are equally costly, but does not take into consideration skilled personnel and expensive equipment that may be necessary on some setups but not others.

Intensity drivers are the most accurate, and consequently, the most expensive cost drivers. They should be used only when the resources required to perform an activity are both expensive and variable each time the activity is performed.

It should be noted that an activity cost driver should match the level of the cost hierarchy of the associated activity. For instance, the cost of unit-level activities (e.g., machine surfacing) should be driven to products and customers using unit-level activity drivers (e.g., machine hours), and the cost of batch-level activities (e.g., set up machines) should be driven to products and customers using batch-level activity drivers (e.g., number of setups or setup hours). If the activity cost driver doesn't match the level of the cost hierarchy of its associated activity, then cost distortion similar to that inherent to Stage II cost systems occurs. In effect, high-volume and complex products are overcosted, and low-volume, simple products are undercosted.

WHERE TO USE ACTIVITY-BASED COST SYSTEMS

Two rules guide the search for potential ABC applications (17, p. 100):

1. Look for areas with large and growing expenses in indirect and support costs. When most expenses are due to direct labor and direct material, and can consequently be directly traced to products and customers without significant error using Stage II cost systems, ABC may be of little use. Furthermore, if organizational activities are all at the unit level (no batch or product-sustaining activities), then ABC and Stage II systems give very similar results, which precludes the need for ABC.
2. Look for a situation where there is a large variety in products, customers, or processes. For instance, consider a facility that produces mature and newly introduced products, standard and custom products, and high-volume and low-volume products. Also consider a marketing and sales organization that services customers who order high-volume, standard products with few special demands, in addition to customers who order in small volumes, special volumes, and require extensive presales and postsales technical support.

LIMITATIONS OF STAGE II OPERATIONAL FEEDBACK SYSTEMS

In order to understand the characteristics of Stage III operational feedback systems, it is important to examine the limitations of Stage II operational feedback systems. These include (17, pp. 37-41):

- Delayed reports
- Exclusive reliance on financial measures
- Top-down direction
- Focus on local task improvement
- Individual control
- Adherence to historical standards

DELAYED REPORTS

In the mid-1980s most organizations used to provide monthly (or quad-weekly) financial feedback to managers. Obviously, using a monthly cycle to provide feedback for monitoring and improving an on-going, real-time process cannot yield the sought performance improvement. The aforementioned example of the bowler not being able to see how many pins he knocked down until the end of the month (see Chapter One) perfectly illustrates this point.

EXCLUSIVE RELIANCE ON FINANCIAL MEASURES

Stage II cost systems may report on the cost of resources spent to produce products, but provide no information on the quality and defects associated with the production. Stage II systems even include an allowance for scrap and waste. However, companies should not budget for scrap; they should attempt to eliminate it entirely. The exclusive financial information generate it but Stage II cost systems should thus be supplemented with direct measures of defects, scrap, yields, and cycle times.

TOP-DOWN DIRECTION

Stage II cost systems hold workers and local supervisors accountable to meeting standards established high up in the organization (by engineers and managers), although modern management practices recommend that front-line employees have to be empowered in order to improve operating processes. Stage III systems must mobilize the motivation and talent of front-line employees for them to make continual improvements in the processes they can control and influence. The design of a Stage III system for performance improvement must reflect the informational needs of individuals and teams who now are responsible for improving the quality, responsiveness, and cost of their local processes.

FOCUS ON LOCAL TASK IMPROVEMENT

Task specialization, which consisted of assigning microtasks to workers and requiring them to perform them over and over again until they achieve high levels of proficiency, assumed that if every individual task was performed efficiently, then the overall process would be highly efficient. This theory was destroyed by innovative Japanese manufacturers who demonstrated breakthrough improvements in cost, quality, and cycle time from switching to a single-piece continuous flow production. And yet, the system of local responsibility and controllability is still present in factories with thousands of microcost centers, each controlled monthly or daily with its own standard (Stage II) cost and budget report. In these factories, the financial feedback to supervisors is basically a feedback on short-term cost performance in their isolated (local) cost centers, which does not say much about the overall performance of the entire manufacturing process.

INDIVIDUAL CONTROL

In a system of decomposed microtasks, based on task specialization, the focus of performance measurement should obviously be on individual worker efficiency and productivity. However, as business processes become more complex and more integrated (work gets done by teams), performance measures should track people's contributions to their team, and the team's contribution to the process. This implies that traditional cost systems, especially those focused on individual labor and machine efficiencies and local cost centers, cannot be the primary means for evaluating team performance.

ADHERENCE TO HISTORICAL STANDARDS

Stage II cost systems measure success when employees in local cost centers meet the cost standards established by their managers. At best, these standards reflect best current practice. Often, however, detailed studies have not been done for many years so the standards are historical. Alternatively, some organizations choose a period, such as the last three months of the year, measure the actual performance during this period, and use

the actuals during that period as the standards for the upcoming year. An organization's critical internal processes should be compared in cost, quality, and cycle time to the best in the world, not to the organization's past performance.

CHARACTERISTICS OF STAGE III OPERATIONAL FEEDBACK SYSTEMS

In order to overcome the limitations of Stage II cost systems, Stage III systems must provide timely information about the actions employees have recently taken to improve processes under their control. The feedback must incorporate both non-financial and financial information, so that front-line employees are able to take informed actions, based on their task-specific knowledge, to improve the quality, cycle time, and cost of processes. In addition, Stage III systems must not impose on front-line employees, standards established by engineers and managers who are remote from day-to-day operations. Rather, the new system must support local employees' experiments and innovations for continually improving process performance. One approach would be to use standards based on most recent efficient actual performance. And this updated standard should be improved upon by actual results in the current period, not just met.

Another approach would be to use benchmarking to identify best practices for critical internal processes. Benchmarking involves studying comparable internal processes of the best organizations not only in one's own industry, but also in any industry using the same process. When feasible, benchmarking sets targets for cost performance based on external, not internal, considerations (17, pp. 47-49; 1, pp. 1-8).

Thus, Stage III systems should evaluate the cost performance of teams and processes against standards established by the most efficient internal or external processes. And these standards should be continually reevaluated to reflect continuous improvements.

We will now examine the role of non-financial measures in the Stage III operational feedback system. Is financial information alone sufficient for cost reduction and process improvement?

NON-FINANCIAL MEASURES

Besides lower prices and costs, customers greatly value quality, responsiveness, and timeliness. Therefore, employees must have information about both the cost consequences of their activities and the quality and cycle time of processes under their control. Stage III systems for learning and improvement must supplement financial feedback with information on critical non-financial measures, especially measures of process quality and time (17, pp. 50-53).

PROCESS QUALITY MEASUREMENT

As organizations adopted the Total Quality Management philosophy, they introduced a broad array of non-financial measures to monitor and improve the quality of their products and processes. These included:

- Process defect rates
- Yields (ratio of good items produced to good items entering the process)
- Waste
- Scrap
- Rework
- Returns

Service organizations also needed to identify the defects in their internal processes that could adversely affect costs, responsiveness, or customer satisfaction. Some organizations developed measures of quality shortfalls. These included:

- Long waiting times
- Inaccurate information
- Access denied or transaction not fulfilled
- Financial loss for customer
- Customer not treated as valued
- Ineffective communication

Front-line employees must receive signals on process quality, not only on the cost of performing their task or process. In effect, employees need indicators that they can control, such as defect rates and yields, in order to achieve the desired cost reductions. Reports about the last period's cost performance, alone, cannot be of much use to employees. Stage III systems should incorporate these quality signals in order to yield tangible process improvement and cost reduction results.

PROCESS TIME MEASUREMENT

Many customers greatly value short lead times (the time between when they place an order and the time when they receive the product or service). They also value reliable lead times (on-time delivery). Thus, reducing cycle times of internal process must be a critical internal process objective.

Choosing starting and ending points for measuring cycle time is determined by the scope of the operating process for which cycle time reductions are being sought. The broadest definition, corresponding to an order fulfillment cycle, could start the cycle with the receipt of a customer order and would stop when the customer has received the order. A narrower definition, aimed at improving the flow of material within a factory, could correspond to the time between when a batch is started into production and when it has been fully processed. Whatever definition is used, the Stage III system of an organization should continually measure cycle times and set targets for employees to reduce those cycle times.

CHAPTER FOUR

ABC EFFORTS IN THE PUBLIC SECTOR

In this chapter, we will examine case studies that illustrate the implementation of activity-based costing in the public sector. The case studies cover the City of Indianapolis, the General Services Administration (GSA), the Internal Revenue Service (IRS) Boston District, the US Post Office, and local government in Victoria (Australia).

IMPROVEMENT OPPORTUNITIES IN THE MANAGEMENT OF PUBLIC EXPENDITURE

ABC provides the opportunity for a number of specific improvements in the management of public expenditure (3, pp. 57-58):

- By providing a better basis for the treatment of capital. Resource accounting allocates the cost of providing capital over its useful life and gives the opportunity to charge directly for its use on this basis. As a result, resource accounting should improve the quality of decision-making on new capital investment and use of existing assets.
- By giving departments the opportunity to develop their data collection and management systems. These systems would give the departments better information on the real cost of the services they provide and the mix of resources required to meet their objectives.
- By allowing departments to know whether private contractors' bids are cost effective or not, and, in the same token, by allowing departments to better evaluate outsourcing (or privatization) of traditional public services.
- By offering the possibility of reduced borrowing through identifying and then disposing of under-utilized fixed assets and through better management of working capital.

The introduction of activity-based budgeting would mean that the process of planning public expenditure for government as a whole and for departments individually would be better informed for the following reasons:

- Pressure for spending at the end of the financial year would be reduced.
- Control of expenditure would be more soundly based, as managers would have more relevant information.
- The procedures for deciding on the level of capital would be improved.
- Organization and planning of the relationship between departments would be made more effective by aligning internal budgetary planning and control arrangements.
- Departments' focus on the services and other outputs which they deliver rather than the inputs which they consume would be increased.

CASE STUDY 1: THE CITY OF INDIANAPOLIS

In 1992, the City of Indianapolis employed around 5,600 people and had a budget of \$480 million. This budget was divided among six operating departments whose responsibility ranged from sewage treatment and trash collection to police and fire protection. The City's budget had grown at a 6% compounded annual rate since the mid-1980s. In every year since 1987, budgeted expenses had exceeded revenues by between \$8 and \$14 million dollars. The projected annual deficit when Mayor Stephen Goldsmith took office in November 1991 was \$20 million. However, not only was the City running in the red on an operating basis; it also had a \$1.75 billion gap in needed capital funds. These capital funds would finance the construction of a \$250 million downtown shopping mall, the opening of a new \$500 million United Airlines maintenance terminal at the airport, in addition to \$ 1 billion in badly needed infrastructure improvements (18, p. 1; 12, pp. 36-39 and 214-219).

Besides the financial challenges confronting the City, Mayor Goldsmith was unhappy with the way government conducted business (18, p. 2):

While the private sector attempts to improve services while reducing cost, the public sector generally spends more money each year while providing the same or lower quality service to the public. Traditional public management tools were clearly incapable of solving the problems our government faced. The staff organizations in the city were worthless; they impeded progress, and subtracted value. The multi-layered bureaucracy was out of control. Lots of unnecessary people were on the payroll because of the patronage process.

Although on many measures Indianapolis was a good deal better off than other cities, we shouldn't be benchmarking ourselves against a failing industry, government. This seemed to be a particularly curious way to approach improving the system.

Mayor Goldsmith argues that most private sector companies are more efficient, more customer-oriented, and more innovative than government because these companies are in competition and will go out of business if customers do not like the products and services they offer. Government, on the other hand, has a monopoly on the delivery of a wide range of services and control over vast assets. There are four ways in which government is exempted from market pressure or protects itself from competition (12, p.23-25):

1. GOVERNMENT CANNOT GO OUT OF BUSINESS

Government never faces the risk faced by every business that lets down its customers. In effect, every US citizen is a "captive" customer for government services – and a new customer is born every few seconds. Poorer Americans are more exposed as they heavily rely on such services as public schools and public transportation.

2. GOVERNMENT CONTROLS REVENUE AND CAN RAISE ITS PRICES EVEN WHEN ITS PRODUCTS ARE UNPOPULAR

If more money is needed to provide a given service, government will raise taxes to pay for it. While the private sector must persuade people of making purchases, government simply takes dollars.

3. GOVERNMENT CAN SPEND MORE THAN IT TAKES IN

While some states and cities are technically required by law to balance their budgets, most government entities, including the federal government, are not. Even governments that must balance their budgets avoid doing so by borrowing, deferring capital spending, and employing questionable bookkeeping devices.

4. GOVERNMENT DELIVERS “ESSENTIAL” SERVICES

Whenever elected officials exert pressure to reduce costs, status-quo managers can mount an effective defense by stressing the essential nature of their tasks. A call for budget cuts in a municipal department of public safety, for example, might be opposed by the argument that streets would be less safe. This strategy pleases citizens, who have neither the time nor the inclination to scrutinize budgets in order to check if savings are possible without cuts in service quality.

The aforementioned four characteristics of government monopolies explain why governments constantly grow and why they are not expected to perform very well. They also explain why, whatever the crisis is, the answer is almost never “cut the budget”.

As a response to the way government traditionally conducted business, Mayor Goldsmith established several guiding principles (18, p. 12):

- 1. People governed least are governed best.** Government should provide only those services people cannot obtain for themselves through the marketplace.

2. **Government should be a rudder, not an engine.** Government should be a facilitator rather than an administrator. It should identify needs that the marketplace cannot fulfill, then empower people and families to fulfill those needs. Government should create an atmosphere in which businesses can thrive, but it cannot replace the marketplace.
3. **People know better than government.** Every time government raises taxes, it makes a bold statement. It says to people, “We know how to spend your money better than you do”. In reality, maximizing the range of choices people have in the free market – by maximizing the amount of money they keep for themselves – is the best way to guarantee health, happiness, and security.
4. **Government should be measured the same way every other enterprise is measured: By its results.** Results are not measured in terms of programs funded or salaries paid, but rather in terms of neighborhoods protected and workers trained. If people aren’t getting a dollar’s worth of service for every dollar they pay in taxes, then government isn’t helping them out; it is ripping them off.

The mayor simply wanted to make the government smaller and more responsive, and to make its managers think about value – the cost and quality of services delivered to its customers, the citizens. Upon taking office in 1992, Mayor Goldsmith replaced many senior managers and requested that his new team install systems to measure the performance and efficiency of government “down to the unit”. The reason for this request was that managers only had the revenue and expense figures for the current and previous year’s budget. In addition, “nothing was broken down by activity and they had no performance-based measurements, so it was impossible to measure anything. Although we were anxious to get in and make change, we couldn’t manage without data” (18, p. 3). Consequently, the mayor requested that departments describe and measure the services they provided, in addition to the costs of providing these services. He also established a new office, Enterprise Development, to create competition for the provision of city-supplied services. The office’s role was to explore initiatives that would enhance the

competitiveness of the municipal departments, and to privatize services in case a private sector contractor could supply these services more efficiently (in terms of quality and cost).

THE DEPARTMENT OF TRANSPORTATION

A former management consultant, Mitch Roob, was appointed as the new head of the Department of Transportation. The department had an annual budget of \$50 million, most of which were allocated to two divisions: maintenance and construction. The new head of the transportation department described the lack of planning in the department as follows (18, p. 4):

Programs were not linked to dollars. Management had no idea about the value of the city infrastructure. There was no balance sheet, no capital plan, and no maintenance plans. The department simply did what they did the year before and requested a 10% higher budget. We went back through the archives and discovered that their current activities were descendants of priorities established in the mid-1970s. These were not necessarily bad plans, but they were no longer appropriate in the mid-1990s.

The head of the transportation department asked the senior managers of the department for a list of their current activities and their costs. But no one could provide answers as the department had no relevant data and no costing system. Managers had never focused on the nature of their activities, the cost of performing these activities, and the efficiency of performing these activities. Roob hired KPMG Peat Marwick, an accounting firm, to help him measure the costs of the activities performed by the Department of Transportation in a six-week pilot project. A team composed of Bridget Anderson, a Peat Marwick manager, Roob, and other DOT employees would implement the project.

THE POTHOLE REPAIR CONTRACT

The pilot project team chose to study the cost of filling potholes because this service was highly visible and important to the average citizen. Roob set a tight deadline for completing the study and announced publicly that pothole maintenance would be put out for open bid after the study had been completed. Thus, private sector bids would be solicited and the new cost system would serve as a basis for the City's bid for maintaining the job.

The team started by asking people about the cost of services they provided. Again, employees couldn't answer the questions. In fact, lots of data were available but they couldn't be traced to the cost of the activities that delivered the services. Bridget Anderson formed a project team that included representatives from the unionized work force and the non-unionized management team, in order to perform the costing study. Peat Marwick developed a training program that every member of the street maintenance division attended. The purpose of the program was for each employee to understand why activity-based costing was being used and how the cost estimates would be determined. Anderson described the involvement of the city union (18, p. 5):

The Mayor and Mitch Roob made it very clear that the union would have to be heavily involved in the process of costing the work activity. In essence, we would be working with the union to help them understand what it cost for them to do a certain job. Then, once they knew the cost, and made efforts to improve it, they would face a bid process. So, both the union and the private sector would have to believe ABC was legitimate because it would be the basis of the union's bid. The union's initial reaction to our presence, however, was very cautious, even hostile.

Anderson and her team adopted a five-phase approach to implement ABC (18, pp. 5-8).

PHASE 1:

The first phase focused on familiarizing the project team with department operations, personnel, and means of quantifying data. The most effective means of identifying activities and outputs, the foundation for the ABC model, are determined. The team interviewed the people in street maintenance to learn about what they did. The employees began by telling their interviewers they only did five or six major things, such as “fix a pothole, seal cracks on the street, or paint a curb”. After much discussion and some process mapping, the team helped the employees discover hundreds of activities that go into providing these services. Finally, the team managed to consolidate similar activities and came up with a list of 35 basic activities: the Activity Dictionary.

PHASE 2:

The second phase consisted of collecting relevant cost information and choosing appropriate cost drivers for the activities defined in Phase I. It also focused on determining the most effective means of measuring departmental outputs. Peat Marwick and the city team gathered data from the controller’s office, from the work management system (existing system that tracks the number of people going out on particular street repair projects and measures the number of hours they worked and the equipment they used), and from interviews to determine the cost of performing each of the activities. Most of the effort was spent estimating how people spent their time among the 35 identified activities, as the largest cost and resource in city government was people. The team discovered that the data in the work management system were not all inclusive and had input errors. As a result, the team performed some reconciliation procedures back to the payroll registers to try and make the information as credible as it could be.

The team also had to identify the indirect and support costs associated with the 35 primary activities. Support costs consisted of indirect labor, supplies, fixed assets (trucks and buildings), and the cost of services in city offices, such as human resources, payroll, legal, information systems, and controller. Much of the indirect cost assignments were

available from an indirect cost recovery plan performed for reimbursement on federal grants. All the direct and indirect cost data were entered into a PC using ABC software.

PHASE 3:

The third phase consisted of establishing resource cost pools on PC-based spreadsheets. Resource cost pools included activity personnel, direct materials, vehicles and equipment, fixed asset and facility cost, and administrative overhead. The team selected a cost driver, such as hours worked or pounds of material, for each of the 35 activities. The cost drivers would assign activity costs to the output of the activities. Initially, the team had difficulty defining outputs for some of the activities. For instance, potholes, unlike standard manufactured products, are all different. They don't have standard sizes and shapes. The team realized that attempting to find out what it costs to fill potholes would be answering the wrong question. They decided to measure the cost of putting a ton of asphalt in potholes. Thus, the "cost object" of the study was the fully loaded cost of filling potholes with a ton of asphalt.

PHASE 4:

Phase 4 consisted of developing an ABC model. First, resource costs were assigned to activities, and second, cost drivers were used to assign activity costs to departmental outputs. The team then reviewed the ABC cost reports and made refinements to the model and to the data after checking against the controller's records to assure that all costs were captured. Exhibits 6 and 7 show the total and unit costs for filling potholes in Indianapolis' five geographic sectors. The collection of costs for each of the five sectors allowed variations in terrain and work procedures in the five sectors to be reflected in the calculated cost of filling potholes.

The team decided to include the cost of all assets that the city owned. Although the city didn't calculate depreciation in its financial statements, the team determined that in order to have a true cost of providing services, they had to adjust out the current capital

purchases, and then add back the cost (depreciation) of having fixed assets, such as vehicles and equipment, and the maintenance and repair of these assets. Moreover, including depreciation would create a level playing field between the private sector and the DOT.

However, the team decided not to allocate the headquarters expenses to the costs of pothole filling. The argument for this non-allocation was that headquarters expenses would remain in the city, regardless of whether the city or a private contractor is awarded the contract. Finally, the ABC team decided to load the depreciation and maintenance costs of unused equipment into a line item, “unused equipment”, in the pothole filling cost calculation. The cost of unused equipment could reach up to 10% of total costs for some city services. In effect, city workers liked to have vehicles available “just in case”. They never considered the option of renting back-up equipment instead of maintaining the stand-by reserve capacity. They also never considered acquiring multiple-use equipment that could be shared among departments. The result was that each department had a lot of excess equipment in their fleets.

PHASE 5:

Phase 5 consisted of summarizing cost information and expanding departments’ capabilities to continue to use the ABC model. In this sense, training sessions were held to assist departmental personnel to learn how to use the ABC model on an ongoing basis.

RESULTS OF THE PILOT PROJECT

At the term of the six-week period allocated to the pilot project, the team came up with an average cost of \$445 per ton of asphalt placed in potholes. Prior to implementing ABC, employees and managers only thought about the number of hours that employees spent filling a pothole. They ignored unproductive time, excess equipment, real estate, inventory, and overhead. After the ABC implementation, it was possible to look at a specific pothole-filling team and see how many vehicles had been allocated to the team,

what their annual supplies budget was, and what their costs for rent and maintenance of both their facilities and vehicles were. In many cases, direct labor constituted only 20% of the fully loaded cost of filling potholes. Before the adoption of ABC, management might have estimated direct labor at 80-90% of the total cost.

At this stage, it became important to senior management and line employees to reduce or simply eliminate costs. For instance, they scrutinized the cost to maintain a vehicle, which was done in another division, because the inefficiencies in the equipment-maintenance group and their expensive oil changes were increasing the union employees' and DOT's cost of pothole filling. Moreover, management and the union studied the composition of the pothole-filling teams. They realized that it was possible to do the job with a three or four-man self-managed team, rather than with a six-man repair crew plus a supervisor. They also realized that the ratio of supervisors to employees was abnormally high (up 36 to 75), causing the overhead cost component to skyrocket. The city could not be competitive in pothole filling while paying salaries and benefits to a large number of managers. The state executive of the municipal workers' union commented on the previous point (18, p. 8):

The ABC really highlighted the amount of overhead, particularly managers, which existed on the city side. We urged city management to "get these guys off our backs". We're not going to loose bids because you're making us carry managers that don't help us fill potholes.

Roob responded by sacking half the supervisors, most of whom had been placed in these jobs by the local Republican Party. The firing of the supervisors made the union understand that city management was serious in its cost cutting campaign (it had sacked its own people), and most importantly, that the privatization option was not a hoax. As a result, the union examined every line item in the ABC report; it reconfigured its approach

to filling potholes by reducing manpower on each team, changing the type and amount of equipment used, and doing multiple tasks with the same resources.

In conclusion, it turned out that, by eliminating half the supervisors, changing the crew assignments for filling potholes, and gaining efficiencies in the use and assignment of trucks and other equipment, the team was able to realize significant cost reductions. The pothole-filling team was finally ready to submit two bids: one in the Northwest sector and one in the Northeast sector of the city. The union estimated the resources – both direct and indirect – they felt they would need in pothole-filling operations and submitted their estimates to Bridget Anderson for verification (see Exhibit 8). Anderson, who had been monitoring how the new work procedures were being implemented, concluded that the estimates were reasonable and consistent with current practice. Eventually, the union workers submitted a bid based on their revised cost estimates.

The private sector bids for pothole filling all turned out to be much higher than the union's bid, with some of the bids exceeding a thousand dollars per ton. In fact, most of the private sector contractors had bid for repaving the streets, not for filling the potholes. The private sector had no experience in filling potholes. Pothole filling failed Mayor Goldsmith's yellow pages test: "If you can't find the service in the yellow pages, you shouldn't try to privatize it". Nevertheless, the implementation of ABC and the bidding process forced the city first to understand its actual cost structure and second to work on reducing its costs in order to be competitive. Although the original Goldsmith administration's original mission had been privatization rather than competition, Roob decided to award the pothole-repair contract to the union because their proposal satisfied the contract specifications at the lowest cost. After the contract award, the city's focus shifted from privatization to competition.

OTHER ABC EFFORTS

After the pothole-filling pilot project, activity-based costing was applied to solid waste pickup in Indianapolis. Subsequent to the implementation, the workers managed to

increase their coverage from 750 to 1,200 homes per day, and to bring in 20% more trash each day with smaller crews. The city workers even started competing successfully for waste pickup in areas that had been previously by private sector waste management firms.

Another area of ABC implementation is sealing cracks on streets. At first, the city workers won the bid against the private sector (\$1,000 per lane mile against \$1,500). The private contractors are now bidding \$950 per lane mile, but the city workers are bidding lower (\$850 per lane mile) and still winning (19, pp. 2-3).

PERFORMANCE MEASUREMENT

Opening up city services to competitive bidding prompted city officials to adopt other complementary business strategies (23, pp. 41-46). Once they had the cost breakdowns, city management could measure employee performance more accurately. And if officials wanted performance to improve, employees needed more empowerment, incentive pay, and training.

Employee empowerment became even more important after a number of city workers were laid off or transferred to private sector bidders. The effect of competitive bidding can be seen in the headcount of employees who are not involved in public safety (that is, everybody except the police and firefighters), which dropped from around 2,400 in 1992 to around 1,300 in 1998. Approximately half of those laid off had managerial responsibilities. The number of supervisors is currently one for every 12 employees, which is in line with private sector standards. This number dropped from an average of one supervisor for every 3 employees in 1992. In addition, a number of city operations now have self-directed teams that determine their own labor, equipment, and materials and even assemble their own bids.

At the same time the city was empowering its employees, it was aggressively seeking high-quality professionals. Officials have interviewed several hundred MBA candidates over the past several years and have recruited from corporations such as Indianapolis-

based Eli Lilly, which was offering early retirement for hundreds of employees. Along with employee empowerment and recruiting, the city instituted a performance-based incentive system. It's estimated that up to half of the city's union employees are eligible for incentives. This constitutes a radical departure from the days when workers' only income gains came from wage increases won after tedious negotiations. In some cases, if employees fail to meet certain performance objectives, they are penalized. For instance, some nonunion workers may not receive annual wage increases if they don't meet agreed upon performance goals. And, in an unprecedented action among city union employees nationwide, Indianapolis garage workers gave up a previously negotiated pay rise in return for sharing incentives derived from meeting certain goals.

Incentive pay has helped both the city and the workers. In effect, taxpayers saved \$13 million in 1994 when the city's solid waste division submitted the winning bids in three municipal districts. The same contract paid off for employees as well: after the union workers identified an additional \$2.1 million in savings on those jobs, each worker was awarded an average of \$1,750 in incentive pay. The workers benefited from an informal program that encourages employees to suggest ways to improve city services or lower costs in return for 10% of any identified savings, up to \$3,000.

Besides making workers eligible for incentive pay, the city invested in training programs that would enable its workers to do their jobs better. In effect, Indianapolis spent \$3.46 million on training between 1994 and 1996. As a result, annual hourly training per employee increased by 40% during the same period. Training covers customer service improvement for employees, and performance evaluation, ABC costing, and customer service improvement for managers.

Finally, the city currently tracks 260 performance measures monthly, ranging from the number of days it takes to issue a zoning permit to whether a division is over or under budget. The performance measures, which were determined with input from employees, allow officials to obtain timely updates on activities and know which areas need improvement. Initially, the city concentrated on developing inputs, such as the number of

tons of asphalt used to fill potholes, but it is now working more on quantifying outcomes – whether the street is in fact smooth – in order to reflect the city’s quality and customer-service goals. A city official thus commented on the process of establishing the performance measurement system (23, p. 46):

You’d like a perfect performance measurement system to be in place before you even get started, but that would take years of study. We took some risks by picking measures and said, “Even if it’s wrong, we have something to work from”. Every six months we review whether we’re measuring the right thing, whether we actually care about that measure, whether the goal is high enough, and whether it’s congruent with other measures.

CASE STUDY 2: ABC IN FEDERAL AGENCIES

Over the last few years, the General Services Administration (GSA), like many other federal agencies, has seen both its budget and staff shrink (30% reduction since 1993). In the face of such downsizing pressure, top managers in the agency realized they had better come up with new and creative ways to do their jobs more efficiently. However, in seeking to do that, GSA discovered it didn’t actually know what it cost to provide any of its services on a transaction by transaction basis. In effect, GSA could gin up general figures about its annual budget and expenditures and produce loads of data on what it had accomplished in any given year, but it couldn’t break down its specific expenses of doing such things as lease space or buy property. “How much of these expenses was for personnel? How much was administrative overhead? How much could be allocated to travel or office equipment? How much was just redundant paper pushing?” were all questions GSA couldn’t answer. Therefore, the agency ignored whether it was (or could be) competitive with private sector real estate offices or whether it was providing real value to its immediate customer: the rest of the federal government.

In order to be able to obtain accurate information about its costs of providing services, GSA decided signed on to pilot several experiments in activity-based costing, along with a handful of federal agencies (28, p. 17-26).

ACCOUNTING SYSTEMS IN FEDERAL GOVERNMENT

Accounting systems in federal agencies such as GSA are adequate for tracking big numbers, like how much money was received, how much money was disbursed, and in what broad categories. What departments or programs know about cost includes personnel costs, rent, utilities, equipment, and materials. However, they fail to allocate these resources to activities such as processing a social security check.

In order to implement ABC, government must identify discrete outputs and then take labor (including fringe benefits), rent, equipment, materials, and administrative overhead expenses and apportion them to those outputs. Ellen Doree Rosen, who came up with an equation for doing ABC while a professor of public administration at the John Jay College of criminal justice in New York, established that most of the information needed to implement ABC was available in government records “right now”.

REASONS FOR ABC IMPLEMENTATION

There are two major reasons why managers of federal agencies are starting to consider ABC implementation. The first reason, which is the least common, is the ability to do detailed analyses, such as what the cost of handling and processing time cards contributes to the overall cost of a product. The second reason, which is by far the most common, is that managers are actually forced to consider ABC. In effect, with the passage of the 1990 Chief Financial Officers Act and the 1996 Federal Financial Management Improvement Act, agencies have to begin calculating, and where appropriate, recovering the real cost of services provided to customers inside and outside government. In addition, the 1993 Government Performance and Results Act (GPRA) requires agencies to identify core missions and develop performance measures that would allow them to

gauge progress on those missions. Obviously, without the cost breakdown generated by ABC, no performance measures can be developed nor tracked. Furthermore, ABC would be helpful in ensuring that the available resources are being maximized in achieving outcomes.

EXAMPLES OF ABC IMPLEMENTATION

The Immigration and Naturalization Service (INS) is using ABC to recalculate its fees for everything from administering citizenship exams to issuing green cards. The agency has identified more than three-dozen product lines for immigrants and prospective US citizens that need updated fees. Some cost drivers identified by INS include the cost of an FBI fingerprint check and what courts charge per head for swearing in new citizens. Besides coming up with fees that accurately reflect the true cost of service, ABC allows INS to estimate with much more confidence what fees it should charge for new services by using the existing cost breakdowns for similar or related services.

GSA implemented ABC with the support of its CFO, Dennis Fischer. The implementation started by launching a training program, which included a two-day workshop on activity-based costing for 1,000 mid-level managers and half-day workshops for members of the Senior Executive Service. After the training program had ended, GSA's real estate arm, the Property Acquisition and Realty Service (PARS), volunteered to start the implementation mainly because it was under the threat of privatization.

PARS started a full cost accounting of its various products and services, and has already identified ways to do its job cheaper, faster and smarter. For instance, GSA develops space requirements with clients jointly. Yet it still sends the final request back to its customer agency for final approval, and this is an obvious waste of resources.

IMPLEMENTATION PROBLEMS

Despite the growing number of cases illustrating the potential of ABC, it is still a hard sell in government. In effect, bureaucratic inertia, turf (or territory) protection, fear that the numbers will be used to justify cuts, and plain laziness are all obstacles to ABC implementation. Moreover, many people in government view ABC as a reemergence of such management trends as planning-programming budgeting systems, management by objectives, and total quality management, which have swept over the federal government with frequent unhappy effects.

CASE STUDY 3: THE EXAMINATIONS DIVISION OF THE INTERNAL REVENUE SERVICE, BOSTON DISTRICT.

The IRS employs 120,000 people for the purpose of collecting the nation's tax. Only 70 or so corporations on the Fortune 500 list post annual sales greater than the IRS's spending level of roughly seven billion dollars per year (11, pp. 39-52).

The lowest level of financial control at IRS is the regional (or second level). District managers, who report to Regional Commissioners, receive dollar budgets for only about 15% of their total cost. Payroll and benefits – the greatest cost – are managed only indirectly at district level through a budget of staff years. Divisions, the organizations that report to districts, receive even less financial input and are held responsible for only travel dollars and staff years. The lowest level organizations, branches and groups, receive no financial goals and are not held accountable for cost, although these organizations spend roughly five and one million dollars per year, respectively.

Lack of financial measurement, however, does not imply lack of measurement. In effect, the IRS uses extensive non-dollar denominated measurements for performance evaluation and management control. Tax return data is segmented by type of return and by filer's asset value or income level in order to generate many operating statistics. Formal annual management by objective goals are established for each manager using this operational

performance data. For instance, the Boston Examinations Division manager's goal for 1991 was to accomplish the following rates:

- 23 hours for TPI 034 returns
- 39 hours for TPI 037 returns
- 59 hours for Activity Code 213 returns
- 78 hours Activity Code 215 returns
- 126 hours for Activity Code 219 returns

THE BOSTON EXAMINATIONS DIVISION

The Boston Examinations Division employs 700 people. The majority of the 700 employees work in audit groups reporting to one of six audit branches. Each group – the lowest unit on the organizational chart – is typically staffed with 10 to 12 auditors, a secretary, and a manager. Branch 1 audits the 48 “large corporate” returns from companies headquartered in Massachusetts. Branch 2 is responsible for all “other” audit programs such as excise, employment, inheritance, and gift taxes. Branch 4 handles the “simple individual” examinations known as office audits since taxpayers must travel to the IRS office. Branches 3,5 and 6 split the remaining “general” examination programs of the state geographically. These audits review “corporate” and “complex individual” returns. The audits are done at field sites and include most Massachusetts-based corporations, partnerships, and sole proprietorships.

KEY COST AREAS

The Boston District has three key cost areas. Salary and benefits represent the largest cost line item and decisions concerning auditor staff levels, program assignment, and geographical disposition are key management responsibilities. Facilities are the second largest cost line item; high rent levels in the Massachusetts area imposes an efficient

utilization of facilities. Overhead support is the third key cost area, given that it amounts to around 40% of the direct costs of audits.

AUDITOR STAFFING ASSIGNMENT

A lengthy and complicated procedure – workload analysis – determines staffing decisions at the Boston Examinations Division (and the rest of IRS). The workload analysis starts by a negotiation with regional officials regarding the number of returns of each type to be examined. Workload is then spread geographically based on DIF (Discriminate Indicator Function) scores of returns previously processed at the service center. DIF evaluates the likelihood of noncompliance based on detailed audits from a national sampling known as the Taxpayer Compliance Measurement Program. To determine the geographic distribution of workload, the analysis simply notes zip codes on tax returns with highest DIF scores. Historical data for average time per case then converts workload to staff years. The mix of auditor capabilities required by location is calculated from rules and standards relating likely case complexity to auditor job grade. Thus, the Boston Examinations Division receives work goals that specify the number of returns of each type to be processed by a given date. In this sense, “nobody knows and nobody cares what the costs are”. Managers have moderate levels of cost responsibility and little authority for cost management. In addition, and most importantly, managers have little intuition concerning the cost structure of the examination process.

FACILITIES UTILIZATION

The General Services Administration (GSA) manages federal buildings and charges the IRS rent based on market rates whether the building is federally or leased. Staff levels and regulation determine facilities needs. GSA standards establish a 125 square foot limit to insure equity among federal employees. While technically a maximum, the regulation has become a de facto entitlement replacing a resource allocation management decision.

OVERHEAD SUPPORT LEVELS

The Boston Examination Division's support resources are divided among several specialized groups and three branch organizations: Planning and Special Programs, Quality Assurance, and Exam Support.

The Planning and Special Programs branch operates like a production control department. The Planning section physically distributes and monitors audit work. Classifiers travel to the processing center in Andover to build the audit backlog based on desired characteristics of grade level of work, type of return, and likelihood of assessment. The Planning section also maintains an inventory control system to track the flow of returns through the audit process. The Special Programs section coordinates special audit requests such as the Taxpayer Compliance Monitoring Program.

The Quality Assurance branch audits the auditors to determine if approved procedures were followed, the law was applied, and proper customer service was maintained. A statistical sampling plan suggests cases for review.

The Exam Support branch employs 70 people for data input on completed audits and back-end clerical work like computation of interest charges and taxpayer correspondence. Along with the other branches, the Exam Support branch provides some specialized services to other New England states.

Finally, it should be noted that staffing needs of the overhead area are based on historical staffing levels and are adjusted by recent overtime requirements.

NEED FOR ABC

Physical processing of workload at the Boston Examinations Division dominated resource deployment without regard to cost of benefit, and rules, regulations and restrictions almost eliminated management decision making in the division. The former was described by one of the managers:

Nobody worried about the costs. Somebody later would maybe add them up and try to figure out what happened but the operating people just worried about getting the job done.

The division simply needed to have cost information by responsibility, product, and location. ABC was the obvious choice to fulfill this need, given that it allows the accurate allocation of indirect overhead responsibility costs to audit programs, locations, and branch organizations. ABC implementation was done in three stages (11, pp. 45-47). Note that since the IRS possessed little cost data, responsibility costs had to be roughly estimated in some cases.

STAGE 1: COMPILATION OF COST ELEMENTS BY ACTIVITY

The District Financial Plan provided a starting point for this stage, since the Examinations Division had virtually no cost information. The plan included staff years by division, travel budget by division, and vehicle expense for the criminal investigations division. The plan also included District wide rent, data processing, telecommunications, training, transportation, printing, service, and supplies and equipment budgets. All budgets were treated as incurred annual cost and distributed to the five divisions on a staff year basis. The reason for adopting budget figures was that they were generally close approximations to actual cost given the lack of reprogramming authority and the incentives to spend authorized budgets completely.

Audit groups and support branches represented the organization entities selected as cost centers. Cost determination for these organizations began with an approximation of payroll based on annualized May data. Benefits cost was based on an average percentage of payroll. All other costs of the Examinations Division except rent were distributed to group or support branch on the basis of payroll cost. Analysis of the Facilities Detail Report calculated the Examinations Division's rent cost per site. When more than one cost center occupied a site, facilities cost was divided on the basis of staff level, which is

a close approximation of occupied space. Note that no attempt was made to determine depreciation expense because capital expenditures represented only 0.2% of total cost and the difference to depreciation is even smaller.

STAGE 2: TRACING RESPONSIBILITY COSTS TO PROGRAMS

The second stage of ABC implementation consisted of distributing costs of similar activities to products or programs on the basis of causal cost drivers. Two types of cost were considered: direct and indirect (or support). Since, the IRS's operational performance measurement systems track direct examination time by program, direct cost for groups that work on more than one audit program was distributed on the basis of reported direct examination time by program.

Indirect costs were distributed using a level of effort analysis for each support organization. The level of effort exercise required discussion with relevant support management to determine resource consumption by audit programs. Level of effort analyses were performed for the support branches and the computer audit, international, white-collar crime, engineering, industry specialist, and customer support groups. Process supporting costs such as district overhead and examinations management were allocated on the basis of all other cost.

STAGE 3: ASSOCIATING COSTS WITH LOCATIONS

The need for geographical cost and performance measurement required the addition of a third stage to the ABC implementation. In this stage, direct audit costs were easily distributed to post of duty (POD) since each audit group was physically associated with a location. Indirect or support costs were distributed to group/POD on the basis of reported direct examination time per group for each program.

IRS operational systems already provided revenue assessment data by group. A performance metric simulating a cost benefit relationship was created by dividing taxpayer assessments by audit cost. This return on investment (ROI) measure was

obtained at group level by dividing group revenue assessments by total group cost. Branch ROI was calculated by adding revenue for all groups in the branch and dividing by the sum of the groups' total costs. ROI for an office location resulted from similar addition of revenue from all groups at a location and division by total cost of the groups.

RESULTS OF ABC IMPLEMENTATION

The ABC pilot implementation induced change in four areas: cost awareness of managers, interfaces between organizations, validation of strategy, and evaluation of performance (11, pp. 48-49).

- **Cost awareness of managers.** Prior to the ABC implementation, managers had little awareness of cost. The Examinations Division's manager ignored that facilities, for instance, cost around three million dollars per year; he merely complied with the GSA rules and regulations limiting space per person. Awareness of cost information, due to the introduction of ABC, led managers to thinking about cost reduction. It also stimulated managers to make common sense, situation specific decisions that rules and regulations could not anticipate.
- **Interfaces between organizations.** Support groups and audit groups used to operate with little management interaction prior to the ABC implementation. Each had a different, work-related, non-financial measurement system unique to its function. The level of effort analysis created a forum for interaction by forcing support managers for the first time to think of the line audit organizations as their customers. Quantification of staff support cost provided line audit managers an opportunity to critically evaluate and influence the support practice.
- **Validation of strategy.** Cost data provided management a new tool for the validation of strategy by questioning, for the first time, the deployment of audit resources to certain offices that are performing badly. The cost data also introduced a number of other questions concerning resource distribution. For example, why certain locations

or audit programs consistently achieved higher ROI levels. If the difference doesn't turn out to be due to a variance in audit execution, then it might be that there is an intrinsic difference in compliance level that could be attributed to business cycle or demographic differences. When such situations exist, effectiveness might be enhanced by shifting audit resources to the locations where "business is better".

- **Evaluation of performance.** If variance in ROI results cannot be attributed to environmental differences in taxpayer compliance rate, then it might reveal differences in management and audit performance. Management attention would then be directed to the problem. However, the attractiveness of cost-based performance measurement did not appear equal for all levels of management. In effect, some managers saw little added value to their management information needs. Non-financial information appeared adequate for lower level management focused on a single task at a single location. They also recognized the hazard of providing a superior manager with an additional measurement of their relative performance. Dollar dominated measurement would appeal primarily to middle and top level management needing to compare and judge performance of diverse, multi-function, or multi-location operations.

Finally, although the ROI measurement might be criticized due to the abstract nature of the revenue assessment measurement (no revenue actually flows to the IRS and assessments alone do guarantee collections, as appeals can be filed), it provides a powerful synthesis of the IRS audit mission.

CASE STUDY 4: THE US POSTAL SERVICE

The US Postal Service is a unique federal entity in several respects. First, the USPS operates in a manner similar to many private sector companies. In effect, the USPS provides a variety of services, generates revenue from these services, and incurs costs and expenses as a result of its operations. Second, the USPS is open to private sector

competition, which includes companies like Federal Express, United Parcel Service, Mail Boxes Etc., and other similar companies. Few other governmental agencies or departments operate in a similar business environment.

Unlike USPS, the federal entity's competitors have long accepted credit cards as payment options for services provided. In addition, customers are continuously seeking convenience and value, while businesses are seeking increased sales and guaranteed payment. Given the competitive forces facing USPS and the rapid pace at which "cashless" technologies are becoming available, USPS management realized that it had to use innovative business methods to maintain and increase its market share against its competition and provide increased value to its customers, while ensuring cost effectiveness (6, pp. 28-36).

ABC IMPLEMENTATION

USPS hired Coopers & Lybrand (C&L) to perform an activity-based cost study of its key revenue collection processes and a market strategy study for a national credit card and debit card program. In order to obtain an understanding of the cash, check, and credit/debit card activities, C&L reviewed USPS data and procedure manuals, interviewed USPS headquarters staff, and conducted telephone surveys of front window supervisors and district office accounting personnel. Using an activity-based cost modeling approach, C&L defined the cash and check process in terms of the activities that link together to form the process. C&L also identified unit, batch, and product-sustaining activities; resources for each of the activities; and transaction volumes for each activity. Unit-level activities included the acceptance and processing of a payment by item. Batch-level activities included closeout at the end of the day, consolidation, and supervisory review. Product-sustaining activities included maintenance charges for bank accounts and deposit reconciliation (cash and checks) and terminal maintenance and training (credit and debit cards).

After building the cash and check cost models, C&L defined activity-based costs for the credit and debit cards in the same manner. C&L also conducted product pricing and profitability analyses of the credit/debit test program. From analyzing data from Phase I of the USPS credit card and debit card market plan (see below) and the organizational costs associated with serving USPS customers through its 28,728 post offices, 9,059 stations and branches, and 1,605 community postal units, C&L identified the following issues affecting costs, product pricing, competitiveness, and customer value:

- USPS provides a limited assortment of payment options relative to the competition. In effect, cash and check payments are predominant USPS payment options, while competitors provide credit/debit card payment options. In addition, most USPS transactions must occur at a post office.
- USPS generates a large volume of low-value cash transactions: the majority of transactions are \$20 or less, and transactions on a per-dollar basis are expensive to process.
- USPS' check receipts processing is costly. In effect, extra steps are required, additional bank charges are incurred, and \$3 - \$4 million are lost to bad checks.
- Policies and procedures are not consistent.
- Based on independent surveys, cash, check, and credit/debit card processes are not uniform.
- The ABC study revealed hidden and indirect costs for each of the payment activities.

C&L pointed out, based on the ABC data collected through the February/March 1994 time frame, that "total incremental costs for a national credit/debit card program are immaterial in relation to total USPS payment processing costs that exceed \$1 billion per year". The cost data also showed that the net benefit of accepting credit and debit cards would be negative through 1997. Projections showed that the net benefits of credit/debit card acceptance would be \$5.2 million, \$15.6 million, and \$28.8 million in 1998, 1999, and 2000, respectively.

In summarizing these findings in the *United States Postal Service Credit/Debit Card Strategy – Final Report*, C&L reported that “credit and debit card processing costs are relatively high at the moment due to the normal impact of process start-up, low initial volume, and high initial implementation costs. However, as volumes continue to grow, projected credit/debit card costs can become competitive with current cash and check processing costs”. C&L also reported that “credit and debit card processing costs for retail window transactions becomes cost effective once total card revenue exceeds 3 - 4% of total revenues from retail transactions. As card volume continues to displace cash and check transactions, card costs become even more advantageous”.

C&L RECOMMENDATION

Based on its analysis of the market test, a Gallup survey, and market trends, C&L recommended that the USPS use a three-phase strategy to implement a national policy of accepting both credit and debit cards: Phase I-Market (already completed), Phase II-Mobilize and Market, and Phase III-Modify (6, pp. 31-32).

The Mobilize and Market phase (phase II), which is a two-step phase, began with an aggressive mobilization effort to implement nationwide acceptance of credit and debit cards for selected USPS products and services at retail windows beginning with larger offices. The second step consisted of an aggressive marketing campaign designed to increase credit/debit card usage at USPS retail windows.

The Modify phase (phase III) covered implementing improved credit/debit card processing technology and procedures to increase the benefits and continue to reduce the costs of the national card program. C&L recommended installing online point-of-sale terminals and consolidating all card authorization and transaction processing. The national implementation would use standalone card verification terminals, and this phase would replace them with integrated equipment.

USPS BOARD APPROVAL AND ROLLOUT

In October 1994, the USPS' Board of Governors unanimously approved a proposal submitted by senior management at USPS (based on the C&L analysis and a decision analysis report prepared by USPS Finance), that credit/debit cards be accepted nationally at USPS retail windows. The proposal recommended an aggressive two-year implementation, at the end of which 33,000 post offices would be equipped with 50,000 card terminals and trained USPS personnel.

A contract for a credit card processor and a vendor to supply the 50,000 card terminals was competitively awarded to NationsBank, with NaBanco, a national card processor, as its subcontractor. The rollout began in April 1995.

RESULTS

From a customer service perspective, credit and debit card acceptance was a success, and even with an aggressive implementation schedule, it was difficult to satisfy demand. Increased demand caused the contract to be modified to cover the installation of 67,000 terminals nationwide. USPS benefits because it gets its funds the next day from card transactions at a very competitive discount rate. Moreover, the payment infrastructure created by card acceptance has helped USPS launch new products and market tests more quickly. The USPS is now the nation's largest debit card acceptor (6, p 35).

CASE STUDY 5: LOCAL GOVERNMENT IN VICTORIA, AUSTRALIA

Local government in Victoria, Australia is undergoing the most significant change in its 130-year history. Fundamental changes include accounting standard AAS 27, boundary restructuring, and compulsory competitive tendering (CCT). These changes have led to the introduction of activity-based costing in local government with the help of such accounting firms as KPMG and Price Waterhouse. As a result, ABC has become a major

tool for the elimination of inefficient service delivery by councils, although the elimination of products and services rarely occurs in government (14, pp. 28-36).

ACCOUNTING STANDARD AAS 27

This standard, introduced in 1992, was the first industry-specific standard adopted by the local government accounting profession in Australia. Prior to the adoption of AAS 27, Victorian municipal accounting followed an “extremely prescriptive” statutory regulation, which prescribed in full detail bookkeeping processes such as how an invoice for a home help account should be processed. It was however unsuitable for management reporting and for evaluating the overall financial position of the council. The essential features of this accounting type, which is basically a fund accounting lying halfway between cash and full accrual accounting, were:

- Current expenditure and revenue were brought to account in a revenue account on an accrual basis.
- Capital expenditures and loan repayments were also written off to this account.
- Capital revenues (loans) were treated as separate funds and not brought into the revenue account.
- No depreciation was charged (it was not necessary because capital assets were fully written off in the revenue account in the year of acquisition).
- Two balance sheets were prepared: a current balance sheet that reconciled to the revenue account, and a capital balance sheet to indicate the realizable assets and long-term debt. Infrastructure assets were not recorded.

The revenue account essentially generated a funding statement that was appropriate to determine rate revenue requirements. It was of little value for management purposes.

The major change introduced by AAS 27 was that full accrual accounting was adopted.

This meant:

- Producing an operating account based on full commercial accounting principles and including depreciation charges. This was effectively a profit and loss statement, which specified the net change in resources controlled by the entity as a result of its operations.
- All assets and liabilities being brought to account in one balance sheet. Infrastructure assets were brought to account for the first time because they had a future economic value.

Ratepayers were now able to use the operating account to find out whether their equity is increasing or decreasing, and whether, over a period, the capital works program is significantly less than the level of depreciation charged. This could indicate whether the council is facing a funding “time bomb” with a major capital projects program required to catch up.

For management costing purposes, the major change was that services were, for the first time, being charged an overhead or indirect cost: depreciation. Line managers started to realize that their service costs were not just the costs of direct items such as wages, materials and equipment.

COMPULSORY COMPETITIVE TENDERING

The Australian government legislated that works and services with a dollar value equal to 50% of the value of a council’s operating budget must be subject to a competitive tendering process, that is, a public tender process. So far as ABC is concerned, the important thing is that in-house bids are acceptable. The staff group currently providing a service is able to bid against private contractors for the service at hand. In-house bids must, however, be fully costed so that they include all costs comparable to those incurred by a private bidder. In addition, the tendering section must be separated from the evaluators in order to insure fair and objective evaluation. Thus, with CCT, city councils have to compare themselves with the best practice in the private sector. It is no longer

sufficient to outperform other city councils: benchmarking has been taken to a higher level.

REVIEW OF CURRENT COSTING PRACTICES

In local government, overhead costs generally include:

- Corporate service costs such as human resources, finance, information technology, city hall operation, and overall city management.
- Departmental support and management costs, which are the costs of operating a division of the council that may be responsible for providing several services. For instance, the salary of a director, technical services responsible for garbage collection, parks and gardens, and road maintenance or the cost of operating a depot from which these activities are provided.

The traditional costing approach consisted of allocating corporate services to the section directly responsible for the service. Thus, corporate costs were allocated to the information technology budget, and payroll and accounting costs were allocated to the finance budget. These corporate overheads were sometimes allocated on a very arbitrary and ad hoc basis. For instance, finance department costs might be allocated to external service areas on the basis of gross expenditure of the service, or the number of staff employed in service delivery, or the number of ledger accounts required by the section. Obviously, these overhead allocations had no support among line managers as they might arbitrarily increase their costs and reflect adversely on their performance.

Since the CCT legislation required that any in-house bid had to be fully costed so that it would be properly comparable to private sector bids, it was necessary to arrive at a basis for allocating all costs on an accurate basis to every service area. ABC represented this basis.

APPLICATION OF ABC FOR OVERHEAD ALLOCATION

The ABC implementation for overhead allocation in local government involved the following steps:

- Review of the management structure of the council.
- Adoption of a conceptual basis for the allocation of costs to activities. A conceptual plan was prepared to show 'macro' areas of a council's expenditure.
- Identification of activities and first-stage cost drivers.
- Identification of second-stage cost drivers, that is, causal relationships and levels of usage. Application of the second-stage cost drivers to individual services.
- Allocation of divisional support costs to individual services provided in the division. The cost of administration within each division (i.e., the cost of the relevant direct and his managerial and secretarial support) could be easily allocated down to the individual service are. It can probably be allocated on a time basis for the director and managers.

AVOIDABLE AND NON-VALUE ADDING COSTS

One of the valuable uses of ABC is the elimination of waste. Avoidable and non-value adding costs are examples of waste. Eliminating these costs can be done using the ABC approach by identifying the high-cost activities carried out by sections of an organization (local government in this case) and then determining which are necessary and which are not. Price Waterhouse analyzed the corporate services section of one large Melbourne council and established that the major reason for the higher cost levels in local government was the excessive number of checking processes and controls. The Price Waterhouse analysis showed that the top five activities (in terms of cost) performed in the corporate service section were mail management, insurance management, data maintenance, meeting statutory requirements, and general administration. These activities amounted to 45% of the division's total expenditure. Analysis of the purchasing function

indicated that there was very significant non-value adding activity in the accounting department. For instance, the following functions were identified for the purchasing section: purchase requisition, classification of expense or asset, preparation of staff list, keying of order to system, checking of order, signatures and references, identification and follow-up on problem requisitions, and issue to supplier. In the process, only the first and last functions were considered as adding value. The remaining functions were considered as non-value adding. Moreover, a complete analysis of mail management showed that 32 percent of the section's costs were wasteful, and a complete analysis of the administration section of corporate services indicated that 72 percent of the costs were non-value adding.

CONCLUSIONS

The major reforms in local government in Victoria, Australia, especially compulsory competitive tendering, have greatly accelerated the rate of understanding and acceptance of ABC concepts. The use of ABC is appropriate in local government because there is a significant number of services or products being provided using the same organizational support, administration, and overhead. This is a very similar situation to many multi-product manufacturers in the private sector, where ABC is extensively applied. ABC allows a better allocation of overhead costs to products and services and the identification of non-value added activities.

CHAPTER FIVE

CONCLUSIONS

Governmental cost systems can be classified as Stage II cost systems for the following reasons:

- They meet financial reporting requirements
- They collect costs by responsibility centers rather than by activities and business processes
- They report highly distorted product costs
- They provide feedback to managers that is too late and too financial.

In addition, these cost systems focus on operating sections of a government, and therefore present a hierarchical or departmentalized view of government. They fail to capture the chains and relationships that occur among governmental departments.

Stage II cost systems prevent governmental departments from knowing the accurate costs of their activities, and consequently, of the products and services they supply to taxpayers, mainly because of an arbitrary allocation of overhead and indirect resources to these products and services. The ignorance of incurred costs by activity prevents governments from tracking inefficient activities – and products and services – and outsource them, in case the private sector offers more economical alternatives. Moreover, the same ignorance prevents governments from developing performance measures to benchmark their performances with those of the most efficient service providers around, since performance measures based on distorted and inaccurate costs can only be as distorted.

Therefore, it is imperative for governmental cost systems to move to a higher level of costing: Stage III cost systems. These are characterized by:

- A traditional, but well-functioning financial system that performs basic accounting and transactions-capturing functions, and prepares monthly or quarterly financial

statements for external users, using conventional methods for allocating periodic production costs to cost-of-goods sold and inventory accounts.

- One or more activity-based cost systems that take data from the “official” financial system, as well as from other information and operating systems, to measure accurately the costs of activities, processes, products, services, customers, and organizational units.
- Operational feedback systems that provide operators and all front-line employees with timely, accurate information, both financial and nonfinancial, on the efficiency, quality, and cycle times of business processes.

Governments already possess the first component of a stage III cost system, which is the system that performs external financial reporting. Thus, an activity-based cost system and an operational feedback system should be implemented in order to achieve the shift to the third stage of cost systems development.

Activity-based costing (or ABC) was originally adopted to assist multi-product manufacturers to establish more accurate costs of producing individual products. Inaccurate knowledge of the overhead and indirect resources used by each product manufactured resulted in inaccurate costing and bad decisions as to which products should be produced. ABC focused on the allocation of the costs of these overhead resources, which had traditionally been on a very arbitrary and ad hoc basis. This was understandable when overhead costs represented a minor portion of total costs. However, as overhead and indirect costs rose in recent years due to such activities as product development, product testing, quality control, and marketing, and came to exceed by far the direct costs of some products, it was important to review the overhead allocation bases. ABC argues that activities consume resources to generate products and services. In this context, overhead services provided should be costed as ‘user charges’ to the consuming service area. They should be allocated on the basis of demand for such services. The main task with ABC is to identify for overhead or indirect costs the relevant

activities that consume the costs (generally called first stage cost drivers) and the basis for allocating the costs of these activities to the various products and services (the second stage cost drivers). ABC is generally implemented in four distinct steps. These four steps are:

- Developing the activity dictionary.
- Determining how much the organization is spending on each of its activities.
- Identifying the organization's products, services, and customers.
- Selecting activity cost drivers that link activity costs to the organization's products, services, and customers.

ABC is extremely useful in situations where there are large and growing expenses in indirect and support costs and in situations where there is a large variety in products, customers, or processes. Since government is characterized by a significant number of services or products being provided using the same organizational support, administration, and overheads, the use of ABC is appropriate. After its implementation, ABC will give a horizontal (as opposed to vertical or functional) view of government and will establish the chains and relationships that occur across the governmental organization.

As previously stated, Stage III operational feedback systems should provide operators and front-line employees with timely and accurate information, both financial and nonfinancial, on the efficiency, quality, and cycle times of business processes they control. Front-line should be empowered by eliminating the traditional top-down approach, whereby standard setting was the task of managers and employees who were remote from day-to-day operations. Continual process improvement can be achieved by using standards based on most recent efficient actual performance. And this updated standard should be improved upon by actual results in the current period, not just met. Another approach would be to use benchmarking to identify best practices for critical internal processes. Benchmarking involves studying comparable internal processes of the

best organizations not only in one's own industry, but also in any industry using the same process.

Government, whether at the local or federal level, has attempted to implement activity-based costing in order to know the exact costs of its activities (and thus products and services), to increase the efficiency of its existing processes, and to eliminate inefficient processes that can be more economically provided by the private sector. Five case studies were described, which covered ABC efforts in the City of Indianapolis, federal agencies such as the General Services Administration and the IRS, the USPS, and local government in Victoria, Australia. A common feature in these efforts was that government was striving to know, for the first time in its history, the true cost of its activities. Traditional costing systems were inadequate for this purpose, as they were focused on external financial reporting and their only goal was therefore to prevent managers from stealing money, without actually insuring that taxpayers' dollars were optimally spent. Another common feature in the governmental ABC efforts was that the information and data needed to develop the ABC systems were usually available within governmental departments, but had to be gathered and refined. A third feature was that public employees were sometimes forced by their management to compete against private sector bidders on a given service they used to provide. Fear of losing their jobs forced the employees to fully cooperate in the ABC effort. A final feature is the lack of focus on operational feedback systems (with the exception of the City of Indianapolis that developed a score of performance measures). The reason might be that most of the ABC efforts described were still at their early stages.

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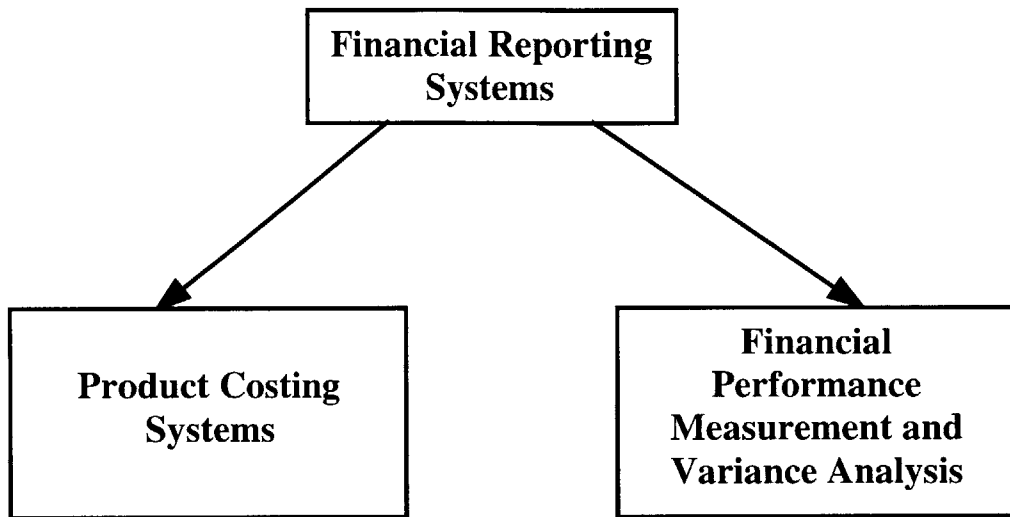
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EXHIBIT ONE

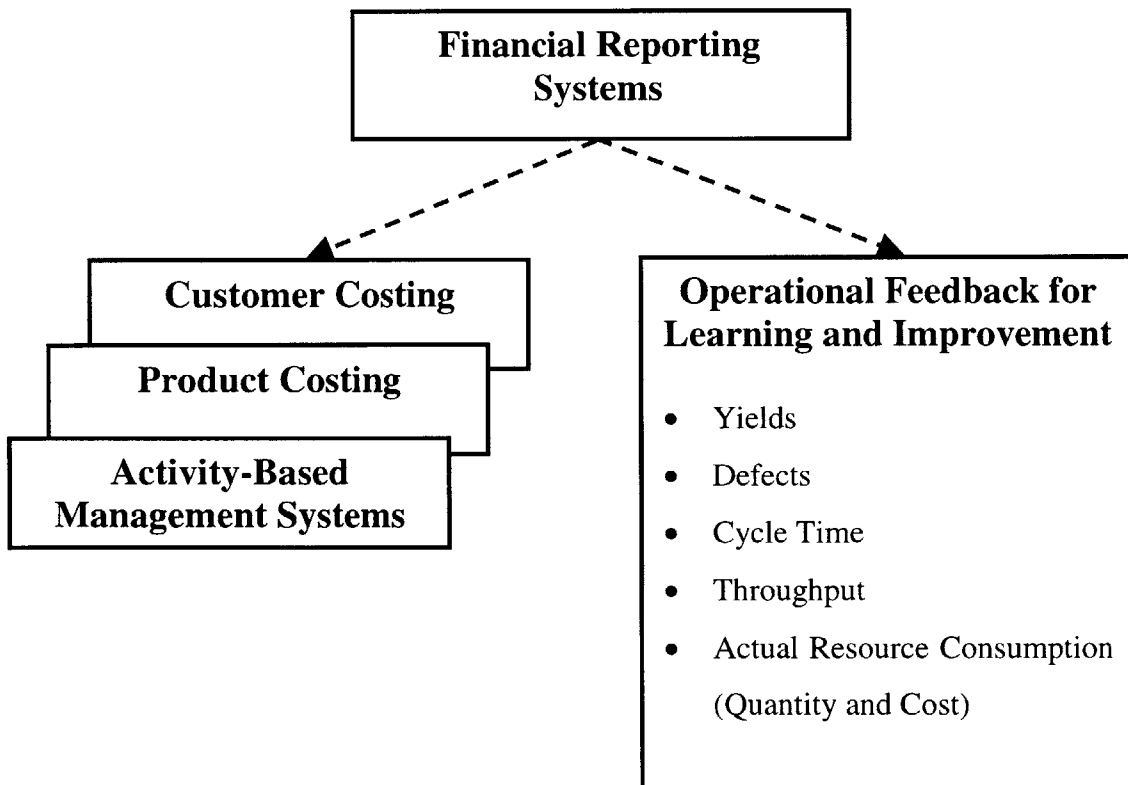
	Stage I Systems	Stage II Systems	Stage III Systems	Stage IV Systems
Systems Aspects	<i>Broken</i>	<i>Financial Reporting-Driven</i>	<i>Specialized</i>	<i>Integrated</i>
Data Quality	Many errors Large variances	No surprises Meets audit standards	Shared databases Stand-alone systems Informal linkages	Fully linked databases and systems
External Financial Reporting	Inadequate	Tailored to financial reporting needs	Stage II system maintained	Financial reporting systems
Product/ Customer Cost	Inadequate	Inaccurate Hidden costs and profits	Several stand-alone ABC systems	Integrated ABM Systems
Operational and Strategic Control	Inadequate	Limited feedback Delayed feedback	Several stand-alone performance measurement systems	Operational and strategic performance measurement systems

Four-stage cost model of cost system design (Source: 17, p. 12)

EXHIBIT TWO

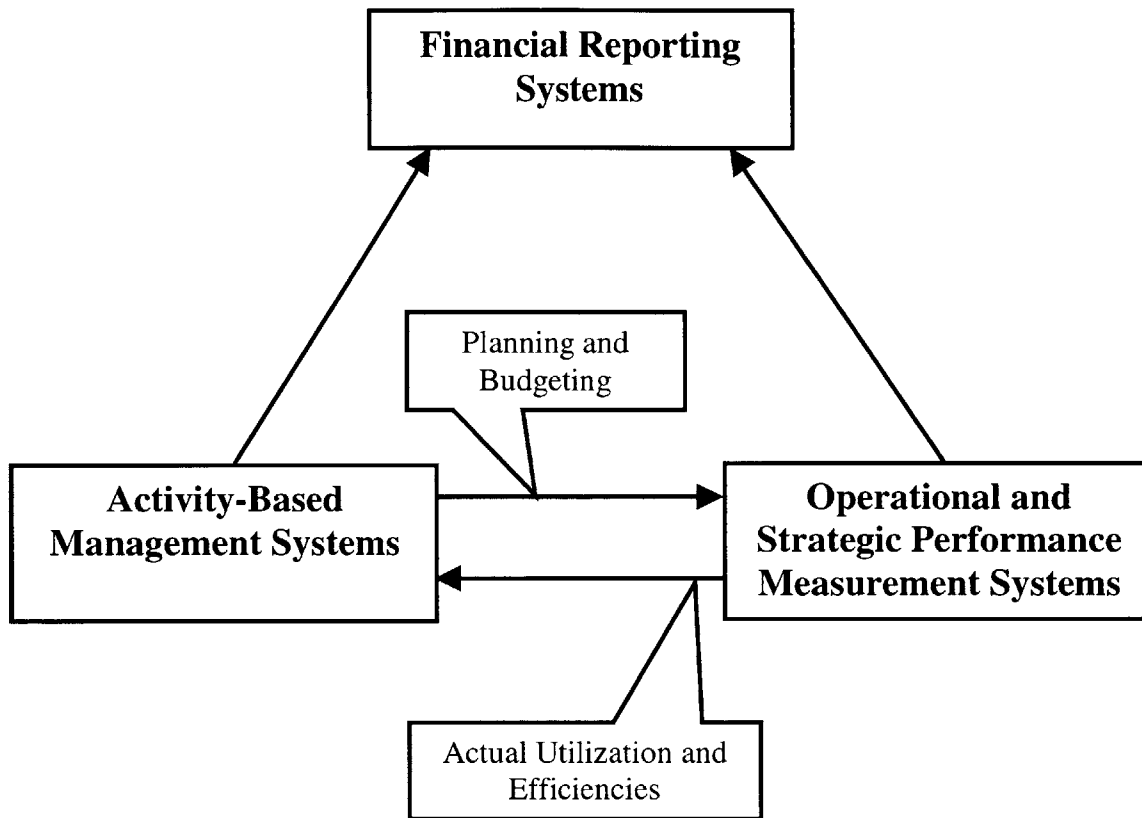


Stage II: Cost systems driven from financial reporting requirements (Source: 17, p. 14).



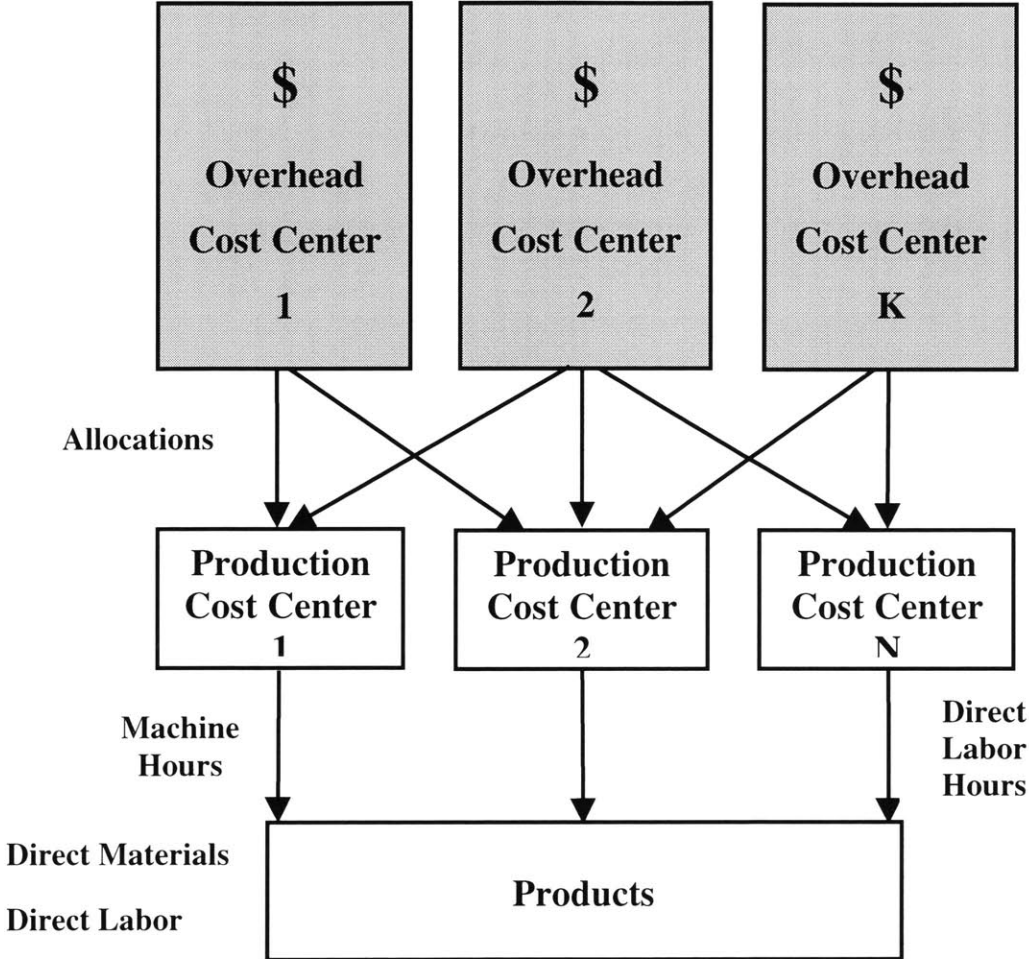
Stage III: Specialized, customized managerial systems (Source: 17, p. 20).

EXHIBIT THREE



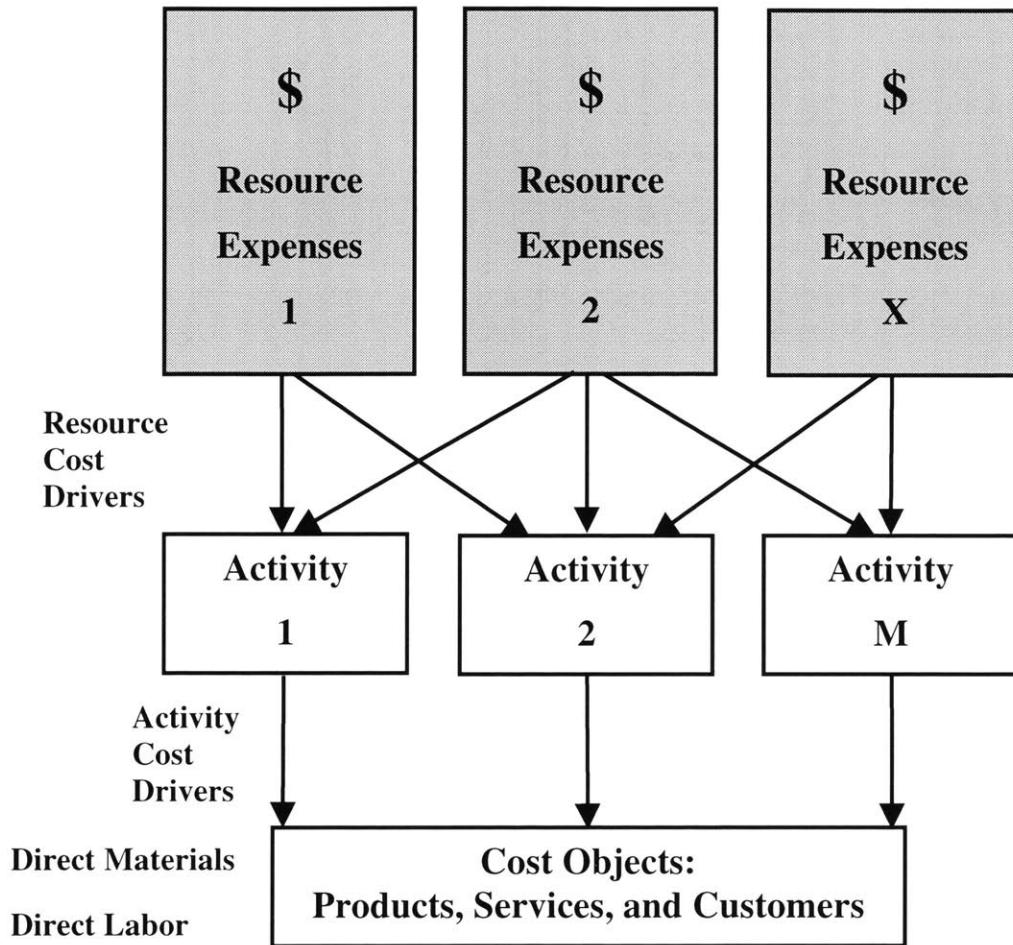
Stage IV: Tomorrow (Source: 17, p. 23).

EXHIBIT FOUR



Traditional cost systems allocate overhead costs to production cost centers and then to products (Source: 17 p. 83).

EXHIBIT FIVE



Activity-Based Cost Systems trace resource expenses to activities and use activity cost drivers for tracing activity costs to objects (Source: 17, p. 84).

EXHIBIT SIX

Activity	Northwest	Northeast	Center	Southwest	Southeast	Total
C Labor (laborers)	27,455	27,927	83,482	41,954	25,162	205,980
C Labor Overtime	462	2,658	1,558	1,210	908	6,797
D Labor (truck drivers)	175,608	181,869	354,628	188,468	163,748	1,064,322
D Labor Overtime	5,225	10,183	16,133	6,192	6,057	43,790
E Labor (equipment oprs.)	43,604	90,373	27,038	20,089	35,844	216,949
E Labor Overtime	2,693	6,162	1,067	7,201	3,579	20,702
Supervisors	41,893	47,085	60,008	55,790	38,267	243,044
Transp. Supervisors	47,997	89,372	33,440	18,798	43,855	233,463
Personnel Costs	\$344,939	\$455,629	\$577,354	\$339,703	\$317,421	\$2,035,046
Binder		432			83	514
Cold Mix	6,185	7,266	3,265	4,659	5,589	26,964
Hot Mix	14,901	21,644	51,301	23,175	56,987	168,009
Special Mix	11,028	11,271	7,320	21,864	17,289	68,772
Tack	2,578	1,070	1,601	484	3	5,735
Direct Materials Costs	\$34,692	\$41,683	\$63,487	\$50,183	\$79,950	\$269,994
Central Admin. Expense	99,774	134,680	160,199	89,172	91,152	574,977
Central Operations	38,206	51,573	94,792	52,765	34,908	272,244
Central Maintenance	34,588	46,688	55,548	28,480	31,604	196,908
Facility Expense	14,554	42,218	29,129	8,007	12,278	106,187
Fixed Assets	1,098	828	1,536	1,029	936	5,428
Maintenance Admin.	17,375	23,456	27,891	14,280	15,885	98,888
Operations Admin.	18,172	24,544	29,193	14,946	16,601	103,456
Overhead Costs	\$223,767	\$323,987	\$398,290	\$208,679	\$203,364	\$1,358,087
Cargo Van				3,086		3,086
Crew Cab		11,167				11,167
Crew: Cab Pick Up 86	12,369			11,699	14,150	38,218
Grader		2,727		4,236		6,963
Hotbox	16,276	4,954	11,396	13,272	18,335	64,233
Loader	1,457	8,958	1,024	1,271	358	13,067
Paver		207				207
Pick Up Mini	1,815	11,478		4,014		17,307
Roller		69				69
Roller VIB: 2 ton.	104			2,541	330	2,976
SAD	40,090	35,607	25,203	41,853	45,535	188,287
SADA	9,005	20,833	19,953	12,243	9,333	7,1367
Sedan		6,990				6,990
Tack Wagon		777				777
TAD	5,607	1,225	7,213	95	1,432	15,571
TADA	29,397	38,542	18,971	37,940	16,738	141,588
Trailer			5,314			5,314
Truck: 1 Ton Dump	4,647	11,909	11,054	13,716	10,847	52,173
Truck: Patch 91	11,514		3,713			15,227
Unused Equipment	3,769	6,127		7,402	20,537	37,836
Rolling Stock Costs	\$136,050	\$161,571	\$103,840	\$153,367	\$137,595	\$692,423
Total Cost	\$739,447	\$982,871	\$1,142,971	\$751,932	\$738,330	\$4,355,549
Tons Filled	1,156	1,726	2,134	2,017	2,753	9,786
Cost per ton	\$639.66	\$569.45	\$535.60	\$372.80	\$268.19	\$445.08

Pothole filling costs: 5 districts, 1992 Actual (Jan. – March) (Source: 18, p. 14)

EXHIBIT SEVEN

<u>Activity</u>	<u>Northwest</u>	<u>Northeast</u>	<u>Center</u>	<u>Southwest</u>	<u>Southeast</u>
C Labor (laborers)	23.75	16.18	39.12	20.80	9.14
C Labor Overtime	0.40	1.54	0.73	0.60	0.33
D Labor (truck drivers)	151.91	105.37	166.18	93.44	59.48
D Labor Overtime	4.52	5.90	7.56	3.07	2.20
E Labor (equipment oprs.)	37.72	52.36	12.67	9.96	13.02
E Labor Overtime	2.33	3.57	0.50	3.57	1.30
Supervisors	36.24	27.28	28.12	27.66	13.90
Transp. Supervisors	<u>41.52</u>	<u>51.78</u>	<u>15.67</u>	<u>9.32</u>	<u>15.93</u>
Personnel Costs	\$298.39	\$263.98	\$270.55	\$168.42	\$115.30
Binder		0.25			0.03
Cold Mix	5.35	4.21	1.53	2.31	2.03
Hot Mix	12.89	12.54	24.04	11.49	20.7
Special Mix	9.54	6.53	3.43	10.84	6.28
Tack	<u>2.23</u>	<u>0.62</u>	<u>0.75</u>	<u>0.24</u>	<u>0.00</u>
Direct Materials Costs	\$30.01	\$24.15	\$29.75	\$24.88	\$29.04
Central Admin. Expense	86.31	78.03	75.07	44.21	33.11
Central Operations	33.05	29.88	44.42	26.16	12.68
Central Maintenance	29.92	27.05	26.03	14.12	11.48
Facility Expense	12.59	24.46	13.65	3.97	4.46
Fixed Assets	0.95	0.48	0.72	0.51	0.34
Maintenance Admin.	15.03	13.59	13.07	7.08	5.77
Operations Admin.	<u>15.72</u>	<u>14.22</u>	<u>13.68</u>	<u>7.41</u>	<u>6.03</u>
Overhead Costs	\$193.57	\$187.71	\$186.64	\$103.46	\$73.87
Cargo Van				1.53	
Crew Cab		6.47			
Crew: Cab Pick Up 86	10.7			5.80	5.14
Grader		1.58		2.10	
Hotbox	14.08	2.87	5.34	6.58	6.66
Loader	1.26	5.19	0.48	0.63	0.13
Paver		0.12			
Pick Up Mini	1.57	6.65		1.99	
Roller		0.04			
Roller VIB: 2 ton	0.09			1.26	0.12
SAD	34.68	20.63	11.81	20.75	16.54
SADA	7.79	12.07	9.35	6.07	3.39
Sedan		4.05			
Tack Wagon		0.45			
TAD	4.85	0.71	3.38	0.05	0.52
TADA	25.43	22.33	8.89	18.81	6.08
Trailer			2.49		
Truck: 1 Ton Dump	4.02	6.90	5.18	6.80	3.94
Truck: Patch 91	9.96		1.74		
Unused Equipment	<u>3.26</u>	<u>3.55</u>		<u>3.67</u>	<u>7.46</u>
Rolling Stock Costs	\$117.69	\$93.61	\$48.66	\$76.04	\$49.98
TOTAL Cost per ton	\$639.66	\$569.45	\$535.60	\$372.80	\$268.19

Pothole filling costs per ton: 5 districts, 1992 Actual (Jan. – March) (Source: 18, p. 15).

EXHIBIT EIGHT

	Northwest		Northeast	
	Quantity	Rate ¹	Quantity	Rate ¹
Personnel Cost Pool				
C Labor (laborers)	2.60 hours/ton	\$23.25/hour	2.60 hours/ton	\$11.18/hour
D Labor (vehicle drivers)	2.60 hours/ton	20.00/hour	2.60 hours/ton	23.08/hour
E Labor (eqpmt. operators)	0.35 hours/ton	44.49/hour	1.15 hours/ton	28.01/hour
Materials Cost Pool				
Hotmix for potholes	1 ton	\$22.00/ton	1 ton	\$22.00/ton
Tack	2.5 gallons/ton	1.54/gallon	2.5 gallons/ton	1.54/gallon
Vehicle Cost Pool				
Crew Cab	1 hour/ton	\$8.65/hour	1 hour/ton	\$8.60/hour
Hotbox	1 hour/ton	17.65/hour	1 hour/ton	11.26/hour
One Ton Truck	.6 hours/ton	15.20/hour	.6 hours/ton	18.22/hour
Arrowboard	1 hour/ton	2.00/hour	1 hour/ton	2.00/hour
Indirect Cost Pool	5.55 hours/ton	\$17.06/hour	6.35 hours/ton	\$19.56/hour

¹ Labor rates based on projections from union contract
 Material rates based on actual contractor price quotes

Union estimates of resources required for two pothole-filling contracts (Source: 18, p. 16).